“When I stand before God, at the end of my life, I would hope that I would have not a single bit of talent left and would say, I used everything you gave me.”

– Erma Bombeck
### Theme: OBESITY

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Obesity is a state of excess adipose tissue mass. Although often viewed as equivalent to increased body weight, this need not be the case. Lean but very muscular individuals may be overweight by numerical standards without having increase adiposity. Body weights are distributed continuously in populations, so that choice of a medically meaningful distinction between lean and obese is somewhat arbitrary. Obesity is therefore defined by assessing its linkage to morbidity or mortality.

In a world where food supplies are intermitted, the ability to store energy in excess of what is required for immediate use essential for survival. Fat cells, residing within widely distributed adipose tissue depots, are adapted to store excess energy efficiently as triglyceride and, when needed, to release stored energy as free fatty acids for use at other sites. This physiologic system, orchestrated through endocrine and neural pathways, permits humans to survive starvation for as long as several months. However, in the presence of nutritional abundance and a sedentary lifestyle, and influenced importantly by genetic endowment, this system increases adipose energy store and produces adverse health consequences.

Globally prevalence of overweight and obesity as per Lancet’s May 14 report, the proportion of adults with a body-mass index (BMI) of 25 kg/m² or greater increased between 1980 and 2013 from 28·8% to 36·9% in men and 29·8% to 38·0% in women. The prevalence of overweight and obesity has also increased in children and adolescents in developed countries, 23·8% for boys and 22·6% for girls. The prevalence of overweight and obesity has increased in...
children and adolescents in developing countries, 8.1% to 12.9% in Boys and 8.4% to 13.4% in Girls.

India ranks third in number of obese people worldwide and prevalence of overweight and obesity has increased in Indians from 16% in 2007 to 20.7% in 2014 for women and 12% in 2007 to 19.5% in 2014 for men. However, it is estimated that by application of the Asian guidelines (Overweight: 23.0-24.9 kg/m², Obesity: >25 kg/m²) additional 10-15% of Indian population would be labeled as overweight/obese. Almost 30-65% of adult urban Indians are either overweight or obese or have abdominal obesity. In 2010, overweight and obesity were estimated to cause 3.4 million deaths and 3.9% of years of life lost worldwide.

More than 66% of U.S. adults are categorized as overweight or obese, and the prevalence of obesity is increasing rapidly in most of the industrialized world. Children and adolescents also are becoming more obese, indicating that the current trends will accelerate over time. Obesity is associated with an increased risk of multiple health problems—Types 2 Diabetes, Hypertension, CAD, Dyslipidemia sleep apnea, nonalcoholic fatty liver disease, degenerative joint disease, and some malignancies. At present obesity has been identified as a disease not a lifestyle disorder and it is important for physicians to identify, evaluate, and treat patients for obesity and associated comorbid conditions.
Dietary Recommendation for Prevention of Obesity

Lifestyle management is highly discussed when the topic of prevention of obesity arises. Foods steeped in saturated fats, calories, carbohydrates, sweeteners should be kept at bay. Health of an individual should be cared of, right from infancy. Breastfeeding is promoted at time of birth since it is nutritious for the infants.

Food consisting of low fat, moderate carbohydrate low calorie diet should be preferred. Calorie limit prescribed as per weight of the person by the National Institute of Nutrition (India) guidelines permit 30 Kcal/kg for a normal healthy person, 20 kcal/kg for overweight individuals and 40 Kcal/kg for underweights.

Foods high in saturated fat (meats, bacon, sausage), fried foods, cookies, icecream should be avoided. Also included are high calories beverage i.e. sugar sweetened beverages such as regular soft drinks, fruit drinks, sweet tea, sweetened coffee drinks and alcoholic beverages. High calorie and low nutrient foods like sweets and junk foods like burgers, French fries etc., are never to be taken by obese people.

In the food planning 100% whole wheat or whole grain with at least 3 gram of dietary fibres per serving is included. Fat free, low fat milk and milk products are generally prescribed. If lactose intolerant then fat free/lactose free milk or fat free plain soy milk is to be chosen. Low fat, high fibre and low sodium foods should actually become a part of daily consumption. There should be no more than 5 gms of fat per serving. 5 gms of fibre or more per serving is recommended. Sodium consumption should be limited to 300 mg per serving.

Fast food and eating other than home cooked meals should be a rarity. While eating outside choose grilled or baked fish or steamed veggies without butter, salads with low fat dressing. While eating, use smaller plates and measure optimum amount of serving. A need for schedule food consumption by small yet regular meals at least five times a day arises that generally involves breakfast, brunch, lunch, snacks and dinner. Avoid excessive eating at one time. Family meals are to be promoted.

Nowadays there is a high rise in number of obesity cases amongst young generation as they binge on fast food and become a couch potato. To defy the ongoing norm screen time of electronic gadgets should be limited, junk foods dependency should be lessened and outdoor activities should be promoted. Ready to go food joints and market malls offer ready made processed and packaged foods that are frowned upon by calorie conscious people.

The increasing number of obesity cases can be checked successfully with lifestyle management and therapeutic intervention.
Obstructive Sleep Apnea

R. Das

Obstructive sleep apnea (OSA) is the most common type of sleep-disordered breathing (sleep apnea) caused by obstruction of the upper airway. It is defined as Apnea-Hypopnea Index (AHI) of more than 5 times/hour by polysomnography. When associated with symptoms during day time it is called ‘obstructive sleep apnoea syndrome’. OSA is often underdiagnosed and neglected in clinical practice. OSA is characterized by repetitive pauses in breathing during sleep, due to cessation or significant decrease in airflow in the presence of breathing effort. These pauses resulting from upper airway collapse subsequent to muscle lax during sleep, lead to complete obstruction – ‘apneas’ or partial obstruction – ‘hypopneas’.

Apnoeas and hypopneas are pronounced in supine position during REM sleep and is associated with a reduction in blood oxygen saturation. This hypoxia stimulates the sympathetic system resulting in arousals from sleep and enhanced respiratory effort towards the end of event and causing restoration of airflow and oxygenation. The cycles of obstruction and restoration of airflow keeps on repeating number of times resulting in recurrent arousals and poor sleep quality. The number of apnoea and hypopneas per hour is a measure of disease severity and indicated as apnoea–hyponea index (AHI). Directly linked is apnoea associated sympathetic activation and increasingly high levels of blood pressure. The classical physiological nocturnal dipping of blood pressure of physiological sleep is thus obtundet.

OSA and OBESITY

There is a definite relationship of obesity with OSA. A body mask index of e” 30kg/m² is associated with 60-90% of OSA. The prevalence of OSA and its consequences are likely to increase in light of the current obesity epidemic considering that 60% of the adult population in industrialized countries is overweight (BMI e” 25 kg/m²) and at least 30% is obese (BMI e” 30 kg/m²).

Obesity worsens OSA because of fat deposition at specific sites. Fat deposition in the tissues surrounding the upper airway appears to result in a smaller lumen and increased collapsibility of the upper airway, predisposing to apnea. Moreover, fat deposits around the thorax (truncal obesity) reduce chest compliance and functional residual capacity, and may increase oxygen demand. Visceral obesity is common in subjects with OSA. Spirometry shows a restrictive pattern in moderate obesity and an obstructive pattern in severe obesity thus reducing functional reserve capacity. The high prevalence of OSA in obese subjects is not limited to adults; recent data show that obese children have a 46% prevalence of OSA when compared with children seen in a general paediatric clinic (33%).

Epidemiology

OSA is seen to be more common in men and elderly population. Only 10-20% of patients in USA are diagnosed as having OSA although in reality a higher percentage are considered at risk. In the adult population, the prevalence of OSA is estimated to be ~25%, and as high as 45% in obese subjects.

The figures in India is not clearly known but is much less due to lack of awareness. Untreated OSA shortens the life span of patients by upto 20 years so as obesity which is a recognised cause of morbidity and mortality. Males are at two fold higher risk than females but females are at greater risk during pregnancy and post menopause suggesting a potential role for hormonal differences in OSA pathophysiology. Unidentified and overlooked OSA can result in unexplained post-operative deaths in first week.

SIGNS and SYMPTOMS

Signs and symptoms may be present for years
or decades without being identified. Most people sleeping alone are not aware of this condition unless noticed by a regular bed-partner. Excessive day time sleepiness, fatigue, morning headache, memory and intellect impairment, poor concentration, confusion, loss of libido, poor concentration at work, personality and mood changes are common symptoms. Patients complain of gasping or choking sensation, nocturia and diaphoresis during sleep with poor quality and fragmented sleep night after night. Patients who are obese also have wheeze on exertion which is not necessarily asthma.

**DIAGNOSIS**

Diagnosis of OSA is often based on a combination of patient history and tests.

**Polysomnography** - These tests range from a lab-attended full polysomnography (“sleep study”) down to single-channel home recording. An in-lab sleep study under the supervision of a sleep medicine physician gives the most complete evaluation of sleep. In India it is carried out as an in-hospital procedure. Polysomnogram (PSG) confirms the diagnosis of OSA. It measures various parameters, including airflow, breathing activity and respiratory effort, oxygen concentration, brain EEG activity, leg muscle activity, and sleeping position, apnoea-hypopnea index and determines the level of CPAP necessary for a particular patient. It can be done at even patients home which gives an equivalent result as performed in laboratory.14 An “event” can be either an apnea, characterised by complete cessation of airflow for at least 10 seconds, or a hypopnea in which airflow decreases by 50 percent for 10 seconds or decreases by 30 percent with either an associated decrease in the oxygen saturation or an arousal from sleep.15 To grade the severity of sleep apnea, the number of events per hour is reported as the apnea-hypopnea index (AHI). An AHI >5/hour is diagnostic of OSA, and is considered mild in severity if < 15/hour. An index > 15/hour indicates moderate OSA, while an AHI > 30/hour represents severe disease.

Pulse oximetry, a non-invasive method of monitoring blood oxygen saturation may be adequate and easier to obtain than formal polysomnography. This however does not measure apneic events or respiratory event-related arousals and thus does not produce an AHI value.

**Anthropomorphic measurements** - Presence of obesity by its definition of BMI should carry a high index of suspicion. Waist circumference (WC) and Neck circumference (NC) are other tools of measurement to assess patients prone to OSA. Neck circumference of more than 17 inches (42.5 cm) in men and more than 15 inches (37.5 cm) in female and waist circumference of more than 40.8 inches (102 cm) correlates with an increased intensity of AHI. Risk factors for obstructive sleep apnea in Asian populations may be different from the Western countries. In a study done by Sonsuwan N, et al the correlations of BMI, NC, WC and Apnea-Hypopnea Index were executed. It was found that The BMI of more than 25 kg/m² had the highest sensitivity for severe OSA, whereas WC more than 101.8 cm had the highest specificity and concluded that BMI and WC, but not NC, were associated with severity of OSA. Most Asian countries have limited resources for polysomnography, hence these parameters may be helpful for clinicians to evaluate the risk of OSA more appropriately.16

**Sensitivity and specificity of various parameters for severe OSA.**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
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<tr>
<td>BMI&gt;25 kg/m²</td>
<td>93.8</td>
<td>38.0</td>
</tr>
<tr>
<td>WC&gt;101.8 cm</td>
<td>43.8</td>
<td>92.0</td>
</tr>
<tr>
<td>NC&gt;40.2 cm</td>
<td>56.3</td>
<td>74.0</td>
</tr>
</tbody>
</table>

BMI: Body Mass Index; WC: Waist Circumference; NC: Neck Circumference


**STOP Bang screening diagnostic tool** - Screening tool commonly employed by anaesthesiologist is STOP Bang screening diagnostic tool. STOP is - snoring, tired, observed, pressure and Bang is -BMI, age, neck circumference, gender. This screening tool carries a sensitivity of 92% and 100%, for detecting moderate and severe OSA, respectively. This classification is used to guide subsequent therapy.17
The STOP Bang screening diagnostic tool

<table>
<thead>
<tr>
<th>Symptoms, signs, predisposing factors</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Snoring: Do you snore loudly (loud enough to be heard through closed doors)?</td>
<td></td>
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<td>2. Tired: Do you often feel tired, fatigued, or sleepy during the daytime?</td>
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<tr>
<td>3. Observed: Has anyone observed you stop breathing during your sleep?</td>
<td></td>
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<tr>
<td>4. Blood Pressure: Do you have, or are you being treated, for high blood pressure?</td>
<td></td>
<td></td>
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<tr>
<td>5. BMI: BMI &gt; 35 kg/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Age: Age &gt; 50 years old?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Neck circumference: neck circumference &gt; 40 cm?</td>
<td></td>
<td></td>
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<tr>
<td>8. Gender: male?</td>
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</table>

Interpretation: a positive answer (“Yes”) to three, or more, of these symptoms, means the patient has a high risk of OSA.

Adapted from - Obstructive sleep apnoea and obesity. S Afr J Clin Nutr 2011;24(4):174-177

Tintinger GR,a Pretorius L,b Labadarios De

Blood Gas Analysis - Determination of serum bicarbonate level if STOP-Bang score is > 3 identifies patients of OSA.

Patients may also present with OSA complications, such as cardiac arrhythmias, including atrial fibrillation, difficult-to-control hypertension (drug-resistant hypertension), pulmonary hypertension, and congestive heart failure. Other factor for loss of muscle tone giving rise to OSA is old age. History of alcohol drinks, sedative medication, smoking is worth taking. Craniofacial syndromes like large tongue, receding jaw, abnormal uvula or palate or tonsillitis or adenoiditis or pharyngeal flap surgery in its postoperative period can experience such episodes of OSA.

Pathophysiology

Interaction between obesity, OSA and metabolic dysregulation.

There exist a link between obesity and OSA and metabolic dysregulation. OSA by itself gives rise to cardiometabolic syndromes, glucose intolerance and insulin resistance. It itself causes increased systemic inflammatory state release of cytokinins, setting of ongoing endothelial dysfunction and progression of atherosclerosis.19,20 Sleep deprivation inhibits leptin production, which suggests a potential mechanism for early development of obesity21. Leptin is released by adipose tissue; its level is high in obese individual. As this is associated with desensitised cellular response; so the effect of leptin is not achieved.22 Leptin also modulates ventilator control resulting in abnormal pattern of respiration in obesity. Other adipokines, tumour necrosis factor alpha, and interleukin-6 are elevated in obesity and they are also linked to depression in CNS activity and airway neuromuscular control,23 thereby increasing OSA severity which is already known to trigger systemic inflammatory state. It has been observed that obese patient with OSA who have high leptin level experience a reduction of leptin levels as early as 4 days of use of CPAP.

Similarly adiponectin which is beneficial in glucose and lipid metabolism and prevent inflammation and atherosclerosis, is seen to be low both in obesity and OSA. It has also shown improved levels with CPAP therapy. Grehlin another hormone produced by cells lining stomach stimulates appetite, and its level is found to increase at night in obese subjects and reduced sleep also causes increased production of ghrelin thus increasing appetite, obesity and OSA.

Treatment:

CPAP is the effective treatment of choice for OSA. Some patients are able to tolerate the positive pressure. Most patients prefer a well-fitting nasal mask over face mask as the latter along with positive pressure may not be well tolerated. It helps patients to sleep better, and are more awake during the day. For patients who have difficulty in adapting to the mask and CPAP, alternative form of therapy may be tried. This alternative form of treatment may include an oral appliance for mild OSA, or surgery for specific indications. CPAP therapy helps to reduce visceral fat, cholesterol. In patients with diabetes type2 CPAP is believed to improve insulin sensitivity with better glycaemic control. It also decreases the release of inflammatory mediators and endothelial damage. Overall survival improves and cardiovascular events are decreased in patients on long term CPAP therapy.

Oral appliances or splints are often preferred but may not be as effective as CPAP. This device is a mouthguard similar to those used in sports to protect
the teeth. It is designed to hold the lower jaw slightly down and forward relative to the natural, relaxed position.

Sleeping at a 30 degree elevation of the upper body or in a recliner is advised. Doing so helps prevent the gravitational collapse of the airway. Sleeping on a side is also recommended.

A lifestyle intervention programme to lose weight can also have important benefits. However, the impact of conservative management on weight loss in improving the OSA lacks supportive valid studies because these studies had methodologic limitations, including lack of either randomization and/or a control group for comparisons, inadequate adjustment for potential confounders, and limited follow-up. The weight loss achieved with conservative therapy is also very limited.

**Bariatric Surgery** - More recent trials assessing weight loss and OSA severity have been in the context of bariatric surgery, which may result in dramatic weight reduction, often maintained for up to 10 years.

### Association between Weight Loss Achieved By Bariatric Surgery & Obstructive Sleep Apnea Severity

<table>
<thead>
<tr>
<th>Study</th>
<th>No of Patient</th>
<th>Follow-up</th>
<th>Year of Study</th>
<th>Type of Surgery</th>
<th>Baseline</th>
<th>Follow-up</th>
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<tr>
<td>Rashied et al 81</td>
<td>11</td>
<td>3-21</td>
<td>1998-2001</td>
<td>GBP</td>
<td>62</td>
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<td>Haines et al 82</td>
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<td>6-42</td>
<td>1998-2005</td>
<td>GBP</td>
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<tr>
<td>Valencia-Flores et al 83</td>
<td>29</td>
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<td>1999-2002</td>
<td>GBP</td>
<td>56.5</td>
<td>39.2</td>
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<td>15</td>
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<td>2002-NA</td>
<td>GBP</td>
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<td>Guaridiano et al 85</td>
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<td>34</td>
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<td>Busetto et al 86</td>
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<td>48.6</td>
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<td>Charuzi et al 91</td>
<td>46</td>
<td>46</td>
<td>1978-1986</td>
<td>GBP &amp; VBG</td>
<td>47.5</td>
<td>32.1</td>
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<td>Scheuller et al 88</td>
<td>15</td>
<td>12-144</td>
<td>NA</td>
<td>GBP &amp; VBG</td>
<td>160°</td>
<td>160°</td>
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<tr>
<td>Sugerman et al 89</td>
<td>40</td>
<td>69.6</td>
<td>1980-1990</td>
<td>GBP, VBG &amp; HG</td>
<td>56</td>
<td>40</td>
</tr>
<tr>
<td>Pillar et al 90</td>
<td>14</td>
<td>90</td>
<td>NA</td>
<td>GBP</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Summers et al 99</td>
<td>1</td>
<td>6</td>
<td>NA</td>
<td>VBG</td>
<td>54</td>
<td>37</td>
</tr>
<tr>
<td>Lettieri et al 98</td>
<td>24</td>
<td>12</td>
<td>2003-2005</td>
<td>GBP</td>
<td>51.0</td>
<td>32.1</td>
</tr>
<tr>
<td>Buchwald et al 92</td>
<td>1195</td>
<td>~24</td>
<td>1990-2003</td>
<td>GBP, VBG, HG, &amp; BPD</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Angrisani et al 93</td>
<td>1</td>
<td>60</td>
<td>2000</td>
<td>GBP &amp; VBG</td>
<td>~43.4</td>
<td>~35.5</td>
</tr>
<tr>
<td>Skroubis et al 94</td>
<td>4</td>
<td>29.3</td>
<td>1994-2005</td>
<td>GBP &amp; BPD</td>
<td>~45</td>
<td>~26</td>
</tr>
<tr>
<td>Nelson et al 95</td>
<td>9</td>
<td>21</td>
<td>1999-2005</td>
<td>GBP</td>
<td>51</td>
<td>37</td>
</tr>
<tr>
<td>Cleator et al 97</td>
<td>20</td>
<td>12</td>
<td>1997-2002</td>
<td>Heogastrostomy</td>
<td>42.3</td>
<td>36</td>
</tr>
</tbody>
</table>

AHI = apnea-hypopnea index, BPD = biliopancreatic diversion; GBP = gastric bypass; HG = horizontal gastroplasty

From above study the authors concluded that patients undergoing bariatric surgery showed an average reduction of 15 kg/m² in BMI and 36 events/hour in the AHI, suggesting that every 1 unit reduction in BMI translated to a reduction of 2.3 units in the AHI. Similar results were published by Greenburg et al in their metaanalysis, that an average reduction of 17.9 kg/m² (95% CI, 55.3-37.7 kg/m²) translates into a reduction of 38.2 in AHI (95% CI, 31.9-44.4 AHI).

Neurostimulation is an upper airway stimulation system that senses respiration and delivers mild electrical stimulation to the hypoglossal nerve thereby increasing muscle tone at the back of the tongue and preventing its collapse over the airway. Approval for this active implantable neuromodulation device has been done following clinical trial.

Radiofrequency ablation (RFA) - American Academy of Otolaryngology considers Radiofrequency ablation as a somnoplasty treatment option in selected situations for mild to moderate OSA. RFA has some potential advantages in situation such as intolerance to the CPAP device. RF uses low frequency (300 kHz to 1 MHz) radio wave energy to target tissue, causing coagulative necrosis and done as outpatient procedure.

Surgery - Sleep surgery, may be undertaken in selected individuals to address specific airway obstruction. The different operations that may be performed includes nasal surgery like turbinectomy, or straightening of the nasal septum, tonsillectomy or adenoidectomy to overcome obstruction. Other procedures are uvulopalatopharyngoplasty, hyoid suspension and maxillomandibular advancement.

Conclusion:

OSA is a highly prevalent condition, having strong association with obesity. As the obesity epidemic is gaining momentum even in developing countries. OSA cannot be overlooked or neglected. Its long term consequences resulting in in cardiovascular and respiratory diseases, post-operative complications, increased morbidity and mortality is a cause of serious concern. Awareness, early recognition and effective treatment of OSA and associated obesity by medical and surgical methods will improve the outcome of OSA patient.

Reference:


Members are requested to enroll more colleagues as members of IMA and join AMS and CGP in large nos for formation of local branches and extra academic activities.
Anaesthetic and Surgical Implications of Obesity

D. Mohanty¹, S.K. Bhoi², S.K. Dhar³

Obesity is a multi-system disorder, particularly involving the respiratory and cardiovascular systems; therefore, a multidisciplinary approach is required. Obesity may be defined as abnormal growth of adipose tissue due to enlargement of fat cell size (hypertrophic obesity) or increase in fat cell number (hyperplasic obesity) or combination of both¹. It is perhaps the most prevalent form of malnutrition accounting, 35.7% of the U.S. adult population [2]. This is the key risk factor in natural history of other chronic diseases. The prevalence of obesity in India is about 18%[16]. This article presents a broad overview of the pathophysiological and practical considerations for anaesthetizing such patients for major (non-bariatric) surgery.

A body mass index (BMI) of > 30 kg/ m2 is defined as obesity. BMI > 35 kg/ m2 with associated co-morbidity, or > 40 kg/ m2 without significant co-morbidity, is considered to be morbidly obese; 55 kg / m2 is considered super-morbidly obese (Table 1).

Table 1 BMI, calculated as weight (kg) divided by height2 (m)²

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>&lt;25</td>
<td>Normal</td>
</tr>
<tr>
<td>25-30</td>
<td>Overweight</td>
</tr>
<tr>
<td>&gt;30</td>
<td>Obese</td>
</tr>
<tr>
<td>&gt;35</td>
<td>Morbidly obese</td>
</tr>
<tr>
<td>&gt;55</td>
<td>Super-morbidly obese</td>
</tr>
</tbody>
</table>

However, morbidity and mortality increase sharply when BMI is > 30 kg /m², particularly in smokers, and risk is proportional to duration of obesity [3]. For a given BMI, men are at higher risk of cardiovascular complications than women. Obesity is described classically as android (apples) or gynaecoid (pears) fat distribution in male & female respectively. The gynaecoid fat distribution characteristically involves more fat distributed in peripheral sites (arms, legs, and buttocks). An android fat distribution involves more central fat (intraperitoneal fat, including involvement of the liver and omentum). Though BMI is used for classification of obesity, regional distribution of excess fat is more predictive than BMI for morbidity and mortality. Excessive abdominal fat, “central obesity” is particularly predictive for NIDDM, dyslipidaemia and cardiovascular disease. Specific definitions have been proposed based on the waist-to-hip ratio (WHR). WHR (>1 in men & > 0.85 in women) indicate abdominal fat distribution. Risk of obesity-associated metabolic complications substantially increased when Waist circumferences is > 102cm (40 inches) for men, > 88cm (34.5 inches) for Women[4]

Obese people have greater energy expenditure than lean individuals, and this is balanced by increased caloric intake. Basal metabolic rate is ‘normal’ in obese individuals when corrected for body surface area(BSA). However, with increasing weight, BSA increases and hence absolute basal metabolic rate values are higher than in lean individuals. Consequently, there is a greater absolute O₂ consumption and CO₂ production.

Aetiology of obesity

The causes of obesity are multifactorial and include genetic and environmental components that are as yet undefined. The regulation of appetite and satiety is a complex process under the control of multiple neuro-humoral mechanisms integrated & processed in hypothalamus.

Hormones include leptin, adiponectin, insulin, ghrelin, and peptide YY3–36. Leptin and adiponectin are produced by adipocytes, and their levels represent a total adipocyte mass. Leptin signals satiety and is
important in reduction of eating and food-seeking behaviours. Obese patients have increased plasma leptin concentrations, but frequently exhibit leptin insensitivity. Moreover, vigorous dieting produces a reduction in adipocyte mass with an associated reduction in leptin levels, which itself may result in an increase in appetite and food seeking behaviours. Adiponectin has a similar signalling role to leptin, but concentrations are not increased in obesity. Both leptin and adiponectin regulate long-term changes in appetite, whereas short-term effects are signalled by insulin acting on the hypothalamus.

Satiety is also signalled by a group of peptides, including ghrelin which is released by the wall of the stomach. Eating stretches the wall of the stomach, suppresses ghrelin production, and reduces hunger. Ghrelin is also thought to be involved in the regulation of insulin sensitivity. The efferent limbs of the energy balance and appetite reflexes are mediated via the autonomic nervous system[12].

Effect of fat distribution
BMI alone is a poor predictor of co morbidity, surgical, or anaesthetic difficulty. Fat distribution; waist or collar circumference are more predictive of cardiorespiratory co-morbidity than BMI. An android distribution makes intra-abdominal surgery more difficult and is associated with increased fat deposition around the neck and airway (hence greater difficulty in airway management and ventilation of the lungs). There is greatly increased risk of – NIDDM, Gallbladder disease, dyslipidaemia, breathlessness, sleep apnoea; moderately increased risk of IHD, hypertension, osteoarthritis, hyperuricemia/ gout[5,12] and small increased risk of other diseases. Obstructive sleep apnoea (OSA) & obesity hypo ventilation syndrome are common problem in the morbidly obese. The risk of cardiorespiratory and other comorbidity increases with the duration of obesity (‘fat years’). However, the presence and severity of comorbidity may be masked by a sedentary lifestyle. The true significance of much obesity-related illness may only emerge during preoperative investigation or in the perioperative period. Since obesity is a multisystem disease affecting all organs, there are a number of implications relevant to the conduct of anaesthesia.

1) Respiratory system
Obstructive Sleep Apnoea (OSA)
OSA is defined as apnoeic episodes secondary to pharyngeal collapse that occur during deeper planes of sleep, resulting in snoring and intermittent airway obstruction; Incidence increases with obesity and increasing age. At least 5% of morbidly obese patients will have OSA particularly if they have associated risk factors such as large collar size (over 16.5 inches). Diagnosis is confirmed by sleep studies.

The characteristic features are:
- Apnoea or hypopnoea during sleep > 5 episodes/hr or > 30 per night (apnoeic episode is defined as > 10s of cessation of airflow, despite continuous respiratory effort against a closed airway).
  - i. snoring;
  - ii. day-time somnolence, associated with impaired concentration and morning headaches;
  - iii. pathophysiological changes: hypoxaemia - decrease of at least 4% in arterial oxygen saturation (Sao2); hypercapnia; systemic and pulmonary vasoconstriction (leading to right heart failure)[4,13,14]

Obstructive sleep hypopnea
Defined as episodic partial reduction of airflow of more than 50% lasting > 10 sec, occurring >15 times/hr of sleep, and accompanied by a decrease of at least 4% in the Sl.No.2. The diagnosis can be made only in patients who undergo polysomnography, or a sleep study. Apnea/hypopnea index (AHI), which is derived from the total number of apneas and hypopneas divided by the total sleep time
- Mild disease: AHI of 5 to 15 events/hr
- Moderate disease: AHI of 15 to 30 events/hr
- Severe disease: AHI of greater than 30 events/ hr

Resultant hypoxaemia and hypercapnia results in arousal and disruption of quality sleep. Indeed relative hypoventilation can cause a progressive desensitisation of the respiratory centres to hypercapnia with resultant Type II respiratory failure. Hypoxemia leads to secondary polycythaemia. Because of the risks of developing systemic and pulmonary hypertension, left ventricular hypertrophy, cardiac arrhythmias, cognitive impairment, persistent daytime somnolence, and other factors, treatment is recommended for patients with
either moderate or severe disease. Treatment includes removal of precipitants like avoidance of alcohol before bedtime, and sleeping on one’s side, weight loss and nocturnal CPAP.

**Anaesthetic implication:**

Take a very careful preoperative history, looking particularly for evidence of the characteristic increasing snoring and subsequent apnoea (ask a relative) and daytime somnolence. Avoid sedative premedication. Maintenance of the airway might be difficult. Airway obstruction is very likely to occur in the postoperative period – nurse in an HDU/ICU setting, sit up if at all possible, give oxygen and apply CPAP if required. Regional techniques and short acting anaesthetic agents are ideal to reduce postoperative drowsiness. OSA occurs most frequently during rapid eye movement (REM) sleep, which predominantly occurs on the second night post surgery. Consider nocturnal oxygen for up to 5 days following major surgery if available[13,14].

2) **Airway**

Obese patients tend to have short, fatty necks making both mask ventilation and direct laryngoscopy technically more challenging. A BMI of 46 is associated with a 13% risk of difficult intubation. The increased bulk of soft tissues in the upper airway make them prone to partial obstruction with the loss of consciousness.

**Anaesthetic implication:**

Always assess the airway with the simple, quick bedside tests such as Mallampati, thyromental distance, incisor gap and the ability to sublux the mandible. positive predictive value increased with combination of tests. Difficult mask ventilation can sometimes be transformed by placement of an oral airway. Obese women are more likely to have large breasts, which can interfere with easy placement of the laryngoscope, therefore aim for a degree of head-up tilt. avoid folding the arms across the chest and, if necessary, apply traction on the breasts to allow placement of the laryngoscope. Given the increased risk of aspiration and difficult intubation, a RSI will often be the safest form of induction. Have all available intubation aids such as bougies and a variety of laryngoscope blades close to hand. Ensure there are adequate numbers of staff, should the patient require turning. If a fibrescope is available, consider awake intubation but be wary of using any additional sedation.[3,4,5]

3) **Ventilation**

The increased body mass and metabolically active adipose tissue leads to increased O₂ consumption and CO₂ production. Minute ventilation is thus increased to achieve normocapnia. There is reduced chest wall compliance (up to 30%) due to the heavy chest wall, increased pulmonary blood volume and splinted diaphragm. This reduction in compliance, together with increased respiratory demand results in an increased work of breathing. In addition, the functional residual capacity (FRC) decreases exponentially with increasing BMI. The closing capacity in these patients can encroach on the FRC even when conscious; therefore the onset of anaesthesia, a supine position and the abnormally high elevation of the diaphragm (due to increased visceral and abdominal wall fat) all combine to cause ventilation-perfusion mismatch, right-to-left shunting and arterial hypoxemia [4].

**Anaesthetic implication:**

These patients desaturate particularly rapidly once apnoeic, as their oxygen reserve is reduced (reduced FRC), and oxygen utilisation increased, thus necessitating meticulous pre-oxygenation. Ideally this should be done with the patient semi erect. Due to decreased chest compliance and sheer mass of the chest wall, higher inflation pressures are required to ventilate such patients. Such high pressures preclude the use of the laryngeal mask airway (LMA) for ventilation besides that hypoventilation often occur when breathing spontaneously through LMA/facemask and thus these techniques are not recommended. Application of PEEP via an ET tube is particularly useful in improving oxygenation by reducing small airways collapse[4].

4) **Extubation**

Extubation is usually best performed with the patient in the sitting position as awake as possible to allow maximal diaphragmatic excursion. Otherwise the left lateral position is very safe initially but abdominal splinting might subsequently lead to hypoxia. Sit up once awake.
5) Cardiovascular system:

Increased visceral fat is a cardiovascular risk factor even when the BMI is normal. Hypertension is particularly common in obesity. Obesity associated hypertension, ischaemic heart disease (IHD), cardiomyopathies, cardiac failure, arrhythmias, sudden cardiac death and dyslipidaemias. Venous insufficiency, cerebrovascular and peripheral vascular disease exacerbated by atherosclerotic processes. Obese patients also have an increased absolute blood volume and increased cardiac output. Thus left ventricular stroke work is increased and left ventricular hypertrophy can result. Given the high prevalence of associated coronary artery disease, the tendency to hypoxia, tachycardia and biventricular strain, the aetiology for ischaemic coronary events is strikingly apparent.

An obese abdomen will directly compress venous system, decreasing venous return from the legs. Once ventilated, higher inflation pressures and application of PEEP further reduces venous return, which may result in a fall in cardiac output. The risk of pulmonary embolus and DVT is doubled in the obese. Hypoxia induced polycythemia, cardiac failure, decreased fibrinolysis and immobilisation also contribute to DVT.

Anaesthetic implication:

Thorough preoperative assessment looking for evidence of IHD and cardiac failure on history, examination and ECG. Chest X-ray and ECHO may be technically difficult but potentially useful tests. Measure NIBP with the correct sized cuff. The sphygmomanometer cuff should be 20% greater than the diameter of the upper arm (remember, if the cuff is too small, the BP will be over-estimated). In the morbidly obese, invasive BP monitoring is advisable perioperatively. Continue cardiac drugs throughout the perioperative period. LMWH prophylaxis, TED stockings, dynamic flow boots should be used from arrival in theatre until full postoperative mobilization. Early mobilisation reduces the incidence of DVT. Postoperative oxygen may particularly reduce nocturnal ischaemic events.

6) Gastrointestinal system

When coupled with increased gastric juice volumes, low gastric pH, and increased intra-abdominal pressure and difficult intubation (as stated earlier); the risk of gastric aspiration is particularly increased. There is also a high incidence of gastro-oesophageal reflux and hiatus hernia. Obesity is associated with macrovesicular fatty liver, which is reversible with weight loss but progresses to steato-hepatitis and cirrhosis if left untreated. Gallstone disease also more common in obese patient.

Anaesthetic implication:

Prescribe IV H2 receptor antagonists (e.g. ranitidine 150mg) or proton pump inhibitors (e.g. omeprazole 20-40mg) routinely 1-2 hours preoperatively, and if in doubt, perform rapid sequence induction with cricoid pressure at induction and extubate when fully awake. Sodium citrate (0.3 M) may be given to patients with significant reflux symptoms. Perform a random blood sugar test on all obese patients. Ensure good perioperative sugar control to reduce infection and risk of myocardial events. Continue statins over the perioperative period as they might improve coronary plaque stability.

7) Endocrine system and other systems

Non-insulin dependent diabetes mellitus (and its associated microvascular and macrovascular changes) is much more common in the obese caused by insulin resistance and inadequate insulin production. Hence, tight glycaemic control in the perioperative period is both important and potentially difficult. Although preoperative weight loss dramatically reduces perioperative risk, even patients presenting for well-planned elective surgery generally fail to achieve significant weight reduction.

Hypercholesterolaemia, hypothyroidism, gout, osteoarthritis, low back pain are common in the obese. Breast, endometrial, colon cancer are increased in obese than normal population. Maternal obesity associated with polycystic ovarian disease, impaired fertility, fetal defects.

Pharmacokinetics of anaesthetic agents

Calculation of appropriate dosages may be difficult. The pharmacokinetics of most general anaesthetic drugs are affected by the mass of adipose tissue, producing a prolonged, less predictable effect. The volume of the central compartment is largely unchanged, but dosages of lipophilic (benzodiazepines and barbiturates) and polar drugs need to be adjusted.
due to changes in volume of distribution (Vd). An increase in Vd prolongs the elimination half-life (Et½), despite increased clearance (Table 3). For these types of drug, the ideal body weight should be used when calculating the dose. However, less fat-soluble drugs show little or no change in Vd (e.g. NMBD). For these drugs, the lean body mass should be used. An exception to this is succinylcholine, which should be dosed to total body weight. Propofol is highly lipid-soluble, but also has a very high clearance. Its volume of distribution at steady state and clearance are proportional to total body weight[9]. Therefore, when using total i.v. anaesthesia, the infusion rate should be calculated on total body weight, not ideal body weight.[6]

Table 3 Factors affecting drug pharmacokinetics in obesity.

<table>
<thead>
<tr>
<th>Volume of distribution:</th>
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<tbody>
<tr>
<td>Decreased fraction of total body water</td>
</tr>
<tr>
<td>Increased adipose tissue</td>
</tr>
<tr>
<td>Increased lean body mass</td>
</tr>
<tr>
<td>Altered tissue protein binding</td>
</tr>
<tr>
<td>Increased blood volume and cardiac output</td>
</tr>
<tr>
<td>Increased concentration free fatty acids, cholesterol, a1 acid glycoprotein</td>
</tr>
<tr>
<td>Organomegaly</td>
</tr>
</tbody>
</table>

**Plasma protein binding:**
- Adsorption of lipophilic drugs to lipoproteins so increased free drug available
- Plasma albumin unchanged
- Drug clearance:
  - Increased renal blood flow
  - Increased GFR & Increased tubular secretion

**Decreased hepatic blood flow in congestive cardiac failure**

Slow emergence after use of fat-soluble volatile agents may be due to central sensitivity as much as due to delayed release from adipose stores. If available, use relatively insoluble agents as much for speed of reversal as to reduce postoperative drowsiness. The risk of halothane hepatitis may be higher in obese patients, although overall is still very low. Estimations of maximum recommended local anaesthetic doses for infiltration should be based upon ideal body weight.

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSING GUIDELINE</th>
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<tbody>
<tr>
<td>Propofol</td>
<td>Dose between lean and actual body weight</td>
</tr>
<tr>
<td>Thiopentone</td>
<td>Dose between lean and actual body weight</td>
</tr>
<tr>
<td>Suxamethonium</td>
<td>Up to 1mg/kg actual body weight</td>
</tr>
<tr>
<td>Atracurium</td>
<td>Dose according to actual body weight</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>Dose according to lean body weight</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>Dose according to actual body weight</td>
</tr>
<tr>
<td>Morphine</td>
<td>Dose according to lean body weight. Titrage to effect</td>
</tr>
</tbody>
</table>

**Regional anaesthesia**

Lung volumes in obese patients are reduced significantly in the postoperative period. There is a linear inverse correlation after premedication between vital capacity and BMI and a curvilinear inverse correlation between FRC and BMI. Although the subject of ongoing debate, many anaesthetists consider perioperative epidural anaesthesia (EDA) an important part of a multimodal approach to improving patient outcome and analgesia rather than relying solely on systemic opioid administration. EDA seems particularly attractive in obese patients undergoing major abdominal surgery, although the superiority of EDA in obese patients is not yet proven.

In a recent study, there was less postoperative reduction in vital capacity and other spirometric values, and lung volumes recovered occurred more quickly in patients receiving EDA compared with those treated with opioids.[5] Abdominal wall muscles play the major role in forced expiration. These may become less effective in the presence of a good epidural block.[7] Good regional anaesthesia may reduce opioid and inhalational requirements intraoperatively in thoracic and abdominal surgery and may also be used as the sole technique in peripheral surgery. The sitting position is usually easier for spinal and epidural placement. Moreover, there are significant practical difficulties in sitting epidural catheters in the morbidly obese. These include the lack of palpable bony landmarks, the depth of the space (extra long needles may be required), and “false” loss-of-resistance in fatty tissues. Initial failure rate is higher in the obese. In the absence of clear bony landmarks the 7th cervical prominence and gluteal cleft will indicate the midline and patients also can assist by verbally redirecting the needle when it strikes the lamina. It is relatively uncommon for the epidural space to be more than 8cm deep. Leave extra catheter in the space as it may be subject to drag as the flexed
patient relaxes. Due to the engorged extradural veins and extra fat constricting the potential space, less local anaesthetic is needed for epidurals. 75-80% of the normal dose may well be sufficient.[10]

A multimodal analgesic approach is often required. This encompasses opioids, NSAIDs, acetaminophen, and other local anaesthetic blocks (e.g. rectus sheath block and wound infiltration).

**Preoperative assessment**

The perioperative management of obese and morbidly obese patients presents significant organizational and practical issues. The Association of Anaesthetists has recently produced a helpful guideline which can be used as the basis of a rational approach to provision of safe anaesthetic services[6]. However, individual patients require a ‘tailored’ plan. A detailed anaesthetic assessment must be performed. Many morbidly obese patients have limited mobility and may therefore appear relatively asymptomatic, despite having significant cardio-respiratory dysfunction.

The drug history should note any amphetamine-based appetite suppressants as these contribute to increased perioperative cardiac risk. Symptoms and signs of cardiac failure and OSA should be sought actively. Many patients have been unable to lie flat for several years, and may routinely sleep sitting up in an armchair. An assessment of the ability to tolerate the supine position may reveal unexpected profound oxygen desaturation, airway obstruction, or respiratory embarrassment[14,15].

Awake intubation in a sitting or semi-recumbent position is often better tolerated than supine induction of anaesthesia and asleep endotracheal intubation. Mouth opening, Mallampati score, neck extension, and circumference should be noted; in combination, these help to predict a potentially difficult airway. Airway obstruction may be clinically obvious at the bedside, as patients with severe sleep apnoea may even ‘snore’ while awake, for example, when drawing breath while speaking.

Investigations should be tailored to the individual patient, depending on comorbidity and the type and urgency of surgery. A full blood count, electrolytes, renal and liver function tests, and blood glucose form a basic set of investigations. Arterial blood gas analysis may be useful in those suspected of respiratory comorbidity (OSA, obesity hypoventilation syndrome, large collar size, and other pulmonary disease) as the patient’s habitual values provide a useful guide to weaning from ventilation and the potential need for extended perioperative respiratory support[14].

A preoperative ECG is essential (Table 4) to rule out rhythm disturbances and cor pulmonale, and as a guide to the need for more extensive cardiac investigation. Patients with evidence of right ventricular hypertrophy or cor pulmonale may benefit from a period of elective nocturnal noninvasive ventilation before elective surgery. This can be effective in relieving right heart failure, day-time somnolence, and pulmonary hypertension.

Table 4 Common ECG abnormalities associated with morbid obesity [6]

| Low voltage complexes |
| LV hypertrophy or strain |
| Prolonged QT/QTc |
| Inferolateral T wave abnormalities |
| Right axis deviation or RBBB |
| P pulmonale |

Echocardiography may estimate systolic and diastolic function and chamber dimensions, although good images may be difficult to obtain by the transthoracic technique. Chest X-ray may be used to assess cardiothoracic ratio and evidence of cardiac failure. PFT may reveal a restrictive defect, but are not performed on all patients. Younger patients, those at the lower end of the BMI range, those with a good exercise tolerance, and those with a benign fat distribution need not be tested unless there is a specific indication. Unfortunately, most cardiopulmonary investigations are technically difficult owing to patient body habitus. Exercise ECG testing may be impracticable, but even a short walk along the ward or an attempt at climbing a flight of stairs can give useful functional information[11].

**Intra-operative:**

Many anaesthetists choose to induce anaesthesia on the operating table. A theatre table with an appropriate maximum weight allowance must be used. There must be enough trained and experienced staff...
in theatre to assist with moving the patient quickly, should it become necessary during induction. Standard monitoring should include a correct-sized blood pressure cuff. Venous cannulation can sometimes be difficult and central venous cannulation with or without ultrasonography may be necessary. Direct intra-arterial monitoring should be considered for situations where rapid haemodynamic changes are possible, surgery is prolonged, in patients with cardiorespiratory disease or if non-invasive arterial pressure monitoring is impractical.

Patient positioning is of paramount importance before induction, particularly head position. A “sniffing the morning air” position may be difficult to achieve due to the large soft tissue mass of the neck and chest wall, and a wedge or blanket beneath the shoulders is of benefit (‘ramped’ technique). A degree of head-up tilt may slow the rapid desaturation that can occur on lying supine. Because of the reduced FRC, preoxygenation is less effective than in lean subjects. For this reason, in many bariatric surgery programmes, awake fibreoptic intubation is a routine. This should be considered in any patient who is hypoxaemic at rest or who has a history or clinical signs suggestive of airway problems.

However, for the majority of obese patients, a standard asleep intubation is both practicable and safe. Difficulties encountered in bag and mask ventilation can be overcome either by a four-handed technique or by the use of the mechanical ventilator with the mask. Laryngoscopy and intubation are often relatively straightforward with normal laryngeal anatomy. A polio handle, a long blade, or both are of value in overcoming the problems of the geometry of the head, neck, and chest wall.

Postoperative shivering, which increases oxygen consumption, prolongs the effects of some anaesthetic agents, and increases cardiovascular stress. Effective temperature maintenance is important; it also reduces postoperative wound infection. Forced warm air over-blankets are extremely effective, particularly when used in combination with fluid warmers.

Calf compression devices should be used and particular care given to pressure areas to prevent sores and nerve injury. If arm boards are used, over-abduction must be avoided as this risks brachial plexus injury. It is important to note that when pneumoperitoneum is used, it causes a significant decrease in static respiratory system compliance and an increase in inspiratory resistance (though little increase in A–a gradient); ventilatory variables must be adjusted accordingly, and PEEP is desirable to maintain oxygenation during controlled ventilation. The use of short-acting anaesthetic agents such as remifentanil, sevoflurane, or desflurane helps to aid rapid recovery from anaesthesia and minimize postoperative hypoventilation and hypoxaemia. Monitoring of neuromuscular block is essential, as incomplete reversal of neuromuscular blocking agents is poorly tolerated in morbid obesity and can have disastrous consequences [11].

Postoperative considerations

Where possible, those patients fit enough for extubation should be extubated wide-awake in the sitting position and transferred to an appropriate postoperative environment. Where the patient is nursed after operation depends on the nature and extent of the surgery and on the individual patient. In patients undergoing minor surgery whose only risk factor is obesity, there is little evidence that perioperative risk is increased and these patients may be nursed on the surgical wards.

However, patients who have obesity-related comorbidities carry a dramatically greater risk of perioperative complications. Therefore, any obese patient undergoing major surgery, or those with a history of comorbidities, should be nursed in an appropriate level 2 or level 3 facility.

Many morbidly obese patients use a CPAP machine at home. Additionally, there are other individuals who suffer significant sleep apnoea or arterial desaturation who would also benefit from postoperative CPAP. There may be a considerable advantage in progressing directly from extubation onto a CPAP system. This may be needed for several nights after operation, as OSA occurs during deep sleep and rapid eye movement sleep, both of which may be suppressed in the immediate postoperative period and show rebound several nights later.

NSAIDs are extremely effective as part of a multimodal postoperative analgesic regimen, but they should be used judiciously as they may increase the incidence of postoperative renal dysfunction. NSAIDs
are best omitted in obese patients with additional risk factors for postoperative renal dysfunction, for example, raised intra-abdominal pressure (particularly in those undergoing laparoscopic surgery) or diabetic nephropathy (sometimes subclinical). Acetaminophen, patient-controlled opioid analgesia, or regional anaesthesia are also useful. In morbid obesity, acetaminophen should be used in standard doses, as its volume of distribution is largely confined to the central compartment. However, as its clearance is increased in obesity, clinicians should give consideration to increasing the frequency of dosing where analgesia is problematic.

I.M. injections should be avoided because of unpredictable absorption. Early mobilization is encouraged where possible, as it reduces postoperative atelectasis and the risk of venous thromboembolism. A bed with an overhead trapeze is useful. The catabolic response to surgery may necessitate the use of insulin after operation to maintain normoglycaemia. This reduces susceptibility to wound infections, and protects against myocardial infarction during periods of myocardial ischaemia.[6]

Post operative period

The postoperative mortality of the obese patient is double that of the non obese. As previously stated, these patients are prone to hypoxia due to small airways collapse and shunt. This may be exacerbated if analgesia if inadequate. Airway obstruction following tracheal extubation is likely to be complicated by the use of opiate and sedative drugs needed for postoperative pain management because these drugs tend to decrease pharyngeal dilator tone and increase the likelihood of upper airway collapse. For this reason obese patients should be maintained on oxygen, humidified if possible, on the ward post operatively with continuous pulse oximetry. Postoperative physiotherapy/incentive spirometry and use of regional techniques such as epidural analgesia should reduce atelectasis and postoperative respiratory failure. Early postoperative mobilisation is vital.

Anaesthesia and the obese child

The prevalence of obesity in children is increasing in the developed world. Although much has been written about the anaesthetic management of obese adults, there is relatively little in the literature relating to anaesthesia in obese children. Generally, obese children experience fewer medical complications than obese adults, although derangements of respiratory physiology are common across all age groups. Despite the relatively low prevalence of obesity-related comorbidity in children, they carry an increased likelihood of an anaesthetic critical incident, the risk rising with increasing BMI.[8]

Surgical issues

Surgery is technically more difficult due to reduced surgical access, difficult visualisation of underlying structures and excess bleeding. This leads to longer operating times, with subsequent exacerbation of many of the factors already mentioned. There is a higher risk of infection. The poor blood supply to the fatty tissues increases the chance of both wound infection and wound dehiscence. There may also be impaired immune system function due to neurohumeral factors.

Special equipment may need to be ordered for the very obese patient. Most theatre tables have a weight limit of approximately 130kg and can often be too narrow for these potentially very wide patients. “Overflow” from the side of the table increases the risk of pressure sores or nerve damage, as the patient is “wedged” in place to ensure they do not fall off. This may also interfere with the tipping/tilting function of some tables. The sheer mass of the patient means they are harder to position, and present an increased risk to theatre staff during handling/lifting. Given such problems it is preferable to induce anaesthesia in theatre to avoid such transferring.

Day case surgery is not contraindicated in the obese. Rather than having a rigid cut off based on BMI, it is preferable to have a policy based upon the type of surgery to be performed. It has been shown that with careful selection patients with a BMI over 35 have similar outcomes to “normal” patients.

References:
15. Chung and Elsaid. Screening for obstructive sleep apnea before surgery: why is it important? Current Opinion in Anaesthesiology; 2009; 22; 404-411.

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Obesity and Women’s Health

S. Swain

Abstract:

The evidence for adverse effects of obesity on women’s health is overwhelming and indisputable. Obesity especially abdominal obesity, is central to the metabolic syndrome and its consequences. Obese women are particularly susceptible to hypertension, diabetes and coronary artery disease. They have a higher risk of back pain and osteoarthritis of weight bearing joints. Obesity negatively affects both fertility and contraception. Pregnancy outcomes are negatively affected by maternal obesity. Rate of cesarean section is high and breast feeding is low. Obesity substantially increases the risk of several major cancer in women especially postmenopausal breast cancer, endometrial cancer and perhaps ovarian cancer. There seems to be an association between depression and obesity in women.

Introduction:

The world Health Organisation in 2010 estimated that more than 1 billion people are overweight and 300 million are obese. According to WHO the Asian countries with the highest prevalence of obesity include India, China, Pakistan, Bangladesh and Indonesia. According to a study by Nutrition foundation of India, Indian females had a greater prevalence of being overweight / obese than males regardless of socio-economic status or age. Where as 32.2 % of males and 50 % of females were overweight among high and middle class groups, 1 % of males and 4 % of females were overweight among lower income groups.

The World Health Organisation (WHO) has set out International guidelines for the classification of overweight and obesity based on body mass index (BMI) and the metabolic risk there of as shown in Table 1.1 BMI is calculated by dividing the patient’s weight in Kilograms by their height in meters square (kg/m²). BMI is most widely used as an indicator of body fatness but is not an index of regional fat distribution. Waist circumference (WC) is a surrogate marker of visceral adiposity and predicts adiposity related cardio-metabolic risk independently and better than BMI. WC > 94 cm in men and > 80cm in women indicated increased risk and > 102 cm in men and > 88cm in women indicates substantially increased (high) risk.

Obesity and Type 2 Diabetes Mellitus:

The risk of diabetes mellitus (DM) increases with the degree and duration of being overweight or obese and with a more central or visceral distribution of body fat, associated with insulin resistance. In general the relationship between BMI and type 2 DM is stronger for women than for men. The Nurses’ Health Study2 followed 84,000 female nurses for 16years and found that being overweight or obese was the single most important predictor of DM. An increased risk of DM was seen in women with BMI values > 24 and waist to hip ratio > 0.76. In morbidly obese patients (BMI > 40 or > 35 with major comorbidities), weight loss surgery can be considered if conservative measures fail. A systematic review that included more than 135,000 patients (80% women) found that bariatric surgery resulted in complete resolution of diabetes in 78 % of patients and improvement in diabetic control in more than 86% of patients. These patients had improvements in insulin levels, fasting glucose levels, and glycosylated hemoglobin levels.

Obesity and Coronary Artery Disease:

Obesity is an independent risk factor for the development of coronary artery disease (CAD) in women and is an important modifiable risk factor for prevention of CAD. The mechanism of action is likely
the relationship between obesity and insulin resistance. Abdominal obesity may be more harmful in women than BMI or weight alone. Waist circumference is an independent risk factor for developing CAD in both normal – weight women and overweight women. The Interheart global case control study of 6787 women from 52 countries found that abdominal obesity was more predictive of myocardial infarction than was BMI alone. A prospective cohort study of more than 44,000 women in the Nurse Health Study found an association between having a waist circumference of > 88 cm and risk of cardiovascular mortality. Waist-to-hip ratio is another significant predictor of death from cardiovascular disease. A meta-analysis that included data on more than 22,000 patients (72% women) looking at the relationship between bariatric surgery and cardiovascular risk factors found that hyperlipidemia improved in 70% of patients after surgery and hypertension was resolved in 62% and improved in 78%.

Obesity and Musculoskeletal pain:

In the United States, the center for Disease Control and Prevention statistics show that more than 31% of obese adults reported a doctor with diagnosis of arthritis compared to only 16% of nonobese adults. Direct mechanical stress on the intervertebral discs and the indirect effects of atherosclerosis on blood flow to the lumbar spine are suspected to be mechanisms through which obesity affects the discs, leading to subsequent low back pain. Further research to elucidate the exact mechanism is needed. The increased burden of obesity is more obvious as women age, with significantly more obese women over the age of 40 reporting low back pain and lumbosacral radicular symptoms. This data supports the theory that obesity over time contributes to low back pain and lumbosacral radicular symptoms. Obesity negatively affects contraception. Older studies have shown that hormonal contraception methods are less effective in obese women. For example, a retrospective cohort analysis of 2822 person years of oral contraceptive use suggested that women in the highest quartile of body weight (>70.5kg) had a 60% higher risk of failure than women of lower weight. This study also found that the increased risk of failure associated with weight was higher for women using very low-dose or low-dose oral contraceptives. However, a recent large cohort study in Europe did not show a difference in contraceptive efficacy of oral contraceptive pills based on BMI.

A study of 1005 women using the levonorgestrel vaginal ring demonstrated higher rates of pregnancy at 1 year for heavier patients (1.7% for a 40kg woman; 9.8% for an 80kg woman). Obesity is a risk factor for technical failure of tubal ligation surgery. The risk of knee OA increases considerably, and 1 category shift downward in BMI from obese to overweight may avoid 19% of new cases of severe knee pain. Dietary weight loss combination with exercise effectively led to significant improvements in pain and physical function in women with knee OA in the Arthritis, Diet and Activity Promotion Trial.

Obesity and Infertility (Including Polycystic Ovary Syndrome):

Obesity affects fertility throughout a woman’s life. The impact of obesity and Polycystic Ovary Syndrome (PCOS) on reproductive function can be attributed to multiple endocrine mechanisms. Abdominal obesity is associated with an increase in circulating insulin levels. This results in increased functional androgen levels (caused by suppression of sex hormone – binding globulin synthesis and increased ovarian androgen production). Chronic elevation of circulating estrogen is caused by aromatization in peripheral adipose tissue. The resulting hyperandrogenism and menstrual cycle abnormalities are clinically manifested in part by anovulatory cycles and subfertility. Additionally, leptin inhibits ovarian follicular development and steroidogenesis and may contribute to reproduction difficulties in obese women. The impact of obesity on reproduction starts at a young age. Obese girls frequently experience the onset of puberty at a younger age than their normal-weight peers.

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intrauterine device may be one of the few reliable contraception options whose efficacy does not seem to be affected by BMI. Product inserts rarely comment on weight specific guidelines.

Although most attention has focused on the impact of obesity on ovulation, other studies suggest a multifactorial impact. Obese women were less likely to access contraceptive health care services and had more unplanned pregnancies.

A retrospective cohort study of 22,840 women demonstrated that obesity was associated with reduced fecundity for all weight adjusted groups of women and persisted for women with regular cycles. In addition, obesity may alter the quality of oocytes and embryos. Increased female sexual dysfunction is common in obese patients. Obesity is frequently associated with disturbances in the menstrual cycle. Cross sectional studies indicate that 30% to 47% of overweight and obese women have irregular menses. PCOS frequently causes menstrual irregularity and is very common among obese women, though the actual prevalence is unclear. Although obesity may amplify the effects of PCOS, it is not a diagnostic criteria for PCOS. Approximately 20% of women with PCOS are not obese.

Weight loss can improve the fertility of obese women by the return of spontaneous ovulation, thus leading to the recommendation of implementing weight (diet, exercise, medication treatment) as initial management of infertile overweight and obese women. Bariatric surgery may have a beneficial influence on fertility. This is supported by the normalization of hormones in PCOS and correction of abnormal menstrual cycles after surgery.

**Obesity and Pregnancy:**

Obesity causes pregnancy complications because of elevated risks of antepartum complications and mechanical difficulties with delivery. Prepregnancy obesity contributes to the development of many pregnancy complications including pregnancy-induced hypertension, preeclampsia, gestational diabetes, c-section, and neonatal death. Compounding this finding is the fact that performing a cesarean section is more difficult in obese women. Rates of fetal anomalies are increased in obese mothers as well, including neural tube defects, spina bifida, cardiovascular anomalies and cleft lip and palate. However, maternal obesity was protective for gastoschisis.

**Obesity and Breastfeeding:**

Maternal obesity is associated with a decreased intention to breastfeed, decreased initiation of breastfeeding, and decreased duration of breastfeeding. Some of these effects may be cultural, having to do with one’s body image, or physiologic caused by metabolic and hormonal effects of adipose tissue (i.e., decreased milk supply). However, obesity may also be related to some confounders such as more pregnancy complications, which also have negative effects on breastfeeding rates. Obese women are at greater risk of a delay in milk production, which may be related to decreased rates of breastfeeding initiation. Obese women had lower prolactin responses to suckling in the first week compared with normal weight women.

Weight loss can improve the fertility of obese women by the return of spontaneous ovulation, thus leading to the recommendation of implementing weight (diet, exercise, medication treatment) as initial management of infertile overweight and obese women. Bariatric surgery may have a beneficial influence on fertility. This is supported by the normalization of hormones in PCOS and correction of abnormal menstrual cycles after surgery.

**Obesity and Depression:**

Population based studies looking at the association between obesity and depression have yielded inconsistent results, with only some finding an association. The difference between sexes is similarly inconsistent. Some studies found an association between obesity and higher rates of depression in women but not in men, others reported inverse associations between obesity and depression in both women and men. Most recently, data from the third National Health and Nutrition Examination Survey (1988 – 1994) showed that obesity was associated with depression in women but not in men. This relationship was stronger when obesity was stratified by severity. One 5year prospective study following a cohort of 2298 persons from Alameda County, CA, showed that the obese were at increased risk of depression but there was no effect of sex on this association. Although many social, psychological and cultural factors likely contribute to
the development of depression is obese women, one explanation argues that the stigma towards obese individuals in American society leads to low self esteem and ultimately depression. Thus, in communities where a higher weight is acceptable, less psychological impact is observed. Another theory argues that obesity is not stressful per se, but the pressure to fit a norm and continued dieting leads to depression.

**Obesity and Cancer in Women General:**

There is mounting evidence that obesity is a risk factor for developing gynecologic and breast cancers and that a higher BMI may also adversely impact survival. Obese women with cancer may have decreased survival because of later screening, comorbid illnesses, or poorer response to treatment. Obese women have increased surgical and possibly radiation complications. In addition, there is no current consensus regarding appropriate chemotherapy dosing for the obese patient. The increased levels of endogenous estrogen contribute to higher risk of several types of cancer.

**Endometrial Cancer:**

Endometrial carcinoma is strongly related to obesity. In premenopausal women, anovulation or oligoovulation that is associated with PCOS results in an endometrium that is chronically exposed to unopposed estradiol. This causes proliferation and the potential for neoplastic changes. Additionally, in premenopausal and postmenopausal obese women, increased insulin and androgens decrease the production of sex hormone-binding globulin. This leads to more unregulated bioavailable estrogens in postmenopausal women. International Agency for Research on Cancer found that there was convincing evidence based on large cohort and case control studies that obesity is associated with a 2 to 3 fold increased risk of developing endometrial carcinoma in premenopausal and postmenopausal women and obesity has been associated with at least 40% of the incidence of endometrial cancer. Mortality from uterine cancer also seems to increase with BMI.

**Ovarian Cancer:**

The data linking ovarian cancer and obesity has been mixed. The rationale for an increased risk of ovarian cancer in obese women focuses on the hormonal impact of obesity. International Agency for Research on Cancer group found that the evidence from the relatively few studies on body weight and ovarian cancer has been inconsistent and does not allow any conclusion to be drawn on a possible association. If some subtypes of ovarian cancer are hormonally responsive, it seems logical to assume that unopposed estrogen could increased the risk of these cancers in obese women.

**Breast Cancer:**

There is a well established link between obesity and postmenopausal breast cancer. It is hypothesized that this is because of an increase in the serum concentration of bioavailable estradiol. Several meta-analysis, systematic reviews, and large cohort studies have shown obesity worsens breast cancer mortality. Obese women also have greater disease morbidity, including a higher recurrence rate, increased contralateral breast cancer, wound complications after breast surgery, and lymphedema. Poorer outcomes associated with breast cancer may be related to more aggressive disease at diagnosis, a higher likelihood of treatment failure and a higher likelihood delayed detection. Morbidly obese women are significantly less likely to report recent mammography. This is particularly true for white women. Obesity may also promote more rapid growth of metastatic disease because of impaired cellular immunity. In addition, the hyperinsulinemia found in some obese women may promote mammary carcinogenesis by increasing the levels of insulin-like growth factor and leptin, which have a synergistic effect with estrogen on mammary epithelial cells by promoting angiogenesis.

**Table 1. Classification of Obesity Based on Body Mass Index (BMI) & metabolic risk classification**

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI (Kg/m²)</th>
<th>Relative risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 18.5</td>
<td>Increased risk</td>
</tr>
<tr>
<td>Normal weight</td>
<td>18.5-24.9</td>
<td>Least risk</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
<td>Increased risk</td>
</tr>
<tr>
<td><strong>Obese</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>30.0-34.9</td>
<td>High risk</td>
</tr>
<tr>
<td>Class II</td>
<td>35.0-39.9</td>
<td>Very high risk</td>
</tr>
<tr>
<td>Class III</td>
<td>&gt;40</td>
<td>Extremely high risk</td>
</tr>
</tbody>
</table>
Weight Loss and Cancer:

Studies evaluating the long term impact of weight loss on cancer risk among women have shown mixed results. In one large US study, cancer incidence and mortality data were compared between 6596 patients who had gastric bypass (between 1984 and 2004) and 9442 morbidly obese persons who had not had surgery. This study showed decreased overall cancer rates in women (P<.0004), with the strongest impact on endometrial cancer (P<.0001) and with less significant impacts on premenopausal and postmenopausal breast cancer (P<.54), cervical cancer (P<.78) and ovarian cancer (P<.19). A large Swedish study followed 13,123 obesity surgery patients and found no overall decrease in obesity-related cancers compared with the baseline incidence among obese individuals. No statistically significant trends were found for breast cancer (P<.60) or endometrial cancer (P<.83) over time. Therefore, efforts directed toward prevention of obesity might be more helpful than weight reduction in attempts to reduce the incidence of obesity related cancer.

Conclusion: Obesity is becoming more prevalent and has wide ranging effects on a variety of women’s health issues. Clinicians should counsel all women about the broad negative effects of obesity and the importance of controlling weight to prevent negative outcomes.

References:
Childhood Obesity – an Indian Perspective

J. Choudhury

Abstract:
Childhood obesity is a burden in both developed and developing countries. Overweight and obesity are caused by numerous social and environmental factors that influence people’s food habit and physical activity. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age. Childhood obesity can profoundly affect children’s physical health, social, emotional well-being and self esteem. Primary and secondary prevention are the mainstay plans for controlling this epidemic.

Key words: childhood obesity, prevention, evaluation.

Introduction:
Obesity has reached epidemic levels in developed countries. Childhood obesity is one of the most serious public health challenges of the 21st Century. The problem is global and is steadily affecting many low and middle income countries, particularly in urban population. The prevalence has increased at an alarming rate. Globally in 2010, the number of overweight children under the age of five is estimated to be over 42 millions. In developing countries their numbers are close to 35 millions.

The centre for Disease Control and Prevention defined “overweight” as at or above the 95th percentile of body mass index (BMI) for age and “at risk for overweight” as between 85th to 95th percentile of body mass index (BMI) for age. An Indian research study has defined overweight as between 85th and 95th percentile of BMI and obesity as 95th percentile of BMI. According to various studies the current prevalence of childhood obesity in India could range from 4% to 22%. A study conducted among 24,842 school children in south India showed that the proportion of overweight children increased from 4.94% of the total students in 2003 to 6.57% in 2005 demonstrating the time trend of this rapidly growing epidemic. Another school based study by International Obesity Task Force in 2011 reported the prevalence of overweight and obesity in 8 to 18-year-old children, was 14.4% and 2.8% by respectively.

Causes of Childhood obesity:

Dietary Factors: Dietary factors have been studied extensively for its possible contribution to the rising rates of obesity. The dietary factors that have been examined include fast food consumption, sugary beverages, snack foods. Foods served at fast food restaurants tend to contain a high number of calories with low nutritional values. Many studies have examined the link between sugary drink consumption and weight and it has been found to be a contributing factor to being overweight. Foods high in saturated fat, refined carbohydrates, and sweetened carbonated beverages are linked to obesity. Students often have ready access to high-calorie foods in school cafeteria and fast food shops located nearby.

Physical Activity: One of the factors that is most significantly linked to obesity is sedentary lifestyle. Each additional hour of television viewing per day increased the prevalence of obesity by 2%. Television viewing among young children and adolescents has increased dramatically in recent years. The increased amount of time spent in sedentary behaviours has decreased the amount of time spent in physical activity. Research which indicates the number of hours children spend watching TV correlates with their consumption of sweetened cereals, sweets, sweetened beverages, and salty snacks. Activity patterns in children have shifted from outdoor play to indoor entertainment like television, internet, and computer games. In many
developing countries, there is acute shortage of open spaces and playgrounds in schools and communities. Neighbourhoods are often considered unsafe for walking and other outdoor activities. An increasing pressure on academics and reduced emphasis on physical activity in schools is another contributory factor to weight gain.

**Environmental Factors** : The majority of children in the past walked or rode their bike to school. A Study conducted in 2002 found that 53% of parents drove their children to school \(^7\). 60% of parents said they drove their children to school as because their homes were too far away from the school. The relationship between Socio-economic Status (SES) and weight shows interesting dichotomy. Urban poor in developed countries appear vulnerable due to poor diet and decreased physical activity. Urban rich in developing countries remain at risk due to an increased affinity to the western type lifestyle. Increased prevalence of obesity in private schools could be the result of generous pocket money, easy access to calorie rich food, availability of domestic help and travelling to school by car.

**Tradition and Social Factor** : Socio-cultural factors have also been found to influence the development of obesity. Our society tends to use food as a reward, as a means to control others, and as part of socializing \(^9\). These uses of food can encourage the development of unhealthy relationships with food, thereby increasing the risk of obesity in developing countries. A common myth is that a fat child is a healthy child and that most of the obesity is baby fat, which will eventually go away as the child grows. Oils, ghee, and butter are believed to be essential to impart strength and increase growth. Left over on plates are strongly discouraged. Adolescent girls have very low levels of outdoor physical activity as they are expected to help out with household activities.\(^10\) Prenatal exposure to maternal smoking and absence or short duration of breastfeeding in infancy are some of the early life determinants of overweight and obesity.\(^11\)

**Family Factors** : Parental obesity is an important factor in predicting childhood obesity. The types of food available in the house and the food preferences of family members can influence the foods that children eat. In addition, family mealtimes can influence the type of foods that children eat. Family habits, whether they are sedentary or physically active, influence the childhood obesity. Studies have shown that having an overweight mother and living in a single parent household are associated with overweight and childhood obesity.

**Genetic & Psychological Factor** : Genetics are one of the biggest factors examined as a cause of obesity. Some studies have found that BMI is 25-40% heritable. However, genetic susceptibility often needs to be coupled with contributing environmental and behavioural factors in order to affect weight. The genetic factor accounts for less than 5% of cases of childhood obesity. Depression and anxiety problems lead to overeating and obesity.

**Secondary Causes** : Obesity due to endocrine disorders like hypothyroidism, Cushing’s syndrome and pseudohypoparathyroidism is far less common than exogenous obesity. Genetic diseases either monogenic (leptin deficiency, MC4R mutation) or pleiotropic genetic syndromes (Prader-willi, Bardet-Biedl) are extremely rare causes of childhood obesity. Hypothalamic defects may rarely cause obesity.

**Prevention of Childhood Obesity** :

The child and family should be counselled on appropriate nutritional and physical activity goals. The weight management programs can be conducted individually or in groups. Participation in a group can be stimulating for children and re-assuring to parents. It is vital to create long-term behavioural changes, which can last a lifetime and also address behavioural issues such as bullying and emotional eating. The Endocrine society of US recommends actions for childhood obesity prevention.\(^12\) Breast-feeding should be continued for a minimum of 6 months. Consumption of nutrient-poor foods (e.g sweetened beverages, fruit juices, and calorie-dense snacks) should be avoided. Portion control, reduced saturated dietary fat for children older than 2 years, increased intake of dietary fibers, fruits and vegetables, and timely meals particularly breakfast to avoid constant ‘grazing’ during the day are strongly recommended. Other recommendations include 60 min of daily moderate to vigorous physical activity. Screen time should be limited to 1-2h per day (American Academy of Paediatrics).
Clinicians should participate in efforts to educate children, parents, schools, and community in general about healthy lifestyle. Education of parents including parental role-modelling is pivotal. School systems should provide health education courses and ensure that only nutritionally sound food and drinks are available in the school environment. Regulatory policies should be designed to decrease the exposure of children to the promotion of unhealthy food choices. Orlistat is the only medication approved by USFDA for treatment of obesity in adolescents aged 12 years and older. Lifestyle modification should be maintained throughout the pharmacologic treatment.

**Consequences of childhood obesity:**
Medical consequences of childhood obesity have been linked to numerous medical conditions. These conditions include fatty liver disease, sleep apnoea, asthma, cardiovascular disease, high blood cholesterol, cholelithiasis, glucose intolerance and insulin resistance. Childhood obesity affects children’s and adolescent’s social and emotional health. Obesity has been described as being “one of the most stigmatizing and least socially acceptable conditions in childhood” overweight and obese children are often teased and bullied for their weight. They also face numerous other hardships including negative stereotypes, discrimination, and social marginalization.

**Academic consequences:**
Childhood obesity has also been found to negatively affect school performance. A research study concluded that overweight and obese children were four times more likely to have problems at school than normal weight children. They are also more likely to miss school more frequently, especially those with chronic health conditions such as diabetes and asthma, which can also affect academic performance.

**Policy formulation:**
Creation of national task force for obesity, decrease in taxes and price of fruits and vegetables, proper food labelling practice and quality monitoring are important. More playgrounds, parks and bicycle tracks will encourage more activity. Restriction on advertisement of commercial foods on television at prime time and during children’s program and ban on unfair nutrition claims for commercial products is necessary.

**Conclusion:**
The growing issue of childhood obesity can be slowed down if society focuses on causes of obesity. Combined efforts starting from home through school and community level are needed to prevent it. Nutrition education is the key for healthy eating habits and hence controlling this epidemic of obesity.

**Reference:**
Obesity and Metabolic Syndrome in Children: A Growing Concern

P.C. Panda¹, S.K. Panda², J.K. Panda³

Introduction:

Of late the burden of non-communicable diseases has up surged across the globe even in the developing world. Atherosclerotic Cardiovascular Disorders (ASCVD) are the leading causes amongst all mortality causes across the life span. Amongst traditional and non-traditional risk factors for such disorders there has been evidence that clustering of some of them simply multiplies the associated risks for the disorders. Such clustering, termed as metabolic syndrome in adults is being traced to be having its roots in childhood. In individuals with susceptible genes influenced by an obesogenic environment, factors like central obesity, insulin resistance, low grade metabolic inflammation trigger endothelial dysfunction as early as in early childhood to lead to manifest ASCVD. International Diabetes Federation has released a consensus definition for metabolic syndrome including criteria for children as low as six years of age. The syndrome has a worldwide prevalence of 3-4% children. Interventions towards primary and secondary prevention of ASCVD through lifestyle building and modification involving dietary regulations, physical activity, stress busting and pharmacotherapy have been found to be effective when begun in early childhood. Emerging evidences have supported novel interventions like probiotics, infant feeding practices, mode of birthing, maternal weight regulation, fecal transplantation, etc. to be tried against metabolic syndrome in children. Still there are many grey areas in the ever evolving concepts of metabolic syndrome in children and adults alike.

Key Words: metabolic syndrome, childhood obesity, overweight, type 2 diabetes mellitus, cardiovascular disease, atherosclerosis, Atheroscletic cardiovascular diseases, endothelial dysfunction, childhood obesity, lifestyle disorders, insulin resistance, non-alcoholic fatty liver disease, dyslipidemia, atherosclerosis.

The myths not so miniature

“Obesity is not a public health problem in children while malnutrition is prevalent everywhere”; “A fat child is otherwise healthy”; “With age ‘baby fat’ goes away”; “Children usually digest whatever they consume”; “Children are always physically active”; “Snacks prepared at home are not so healthy”; “Parents and teachers, teach the kids correct diet and lifestyle”; “A child usually does not develop high blood pressure or high cholesterol”; “Most life style diseases begin in adulthood”; “Most of the metabolic abnormalities if diagnosed in early childhood are treatable and reversible without long term outcome”.

These are the myths that reflect the current overwhelming sentiments, attitude and approach as regards obesity and cardiovascular risks in the children.

What is Metabolic Syndrome

Traditional risk factors (table.1) have been identified and validated for Atherosclerotic Cardiovascular Diseases (ASCVD). But concurrent presence of more than one of those factors simply multiplies the risk.
Metabolic Syndrome (MetS) is not a disease in itself. It has been defined as a cluster of risk factors of metabolic origin for ASCVD and type 2 diabetes mellitus (t2dm), which include abdominal obesity, high cholesterol, high blood pressure, diabetes (if not yet present) and high fasting plasma glucose [1].

Before WHO adopted the latest nomenclature in 1998, MetS has been known as Syndrome X, the Deadly Quartet, the Insulin Resistance Syndrome, Metabolic Cardiovascular Syndrome and Reaven’s Syndrome, etc.[2].

**Diagnostic Criteria of Metabolic Syndrome in Children**

There have been at least six different published definitions for MetS, as proposed by the World Health Organization (WHO), National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III), European Group for the Study of Insulin Resistance, American Association of Clinical Endocrinologists, American Heart Association/National Heart, Lung, and Blood Institute, and most recently the International Diabetes Federation (IDF), all with varying combinations of the listed risk factors [3-8].

In absence of a unified attempt and consensus towards a uniform definition of the condition it has been difficult to reflect on the prevalence of the paediatric metabolic syndrome. WHO definition (1998), (WHO) Working Group on Diabetes (1999) and the ATP III Criteria (2001) did not mention anything about paediatrics age group. [4-6]

The Revised ATP -III Criteria (2005) for the first time defined MetS in children in distinct way. It defines MetS between 12 -19 years as presence of three or more of the following features [9,10]:

1. Triglycerides > 110 mg/dl ;
2. High density lipoprotein cholesterol (HDL-C) < 40 mg/dl;
3. Systolic blood pressure or diastolic blood pressure > 90th percentile for age and gender;
4. WC > 90th percentile for age and gender;
5. Fasting blood glucose > 110.

IDF has laid down the following criteria for diagnosis of Pediatric MetS. Here the ‘essential’ component is central obesity, measured by waist circumference at a level midway between lower rib margins and iliac crest borders. Ethnicity-specific cut-off points have been selected in different populations. It talks about a platinum definition (research definition) as well.[10,11,12]

### Table 1. Traditional Risk Factors for CVD in Children [13,37]

<table>
<thead>
<tr>
<th>1. Constitutional</th>
<th>Family history of atherosclerosis Age Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Behavioral/lifestyle</td>
<td>Nutrition/diet Physical inactivity Tobacco exposure Perinatal exposures</td>
</tr>
<tr>
<td>3. Physiological</td>
<td>Blood pressure Lipids Obesity Glucose metabolism and insulin resistance</td>
</tr>
<tr>
<td>4. Medical diagnoses</td>
<td>Diabetes mellitus (types 1 and 2) Chronic/end-stage kidney disease</td>
</tr>
</tbody>
</table>

**Figure 1.A** An Obese child

**Figure 1.B** Mean Prevalence of MetS in boys and girls [11]

**I. Age less than 6 years:**
The MS is not defined due to lack of sufficient studies in this population.

**II. Age 6 years till 10 years:**
MS is not defined in this group as well. Risks are defined as follows;

Central obesity defined as WC of >95th percentile is taken as a risk factor for MetS; further work up is advocated if there is a family history of MetS, t2dm, hypertension, cardiovascular disease, dyslipidemia and/or obesity.

**III. Age 10 years or above:** Defined as criteria-1 plus any other two.
1. Central Obesity defined as WC > 90th per centile for ethnic reference values (in the above 16 yrs age group, ethnic specific absolute cut offs are used; South Asians Male > 90 cm and Female >80 cm)

2. TG >150mg/dl

3. HDL-C <40mg/dl for male /< 50mg /dl for female or on drugs for dyslipidemia (in the 10-16yrs age group <40 mg/dl in both sexes)

4. Blood Pressure- Systolic >130 or Diastolic > 85 mmHg or on drugs for hypertension

5. FBS > 100mg/dl or known t2dm

How common is MetS in Children

The prevalence of MetS is on the rise as a result of the global epidemic of obesity among children and adolescents [13]. Varied figures on prevalence have been reported due to use of different cut offs in childhood prescribed by various definitions [10,11].

In the maiden systematic review of all relevant literature published since 2003, covering 85 papers the median prevalence of MetS is found to be 3.3% (0–19.2%) amongst all children, 11.9% (2.8-29.3%) in the overweight children and 29.2% (10-66%) in obese children. The prevalence is a little higher for boys than girls (5.1% vs. 3.0%) and also in older compared with younger children (5.6% vs. 2.9%). Limited evidence was found to suggest differences between ethnic groups [10-13].

The prevalence of MetS in children increases directly with the degree of obesity. Each component of the syndrome worsens with increasing obesity and the association is independent of age, sex, and pubertal status.

It will take a few more years before there is an authentic report as regard the trend of MetS. In the NHANES-III study (1988-1994), the prevalence of MetS was 6.8% among overweight adolescents and 28.7 % among obese adolescents with an overall prevalence of 4.2%. The recent 1999–2000 dataset reports 12.7% prevalence in 12-19 age groups, a 38% increase. The prevalence has been 32.1% among adolescents with a BMI at or above the 95th percentile for age and gender, compared to 7.1% among those with BMI 85th-95th percentile, and 0.1% among those with a BMI < 85th percentile. Cook et al. have reported a prevalence of 4.2 percent for the metabolic syndrome in American adolescents of different ethnicities. Using ATP III criteria de Ferranti et al. found a much higher prevalence of nearly 10% of US children aged 12–19 years. A Canadian study reported a prevalence of 11.5 %. MetS has been a worldwide phenomenon; regional prevalence as reported by different studies are elaborated in Table.2.

<table>
<thead>
<tr>
<th>Region</th>
<th>Study</th>
<th>Age group</th>
<th>MS prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>North India</td>
<td>Singh et al.,2007</td>
<td>Children</td>
<td>4.2%</td>
</tr>
<tr>
<td>China</td>
<td>2002 NNH Survey</td>
<td>10-19 yrs</td>
<td>3.7%</td>
</tr>
<tr>
<td>Tehran, Iran</td>
<td>Azizi et al</td>
<td>10-19yrs</td>
<td>9.5%</td>
</tr>
<tr>
<td>US</td>
<td>De Ferranti</td>
<td>Children</td>
<td>3.1-12.7%</td>
</tr>
<tr>
<td>Mexico</td>
<td>Moran R et al</td>
<td>Children</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

With obesity on the rise in recent years, it is apt to predict that MetS is going to have rising trend as well. Globally the population of obese/overweight preschool children has simply increased by 60 % from 1990 to 2010 and 60% of them are from the developing nations.

The Starting Point for MetS

1. Central adiposity

Though the exact aetiology of MetS is still elusive, strong evidences favour the hypotheses that implicate central adiposity, insulin resistance, and low grade inflammation (meta-inflammation) [5]. In individuals with genetic predisposition, energy imbalance in an obesogenic environment leads to hyperplasia and hypertrophy of the adipose tissue especially in the visceral distribution, resulting in adipocyte dysfunction. This is manifest as oxidative stress and mitochondrial dysfunction mediated by the altered secretion of adipokines, inflammation, and insulin resistance at the cellular level.

Specific fat depots in body have distinct metabolic characteristics in terms of adipocytokine and cytokine secretion profile, sensitivity to hormones like norepinephrine or insulin and anatomical blood supply and drainage (portal vs. systemic).

Insulin promotes glucose uptake in muscle, fat, and liver cells and influences lipolysis and the production of glucose by hepatocytes. Fat deposits in liver and muscles leads to both tissues developing insulin
resistance. The normal adaptive response leads to higher insulin secretion and lower insulin clearance resulting in hyperinsulinemia.

Hepatic metabolic pathways not related to glucose homeostasis are undisturbed physiologically and lead to typical dyslipidemia and enhanced hepatic deposition of lipids often termed as NAFLD.

Other insulin-sensitive tissues/organs like kidney or ovary that do not share the pattern of enhanced lipid deposition within them, maintain their baseline insulin sensitivity and are exposed to a hyperinsulinemic state. Enhanced sodium retention and reduced uric acid clearance by the kidney potentially results in systemic hypertension. Increased androgen production by theca cells of the ovary manifests as polycystic ovary syndrome.

Hyperinsulinemia activates the sympathetic adrenergic pathways affecting the metabolism and secretion of proinflammatory cytokines as well as coagulation mediators. Reduced levels of adiponectin and increased inflammatory cytokines like seem to be non-traditional factors accompanying the classic components of the syndrome.

All of these processes involving the complicated cycle of lipid and glucose toxicity within stromal cells and tissue macrophages leads to development of oxidative and ER stress, chronic inflammation, and insulin resistance and acting on diverse organs in the body contributes to the development of ASCVD events. Traditional risk factors like family history, poor diet, and inadequate exercise, etc. do interplay with these non-traditional factors. (figure.2)

Early markers of atherogenesis like endothelial dysfunction have been associated with the presence of the MetS in adults, and a few studies have reflected comparable findings in childhood MetS as well. These studies revealed that obesity and its related peripheral insulin resistance seem to cluster with the majority of the traditional components of the syndrome, yet also cluster with other factors, such as increased fibrinolysis, endothelial dysfunction, and subclinical inflammation, which seem to be part of the typical metabolic milieu of the insulin-resistant individual yet are not routinely assessed or used for clinical decision-making.

Amongst the four identified clusters of risk factors for ASCVD (hyperlipidemia, obesity, t2dm and hypertension) studied in adolescents, obesity had the most substantial influence on cumulative cardio metabolic risk. Each component of the syndrome worsens with increasing obesity independent of age, sex, and pubertal status.

2. Genes

MetS is determined by the interplay of genetic and environmental factors. All the components of MetS are strongly inherited. In most cases, genetic factors predispose a person to a disease, while lifestyle factors determine whether (and when) the disease will develop. At present, no single gene or cluster of genes has been consistently replicated for MetS among different populations, probably due to the complex interplay
between gene and environment necessary for expression of this phenotype. Genome scans have identified strong links between certain candidate genes and MetS (table.3)

The ‘thrifty genotype’ hypothesis (Neel-1962) states that there are diabetogenic genes that confer a survival advantage accrued from generations of exposure to malnutrition and famine. In contemporary children with adequate nutrition these genes promote obesity and insulin resistance. To date no genetic markers have been shown to be consistently associated with t2dm or similar risk factors.

The ‘thrifty phenotype’ hypothesis (Hales and Barker-1992) proposes that, fetal malnutrition alters metabolic pathways to turn the fetus nutritionally thrifty or insulin resistant leading to underdeveloped beta-cells. The resultant insulin deficiency is a survival advantage if the person remains undernourished throughout life, but, conditions of adequate nutrition can result in insulin inadequacy and t2dm.

Drifty gene hypothesis or predation release hypothesis (Spearman-2008) overrules the earlier two notions. It stresses that the modern distribution of obesity stems from a genetic drift in the set of genes those encode the regulations on metabolism and set an upper limit of body fatness. When the ancestral humans ceased to be prey, such genes gradually became unnecessary and a genetic drift crept in through random mutations. In modern era some individuals inherit this predisposition and develop obesity and t2dm.

3. Birth weight and gestational age

Low birth weight, a marker of intrauterine adversity, has consistently been associated with a variety of adult-onset diseases, including t2dm, essential hypertension, dyslipidemia, coronary artery disease, and cerebrovascular accidents. A Meta analysis estimated that up to 35% of the cases of t2dm are attributable to reduced birth weight.

Prematurely born children aged 4-10 years especially before 32 weeks of gestation also have been found to have an isolated reduction in insulin sensitivity and are at increased risk for insulin resistance and consequent adult diseases; the degree of insulin sensitivity hardly in proportion to the degree of prematurity. There seems to be critical window during late gestation when insulin sensitivity is permanently altered.

In humans, pre-adipocytes begin to differentiate into adipocytes during late embryonic development, with a majority of differentiation taking place after birth. Increases in adipocyte size are associated with the late gestation and the pre-weaning period where as increases in adipocyte numbers generally occur post weaning.

4. Microbiome

A dysbiosis in the gut microbiota are associated with greater risk of diverse gastrointestinal and immune disorders like obesity, necrotizing enterocolitis, asthma, allergy, inflammatory bowel disease, etc. More over obesogenic bacteria favour high energy harvest from non-digestible carbohydrates via short chain fatty acids production and promote high energy storage via increasing hepatic denovo lipogenesis. The aberrant gut microbiota composition triggers a low grade inflammation and metabolic endotoxemia by allowing permeability of large glycolipid bacterial outer membrane called LPS (lipopolysaccharide), a powerful trigger of innate immune system response and is causally linked to chronic low grade inflammation leading to adiposity, insulin resistance, t2dm, nonalcoholic fatty liver disease and even atherosclerosis, in short MetS.

High fat and energy diets alter the composition of intestinal microbes, which in turn disrupts the energy storage, immune response and gut function. Latest research has found out that microbial contact may begin prior to birth, within the in-utero environment. After birth breast milk is the main source of comensals whose composition largely depends on the metabolic and immune status of the mother with the milk of

<table>
<thead>
<tr>
<th>Table 3. Candidate Genes associated with MetS([53,54,55])</th>
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<tbody>
<tr>
<td>1. Genes for monogenic obesity:</td>
</tr>
<tr>
<td>Leptin</td>
</tr>
<tr>
<td>Leptin receptor</td>
</tr>
<tr>
<td>Melanocortin receptor</td>
</tr>
<tr>
<td>Pro-opiomelanocortin</td>
</tr>
<tr>
<td>2. Genes for Free Fatty acid metabolism</td>
</tr>
<tr>
<td>Adiponectin</td>
</tr>
<tr>
<td>B-adrenergic receptor</td>
</tr>
<tr>
<td>Fatty acid binding protein -2</td>
</tr>
<tr>
<td>Lipases</td>
</tr>
<tr>
<td>Uncoupling proteins</td>
</tr>
<tr>
<td>3. Genes for insulin sensitivity</td>
</tr>
<tr>
<td>Peroxisome proliferator-activated receptor-γ</td>
</tr>
<tr>
<td>Glycogen synthase-1</td>
</tr>
<tr>
<td>Insulin receptor substrates</td>
</tr>
<tr>
<td>Skeletal muscle glycogen synthase-1</td>
</tr>
<tr>
<td>Calpain-10</td>
</tr>
<tr>
<td>4. Genes for lipid metabolism</td>
</tr>
<tr>
<td>CD36</td>
</tr>
<tr>
<td>Apolipoprotein e</td>
</tr>
<tr>
<td>m-β (oh) dehydrogenase-type-1</td>
</tr>
<tr>
<td>Upstream transcription factor-1</td>
</tr>
<tr>
<td>5. Genes for inflammation</td>
</tr>
<tr>
<td>TNF-α</td>
</tr>
<tr>
<td>CRP</td>
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obese mother containing less diverse bacterial genome. Formula feeding, antibiotic usage within the first two years of life, even the modality of birth (caesarian or vaginal), age and type of introductory complementary feeding, etc have been implicated to alter the human microbiota.

5. Diet

MetS is a consequence of multiple gene–environment interactions. The gradual increase in prevalence of overweight and obesity and MetS is clearly not caused by sole changes in the genetic makeup of the human species, but indicates the contribution of an obesogenic environment in terms of, such as low levels of physical activity and abundance of calorie-rich diets.

Adult studies have confirmed that Western dietary pattern (high in red/processed meat, fried food, high-fat dairy foods and sugar sweetened beverages) to be associated with adverse levels of cardiovascular risk factors, higher BMI and higher all-cause, ASCVD, and cancer mortality. Conversely, a Mediterranean diet (rich in fruits, vegetables, whole grains, fish, supplemented with olive oil or nuts) has beneficial effects on cardiovascular risk factors. Well controlled studies to support these findings are lacking in children. In a recent study among adolescent boys and girls, both obese/overweight or otherwise higher insulin sensitivity was observed across increasing tertiles of whole grain intake after adjustment for age, sex, race, Tanner stage, energy intake, and BMI.

6. Physical Activity

Obesity has been proved to be consequence of mismatched energy balance in the body. Physical inactivity promotes the development of obesity and modifies muscle insulin sensitivity. Physical activity is associated with lower levels of inflammatory cytokines and markers of oxidative stress and is correlated with insulin sensitivity in adolescents and with improved endothelial function and HDL-C, even in the absence of weight loss. Physical activity is beneficial for weight management and prevention of overweight and obesity in adults and children both.

Studies have correlated overweight and obesity among children and adults with sedentary behaviour, such as television watching although its effect on the development of insulin resistance and inflammation is still not known. In the Minnesota Heart Survey, children who watched at least 1 hour of television per day and had 1 or 2 overweight parents were at 15% or 32%, respectively, greater risk of being overweight than children with normal-weight parents. Furthermore, for each hour of television watched per day, the likelihood of a child being overweight increased 2%; overweight parents watched more television than normal-weight parents.

7. Stress

Stress has not spared the tiny age especially in the modern era lifestyle. Several psychological dysfunctions have been associated with obesity including binge eating, emotional eating, night eating, anxiety, sexual or emotional abuse, attention deficit disorder, depression and anxiety, etc. Psychological characteristics, including anger, depression, and hostility may be linked to increased risk for metabolic syndrome. In humans, stress, depression, and cortisol are linked to the MetS. MetS is equivalent to ‘Cushing’s syndrome of the abdomen’ with cortisol found to have increasing role in mediating visceral fat accumulation, insulin resistance, and T2DM in animal studies.

8. Other factors

Systemic review of researches on early life determinants of obesity have linked maternal weight, mode of delivery and complementary feeding practices to composition of gut macrobiotic and subsequent processes leading to metabolic effects like obesity and MetS in children and adults.

a. Maternal weight & gestational diabetes

There has been increasing evidences to link obesity in child bearing women, gestational diabetes and offspring obesity. Children who are large for age at birth and exposed to an intrauterine environment of either diabetes or maternal obesity are at increased risk of developing MetS. With obesity on the rise, these observations indicate towards a perpetuating the cycle of obesity, insulin resistance, and their consequences including MetS in subsequent generations.

b. Mode of delivery

Caesarean delivery has been associated with increased prevalence of obesity in childhood and
adolescence. The overall pooled odds ratio of overweight/obesity for offspring delivered by caesarean section compared with those born vaginally was 1.33; it was 1.32 for children, 1.24 for adolescents and 1.50 for adults. Vaginally delivered infants acquire a collection of bacterial communities similar to the mother’s vagina and skin; caesarean babies acquire different and less diverse bacterial population which mimics the microbiota of assisting personnel and the environment.

c. Formula feeding

Systematic reviews reflect that breastfeeding practice is associated with a modest reduction in occurrence of obesity, hypercholesterolemia and t2dm in later life. Formula feeding leads to higher postnatal growth velocity with the adiposity rebound occurring earlier in those children who have greater fatness later. Breastfeeding promotes slower growth, protects against overweight and obesity by inducing lower plasma insulin levels that mediates decreased fat storage and slower early adipocyte development. The underlying biological mechanisms centre around the unique composition of human milk and the metabolic and physiological responses to it.

The road from MetS to ASCVD; Early effects of MetS

ASCVD still ranks high amongst the causes of death worldwide. Though clinical manifestation is usually in the adult age recent epidemiological and pathological research has detected structural and functional changes relating to the atherosclerotic process or its precursors in heart and blood vessels as early as in early childhood itself. Autopsy studies have corroborated that the extent of early atherosclerosis of the aorta and coronary arteries is directly associated with levels of lipids, blood pressure, and obesity in childhood and adolescence. Non-invasive studies in peripheral vessels, a surrogate for coronary arteries, have demonstrated associations between subclinical atherosclerosis and cardio metabolic risk factors as early as childhood.

Most of the traditional risk factors for ASCVD in adults (table-12) have been established to be risk factors for such diseases or processes in children as well. Biomarkers for the process have recently established the onset in early childhood itself. Longitudinal studies of cohorts in which the metabolic syndrome cluster was present in childhood identified an increased incidence of bothT2DM and clinical cardiovascular events over a follow-up period of 25 years.

Endothelial dysfunction is the initial step in the atherogenetic process. Brachial artery structure and function in obese children have been found to be abnormal in terms of lower arterial compliance, lower dispensability, increased wall stress, increased incremental elastic modulus, impaired endothelial function, and increased insulin resistance compared with the normal-weight children.

Increased C-IMT (carotid artery intima- medial thickness), a common marker of preclinical atherosclerosis, have been reported to be high along with abnormal flow-mediated vasodilatation in adolescent offspring of adults with premature ASCVD as compared to normal controls[1521]. Such changes also have been detected in adults with increasing numbers of MetS risk factors measured in childhood.

Observations from autopsy studies by the Bogalusa Heart Study and the Multicenter Pathobiological Determinants of Atherosclerosis in Youth study and Massachusetts Medical Society Study clearly documented a strong co-relation between asymptomatic coronary atherosclerosis and ante mortem cardiovascular risk factors in young people. The prevalence and extent of the lesions in the aortic and coronary arteries related proportionally with the number of risk factors and also increased with age.

In epidemiological studies it has been reflected that, so far as ASCVD process is concerned, tracking of the cluster of the MetS components from childhood into adulthood has been shown to be stronger than the tracking of individual components. In an 8-year follow-up, the magnitude of overall multiple risk indexes tracking correlation was reported to be significantly stronger than that noted for individual risk factors.

Obesity is believed to represent a major risk factor for NAFLD, which is considered to be the liver presentation of the metabolic syndrome mediated through insulin resistance.Cardiovascular disease is the major cause of mortality in patients with NAFLD, so management must include modification of cardiovascular risk factors. As well.
MetS; Interventions in childhood, putting the brakes early

With the roots at both genetic and epigenetic levels, new scientific evidence highlights the need for a multifaceted approach for halting the genesis and progress of MetS and its consequence with focus on the whole life course of the human being. It should start even before conception. The environ must be made less obesogenic for the expectant mother, the pregnant, the parturient, the newborn, the infant, the child, the adolescent and the adult [7, 8].

1. Screening

a. Screening for glucose dysmetabolism

As per American Diabetic Association guideline, any overweight child with 2 risk factors should undergo t2dm screen. Overweight is defined as BMI of 85th per centile or higher for age and gender or weight-for-height of 85th centile or higher or weight for age beyond 1205. The listed risk factor include family history of t2dm in first/second-degree relative, at risk race/ethnicity (Native American, African-American, Latino, Asian-American, Pacific Islander) and signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, or polycystic ovary syndrome). Screening should start at 10 years or at puberty whichever is earlier. It shall be done every 2 years and shall include fasting plasma glucose estimation (table.4).

b. Screening for dyslipidemia

Universal screening is advocated for non-fasting non-HDL cholesterol level in pre-pubertal children (9 to 11 years) and again in individuals 17 to 21 years. Targeted screening is advised for the group 2-8 yrs and 12-16 yrs with enlisted list factors only.

c. Screening for hypertension

Children under 3yrs should undergo no routine blood pressure measurement. Screening is warranted in cases of neonatal complications, congenital heart disease, urinary/renal abnormality, solid-organ transplant, malignancy, drug prescription, or condition known to raise BP or increase intracranial pressure only.

Children aged 3-11 yrs should undergo annual screening. Cases of Pre-hypertension (between 90th-95th centile) weight management should be advised with a follow up after 6months. Stage-1 hypertension (5 mmHg above 95th per centile re-confirmed after a gap of 1 week) should undergo basic work up to rule out secondary causes. When the reading stands at 5mm/h above the 99th per centile declared as stage-2 hypertension and should be offered treatment.

In the 12-17 yrs category intervention along with weight management includes diet management as well. In the 18 to 21 yr age group Blood Pressure should be routinely measured at every heath care visits and labelled as Prehypertension, stage-1 hypertension and stage-2 hypertension when the reading is between 120/80 to 139/89, 140/90 to 159/99 and 160/100 respectively.

2. Dietary interventions

a. The age factor

The principal cause behind childhood obesity being energy imbalance diet is an important point of intervention against MetS in children as well.

Infants should be exclusively breastfed till six months of age with gradual introduction of complementary foods which are hygienic, homemade, tasty, nutritious, cheap and culturally acceptable. Fat intake in infants should not be restricted without medical indication. Fats are essential for neuronal growth and cellular growth.

Children above 2yrs of age shall be managed with two lines i.e. balancing calories to manage body weight and focusing on nutrient-dense foods and beverages. The former includes the concepts of controlling total calorie intake to manage body weight, increasing physical activity, and avoiding inactivity. The later emphasises on nutrient-dense foods and beverages and encourages the concepts of eating vegetables, fruits, whole grains, fat-free or low-fat dairy products, and seafood more often, and eating less often foods and beverages high in solid fats and added sugars and reducing sodium intake. Emphasis should be placed on low-fat, semi-skinned dairy products, lean meats prepared with no extra fat, avoidance of fried foods,
processed meat products and high-fat and in many cases high-sugar.

For children with risk factors (a positive family history of early cardiovascular disease, dyslipidemia, obesity, primary hypertension, DM, or exposure to smoking in the home) only a modified diet may be advocated beyond 12 months of age. For them total fat intake is limited to 30% of total calories, saturated fat intake is limited to 7-10% of calories, and dietary cholesterol is limited to 300 mg/day. The rest 20% of fat intake in diet should be a mixture of mono and polyunsaturated fats. Trans fats consumption is to be minimised. For infants only pure fruit juice is allowed maximum 4oz per day. For children beyond infancy beverages should be 100% fruit juice (from a cup), no more than 4 oz/d fat free unflavoured milk and non-sweetened beverages are allowed. Dietary fibre should be consumed at least ‘age +5’gm/day.

b. The plate composition:

In the US, the concept of ‘My Plate’ (U.S. Department of Agriculture/June 2011) or ‘My Eating Pyramid’ (Harvard School of Public Health) are practical guides towards diet for kids as well. As such National Institute of Nutrition, India recommends ‘Food Pyramid’ which describes daily food stuff consumption as different components like to be consumed adequately (carbohydrates, proteins,), liberally (fruits and vegetables), moderately (oil, meat) and sparingly (junk foods); It restricts the intake of saturated fat (butter, ghee, hydrogenated fats) and cholesterol(egg, organ meat and red meats). In simpler terms, a child should consume a fistful of carbohydrates, a palmful of proteins s and two fistful of vegetables in a meal.

c. Eating behavior

Eating behaviour inculcated in childhood persists for whole of life. The family should avoid out-eatings. Wherever possible, meals should be eaten as a family. Positive associations with food are created when mealtime is associated with an opportunity to share the day’s events in a calm, secure, anxiety-free and sharing atmosphere. Unpleasant and stressful meal times converts it into an exercise in satiating purely physiological needs and the child habitually eats as quickly as possible without enjoying the food itself. The child should be allowed to be involved in food choice and preparation and serving .Food should never be used as means of award or punishment for the child. Food likes and dislikes of individual family members including kids should not be catered to in the family.

c. Food frequency routine

Snack and meal time should be fixed and regular as far as practicable. Food grazing shall not be allowed; rather allow snacks or meal at intervals of every 2-4 hours. Water should be offered in case the child reports hunger before scheduled time. Breakfast regulates hunger throughout the day and, as with all meals, should not be missed. Consuming infrequent and large meals disrupts natural requirements and can contribute to the development of overweight. The role of school tiff in is paramount.

3. Physical activity

Energy balance is the key to obesity prevention and management even for children. The intervention focuses on both increasing physical activity as well as limiting physical inactivity. There is strong evidence that incremental moderate-to-vigorous physical activity is associated with lower systolic and diastolic Blood Pressure, decreased body fat, decreased BMI, improved fitness measures, lower TC level, lower LDL cholesterol level, lower triglyceride level, higher HDL cholesterol level, and decreased insulin resistance in children and adolescents.

Figure 4. The Healthy Eating Pyramid
a. Increasing physical activity

Children above 5 years must have 60 minutes of moderate to vigorous physical activity almost every day. In 3-5yrs age group the at least 20-60 minutes of such activity is advocated. The child should be involved in daily house chores.

b. Static exercises

The resting metabolic rate is higher in persons with more muscle bulk in the body. Every pound of muscle burns 6 calories a day at rest while each pound of fat burns only 2 calories daily. Static exercises aimed at muscle building may be helpful in reshaping the body and its composition especially during adolescence.

c. Decrease screen time

Screen time includes time spent with television, computer, tablet devices, smart phone and video games. AAP recommends less than 2 hours of screen time per day for all children beyond 2 years of age. Television-watching time and risk for overweight are highly associated. As per conclusions from a recent study girls who watched 2 hours or more television per day at ages 7, 9 and 11 yrs were over 13 times as likely to be overweight at age 11yrs. Children with a television in their bedroom are at higher risk for childhood overweight. Reduction in total number of hours of television and videocassettes was associated with a relative reduction in BMI.

4. Role of pediatrician/family physician/primary physician

Paediatricians themselves should be aware of the weight problems of obesity, MetS and other cardiovascular risk factors. They should incorporate into their regular practice counselling about infant feeding practices, screen time limitations, diet factors, physical activity, etc. Parental habits and life style components shall also be enquired about and suggested upon whenever opportunity is available. Timely interventions should be suggested and initiated to counter the syndrome.

5. School level interventions

Human lifestyle is delicately linked with culture, values, habits and education. Schools which engage almost one third of a child’s time has tremendous scope for imparting preventive life skills to mitigate the threats of obesity, MetS and other lifestyle diseases.

At the school removal of food vending machines, imparting compulsory physical education and the provision of nutritionally-balanced school meals are some of the initiatives which are advocated in some countries. Recess time, play periods and after school sports and physicals shall be encouraged. Safe walking and cycling to and from schools shall be encouraged with provision of cycle stand at school.

Health promotional activities for school staff shall be in place to make them aware of the problem ensuring healthy food in the cafeteria, exposure to seminars and workshop on health, nutrition and life style issues.

Regular measurement of body weight and height of students with nutritional counselling for parents and students is immensely helpful.

6. Societal endeavours

There should be support for individuals through sustained political commitment and the collaboration of many public and private stakeholders. Choice for regular physical activity and healthier diet should be made affordable, available and accessible for all section of the society. The food industry shall adopt policies to promote healthy diets by reducing the fat, sugar and salt content of processed foods, ensuring that healthy and nutritious choices are available and affordable to all consumers and practicing responsible marketing especially those aimed at children and teenagers. There shall be availability of healthy food choices and supporting regular physical activity practice in the workplace.
In order to make some headway at political level, WHO has developed the “Global Action Plan for the prevention and control of non-communicable diseases 2013-2020” which aims to achieve the commitments of the UN Political Declaration on Non-communicable diseases endorsed by many countries in September 2011. This Action Plan aims to build on the WHO Framework Convention on Tobacco Control and the WHO Global Strategy on Diet, Physical Activity and Health. The plan will contribute to progress on 9 global NCD targets to be attained in 2025, including a 25% relative reduction in premature mortality from NCDs by 2025 and a halting of the global obesity rates to those of 2010.

7. Parental role

Food habits of parents often shape the food habit of the offspring. An awareness and effort at parental level definitely reflects on the kids. The younger the child, the larger the role of parents on the child’s weight.

Young people with physically active parents are more likely to maintain an active lifestyle throughout adult life than those with sedentary parents. The environmental culture that children grow and develop is essentially determined by parents. Parents must understand the detrimental effects that poor eating habits, a sedentary orientation, and low fitness have on the metabolic syndrome. For parents to provide children with a healthy living environment, they must practice healthy living themselves. This should include regular health check-ups for themselves and their children. The idea of showing the child how to live, rather than telling the child how to live, is important for controlling this syndrome. Human behaviour is almost entirely acquired; to a greater or lesser extent, children model themselves on their parents’ behaviour. Young people with physically active parents are more likely to maintain an active lifestyle throughout adult life than those with sedentary parents. Enjoyable activities should be planned into free time for the entire family, wherever possible in natural surroundings.

8. Weight loss programme

Obesity is the main modifiable risk factor in MetS. A 5-10% weight loss is associated with improvement in risk factors for ASCVD. However as many as 50-70% drop out in any comprehensive weight loss programme enrollment. Data on effectiveness of such programme in the less than 6yrs age group is lacking. The success is typically better when parents are the focus of intervention. The impact of low glycemic load diet, low carbohydrate diet, fiber supplements or protein sparing modified fasts have failed to yield significant results in different studies in children. Obese children (BMI > 95th per centile) without co-morbid risk factors shall be enrolled for weight maintenance programme only for the excess weight balances out with increase in age especially before puberty. For obese children with co-morbid risk factors the goal shall be gradual weight loss not to exceed 1 lb/month in children aged 2 to 11 years or 2 lb/week in adolescents. So far use of medications for weight reduction is concerned the effect if any rebounds after stoppage of therapy. Drugs approved for use in children include Metformin (not approved for weight reduction only or in age less than 10yrs) and Orlistat (approved beyond 12 yrs of age).

9. Surgery

Proved to be quite promising in adults, bariatric surgery has been recommended for cases of severe obesity in adolescents (12-18yrs) using specific eligibility criteria even though the has been scarce reports on the results. In adults it has been seen to improve upon conditions likes. Pediatric population demonstrated beneficial effects on fasting glucose, BMI, fasting insulin, waist circumference, and body weight. Standardization of eligibility criteria for adolescents and further studies on safety and long-term efficacy of this approach are warranted.

10. Drugs

When changes in lifestyle alone do not control the risk factors related to MetS drug therapy may be resorted to. As such studies in children on utility of drugs to mitigate risk factors or consequences of MetS is scarce.

a. Antihypertensive

Pharmacotherapy is only resorted to when it crosses beyond 95th per centile and there is no improvement with life style intervention or there is evidence of target organ damage (microalbuminuria). Pharmacotherapy, when indicated, should always begin with a single drug, angiotensin-converting enzyme inhibitors being the usual drug of choice. Other
approved and acceptable drug classes for use in children include angiotensin-receptor blockers, α-blockers, calcium channel blockers and diuretics. Drugs should be titrated till the Blood pressure is under 95th per centile.

b. Antilipids

The 2008 AAP recommendations for the management of hypercholesterolemia in children are includes more comprehensive screening, emphasises on improving the quality of dietary fat rather than reducing the quantity of total fat consumption, has lowered the minimum age for drug use from 10 to 8 years, and chosen statins as the drug of choice over fibrates.

All statins listed are approved as an adjunct to diet to lower LDL cholesterol in adolescent boys and postmenarcheal girls aged 10–18 y (8 y for pravastatin). With statin therapy in children monitoring of drug adverse effects (like myopathy), drug interactions (with cyclosporine, niacin, fibric acid derivatives, erythromycin, azole antifungal agents, nefazodone, and HIV protease inhibitors) and growth and development are mandatory. These are contraindicated in pregnancy.

b. Antilipids

Table 5. Recommendations for Pharmacologic treatment of dyslipidemia in children [72,73]

<table>
<thead>
<tr>
<th>AAP</th>
<th>AHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CVD risk factors: Treat when LDL&gt;190mg/dl despite diet therapy.</td>
<td>No CVD risk factors: Treat when LDL&gt;190mg/dl.</td>
</tr>
<tr>
<td>Family History of heart disease or &gt; 2 additional CVD risk factors present: Treat when LDL&gt;160mg/dl despite diet therapy.</td>
<td>Risk factors present(elevated blood pressure, diabetes, strong family history of premature CVD) No CVD risk factors: Treat when LDL&gt;190mg/dl.</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Life style modifications recommended for all patients if LDL&gt;goal.</td>
</tr>
</tbody>
</table>

Bile acids sequestants like cholestyramine or colestipol are not indicated in children. Colesevelam is indicated as monotherapy or with statin for LDL cholesterol reduction in boys and postmenarcheal girls aged 10–17 y with family history after diet trial. Cholesterol absorption inhibitors and fibric acid derivatives are indicated in pediatric age group. Nicotinic acid is not approved for use below 2 years of age.

c. Metformin

Metformin, an insulin-sensitizing agent, lowers hepatic glucose production and promotes glucose uptake in muscles, Schwimmer et al., in 2005. Documented hepatic steatosis reduction in non-diabetic children with Metformin therapy for 24 weeks. Metformin also yielded improvement in prevalence and severity of hepatic steatosis and fasting insulin level in another placebo controlled trial in 2009. On the contrary a study by Nobili et al. failed to establish any advantage of the drug over lifestyle modifications on NAFLD. Recently, the TONIC study demonstrated that neither Metformin nor Vitamin E was superior to placebo in significant ALT reduction or histological improvement in NAFLD.

d. Bile acids

Ursodeoxycholic acid (UDCA), a hepatoprotective agent, is assumed to prevent NAFLD progression by protecting hepatocytes from bile salt-mediated mitochondrial injury, activating anti-apoptotic signalling pathways, and fulfilling immunomodulatory functions. But the practical utility of the therapy is yet to be proved.

e. PUFA

Polyunsaturated fatty acids include essential fatty acids, such as omega-3 and omega-6. Its anti-inflammatory and insulin sensitising properties helps in lowering of TG, rise in HDL and LDL cholesterol particle size thus justifying its potential use in dyslipidemia and NAFLD.

f. Other drugs

Pentoxifylline as a phosphodiesterase inhibitor it antagonizes the TNF-alpha pathway and has been shown to promote a reduction in serum ALT levels and an improvement in histological features. FXR agonists and TLR antagonists may be potential therapeutic targets for treatment of pediatric NAFLD. Incretin mimetics and dipeptidyl peptidase-4 (DPP-4) inhibitors increase insulin secretion. Glucagon-like peptide-1 (GLP-1) stimulates insulin secretion and inhibits glucagon release. These pharmacological agents represent potentially new therapeutic approaches to NAFLD treatment.

g. Probiotics

Studies undertaken on NAFLD animal models suggested that probiotics may reduce liver inflammation and improve gut epithelial barrier function. In 2005, Loguerico et al. evaluated the effect of a probiotic (VSL-3) in patients with chronic hepatopathies, including NAFLD and showed reduction in liver injury and improve liver function tests.
In 2011, a doubleblind, placebo-controlled pilot study was performed in obese children with persisting hypertransaminasemia and ultrasonographic bright liver. In this study, patients receiving probiotic therapy (Lactobacillus GG) exhibited a significant improvement in serum ALT and anti-peptidoglycan polysaccharide antibody levels that was independent of changes in BMI z score and visceral fat.

In the context of amelioration of insulin sensitivity and decreased adiposity, the potential of gut microbiota modulation with specific probiotics and prebiotics lies in the normalization of aberrant microbiota, improved gut barrier function and creation of an anti-inflammatory milieu. This would suggest a role for probiotic/ prebiotic interventions in the search for preventive and therapeutic applications in MetS and other related metabolic and immune disorders.

11. Novel interventions

Interventions still in conceptual or research stage thought to be potentially useful in prevention and treatment of MetS in children include fecal transplant, obesity vaccines and microbe based therapies among others.

Ongoing Dilemmas, Future Challenges

For MetS the concept is new; the definitions are evolving. Some are still sceptical about the necessity and utility of such a terminology. The aetiology and pathogenesis is still obscure .The childhood cut offs for insulin resistance or fasting glucose is still not beyond doubts. The exact relationship between different factors or constellation of factors to ASCVD outcome is still elusive. Role of bio-markers to identify and monitor atherosclerotic and other interplaying processes in early age is still experimental. Further research and exploration is the need of the hour.

References :

1. Weiss R. Childhood Metabolic Syndrome; Must we define it to deal with it? Diabetes Care 2011; 34: S 171-176.
2. Song et al. Genetics of the Metabolic Syndrome: Hospital Physician 2006; 5 1 – 6 1.
Management of Obesity: A Physician’s View Point

R.K. Goenka¹, A. Mohanty², J.K. Panda³

Abstract:
Obesity is a multi-factorial disorder, which is often associated with many other significant diseases such as Diabetes, Hypertension and Cardiovascular diseases, Metabolic syndrome, Osteoarthritis and Cancers of different parts. The prevalence of obesity is rising globally and in India mostly due to nutritional transition from typical carbohydrate diet to fast food dietary habits. Obesity and overweight are not only a problem of adults but also of the children and adolescents worldwide. Hence, prevention of obesity during childhood should be considered a priority, as there is a risk of persistence to adulthood is likely. The management of obesity will therefore require a comprehensive range of strategies focusing on those with existing weight problems and also on those at high risk of developing obesity. This article highlights various treatment aspects of obesity with special emphasis on the guidelines for day to day implementation.

Key words: Overweight, Obese, Body Mass Index (BMI)

Introduction:
Obesity is a vexing problem in the developed economies. For developing countries like India, morbid obesity has not yet become a public health priority, the reasons are still far from clear. Probably, India is, in our own eyes, still a country of poverty, hunger and malnutrition. Yet, statistics suggest otherwise. According to a study published in the noted journal Lancet, India is just behind USA and China in this global hazard list of top 10 countries with highest number of obese people. The US topped the list with 13 per cent of the obese people worldwide in 2013, while China and India together accounted for 15% of the world’s obese population. [1]

Worldwide, the proportion of adults with a body mass index (BMI) of 25 kg/m² or greater increased between 1980 and 2013 from 28·8% to 36·9% in men and 29·8% to 38·0% in women. The prevalence of overweight and obesity has increased in children and adolescents in developing countries 8·1% to 12·9% in Boys and 8·4% to 13·4% in Girls and in Indians from 16% in 2007 to 20.7% in 2014 for women and 12% in 2007 to 19.5% in 2014 for men. [1], [2] However, it is estimated that by application of the Asian guidelines, additional 10-15% of Indian population would be labeled as overweight/obese. [2]

Quantifying Obesity: The National Heart, Lung, Blood Institute (NHLBI) in 1998, The International Obesity Task Force, WHO in 2000 and the Western Pacific Regional Office (WPRO), WHO in 2000 have laid the following guidelines for quantifying obesity, vide Table 1.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Terminology</th>
<th>BMI (kg/m²)</th>
<th>Classification</th>
<th>BMI (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>Underweight</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Normal range</td>
<td>Normal</td>
<td>18.5–24.9</td>
<td>Normal range</td>
<td>18.5–24.9</td>
</tr>
<tr>
<td>Pre-obese</td>
<td>Overweight</td>
<td>25–29.9</td>
<td>Overweight at risk</td>
<td>25–29.9</td>
</tr>
<tr>
<td>Obese I</td>
<td>Obese I</td>
<td>30–34.9</td>
<td>Obese I</td>
<td>35–39.9</td>
</tr>
<tr>
<td>Obese II</td>
<td>Obese II</td>
<td>35–39.9</td>
<td>Obese II</td>
<td>≥40</td>
</tr>
<tr>
<td>Obese III</td>
<td>Obese III</td>
<td>≥40</td>
<td>Obese III</td>
<td>≥40</td>
</tr>
</tbody>
</table>

TABLE 1 (quantification of obesity)

COMPICATIONS: (Fat Mass Disease)

Obesity associated with co-morbid conditions like hypertension, dyslipidemia, type 2 diabetes mellitus (DM), coronary heart disease (CHD), metabolic syndrome, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, psychological problems and some cancers. [3] Obesity is also
associated with increased risk in all-cause and cardiovascular disease (CVD) mortality. With the reduction of weight in the overweight or obese people, can also reduce the above mentioned risk.

**METABOLIC SYNDROME:** The metabolic syndrome (syndrome X, insulin resistance syndrome) consists of a constellation of metabolic abnormalities that confer increased risk of CVD and DM. The criteria for its diagnosis are outlined in Table 2.

**TABLE 2 (NCEP:ATPIII 2001 and IDF Criteria for the Metabolic Syndrome)**

**MANAGEMENT:**

The primary goal of treatment is to improve obesity-related comorbid conditions and reduce the risk of developing future comorbidities.

Information obtained from the history, physical examination, and diagnostic tests is used to determine risk and develop a treatment plan (vide Figure 1). Setting an initial weight-loss goal of 10% over 6 months is a realistic target. [3] Therapy for obesity always begins with lifestyle management and may include pharmacotherapy or surgery, depending on BMI risk category (vide Table 3). [4]

5 A” model of lifestyle counselling: [5]

- **Ask:** Ask for permission to discuss body weight
- **Assess:** Assess BMI, Waist Circumference, Stage of Obesity
- **Advise:** Advise the patient about health risk of obesity, the benefits of modest weight loss, treatment options and long term strategy.
- **Agree:** Agree on realistic weight loss expectations, targets, behavioral changes and specific details of treatment.
- **Arrange/Aassist:** Assist in identifying and addressing barriers, provide resources, and arrange regular follow up.

**LIFESTYLE MANAGEMENT:** Because obesity is fundamentally a disease of energy imbalance, all patients must learn how and when energy is consumed (diet), how and when energy is expended (physical activity), and how to incorporate this information into their daily lives (behavior therapy). The principal components of an effective high-intensity, on-site comprehensive-lifestyle intervention includes:

1) prescription of a moderately-reduced calorie diet;

2) a program of increased physical activity; and

3) the use of behavioral strategies to facilitate adherence to diet and activity recommendations.

**A. DIET THERAPY** - The recommendations of the 2005 U.S. Department of Agriculture Dietary Guidelines for Americans include maintaining a diet rich in whole grains, fruits, vegetables, and dietary fiber; consuming two servings (8 oz) of fish high in omega 3 fatty acids per week; decreasing sodium to <2300 mg/d; consuming 3 cups of milk (or equivalent low-fat or fat-free dairy products) per day; limiting cholesterol to <300 mg/d; and keeping total fat between 20 and 35% of daily calories and saturated fats to <10% of daily calories. The revised Dietary Reference Intakes for Macronutrients released by the Institute of Medicine recommends 45–65% of calories from carbohydrates, 20–35% from fat, and 10–35% from protein. The guidelines also recommend daily fiber intake of 38 g (men) and 25 g (women) for those over 50 years of age and 30 g (men) and 21 g (women) for those under age 50.
Types of Energy reduced diets:

a. **Very Low Calorie Diet (VLCD)** - It is calorie controlled, vitamin/mineral fortified liquid meals. It provides <800 kcal/day. VLCD is recommended for the morbidly obese or for those in whom rapid weight loss is essential. [6]

b. **Low calorie diet** - (LCD) supplies >800 kcal/day, in the range of 1200–1600 kcal/day. Strategies in relation to LCD consist of three categories: a traditional reduced calorie diet plan that utilizes a food regimen, a meal plan of prepackaged foods and snacks that are vitamin/mineral fortified or a partial meal replacement (PMR) plan - one or two portioned-controlled, vitamin/mineral fortified meal replacements along with reduced calorie meal(s) and snacks. It provides a nutritionally balanced low fat, low energy meal. [6]

**Specific nutrients:**

a. **Oat fibre** - The common oat (*Avena sativa*) is a species of cereal grain grown for its seed. Oats are suitable for human consumption as oatmeal and rolled oats. [6,7]

b. **Conjugated linoleic acids (CLA)** - The United States Food and Drug Administration categorizes CLA as generally recognized as safe (GRAS) status for certain food categories, including meal replacement shakes. [8]

Potential mechanisms responsible for these antiobesity properties of CLA include: decreasing energy intake by suppressing appetite, increasing energy expenditure in white adipose tissue (WAT) mass, muscle, and liver tissue, or lean body mass, decreasing lipogenesis or adipogenesis, increasing lipolysis or delipidation.

c. **Whey Protein** - Whey is a general term that typically denotes the translucent liquid part of milk that remains following coagulation and curd removal during cheese manufacturing. All of the constituents of whey protein provide high levels of the essential and branched chain amino acids (BCAAs). [9]

**B. PHYSICAL ACTIVITY THERAPY** - The most important role of exercise appears to be in the maintenance of the weight loss. The 2008 Physical Activity Guidelines for Americans recommends that adults should engage in 150 min a week of moderate-intensity or 75 minutes a week of vigorous-intensity aerobic physical activity performed in episodes of at least 10 min, preferably spread throughout the week. A high amount of physical activity (more than 300 min of moderate-intensity activity a week) is often needed to lose weight and sustain weight loss. [3]

**C. BEHAVIORAL THERAPY** - Cognitive behavioral therapy is used to help change and reinforce new dietary and physical activity behaviors. Strategies include self-monitoring techniques (e.g., journaling, weighing, and measuring food and activity); stress management; stimulus control (e.g., using smaller plates, not eating in front of the television); social support; problem solving; and cognitive restructuring to help patients develop more positive thoughts about themselves. [3]

**PHARMACOTHERAPY** : Adjuvant pharmacologic treatments should be considered for patients with a BMI >30 kg/m² or a BMI >27 kg/m² for those who also have concomitant obesity-related diseases and for whom dietary and physical activity therapy has not been successful. [4]

**Classes of Drugs**-

A. Centrally Acting Anorexiant Medications,

B. Peripherally Acting Medications,

C. The Endocannabinoid System,

D. Newer Drugs

A list of drugs with their mechanism of action and side effects are outlined in Table 4.

**TABLE 4 (Drugs)**

**ALTERNATIVE MEDICINE** :

Epigallocatechin Gallate (EGCG - bio-active),
FIGURE 1. Algorithm for guiding obesity management
BMI, body mass index; Ht, height; Hx, history; Wt, weight
the most abundant catechin in green tea, has received the most attention as a potential anti-obesogenic agent. Caralluma fimbriata is an appetite suppressant. Hydroxycitric acid (HCA - bio-active), the principal acid of the Indian fruit Garcinia cambogia decreases body weight gain. SURGERY:

Indications— BMI > 40 kg/m2 OR BMI > 35 kg/m2 with co-morbidities like Hypertension, DM, Hyperlipidemia, Sleep apnea, Severe arthrosis, severe sleep apnoea. Candidates for Surgery : Age > 18 or < 60, failure of diet > 6 months, obesity history > 5 years, low risk for surgery, no endocrinological disease, psychologically sound.

References:

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Obstructive Sleep Apnea in Obese and Non-obese Patients of Odisha

S. Sahu¹, S. Dash²

Introduction:

Two epidemics that are gaining importance in 21st century in developing countries are Obstructive Sleep Apnoea and Obesity. Our understanding on sleep, its architecture and disease associated with sleep is evolving rapidly. Disorder of sleep is associated with much co-morbidity, like cardiovascular diseases, hypertension, congestive cardiac failure, atrial fibrillation, diabetes and pulmonary artery hypertension [1, 2]. Obesity predisposes to obstructive sleep apnoea (OSA), so in the light of current epidemic of obesity we expect an increase in the prevalence of OSA patients. Sleep disordered breathing is widely prevalent in India. Awareness of medical professional as well as the public attending the hospital for various reasons was poor with regard to the existence of sleep disorders, implications, and its treatment. Considering the health implications and poor awareness, there is a need to sensitize physicians and increase awareness among the public [3,4,5,6].

Study Design:

This is a case-control study, where we analyzed the patients presenting to us with clinical history suggestive of obstructive sleep apnoea from Jan 2010 to June 2015. A total of 419 patients were studied of which 292 patients (Group 1) underwent full night polysomnography and the rest 127 (Group 2) underwent overnight SpO₂ observation because they were unable to do polysomnography because of financial reasons and/or co-morbidities and serious illness. A brief clinical sleep history was obtained from the patients and/or the bed partner of the patient and the family members. Any associated co-morbidities were noted.

Of the 292 patient who underwent polysomnography, an apnoea-hypopnoea index > 5/hour was considered to be diagnostic of OSA. Apnoea is considered cessation of breathing for more than 10 seconds. Hypopnoea is decrease in flow of 50% with a desaturation of > 4% in SpO₂. Patients were classified as mild (AHI > 5 -15/hr), moderate (AHI 15-30/hr) and severe (AHI 30/hr) OSA. Patient with BMI >30 were considered as the obese. Patients were compared in respect to clinical variables, co-morbidities and polysomnographic data variables.

The rest 127 had desaturation of oxygen of >4% during sleep. Their clinical profile, sleep history and co-morbidities were recorded. Data was analyzed using SPSS software.
**STATISTICS:** The statistical analysis of the patients who underwent full night polysomnography is shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. (GROUP 1: FULL NIGHT POLYSOMNOGRAPHY)</th>
</tr>
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<tbody>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td><strong>BMI</strong></td>
</tr>
<tr>
<td>30-34.9</td>
</tr>
<tr>
<td>=35</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<td><strong>SEX</strong></td>
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<tr>
<td>MALE</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>AGE</strong></td>
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<td>MEAN±SD</td>
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<td><strong>SYMPTOMS PRESENT</strong></td>
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<tr>
<td>SNORING</td>
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<tr>
<td>SLEEP DEPRIVATION</td>
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<tr>
<td>DAYTIME SLEEPINESS</td>
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<td><strong>RESP. FAILURE PRESENT</strong></td>
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<td>COPD ASSOCIATED</td>
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<tr>
<td>BMI=35</td>
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<tr>
<td>BOTH COPD AND BMI=35</td>
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<tr>
<td>NO CAUSE</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td><strong>COMORBIDITIES</strong></td>
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<tr>
<td>COPD</td>
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<tr>
<td>CAD</td>
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<tr>
<td>HTN</td>
</tr>
<tr>
<td>HYPOTHYROID</td>
</tr>
<tr>
<td>DM</td>
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<tr>
<td><strong>NO. OF COMORBIDITIES</strong></td>
</tr>
<tr>
<td>NONE</td>
</tr>
<tr>
<td>ONE</td>
</tr>
<tr>
<td>TWO</td>
</tr>
<tr>
<td>THREE</td>
</tr>
<tr>
<td>FOUR</td>
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<tr>
<td><strong>SLEEP DISORDER SEVERITY (AHI)</strong></td>
</tr>
<tr>
<td>MILD (5 -15)</td>
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<tr>
<td>MODERATE (15 -30)</td>
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<tr>
<td>SEVERE (=30)</td>
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</tbody>
</table>
The statistical analysis of patients (group-2) who underwent overnight pulse oximetry to look for desaturation is shown in Table 2.
Results:

Among the 292 patients in group 1 who underwent full night polysomnography, 74.3% of the patients were obese with BMI > 30. Morbid obesity was found in 113 patients (52.07%) among the obese patients. Males were predominant in both the obese (74%) and the non-obese (75%) group. The age of presentation in both the obese (55.88±12.16) and non-obese (55.88±14.57) group was same. Symptoms of obstructive sleep apnoea in obese group were higher compared to non-obese group i.e. snoring 85% vs 74.7%, sleep deprivation 48.4% vs 40% and daytime sleepiness 71.9% vs 62.7% of the patients. Snoring was the most common symptom. On assessing the co-morbidities of the patients it was found that apart from coronary artery disease all other co-morbidities were higher among the obese group with hypertension the most common morbidity in both the groups. Prevalence of multiple co-morbidities i.e. two or more was more among the obese groups (36%) compared to non-obese group (20%). Polysomnography results revealed that the incidence of moderate and severe form of OSA was more in the obese patients than the non-obese group (moderate-18.9% vs 17.3%, severe-78.8% vs 76%).

Among the 127 patients in group 2, who underwent type-4 sleep study (nocturnal hypoxia detected by desaturation during sleep), mean age of presentation was 59.8 ± 12.68. Predominant patients were male (66.1%) and snoring was the most common symptoms (79.5%). Hypertension was the most common co-morbidity. Two or more co-morbidity was present in 45.7% of cases.

Among all 419 patients, 122(29.11%) patients in total from both the groups presented with respiratory failure. 99 (81.1%) patients either has COPD or BMI > 35 or both. Only 23 (18.85%) patients (8 patients in group 1 and 15 patients in group 2) presented respiratory failure with a BMI<35 and did not have COPD.

Discussion:

Obstructive sleep apnoea is a sleep disorder breathing where there is obstruction to the flow of air to the lungs leading to complete cessation of airflow in spite of persistent drive from the brain and contraction of thoracic muscles and diaphragm during inspiration. Pathophysiology associated with OSA includes anatomic compromise, pharyngeal dilator muscle dysfunction, lowered arousal threshold, ventilatory control instability, and/or reduced lung volume. It results in of repetitive collapse of the upper airway that leads to snoring, frequent episodes of sleep interruption, hypoxemia, hypercapnia, swings in intrathoracic pressure and increased sympathetic activity [7]. The cardinal symptoms include snoring, witnessed apnoeas, excessive daytime sleepiness, fatigue, irritability, poor concentration and poor memory. In India the prevalence of OSAS (obstructive sleep apnoea syndrome) is 2.4% to 4.96% in men and 1% to 2 % in women [13,7]. The standard diagnostic test for OSA is an attended in-laboratory polysomnography (PSG) or portable monitoring (PM). PSG is supervised by a trained technician with at least seven channels. Mild, moderate, and severe OSA is defined as AHI (Apnoea-hypopnoea Index) of 5-15 events/h, 15-30 events/h, and > 30 events/h, respectively. Men have a twofold higher risk for OSA than that of women [14]. Our study also found a male predominance.

Obesity is considered as a predisposing factor for OSA [8,9]. Patients of OSA who gain 10% of their baseline weight are at a six-fold-increased risk of progression of OSA, and an equivalent weight loss can result in a more than 20% improvement in OSA severity [10]. Obesity may worsen OSA because of fat deposition at specific sites. Fat deposition in the tissues surrounding the upper airway appears to result in a smaller lumen and increased collapsibility of the upper airway, predisposing to apnoea [11]. Although there is compelling evidence showing that obesity, as well as visceral obesity may predispose to OSA, and that losing weight results in OSA improvement, recent studies suggest that OSA may itself cause weight gain [12,13]. Factors such as reduced activity levels and increased appetite, particularly for refined carbohydrates, may conceivably contribute to weight gain in OSA patients [12,13]. Our study found that most of our patients (74.3% in group 1 and 83.46% in group 2) were obese with BMI > 30. Studies in predominantly white populations have found that OSA is associated with premature mortality, and obese individuals have a lower life expectancy compared to normal BMI counterparts [21].
Patel et al reported a significant correlation between AHI and anthropomorphic adiposity measures (ranging from 0.57 to 0.61), suggesting that obesity could explain nearly 40\% of the genetic variance in sleep apnoea [15]. Similarly our study also found that the severity of OSA was more in the obese individuals than the non-obese OSA patients. Several cardiometabolic alterations have been associated with OSA, independent of obesity and other potential confounders. Among the most important are diabetes and cardiovascular disease [16, 17]. Among the co-morbidities hypertension, obesity, Type-2 diabetes mellitus (DM), chronic ischemic heart conditions, COPD, hypothyroid, hypercholesterolemia, and hypertrophy of tonsils and adenoids are conditions frequently associated with OSA in decreasing frequency [20]. Our study also found that HTN is the most common co-morbidity associated in both the group followed by diabetes with a higher incidence of DM and cardiovascular co-morbidities including CAD and HTN among the obese patients. Multiple randomized studies have also found that weight loss can cause improvement in the severity of obstructive sleep apnoea [18,19].

Clustering of obesity, hypertension, dyslipidaemia and insulin resistance is called Metabolic Syndrome (MS). A north Indian population-based study [22] found the prevalence OSA with MS to be 77\% compared to 40\% in normal controls. Syndrome Z is defined as the co-occurrence of obstructive sleep apnea (OSA) and metabolic syndrome. Considerable proportion of community-dwelling northern Indian adults(4.5\%) have syndrome Z. Age, male gender, percent body fat and severity of nocturnal desaturation were independent risk factors for syndrome Z. Patients with OSA & COPD overlap have more severe hypoxemia and hypercapnia. So also our study demonstrated that respiratory failure is more common among patients either having COPD or morbid obesity or both of it.

Treatment of OSA includes reduction of weight, avoidance of sedatives and nasal CPAP during sleep. Adequate treatment reduces blood pressure in hypertensives, reduces risk of developing hypertension, reduces risk of atrial fibrillation and its recurrence and risk of heart failure, decreases insulin resistance apart from improving neuropsychiatric manifestations and daytime symptoms. It also reduces risk of accidents [16, 17,21].

The limitation of the study is that the patients were from a tertiary care corporate referral hospital. Therefore the group may have consisted of more obvious and sicker patients with high proportion of them presenting with respiratory failure.

**Conclusion :**

Our study is the first ever study in our state of Odisha where we analysed patients with obstructive sleep apnoea. Our studies also confirmed previous studies that most of the OSA patients are obese. Co-morbidities were more common among the obese patients and they were more symptomatic than the non-obese group. Severity of the OSA was also more in obese patients. COPD and BMI >35 associated with OSA are more prone to develop respiratory failure. OSA and Obesity prevalence is increasing in India so also in our state. Patients with obesity and multiple co-morbidities must be screened by questionnaires for OSA and those with high suspicion for OSA must undergo a polysomnography. Early treatment of OSA patients with CPAP devices and regular exercise not only will improve the symptoms but also help in prevention, progression and better control of co-morbidities like hypertension, cardiovascular diseases, arrhythmias, sudden death and diabetes mellitus.

**BIBLIOGRAPHY**


Measurement of activity of serum enzyme Glutathione-S-transferase as a tumor marker in stomach cancer

R. Ambad¹, M. Agnihotri ², S. Nagtilak³, H.K. Tripathy⁴, S.R. Panigrahy⁵

Abstract:

Glutathione-s-transferase (GSTs) is a family of enzymes involved in detoxification of foreign compounds. They participate in antioxidant defenses through several mechanisms including reactive oxygen species. GSTs catalyze the binding of large variety of electrophiles to the sulfydryl group of glutathione yielding less harmful and more water soluble molecules, which can be excreted via bile or urine. Since most reactive, ultimate carcinogenic forms of chemicals are generally electrophiles, GST takes considerable importance as a mechanism for carcinogen detoxification. Efforts for early diagnosis of stomach cancer have been spread over the past two decades with limited success and tumor markers are appealing tools for this purpose. Keeping this in view the present study was undertaken to determine the activity of serum GSTs in different stages of stomach cancer.

Keywords: GST, Stomach Cancer, Tumor marker, Chemotherapy.

Introduction:

Several modifiable environmental, dietary and habitual risk factors have been associated with development of gastrointestinal cancers, causal relationship between tobacco usage and gastrointestinal malignancies have been demonstrated for several decades. Dietary factors that have been closely associated with stomach cancer are western style breakfast, diets high in antioxidants and diets low in salt. The incidence rate of stomach cancer is 5.7 per 100,000 men and 2.8 per 100,000 women. Tobacco, which is widely used in India, is major cause of the cancer of the upper digestive and respiratory tract [1, 2]. Upper gastrointestinal cancers are highly lethal diseases unless diagnosed early.

In the recent year’s glutathione-S-transferase (GSTs) has attracted interest in the field of cancer because their activity is readily increased in chemically induced tumors [3, 4]. They have a considerably important role in detoxification of carcinogens. GSTs are present in many species and tissues of the human gastrointestinal tract. Likewise, the human GSTs were found to be over expressed in most of the tumors[4, 5].GSTs expression in response to tumor formation is probably a resistance mechanism by which cells can survive, and the source of plasma enzymes mainly transformed cells with over expression of GSTs. Indeed GSTs are one of the enzyme systems induced by anticarcinogens and thus can prevent tumor formation. GSTs have also been suggested to play an important role in multiple drug resistance in cancer chemotherapy[6]. In view of this, present study was under taken to assess, the clinical utility of GST enzymes in stomach cancer.

Material and Methods:

a. Selection of Patients

Total 42 cases of carcinoma of stomach were selected for this study. They were divided in three groups as normal control, stage II stage III. In normal control consist of 40, stage II group consist of 21 and stage III group consist of 21. All patients were clinically and histological diagnosed. All patients with stage-III received chemotherapy including cisplastin, cyclophosphamide and doxorubicin. Out of 42 patients 28 were males & 14 were female of stomach carcinoma were selected for this study. For normal
control total 40 normal healthy age and sex matched persons were selected. GSTs activity was measured in the serum of control group (n=40) and in patients with stomach cancer (n=42). Subjects with stomach cancer and those without any evidence of any type of cancer participated in this study as listed intable.

TABLE-1 : Distribution for control and patients of stomach cancer

<table>
<thead>
<tr>
<th>Number of subjects (male/female)</th>
<th>Age-range (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>40 (24/16)</td>
</tr>
<tr>
<td>Stomach cancer</td>
<td>42 (28/14)</td>
</tr>
<tr>
<td>Stage II</td>
<td>22 (15/08)</td>
</tr>
<tr>
<td>Stage III</td>
<td>21 (13/08)</td>
</tr>
</tbody>
</table>

TABLE-2 : Comparison of serum GST activity in control with stomach cancer

<table>
<thead>
<tr>
<th>No. Of cases</th>
<th>Mean ± SD</th>
<th>No. of cases (Value&gt; normal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GST Control</td>
<td>40</td>
<td>5.36±0.59</td>
</tr>
<tr>
<td>GST</td>
<td>42</td>
<td>10.30 + 2.35</td>
</tr>
</tbody>
</table>

b. Collection of samples

5ml of fasting blood sample were collected in plain bulb. Serum was separated and used for determination of activity of glutathione-s-transferase. Serum GSTs activity was measured by, using 1-chloro-2, 4 dinitrobenzene as substrate (purchased from Sigma company), according to the procedure described by Habig et al [7].

Data were expressed as mean ±SD. Mean values were assessed for significance by unpaired student “t” test. Probability values p < 0.05 were considered statistically significant.

Results:

Mean GSTs activity in serum was significantly higher in patients with stomach cancer as compared to control group (p<0.001). The patients of stomach cancer after chemotherapy had significantly elevated activity of serum GSTs than before chemotherapy.

As shown in table 3 mean serum GSTs activity (mean±SD) in control using CDNB as substrate was5.36±0.59 IU/L. Serum GSTs activity of stomach cancerous patients was 10.30 + 2.35IU/L. GSTs activity was significantly higher in stomach cancer patients than control (p<0.001). The 39 of 42 patients of stomach cancer had increased activity of serum GSTs.

Table-3 : Serum GST activity in stomach cancer patients before and after chemotherapy.

<table>
<thead>
<tr>
<th>No. Of Cases</th>
<th>Mean ±SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>40</td>
<td>5.36 ± 0.59</td>
</tr>
<tr>
<td>Before Chemotherapy</td>
<td>21</td>
<td>8.43 ± 1.95</td>
</tr>
<tr>
<td>After Chemotherapy</td>
<td>21</td>
<td>12.02 ± 1.09</td>
</tr>
</tbody>
</table>

(All Values are expressed in IU/L) * Stage-II vs Stage-III

Discussion:

Glutathione-s-transferase (GSTs) is a family of enzymes involved in detoxification of foreign compounds. They participate in antioxidant defenses through several mechanisms including reactive oxygen species [8]. GSTs catalyze the binding of large variety of electrophiles to the sulfydryl group of glutathione yielding less harmful and more water soluble molecules, which can be excreted via bile or urine. Science most reactive, ultimate carcinogenic forms of chemicals are generally electrophiles, GST takes considerable importance as a mechanism for carcinogen detoxification [9].

The ability of the GSTs to provide cellular protection against a wide variety of xenobiotics makes this enzyme family an attractive candidate biomarker of both cancer susceptibility and chemopreventive activity[3, 6].

In the present study serum GST was significantly higher (p<0.001) in patients with stomach cancer as compared to those obtained from normal healthy control group (TABLE 2). Similar findings reported by G.S.Mohammadzadeh et al[4]. The increased activity of total GSTs in serum can be due to over expression of isoenzymes of GST in tumor tissues. GST- δ class was found to be over expressed in most of tumor[10, 11]. However, there are doubts over the use of total GSTs activity as a marker for all types of tissues. The GSTs activity of plasma represents a non invasive biomarker of cellular protection. The strong correlation between the GST- δ activities of plasma and stomach tumor tissues has been reported (12). Our result showed a significant increased (p<0.001) activity of GSTs in stage-III (received chemotherapy) than stage-II patients (TABLE 3). Many studies also showed progressive increase of GSTs with advancing
cancer and has been associated with poor prognosis and development of drug resistance [10-13]. K.Johansson et al [13] reported GSTs protect the cells from lipid peroxidation and $\text{H}_2\text{O}_2$ which is increased by cisplatin, a chemotherapeutic drug. Our results show the association of serum GST and chemotherapy in stomach cancer.

Elevation of serum GST activity in stomach cancer is probably resistance mechanism by which cells can survive and sources of plasma enzyme is mainly transformed cell with over expression of GST. Thus progressive increases of enzyme GST with advancing cancer have been associated with poor prognosis. Elevated level of GST may be associated with development of drugs resistance in both oesophagus and stomach cancer.

**Conclusion**:

Serum GSTs measurement in plasma may be useful tumor marker in stomach cancer and serum GSTs activity might be helpful to predict the response of chemotherapy in advance stages of cancer. GST values are helpful in predicting the radiation response. Overexpression of GST in neoplasia may be causal, allowing replicative advantage, or casual, accompanying clonal expansion. The major limitation to its widespread use is the length of time needed for performance of the assay and until this is overcome, it will remain primarily a research tool.

**References**:

Clinico - Pathological profile and management of Acute suppurative thyroiditis leading to Thyroid Abscess - Our experience in 11 cases

K. C. Mohapatra1, G. Panda2, R. Minz3, A. Patra4

Abstract:
A retrospective study was carried out on 11 patients with thyroid abscess between 27-65 years of age, who were treated in the Department of Surgery of SCB Medical College and Hospital, Cuttack during the period of 1998 – 2014. All patients were examined clinically after taking a detailed history and were investigated by routine biochemical test, Thyroid function test (TFT), ultrasound (USG), X- Ray neck, X- Ray chest and fine needle aspiration and cytology (FNAC). Aspiration of the swelling over neck was done in all cases and the aspirated material was sent for gram stain, culture and sensitivity. Empirical antibiotic was started in the form of 3rd generation cephalosporins followed by culture specific antibiotic. 3 patients underwent conservative treatment with proper antibiotics and rest 8 underwent Incision and drainage (I & D) under local anaesthesia (LA). Out of these 8 cases 5 cases came back with residual goitre and underwent thyroidectomy. Aetiology of Thyroid Abscess was studied in each case. Youngest patient was 27 years old and eldest being 65 years. All the patients in this study were female.

Keywords: Acute suppurative thyroiditis, Thyroid abscess, Thyroidectomy , thyroid function test.

Introduction:
Thyroid Abscess is very uncommon of all thyroid disorders with an incidence of < 1% and those resulting due to AST represents only 0.1 to 0.7% of surgically treated pathologies[1]. Because of its rarity and unusual clinical feature the diagnosis of acute suppurative thyroiditis is often delayed leading to abscess formation with all the inherent dangers of advanced suppuration in the neck. Pre-existing thyroid abnormality associated with immune deficiency state like diabetes mellitus (DM), Human immune-deficiency virus infection (HIV) and cancer pre-dispose this infections complication. India being the diabetic capital of the world adds to more of incidence of Acute Suppurative Thyroiditis due secondary immune deficiency. Recently there has been an increase in immune compromised state in the population due to rise in DM type -2. Immuno-suppression therapy in arthritis, Chronic Renal failure, Anaemia, Hypoproteinemia and cancer also contribute to thyroid abscess etiology. Staphylococcus aureus and streptococci have been reported as the most common causal organism with frequent isolation of mixed flora. Though some of the literature report Klebsiella[2], Salmonella typhi[3], Salmonella bradenberg[4], Eikenella corrodens[5] as the isolated organism. When Acute Suppurative Thyroiditis occurs in children there is a pre-existing pyriform sinus congenitally[6]. But this is not seen in our population. Hence the underlying pathology and immune deficient state needs to be tackled simultaneously not only to prevent acute infectious state of AST but also to avoid its progression to thyroid abscess.

The objective of the present paper is to study the etiology, clinical features, pathology, biologic behaviour and management of Thyroid Abscess in Indian patients.

Materials and methods:
A retrospective study was carried out on 11 patients aged 27 to 65 years who were diagnosed cases of thyroid abscess and were treated for the same during the period 1998–2014 in the Department of Surgery, SCBMCH, Cuttack. All the patients presented with complain of pain , fever with chills and rigor and on examination all the patients had redness,
tenderness and induration over the thyroid. After taking detailed history and complete clinical examination, all of the patients were subjected to routine biochemical tests, TFT, USG of neck, X-RAY NECK, X-RAY CHEST and FNAC. Following FNAC in all cases, the sample was sent for cytology, gram stain, AFB and culture sensitivity.

**Observation :**

Female preponderance (11/11), All the patients had pre-existing goitrous pathology, all the patients were euthyroid, ESR was raised in 4 cases.

**TABLE 1 SHOWING PATIENT DATA :**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OF PATIENTS</td>
<td>11</td>
</tr>
<tr>
<td>MALE:0</td>
<td></td>
</tr>
<tr>
<td>FEMALE:11</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>27 – 65 years ; mean=41.72; SD=11.9423</td>
</tr>
<tr>
<td>PRE-EXISTING GOITRE</td>
<td>6</td>
</tr>
<tr>
<td>DYSPHAGIA</td>
<td>1</td>
</tr>
<tr>
<td>IMMUNEDEFICIENCY</td>
<td>7</td>
</tr>
<tr>
<td>FRANK ABSCESS WITH NECROSIS</td>
<td>3</td>
</tr>
</tbody>
</table>

**TABLE 2 SHOWING TREATMENT DATA :**

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>NO OF CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSERVATIVE</td>
<td>3</td>
</tr>
<tr>
<td>I &amp; D</td>
<td>8</td>
</tr>
<tr>
<td>THYROIDECTOMY</td>
<td>5</td>
</tr>
</tbody>
</table>

**Discussion :**

The age of the patients in this study group ranged between 27-65 years with the youngest being 27 years and oldest being 65 years. Majority of the cases fall in the age group of 30-50 years with a median age of 41 years. The present study showed similar results to Jose R J et al[7], Afroze et al[8], Mitra et al[9] i.e, 36, 40 and 40 respectively with similar range of age group.

The sex distribution in the present study showed female dominance ( 11/ 11). Other series report also showed female dominance with Popivanov et al[10] showing a ratio of 1: 17 similar to the present study.
The clinical features encountered in our study like warm, tender and fluctuant mass with erythematous and oedematous skin and presence of dysphagia showed similar results with Rohondia et al (11).

The most common organisms isolated in this study were staphylococci and streptococci species which showed similar results to Lamani et al(1) and Rohondia et al. On the contrary Queen et al reported eikenella corrodens as the causative organism in AST infection(5). Literature by Landin et al report klebsiella as causative organism of AST(2). Chivato et al report salmonella bradenburg as causative organism of AST.

Immunocompromised state is one of the main cause of AST in adults as observed in this study which is similar to the study conducted by Lamani et al were thyroid abscess was seen in immune compromised patient(1). On the contrary AST in children is due to anatomical defect i.e, pyriform sinus fistula where AST has tendency of recurrence as observed by Akira Miiyauchi et al(6).

Conclusion :

In our series thyroid abscess was exclusively found in females. A secondary immune deficient state was present in most of the cases which had led to abscess formation along with Pre-existing goitre. Aggressive infection with necrosis of skin and other soft tissues was an accompaniment in late, neglected and diabetic patients. Multilocular and bilateral involvement was also observed. Clinical features, physical examination, FNAC and USG led to diagnosis in all cases. Conservative treatment was effective in early stage. Incision and drainage followed by culture specific antibiotic is the mainstay treatment. Hemithyroidectomy / total thyroidectomy is required in residual goitres disease. Underlying cancer is one of the causes of abscess.

Bibliography :

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Profile of Colonoscopic Findings in a Tertiary Care Centre in Coastal Eastern India

G.K. Pati¹, S. Panda², S. Parida¹, J. Narayan¹, P.K. Padhi¹, P. Parida¹, P. Nath¹, S.C. Jayasingh³, C. Panda², S.P. Singh³

Abstract:

The objective of this study was to find out the profile of the colonoscopic findings in patients undergoing colonoscopy at a tertiary care referral hospital in Coastal Eastern India. Consecutive cases with lower gastrointestinal (LGI) related complaints were subjected to colonoscopy during the period from January 2015 to November 2015. The subjects consisted of 515 cases aged between 1 to 85 years. Mean age± SD (Standard deviation) of the patients was 43.91±17.65 years. 336 (65.24%) cases were males and 179 (34.75%) cases were females. In the present study 27 (5.24%) cases were children (aged < 15 years) and 488 (94.75%) cases were adults (Age > 14 years). The most common indications for colonoscopy were intermittent lower gastrointestinal (LGI) bleed in 60% cases followed by chronic diarrhea in 40% cases, intermittent lower abdominal cramping pain and loose motions in 30% cases, intermittent constipation in 20% cases and painful defecation in 15% cases. Out of 515 cases 35.53% cases had normal colonoscopy findings, 12.23% cases had internal hemorrhoids, 8.93% cases had rectal growth, 6.99% cases had colonic growth, 6.6% cases had ulcerative colitis, 6.01% cases had anal fissure, 4.07% cases had infective colitis, 3.68% cases had rectal polyps, 2.71% cases had ulcerative proctitis, 2.52% cases had colonic polyps and 1.16% cases had Crohn’s disease. In our study, we found that females suffered from inflammatory bowel disease (ulcerative colitis and Crohn’s disease), colonic growth, rectal growth and polyps, idiopathic colonic ulcers, nonspecific colitis and proctitis more commonly, whereas males suffered from internal hemorrhoids, fissure in ano, infective colitis, idiopathic rectal ulcers, ulcerative proctitis and anorectal growth more commonly. Besides, we also found that females had more colon related abnormal colonoscopic findings compared to males, whereas males had more anorectal abnormal colonoscopic findings compared to females.

Keywords: Colonoscopy, colorectal cancer, lower gastrointestinal bleed, ulcerative colitis

Introduction:

Colonoscopy is considered as the gold standard for investigation of diseases affecting the large intestine. It is the screening investigation of choice for colorectal neoplasms. Colonoscopy is routinely performed for lower gastrointestinal (GI) symptoms especially bleeding. There is paucity of data on the yield of colonoscopy for its different indications from Odisha and other parts of India especially in the context of lower GI bleed and cancer. Colonoscopy (screening and therapeutic) is one of the leading reasons for the recent reduction in deaths from CRC (colorectal cancer) in the United States of America. The first successful report of total colonoscopy was in 1966 by Overholt and Pollard. However, colonoscopy is not a completely innocuous procedure, with occasional perforation and bleeding being the main complications. This procedure is now in widespread use all over the country. In the developed countries, the various governing bodies have published standards to which performing physicians and their institutions are expected to adhere in the best interest of the population. In view of the paucity of data regarding yield of colonoscopy in detecting various neoplastic and bleeding lesions, we decided to report here the results of the colonoscopic findings observed during the past one year to create awareness about the spectrum of abnormalities diagnosed by this procedure, and create...
awareness about the utility of this under-utilized investigation in this region.

**Materials and Methods:**

This is a retrospective, non interventional open labeled observational study. The subjects included consecutive cases having lower gastrointestinal complaints admitted in to the department of Gastroenterology of S.C.B. Medical College and Hospital, Cuttack during the period from January 2015 to November 2015. All the patients were provided with information on colonoscopy including the full bowel preparation instructions. The patients underwent colonoscopy following full bowel preparation with sodium phosphate / polyethylene glycol solution after informed consent was obtained. The demography (including age and gender), indications for colonoscopy and endoscopic findings were analyzed. The patients were provided with the colonoscopic report immediately following completion of the procedure and wherever applicable, mucosal biopsy was obtained and sent for histopathological analysis. The Olympus video endoscopic system was used for all the cases and colonoscopy was performed using standard techniques. The procedures were performed with the patients in the left lateral position following per rectal xylocaine jelly application with selective use of external sigmoid counter-pressure and position changes in order to achieve successful caecal intubation with identification of the appendiceal orifice. Cannulation of the terminal ileum was not routinely attempted. The clinical diagnosis was arrived basing on clinical history, appearance of lesion, or biopsy as appropriate. The results were expressed as mean ± standard deviation (SD) or frequency (in percent). All the analysis was done in SPSS 17 software.

**Result:**

A total of 515 consecutive cases admitted in the department of Gastroenterology of S.C.B. Medical College and Hospital, Cuttack were included in the study protocol and subjected to colonoscopy procedure following full bowel preparations. Out of them, 336 (65.24%) cases were males and 179 (34.75%) cases were females. Males outnumbered the females (M:F = 2:1) in our study (Figure 1). The age ranged from 1 to 85 years. Mean age ± SD (Standard deviation) of the patients was 43.91±17.65 years; male (44.12±18.09) years and female (43.53±16.83) years. There was no difference in mean age by gender in our study. In our study 27 (5.24%) cases were children (aged < 15 years) and 488 (94.75%) cases were adults (age > 14 years). The most common indications for colonoscopy were intermittent lower gastrointestinal (LGI) bleed in 60% cases followed by chronic diarrhea in 40% cases, intermittent lower abdominal cramping pain and loose motions in 30% cases, intermittent constipation in 20% cases and painful defecation in 15% cases (Figure 2). Colonoscopy procedure was safely carried out in all the cases without any procedure related complications. Out of 515 cases, 183 (35.53%) cases had normal colonoscopy findings, 63 (12.23%) cases had internal hemorrhoids, 46 (8.93%) cases had rectal growth, 36 (6.99%) cases had colonic growth, 34 (6.6%) cases had ulcerative colitis, 31 (6.01%) cases had anal fissure, 21 (4.07%) cases had infective colitis, 19 (3.68%) cases had rectal polyps, 14 (2.71%) cases had ulcerative proctitis, 13 (2.52%) cases had colonic polyps, 9 (1.74%) cases had idiopathic rectal ulcers, 7 (1.35%) cases had anorectal neoplasm, 7 (1.35%) cases had idiopathic colonic ulcers, 6 (1.16%) cases had Crohn’s disease, 5(0.97%) cases had nonspecific proctitis, 3 (0.58%) cases had nonspecific colitis, 2 (0.38%) cases had colonic stricture, 2 (0.38%) cases had perianal fistulas, 1 (0.19%) case had both anal fissure and internal hemorrhoids, 1 (0.19%) case had angiomatous malformation, 1 (0.19%) case had colonic diverticula, 1 (0.19%) case had both colonic polyp and internal hemorrhoids, 1 (0.19%) case had features suggestive of congestive colopathy, 1 (0.19%) case had ileocecal growth, 1 (0.19%) case had both internal hemorrhoids and infective colitis, 1 (0.19%) case had perianal ulcerations, 1 (0.19%) case had petechial spots.
over colonic mucosa, 1 (0.19%) case had pseudomembranous colitis, 1 (0.19%) case had both rectal growth and internal hemorrhoids, 1 (0.19%) case had rectal varix, and 1 (0.19%) case had only superficial rectal mucosal erosions (Figure 3). In our study 7 (25.92%) children and 176 (36.06%) adults had normal colonoscopic findings. Most (51.81%) children had colorectal polyps, out of which 85.71% cases had only rectal polyp. 46 (13.69%) males and 17 (9.49%) females had internal hemorrhoids, 15 (4.4%) males and 7 (3.91%) females had infective colitis, 121 (36.01%) males and 62 (34.63%) females had completely normal colonic mucosal study findings, 2 (1.11%) females and 1 (0.2%) male had nonspecific colitis, 3 (1.67%) females and 2 (0.59%) males had nonspecific proctitis, 1 (0.55%) female had pseudomembranous colitis, 20 (11.17%) females and 26 (7.73%) males had rectal growth, 12 (3.57%) males and 7 (3.91%) females had rectal polyps, 7 (2.08%) males and 2 (1.11%) females had idiopathic rectal ulcers, 19 (5.65%) males and 15 (8.37%) females had ulcerative colitis, 10 (2.97%) males and 4 (2.23%) females had ulcerative proctitis, 22 (6.54%) males and 9 (5.02%) females had fissure in ano, 3 (0.89%) males and 3 (1.67%) females had Crohn’s disease, 5 (1.48%) males and 2 (1.11%) females had anorectal growth, 23 (6.84%) males and 13 (7.26%) females had colonic growth, 10 (2.97%) males and 4 (2.23%) females had colonic polyps, 2 (1.11%) females had colonic stricture, 4 (1.19%) males and 3 (1.67%) females had idiopathic colonic mucosal ulcers, 1 (0.55%) female had only colonic diverticula, 1 (0.29%) male had angiomatous malformation and 1 (0.29%) male had colonic mucosal findings suggestive of congestive colopathy. Colonic stricture and diverticula were not found to be present in males in our study. Mean age±SD of cases with normal colonoscopy findings was 45.13±17.72 years, fissure in ano was 40.1±14.11 years, hemorrhoids was 48.92±16.76 years, ulcerative colitis was 38.79±14.8 years, Crohn’s disease was 42.33±15.53 years, rectal growth was 44.89±14.35 years, rectal polyps was 18.78±20.92 years, idiopathic rectal ulcers was 45±15.88 years, nonspecific colitis was 47.63±14.18 years, infective colitis was 41.59±18.53 years, anorectal growth was 52.29±13.71 years, ulcerative proctitis was 48.21±17.2 years, colonic growth was 47.8±14.82 years, colonic polyps was 38.14±19.7 years and that of idiopathic colonic mucosal ulcers was 48.29±17.43 years.

Discussion:

Colonoscopy is regarded as the ‘gold standard’ in the diagnosis of colonic diseases. It has the best sensitivity and specificity for the diagnosis of polyps and has been credited in part with the reduction in colorectal cancer in the USA. It would have been useful to compare colonoscopy withdrawal times in the groups with detected polyps and those without, but this variable of quality was not clearly documented. It is generally recommended that this should take at least six minutes for better colonoscopic detection of abnormalities. Another indicator of good colonoscopy quality is caecal intubation rate which was achieved in 92 per cent cases in our study. Generally, this rate is expected to be above 90 per cent in the screened population for better detection of different colonoscopic
abnormalities.\textsuperscript{5,6,7} Our practice can be improved further with the use of photographic documentation of the appendiceal orifice as recommended.\textsuperscript{8} We did not observe any serious complications such as bleeding and perforation during the procedure. There is great variability in iatrogenic colonoscopy perforation with rates of 0.2 to 0.016\% reported for diagnostic procedures, and up to 5\% following some therapeutic interventions.\textsuperscript{9} The risk of severe complications could be reduced significantly with conscientious procedure performance, thorough bowel cleansing, and sufficient risk evaluation preceding the procedure, and appropriate anesthesia or sedation. Due to the slightly higher risk of complications in children, indications for pediatric colonoscopy are usually more stringent than for adults. Hematochezia, potential IBD, or cancer surveillance are reported to be the most common indications for the procedure.\textsuperscript{10} In our study, hematochezia, abdominal pain/discomfort, and diarrhea were the most common presentations for pediatric endoscopy referral. For pediatric patients presenting with recurrent hematochezia, unrelied abdominal pain, or unexplained diarrhea, colonoscopy may be the most useful diagnostic tool. In our study pediatric patients had a higher frequency of abnormal colonoscopic findings compared to adults (74\% vs. 63.93\%), which was similarly reported in previous studies.\textsuperscript{11,12} In our study, we found that inflammatory bowel disease (ulcerative colitis and Crohn’s disease), colonic growth, rectal growth and polyps, idiopathic colonic ulcers, nonspecific colitis and proctitis were more common in females, where as males more often suffered from internal hemorrhoids, fissure in ano, infective colitis, idiopathic rectal ulcers, ulcerative proctitis and anorectal growth. In our study we found females had more colon related abnormal colonoscopic findings compared to males whereas males had more anorectal related abnormal colonoscopic findings compared to females. The significant indications predicting an abnormal colonoscopic finding were lower gastrointestinal bleeding, whereas abdominal pain, constipation or a change in bowel habit were less likely to have an abnormal colonoscopy. This may have implications for rationalizing the colonoscopy service in the setting of limited resources like our region. Previous studies have reported that colonic cancers were usually left-sided but there might be synchronous cancers in the right side which may be missed as colonoscopy may miss 4–5\% of cancers especially on the right side.\textsuperscript{4,13} Therefore, ideally in all cases, full colonoscopy procedure should be carried out with proper bowel preparation for better detection of colonoscopic abnormalities.

Conclusion:
This report is the first large-scale report of videocolonoscopy results from this region. While it is limited by the single institution and retrospective analysis of the data, it provides some insight into the results and service being offered to diagnose and treat problems of the lower gastrointestinal tract. It also shows that there are areas where there is room for improvement of this service. In our region, the most common indication for colonoscopy was lower gastrointestinal bleed followed by chronic diarrhea. In our region males more often suffered from anorectal problems compared to females, whereas females suffered from colon related problems more commonly compared to males. A significant proportion of patients in our region had normal colonoscopy findings despite significant colon related complaints such as chronic diarrhea and abdominal pain, which suggests that they might be suffering from functional bowel disorders. However further prospective multicentre observational studies are required to validate our conclusions.

References:


Obesity and Cancer : A Review

L. Pattanayak¹, N. Panda²

Introduction :

Obesity and Cancer are the two major epidemics of this century. Obesity, a growing health problem is a condition in which a person has an abnormally high and unhealthy proportion of body fat. Its association with diabetes, cardiovascular disease and hypertension is established. However, the recent obesity and cancer association has received much emphasis. The present article is a review on the common cancers associated with obesity and the pathophysiology behind it.

Discussion :

Obesity is defined by the WHO as a BMI (Body Mass Index) of more than 30 kg/m² while Overweight is defined as a BMI of more than 25 kg/m². (ref 1) The BMI is a scale obtained by dividing a person’s weight (kilograms) by height (in meters) squared. The NIH (National Institute of Health) has recommended five categories for adults above 12 years. BMI less than 18.5:- Underweight; BMI 18.5 to 25:- Normal; BMI 25 to 30:- Overweight; BMI more than 30:- Obese. (ref 2)

The National Cancer Institute (NCI) Surveillance, Epidemiology, and End Results (SEER) data, in 2007 in the United States showed that 34,000 new cases of cancer in men (4 percent) and 50,500 in women (7 percent) were due to obesity. (ref 3) The percentage of cases attributed to obesity varied widely for different cancer types but was as high as 40 percent for some cancers, particularly endometrial cancer and breast cancer. With the existing trend in obesity, around 500,000 cases of cancer will be added in the US by 2030 (ref 4).

The most commonly associated cancers with obesity are:- colorectum, breast, endometrium, gastric, pancreatic, hepatobiliary and leukaemia. A Comprehensive Systematic Review done by the World Cancer Research Fund and the American Institute of Cancer Research conclude that obesity is an established risk factor for several cancers (ref 5). Besides obesity also leads to poorer treatment outcome, worsened prognosis and increased mortality rates (ref 6).

The pathophysiology linking obesity and cancer include modulation of energy balance with calorie restriction, involvement of growth factors, multiple signalling pathways, and inflammatory processes.

The plausible mechanisms linking obesity and cancer are:-

• Production of excess estrogens by the fat tissue which is associated with the risk of developing breast and endometrial cancer.
• Increased levels of insulin and insulin-like growth factor-1 (IGF-1) in the blood (hyperinsulinemia or insulin resistance) which promotes development of certain tumours.
• Production of hormones by fat cells which stimulates or inhibits cell growth. Leptin, which is more abundant in obese people, promotes cell proliferation, whereas adiponectin, which is less abundant in obese people, has antiproliferative effects.
• Fat cells also have direct and indirect effects on other tumour growth regulators, including mammalian target of rapamycin (mTOR) and AMP-activated protein kinase.
• Obese people have “subacute,” inflammation, which has been associated with increased cancer risk.

High levels of Insulin or IGF (Insulin like Growth Factors) in humans increases the propensity for colonic polyps, gastric, breast and pancreatic cancers. IGFs play a significant role in cellular metabolism, differentiation and survival. Longo et al reported that the ability of IGFs to lower antioxidant defence
mechanisms thereby promote cellular damage and diseases in humans (ref 7).

Fat tissue is considered to be an endocrine organ which secretes polypeptides and adipokines. Of these leptins and adiponectins are involved in cancer cell development and growth (ref 8).

Leptin plays a major role in energy balance and control of appetite. It induces cancer progression by activation of PI3K, MAPK, and STAT3 pathways (ref). Obesity increases circulating leptin, available IGF-1, and proinflammatory cytokines, leading to increased signalling through the PI3K/Akt cascade. These signals converge on mTOR, promoting cell proliferation and inhibiting apoptosis. On the contrary, restriction of caloric intake enhances signalling through AMPK, suppressing mTOR activity and promoting cancer cell death.

Adiponectin is secreted from the visceral adipose tissue and is inversely related to adiposity, hyperinsulinemia and inflammation. Adiponectin exerts anticancer effects by decreasing Insulin and IGF and also has anti-inflammatory effects by inhibiting the nuclear factor of B cells.

The most important signalling pathways linking obesity and cancer are the PI3K/Akt/mTOR cascade. This cascade is a target of the obesity-associated factors and regulates cell proliferation and survival. Activation of the PI3K/Akt/mTOR pathway affects cellular growth, proliferation, survival and metabolism which are most commonly seen in human epithelial tumours. Activation of the RTK stimulates PI3K to produce second messengers like PIP3. PIP3 anchors Akt to the cell membrane which can be further phosphorylated and activated. The Akt cascade stimulates the mTOR (mammalian target of rapamycin) which is the nutrient pathway to regulate cell growth. Finally mTOR activation leads to uncontrolled cell growth, proliferation and resistance to apoptosis (ref 9). Evidence has shown a number of cancers which have overactivated mTOR pathway (ref 10).

Nine independent academic institutions and 17 cancer centres worldwide conducted systematic reviews on food, nutrition, weight gain and cancer. Out of the 10 recommendations to reduce the risk of developing cancer, the most important was maintaining a healthy weight throughout life. This again can be achieved by regular physical activity and limited consumption of energy dense foods and sugary drinks. The National Expert Panel suggests to adapt a physically active lifestyle, consumption of a healthy plant based diet and limitation of alcohol intake.

Conclusion: Obesity and Cancer are the major epidemics of recent times. Overweight and obese people are at increased risk of developing cancer with poor treatment outcome and mortality. Maintenance of a healthy body weight throughout life is one of the most important ways to protect against cancer. However, the major challenge remains in applying our knowledge and sensitising the public on the link between obesity and cancer.

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Original articles
Reviews
Case Reports
Pictorial CMEs
are invited
for
next issue of
OMJ on theme
“HEALTHY CHILD”
to reach Editor / State HQ Office
Before end of July, 2016
Abstract:

Pheochromocytoma is a rare catecholamine producing chromaffin tissue tumour represents very significant challenges to the anaesthetists specially when undiagnosed as it has nonspecific clinical symptoms and risk of critical events, including death. Careful planning and meticulous techniques are essential in addition to close communication with the surgical team. This article attempts to address the preoperative, intra and post operative anesthetic issues in management of this challenging tumour.

Introduction:

Pheochromocytomas are catecholamine secreting neuroendocrine tumours that arise from the chromaffin cells of the sympathoadrenal system; however, it may arise anywhere in the body. The annual incidence is estimated in 2 to 8 cases per million in general population. The word pheochromocytoma in Greek means “dusky coloured tumour”. They are usually found in the adrenal gland (around 85%-90%) but extra-adrenal pheochromocytoma are tumours that originate in the paravertebral sympathetic chain. The morbidity and mortality in an unexpected emergency situation is quoted to be 50% but near zero perioperative mortality in planned surgery as per recent studies.

Pathology:

Most pheochromocytomas are solitary tumor localized to a single adrenal gland usually in right side. Pheochromocytoma is often referred to as the ‘10% tumour’ because 10% are extra adrenal, 10% are malignant, 10% are inherited as an autosomal dominant trait and 10% present bilaterally. Most pheochromocytomas (more than 80%) mainly secrete norepinephrine, sometimes paroxysmally, but usually sustained. In rare cases, these tumours may produce epinephrine predominantly. As an exception familial pheochromocytomas secrete large amounts of adrenaline.

Clinical Features:

The incidence is equal in both male and female, may occur at any age being most prevalent between the third and fifth decades of life. The classic triad of headache, palpitation and diaphoresis is present in up to 70% of the cases and only 50% have sustained hypertension. Hypertension is the commonest sign and headache the commonest symptom. Hypertension is usually sustained but can less commonly paroxysmal. When true paroxysm occurs, blood pressure may rise to alarmingly high level, increasing risk for cerebro vascular hemorrhage, heart failure, dysrhythmia, myocardial infarction. The paroxysm sometimes accompanied by facial pallor, anxiety and a feeling of impending doom, and postural hypotension especially when the predominant catecholamine is adrenaline. Central nervous system manifestations include anxiety, psychosis, nervousness and tremors. Uncontrolled hypertension can lead to hypertensive encephalopathy or seizures. Glucose control is impaired because of the excessive glycogenolysis induced by the catecholamines, combined with an impaired release of insulin. Excessive adrenaline secretion can cause a state of hypermetabolism associated with weight loss. Rarely bladder pheochromocytomas can present with crisis symptoms precipitated by the voiding of urine. Pheochromocytoma can present during pregnancy mimicking preeclampsia. Pheochromocytoma is an extremely rare tumour in children, but may be suspected in episodic hypertension especially in association with a family history of medullary carcinoma of the thyroid gland or pheochromocytoma or both.

Diagnosis:

Clinical: by symptoms and signs

Biochemical tests: Once a clinical diagnosis is made, an excessive catecholamine secretion must be demonstrated by- Free catecholamine level in a 24
hr urine sample, the best confirmatory test. High performance liquid chromatography allows accurate measurement of free adrenaline, noradrenaline and dopamine in body fluids. Plasma or urine catecholamine metabolites such as metanephrines (free urine catecholamine estimation has superseded this investigation) Plasma free metanephrines: (Sensitivity of 99% and specificity of 89%) for high risk patients e.g.: familial pheochromocytoma. Urine metanephrine levels: the single best urine screening test. Urinary vanillylmandelic acid (VMA) levels: the oldest and least expensive test, but nonspecific. Glucagon stimulation test-now considered to be safest and most specific provocative test clonidine suppression test-done in equivocal cases Histamine provocative test-abandoned now.

**Localisation**

MRI(Image 5) and CT both provide accurate and consistent identification of the majority of pheochromocytomas

**MIBG scan.**

Meta-iodobenzyl guanidine is a radiopharmaceutical agent which is an analogue of guanethidine, similar in structure to noradrenaline and hence taken up by adrenergic neurons and concentrated in catecholamine secreting tumours. MIBG is detected by scintigraphy and such scans can help to localise recurrent tumours, metastases and tumours in unusual sites Other useful tests include positron emission scans and selective venous catheterisation and catecholamine sampling. The best option for topographic location is the use of catecholamine synthesis metabolic marker such as scintigraphy with 123I-MIBG and PET scan with18 F- fluorodopamine.

**Preoperative investigations**

Complete blood count, and serial haematocrit values: often shows homoconcentration, normalisation of the haematocrit is indicative of the adequacy of á blockade. Occult anaemia might be revealed on correction of the vascular tone. Test for blood sugar as hyperglycaemia is common. Renal function tests- serum urea, creatinine electrolytes. Thyroid function test. Chest radiograph-for cardiomegaly, pulmonary oedema. ECG : nonspecific T wave changes secondary to myocardial ischemia, left ventricular hypertrophy, arrhythmias. Most changes are reversible on treatment.

2D Echo: to estimate myocardial function if cardiomyopathy is suspected. Ophthalmological examination for detection of hypertensive retinopathy, papilloedema

**Preoperative Preparation**

*Preoperative adrenergic blockade achieves the following objectives:* Lowers blood pressure, increases intravascular volume, reduces the chance of hypertensive crises during induction and tumour manipulation, Allows resensitisation of adrenergic receptors, reduces myocardial dysfunction in the perioperative period.

The available pharmacological options are-

1. Adrenoceptor antagonists :
   a. **Non selective** (Non competitive)
      - Phenoxybenzamine
      - Phentolamine
   b. **Selective** (Competitive)
      - prazosin
      - doxazosin
      - terazosin
2. á Antagonist-after á blockade
3. Ca- channel blocker
4. Magnesium sulphate

**Nonselective á blockers**

Phenoxybenzamine is an irreversible non selective á blocker which alkylates á receptors permanently. This confers a degree of protection against blood pressure surges during tumour manipulation when catecholamine levels can rise by a factor of several hundreds. Disadvantages like tachycardia, and the persistent á blockade which can be responsible for resistant hypotension after tumour removal. Duration of action is almost 24 hrs. For these reasons many clinicians choose to stop phenoxybenzamine administration 48 hrs prior to surgery Phenoxybenzamine is started at least 14 days (sometimes even months) before surgery to increase the intravascular volume and restore myocardial dysfunction. The usual starting dose is 10 mg twice daily slowly increased up to 60 -250mg/day. Adequate á blockade is detected by postural hypotension with nasal stuffiness and reflex tachycardia controlled by á blocker. Hyperglycemia also show normalization with á blockade.
Selective á1 blockers: Selective á1 blockers, like prazosin, in comparison to Phenoxybenzamine, do not block the á2 receptors and therefore do not induce a tachycardia as a side effect. Because they are competitive blockers they are not as efficient as phenoxybenzamine in preventing surges in blood pressure during tumour manipulation when a massive release of catecholamines displaces the drug from the receptors. Dose of prazosin 1 mg every 8 hrly and increased gradually and can be continued till the day of surgery. Profound first dose hypotension may be seen with this drug. Doxazocin, terazocin are also selective á1 adrenoceptor blockers but have not gained popularity.

Beta blockers:
The role of á blockers is to control the tachycardia. The choice and timing of á blockade is important. A non selective á blocker should not be prescribed before á blockade is achieved. á blockade should only be started after appropriate arteriolar dilatation has been achieved with á blockers. Selective á1 blockers, including atenolol (50-100mg/day) and metoprolol (25-50mg/day) are useful in patients with reactive airway disease or peripheral vascular disease. á blockers with additional á blocking property examples include labetalol (100-400mg/day) and carvedilol (12.5-50mg/day) can be used Celiprolol having á1 antagonist and á2 agonist property may be the drug of choice.

Other drugs:
Calcium channel blockers and ACE inhibitors have been used in the preoperative control of blood pressure. A 7-10 days course of nicardipine before surgery induces arterial vasodilatation. Magnesium sulphate inhibits catecholamine release and alters adrenergic receptors response. á- methylparatyrosine (Metyrosine) is an inhibitor of tyrosine hydroxylase enzyme. It can reduce catecholamine production by 50 – 80% but only used in case of inoperable and malignant tumours. Criteria for optimal control include: as per ROIZEN’S criteria (Roizen et al in 1982) Blood pressure readings consistently less than 160/90 mm hg. Presence of orthostatic hypotension but BP on standing should not be less than 80/45 mm hg. ECG should be free of ST-T changes. No more than one premature ventricular contraction every 5 minutes. Nasal congestion.

Premedication:
All patients are premedicated with oral alprazolam 0.5 mg night before surgery and on the morning of surgery, prazocin is given the night before surgery. Oral metoprolol is also prescribed on the morning of surgery, beta adrenergic blockade should be avoided in patients with catecholamine induced cardiomyopathy as it can lead to development of intractable hypotension, bradycardia and asystolic arrest. An intravenous drip is started the night before surgery to counteract plasma volume expansion after á blockade but Desmont & Marty reported that administering fluid only intraoperatively, whenever necessary, was as efficient as preoperative fluid infusion in regard to hemodynamic control. Venous thromboprophylaxis is essential with Dalteparin 5000 IU subcutaneous or Enoxaparin 0.4mg s/c evening before surgery and 12 hrs postoperatively is given.

Intraoperative Management:
The intraoperative goals are to: Avoid drugs or manoeuvres which produce a catecholamine surge. Maintain cardiovascular stability with short acting drugs, Maintain normovolaemia and haemodynamics after tumour resection.


Monitoring and vascular access: Large bore peripheral venous access,NIBP,ECG, Pulse, oximeter, EtCO2, Temperature probe, Invasive blood pressure – Arterial line(inserted prior to induction of anaesthesia) and CVP monitoring, Cardiac output monitoring in patients with cardiomyopathy (Pulmonary artery catheter, TOE in patient with left ventricular dysfunction)

Urinary catheter, temperature monitoring, ABG

IMAGE -1 Interior of tumor (cut section)
Anaesthetic technique: Regional anaesthesia has been used alone or General ± epidural anaesthesia have been successfully used. A low thoracic epidural blocks sensory and sympathetic discharge in the area of the surgical field, but it cannot prevent the effect of the catecholamines released during surgical manipulation of the tumour. The following drugs should be prepared and kept ready for immediate uses are— inj Phentolamine 10 mg/ml, inj Nitroglycerine 5 mg/ml, inj nitroprusside 50mg /ml; inj dopamine 40 mg/ml, inj norepinephrine 2mg/ml, inj lidocaine, inj amiodarone, inj esmolol. Factors which release catecholamines should be avoided: stress, anxiety, pain, hypoxia, hypercarbia. Consider premedication with midazolam 1-2 mg and radial artery cannulation is performed under local anaesthesia. Arterial cannulation can be done after induction in apprehensive patients. A large bore peripheral IV catheter is to be inserted routinely in preinduction period. Histamine receptor 2 antagonist are also indicated in appropriate patients. Metoclopramide may induces hypertensive crisis so best avoided. Endotracheal intubation should be attempted having achieved a satisfactory depth of anaesthesia as catecholamines released from stored nerve terminals often produce an exaggerated pressor response: Avoid medications that can stimulate the sympathetic nervous system like ketamine,ephedrine. Histamine releasing drugs (Atracurium, Morphine) should be avoided. Suxamethonium can produce catecholamine surge by virtue of muscle fasciculation Drugs considered safe include: Propofol, Etomidate, Fentanyl, Alfentanil, Remifentanil, Benzodiazepines, Vecuronium, Rocuronium, Attenuation of pressure response to laryngoscopy can be done with small dose of fentanyl, IV lidocaine,esmolol 0.5 mg/kg bolus and infusion as required, A central venous line inserted for hemodynamic monitoring and administration of fluid, it is to be maintained around 8-9 mm hg, Etco2 to be kept within normal range by adjusting respiratory rate rather than tidal volume. Anesthesia is maintained with O2 ,N2O and isoflurane or sevoflurane with intermittent doses of fentanyl citrate Fluids should be considered as the first line of management in these patients because, they require large amounts of fluid after tumor resection. Management of hypotension by fluids, like ringer lactate and normal saline replacement is believed to be a factor for lowering operative mortality. But some studies suggest that the predominant mechanism of severe hypotension following tumor resection is likely to be a decrease in arterial tone and that severe hypotension may occur in normovolemic patients. Blood glucose should be closely monitored (hypoglycaemia is common after tumour removal) so dextrose containing fluid to be started after tumour removal depending on blood sugar. Normothermia should be maintained with the use of forced air warming devices. In case of laparoscopic removal of tumour surgeons are asked to slow insufflation of co2 and to keep Intra abdominal pressure low at 8-10 mm hg. If epidural infusion is being used intraoperatively,further doses of fentanyl or any other opioid are usually not required. To achieve adequate intraoperative and postoperative analgesia with the epidural, infusion of bupivacaine 0.1-0.125% with fentanyl 2 mcg ml-1 at the rate of 6-12 ml hour-1, is administered after an initial bolus of 8-10 ml of 0.25% bupivacaine in divided doses.

Catecholamine withdrawal following venous ligation

A combination of factors is responsible for the refractory hypotension following ligation of the venous drainage of the tumour. A sudden drop in the catecholamine concentration, the residual α blockade from phenoxybenzamine, down regulation of
adrenoceptors, suppression of the normal contralateral adrenal gland from excessive catecholamines, catecholamine induced myocardial dysfunction and hypovolaemia from blood and fluid loss are all causative factors. A preventative measure involves volume loading before tumour ligation and fluid boluses should be tried before initiating vasoactive medications. Colloids, plasma expander, blood products are arranged as indicated. When this is ineffective, treatment options include adrenaline, noradrenaline and phenylephrine with milrinone in the setting of right ventricular dysfunction. Vasopressin is also effective in refractory cases (0.04U/min increasing as required). One should consider glucocorticoids if hypoadrenalism is suspected or if bilateral adrenalectomy is performed. Patients are usually extubated at the end of the procedure after ensuring haemodynamic stability. Morphine may be used for post operative analgesia in the absence of a working epidural. ABG is done perioperatively and at the end of surgery to study the metabolic status of patient.

Post Operative Management: These patients, ideally, are managed post operatively in an ITU/HDU. Anticipated problems include refractory hypotension (which might require large volumes of fluid and vasopressor therapy) and hypoglycaemia due to excess insulin release and inadequate glycogenolysis. The majority of patients are restored to normotension although plasma catecholamine levels may still be elevated due to their slow release from the nerve terminals. Approximately 50% of patients remain hypertensive for a few days, could be due to residual tumor, renal ischemia or underlying essential hypertension with a tumor recurrence rate of 14% in primary adrenal disease and 30% in extra adrenal disease. so long term follow up needed for all patients. Electrolyte, and endocrine abnormalities must be ruled out in drowsy and unresponsive patients. Appropriate blood glucose and electrolyte monitoring are indicated. Careful attention to be given in fluid management. Steroid supplementation to be done if bilateral adrenalectomy is carried out or if hypoadrenalism is suspected. Lifelong follow up with plasmatic dosage of catecholamine and metanephrine is recommended since there are cases of late tumoral relapse in literature. Genetic testing should be done in first-degree relatives of confirmed cases or when genetic syndrome is suspected (café au lait spots, cerebellar tumor, thyroid medullary carcinoma, hyperparathyroidism).

Post Operative Analgesia:
Post operative pain control depends on the type of incision. Laparoscopic approach has the advantage of minimal pain. Epidural analgesia provides good post operative pain relief and may be supplemented by NSAIDS, Paracetamol, LA infiltration.

Special circumstances

Pregnancy: Pheochromocytoma in pregnancy is rare, estimated to occur in 1 out of 54,000 pregnancies. The mortality from pheochromocytoma in pregnancy is high. Undiagnosed cases can mimic preeclampsia. Labour can also precipitate crises and hence an elective Caesarean Section should be planned if the condition is diagnosed late in pregnancy. If diagnosed early, resection of the tumour can be considered before the second trimester with the risk of miscarriage. Phenoxybenzamine can be safely used during pregnancy. Selective b1-blockers such as metoprolol or atenolol must be favored over non-selective b-blockers such as propranolol, which were associated with growth retardations, neonatal bradycardia, and hypoglycemia in the fetus.

Conclusion:
The anaesthetic management of patients with pheochromocytoma remains a challenge to even the
most experienced of anaesthesiologist,. Successful management requires careful preoperative optimization, meticulous intraoperative planning, judicial use of a combination of vasodilatory and vasoactive medications and vigilant post operative care. Patients with pheochromocytoma should ideally be managed by an experienced team of endocrinologist, endocrine surgeon and anaesthesiologists. Different anaesthetic techniques and medications have been used successfully with good results. The pathophysiology of the disease is complex and anaesthetic care must be tailored in accordance with each patient’s situation.

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Anaesthetic Considerations for the Morbidly Obese Patients

B.K. Pradhan¹, S.S. Routray², K. Raut², D. Mishra³

Abstract:
The prevalence of obesity has increased significantly in developing countries like India in last decade. More and more number of obese patients are posted for elective and emergency surgery. Although mild degrees of obesity possess few additional problems during perioperative management, morbid and super obese patients require special consideration, equipment and handling. So proper pre-operative assessment and preparation, choice of anaesthetic technique, patient positioning, handling and post operative management is necessary.

Introduction:
Obesity is defined as having a body mass index (BMI) ≥ 30 kg/m². Morbid obesity is defined as a BMI ≥ 40 kg/m², which is again classified into super obesity (BMI ≥ 50 kg/m²) and super-super obesity (BMI ≥ 60 kg/m²). Surgery in these group of patient population possess challenges to the anaesthesiologist. So careful planning, preoperative assessment and proper intraoperative and postoperative management is required.

Preoperative evaluation: A preoperative evaluation should include a thorough medical history, physical examination, and investigations.

Airway evaluation: Anatomic changes associated with obesity that contribute to a potentially difficult airway include limitation of movement of the atlantoaxial joint and cervical spine by upper thoracic and low cervical fat pads. Excessive tissue folds in the mouth and pharynx, short thick neck, thick submental fat pad, suprasternal, presternal, and posterior cervical fat and large breasts in females adds to more difficult airway. The patient’s neck circumference has been identified as the single biggest predictor of difficult intubation in morbidly obese patients.

Cardiovascular evaluation: Preload, afterload and cardiac output increase with increasing weight by as much as 20 to 30 mL/kg of excess body fat because of ventricular dilation and increase in stroke volume. The resulting increase in left ventricular wall stress leads to hypertrophy, reduced compliance, and impairment of left ventricular filling (diastolic dysfunction) with elevated left ventricular pressure, diastolic blood pressure, and cause pulmonary edema. When left ventricular wall thickness fails to keep pace with dilation, systolic dysfunction (obesity cardiomyopathy) and eventual biventricular failure occurs.

Respiratory system evaluation: Pulmonary mechanics, lung volumes, functional residual capacity (FRC), oxygenation, and ventilation are altered in these individuals. Chest wall compliance decreases because of increased weight of excess adipose tissue. Respiratory work and oxygen consumption are increased. The increased work of breathing in combination with reduced functional residual capacity, expiratory reserve volume, as well as increased closing capacity increases the overall risk of atelectasis, especially in the supine position. Obstructive sleep apnea (OSA) and Obstructive Hypoventilation Syndrome are important concerns in these patients.

Endocrine Disease: The high prevalence of insulin resistance and diabetes in obese patients justify the need of considering glycemia checks preoperatively and correcting abnormalities if present. Preoperative evaluation should include assessment of therapies for glycemia control, last time dosing, dose of preoperative administration and usual glucose values for a specific patient.
**Gastrointestinal:** Frequency of gastroesophageal reflux is strongly correlated with increasing BMI. Although hiatal hernia is more common in obese individuals compared to the non-obese, it is unknown whether the effects of obesity are additive in reducing lower esophageal sphincter tone or not. Obesity is also associated with increase in abdominal pressure, gastric volumes, incidence of gastroesophageal reflux and hiatal hernias, lower gastric pH and fatty infiltration of the liver.

**General considerations:**

**Preparation** should include placement of adequate intravenous access.

In Blood pressure (BP) monitoring, the small size of the BP cuff overestimates the blood pressure reading. The forearm can be used if the upper arm is too large or cylindrical in shape. In some cases, an arterial line may be necessary to accurately determine the BP as well as to obtain arterial blood sample for ABG analysis in patients with respiratory compromise.

**Positioning for airway management:**

Ramped position or head elevated laryngoscopy position (HELP) clearly improved the laryngeal view when compared with the standard ‘sniff’ position. The ‘ramped’ position can be achieved by arranging blankets, or one of the commercially available pillow devices, underneath the patient’s upper body and head until horizontal alignment is achieved between the external auditory meatus and the sternal notch. This positioning allows easy access to the airway and facilitates placement of a laryngoscope.

**General anesthesia:** Experienced personnel and difficult airway equipment must be available. In all cases, proper positioning of the neck, shoulders, and chest are the keys to successful intubation. In some cases, awake fiberoptic intubation may be the safest option. Lean body weight is optimal for dosing of most drugs used during anesthesia including opioids and induction agents. Lean body weight is defined as 20-30% more than ideal body weight. Succinylcholine is often used to secure the airway. The dose of succinylcholine (1.0-1.5 mg/kg up to a maximum of 200 mg) is based on total body weight. Trendelenburg positioning, and positive end-expiratory pressure have used to maintain oxygenation and ventilation. Although isoflurane, sevoflurane, and desflurane can be used in standard concentrations, desflurane provides a faster recovery. Titration of nondepolarizing muscle relaxants with the help of a twitch monitor is a reasonable approach. Obese patients present a higher risk of sedation-induced respiratory depression, so careful titration of benzodiazepines, opioids and propofol is mandatory to avoid hypercapnia and hypoxemia.

**Regional Anesthesia:** Neuraxial anaesthetic techniques (spinal, epidural, combined spinal epidural) and peripheral nerve blocks are used alone or in combination with general anesthesia in increasing frequency as more obese patients are coming to the operating room.

Advantages: 1) minimal or reduced manipulation of the airway; 2) administration of fewer medications with cardiopulmonary depression; 3) reduced risk of post-operative nausea and vomiting; 4) better postoperative pain control; and 5) improved postoperative outcomes.

But there is an increased risk of block failure in obese patients compared to those of normal weight. Failure is often due to technical difficulties and limitations of regional anesthesia. In addition, these patients also experience an increased risk of complications. With proper planning, these techniques may be used successfully and should be considered in the anesthetic plan for obese patients who are candidates for regional anesthesia. Neuraxial anesthesia can produce serious cardiopulmonary alterations in obese patients undergoing surgery. Because pulmonary mechanics, lung volumes, functional residual capacity (FRC), oxygenation, and ventilation are altered in these individuals, supine and trendelenburg positioning during neuraxial anesthesia can lead to deterioration of lung volumes and further reductions in FRC. Functional residual capacity may fall below closing capacity promoting small airway collapse, atelectasis, ventilation perfusion mismatch, and hypoxia, especially during supine and trendelenburg positioning. The American Society of Anesthesiologists has published guidelines for the care of patients with obstructive sleep apnea (OSA) and recommends that regional anesthetic techniques should be considered to reduce or eliminate the requirements for systemic opioids in patients with sleep apnea. Positioning is an important step in placement of a successful neuraxial anesthetic.
Ultrasound imaging can also be helpful to identify spinal processes and has been shown to significantly reduce the number of needle puncture and decrease the time for spinal block placement in morbidly obese patients undergoing orthopedic surgery.

In most cases, standard neuraxial needles (9-10 cm) are usually of sufficient in length if placement is midline. However, longer needles (16 cm) are sometimes needed in extremely obese parturients. Epidural anaesthesia offers several advantages over single-injection spinal anesthesia including titratable dosing of local anesthetics, ability to prolong the block, decreased risk of excessive motor block, more controllable hemodynamic changes and utilization for postoperative analgesia. Combined spinal-epidural anaesthesia is an alternative to conventional spinal or epidural anaesthesia, however there is concern that the technique is more complicated than either spinal or epidural alone.

**Peripheral nerve block**: In obese patients, these blocks can be technically challenging and have more failure rates. Supplemental general anesthesia is also needed to supplement these blocks more often. Dosing of local anesthetics during regional anesthesia can be challenging in the obese patients. The maximum safe dose of local anesthetic for a peripheral nerve block is often based on patient weight. However, basing the dose on the actual weight in these patient population will increase the risk for systemic toxicity. Regardless of the route of administration (e.g., local infiltration, peripheral nerve block) local anesthetic dosing should be based on ideal body weight rather than actual weight. Ultrasound has the advantage of real-time identification of landmarks over the nerve-stimulators and/or paresthesia technique to identify proper needle position. Routine use of ultrasound-guided regional techniques in non-obese patients is likely to improve success rates in the obese.

**Postoperative Care**: Morbid obesity increases the risk for postoperative complications, including: hypoxemia, atelectasis, deep venous thrombosis, pulmonary embolus, pneumonia, pulmonary edema, postoperative endometritis, wound infection, and dehiscence. Goals of effective postoperative care should be aimed at enhancing pulmonary function and preventing venous thrombosis. Early ambulation, thromboprophylaxis, chest physiotherapy, and effective postoperative pain control are essential in preventing complications in these patients.

**References**:

Bariatric Surgery
What, When & Why?
S. Patnaik¹, R. Das²

Introduction

Obesity is a serious worldwide health problem it constitutes a burgeoning global epidemic. It has been shown to predispose to various diseases, particularly cardiovascular disease, diabetes mellitus, sleep apnea, and osteoarthritis. Studies have shown that obesity is an important independent risk factor for morbidity and mortality from coronary disease; consequently, the American Heart Association continues to emphasize the importance of obesity as a major modifiable risk factor in the treatment of coronary artery disease. In the United States, the mortality rate from obesity exceeds 400,000 patients a year, and obesity is considered to be the second cause of preventable death after cigarette smoking. The long-term implications of obesity are detrimental to patients’ health and are costly. It is estimated that the annual cost spent on the treatment of obesity and obesity-related health problems exceeds $100 billion. Despite various pharmacological treatments, diets, exercise, and behavioral therapy, most patients regain all lost weight within a period of 2 years. Over 30% of Americans are obese & over 5 million suffer from morbid obesity. In India <10% of our population suffer from morbid obesity.

It is a disease in which the natural energy reserve stored as fat is increased to a point where it compromises the patient’s state of being. The etiology of obesity is multifactorial, and is related to genotypic and environmental factors. Environmental factors such as social and cultural aspects, in association with genotypic factors, cause the abnormal physiology, metabolism, and behavioural and psychological pathways that result in the obesity phenotype.

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The definition and classification of obesity is primarily based on the body mass index (BMI), calculated as weight divided by the square of height, by means of kilograms per square meter as the unit of measurement. Body mass index provides a reliable indicator of the level of fat in the body for most people (but not athletes), and is used to screen for weight categories that may lead to health problems. For example, Caucasians with a BMI of 30-35kg/m² is considered as class 1 obesity, 35-40kg/m² as class 2, and >40kg/m² as class 3. Morbid obesity is usually defined as a BMI>50 or 70kg/m², respectively. Alternatively, absolute or relative increase in body weight may be used to define obesity.

Morbid obesity is a debilitating disease; it imposes physiological – psychological stress and is often associated with social isolation, depression, and other psychological and somatic comorbidities. These include metabolic complications (type II diabetes, fatty liver, cholelithiasis and hyperlipidemia), hypertension, ischemic heart disease, arthritis and respiratory system complications (obesity hypoventilation syndrome and sleep apnea syndrome). Other common comorbidities include joint degeneration, endocrine disorders including sex hormone secretion disorders, vein congestion, and deep vein thrombosis. Disturbingly, obesity has been ignored for decades, although there is considerable evidence that suggests the obesity plays an important role in cancer pathogenesis. Obesity has been clearly associated with increased risks for kidney cancer in both genders, and in endometrial cancer and postmenopausal breast cancer in women. Studies suggest that obesity and overweight also are related to increase risk of colorectal cancer and gall bladder cancer. Obesity and overweight are often associated with gastric reflux disease; thus, obesity as a predisposing factor for thyroid cancer and prostate cancer is still under evaluation.
In a recent study, the association between different grades of obesity and the number of life-years lost indicated that “life expectancy is up to 20 years shorter in severe obesity”. The World Health Organization (WHO) considers obesity to be the fifth major unhealthful dangerous factor because it brings inestimably potential health problems. Therefore, awareness and aggressive-intervention are imperative in order to improve the patients’ well-being.

Overview of Bariatric Surgery:

Bariatric surgery is the only effective means to achieve significant weight loss with improvement or resolution of comorbid diseases. The field of bariatric surgery began over 50 years ago and has grown steadily and, over the last decade, explosively, with over 100,000 procedures performed annually in the United States. In India it effects 7%-10% of the population & >12,000 surgeries are performed per year.

The purpose of this chapter is to present the reader with a framework for understanding the numerous described bariatric surgical procedures along with their historical development. The evolution of these operations has not been a linear process, as previously abandoned procedures have been modified and reintroduced. As newer technologies emerge, this framework will permit the reader to compare their function, advantages, and limits of use to existing procedures.

Bariatric operations are classified as (i) purely malabsorptive (ii) purely restrictive & (iii) combined malabsorptive-restrictive. An additional category, entitled “miscellaneous”, contains the procedures that do not fit into the three standard classes. Note that no distinction between “laparoscopic” or “open” procedures is made, since these are merely approaches to perform a given procedure. The advantages of a laparoscopic approach (less pain, faster recovery, and fewer wound-related complications) are well established and require no further discussion here. The bariatric surgeon requires a thorough understanding of the recognized operations and, based on his or her ability, may perform them laparoscopically.

Treatment Selection and Indications for Surgery:

Weight reduction should be an integral part of any treatment regimen. Studies have confirmed that obesity is far more complex than overindulgence. These patients usually suffer from a complex disorder with genetic, metabolic, hormonal, psychosocial, and perhaps central nervous system disturbances. What is more troubling is that the pathogenesis of this disease is poorly understood and varies from patient to patient, making conventional treatment options more complicated and often unsuccessful. Weight loss can be achieved by various measures, such as nutritional modification, exercise, drugs, and bariatric surgery. Bariatric surgery has been found in numerous studies to be the most efficacious long-term treatment option for weight reduction, resulting in improvement or complete remission of comorbidities.

Surgical therapy should be considered for individuals with a BMI >40kg/m2 or BMI >35KG/M2 with comorbidities, in accordance with the National Institute of Health (NIH) consensus criteria for morbid obesity updated by the American Society for Metabolic & Bariatric Surgery (ASBS) in 2002.

Surgical Treatment: Benefit and Risk

There are a variety of surgical options, which can be classified into the following three categories: restrictive procedures, malabsorptive procedures, and combined restrictive / malabsorptive procedures. Restrictive procedures & malabsorptive procedures promote weight loss by interrupting the digestive process, causing food to be poorly digested and absorbed. Some purely malabsorptive operations are no longer recommended due to reduced energy. Each type of bariatric procedure has associated prolein malabsorption benefits, drawbacks, and risks. The possible benefit and risk of each procedure should be carefully considered to accommodate individual patient needs and preferences.

Bariatric surgery, as any other surgical procedure, carries the potential for serious morbidity and mortality. Obese patients are considered at high risk for complications in part due to the presence of significant comorbidities. General anaesthesia also imposes a great risk for these patients – especially patients with obstructive sleep apnea or those with symptomatic gastroesophageal reflux and other predisposing – due to the increased risk for both pulmonary gastric aspiration and difficult airways. Thus, severely obese patients necessitate a multidisciplinary evaluation prior
to surgery. Complication may be anastomotic leak, deep vein thrombosis, secondary pulmonary embolism and cardiac and pulmonary complications.

Early postoperative complications includes bleeding, anastomotic leak, infection secondary to leak, strictures, anastomotic obstruction, and small bowel obstruction. Late complications (>30 days) include ulcers, stricture, obstruction, nutritional deficiency, internal / incisional hernia, redundant skin, failure of weight loss or regain, and psychological complications.

Psychological side effects includes increased depression and disruption of social relationships, and may result from unrealistic expectation from surgery and exacerbation of preoperative physiological pathology. Thus, meticulous physiological screening and informative preoperative consultation are imperative for successful outcomes. High risk for cardiac complications, poor myocardial reserve, significant chronic obstructive airways disease or respiratory dysfunction, noncompliance with medical treatment, significant psychological disorders, or significant eating disorders.

**Purely Restrictive procedures:**

**Sleeve gastrectomy:**

a) Development:

The sleeve gastrectomy (SG), in which a narrow tubular stomach is created based on the lesser curvature with resection of greater curvature gastric remnant. Due to presumed increased morbidity and mortality with superobese patients undergoing RYGB or Duodenal Switch, Regan proposed SG as a staged procedure in which an SG is performed first and then converted to a DS or LRYGBP after a period of initial weight loss. This “initial weight loss” turned out to be substantial, with 50%-60% EWL over 12 months and, combined with a favourable safety profile, the SG has lately been proposed as a definitive stand-alone bariatric procedure.

b) Technique:

The greater omentum and gastrocolic ligament are separated from the greater curvature of the stomach beginning at a point 2 to 3cm from the pylorus and extending proximally to include division of the gastrosplenic ligament with the short gastric vessels. A 36 French bougie is advanced along the lesser curvature and the stomach is divided with linear staplers around the bougie from a point on the greater curvature 2-3cm from the pylorus to the angle of His.

c) Outcome:

In a meta-analysis of 15 studies, 12month %EWL was 51% (45-81) with 9% complications, including bleeding & staple-line leaks and a perioperative mortality of 0.6%. Many of these studies included primarily higher risk patients with greater BMIs.

d) Current status:

The SG has been touted as both an initial stage of another bariatric procedures, such as a DS & LRYGBP, as well as a stand-alone operation. Recent reports of using the SG as a definitive procedure demonstrate impressive weight loss and comorbidity improvement with low morbidity and mortality for high-risk patients at 12months but long-term effects are currently unknown.

**Purely malabsorptive procedures:**

Purely malabsorptive procedures were initially popular in the 1960s and 1970s. Because of the risk of vitamin and protein deficiencies as well as diarrheal issues, these procedures are no longer performed as primary bariatric surgery in the United States.

**Combined Restrictive-Malabsorptive Procedures**

**Gastric Bypass:**

a) Development:

Mason and Ito are credited with the first gastric bypass (GBP) for morbid obesity in 1996. Their operation included a horizontal gastric pouch with a
100-150ml reservoir anastomosed to a loop of jejunum. This operation has evolved over the last four decades into what is considered the “gold standard bariatric procedure” to which all other procedures are compared. The fundamental modifications included a Roux-en-Y drainage, vertical pouch based on the less-distensible lesser curvature, isolated gastric pouch (divided from the gastric remnant) with less than 30ml volume and a 10-15mm anastomosis. Brolin randomized superobese patients (BMI>50) to 75 vs. 150cm alimentary (Roux) limb lengths and found significantly improved excess weight loss at 2years (50% vs. 64%, respectively).

b) Technique:
The gastric pouch is created by creating a 15-30ml pouch based on the lesser curve by stapling either “free-hand” or around a 36 French gastric calibration tube. Care is taken to avoid injury to the left gastric artery, which supplies the pouch, and to exclude the fundus by not dividing the stomach to the left of the angle of His. The proximal jejunum is divided and the distal stump (alimentary limb) is brought antecolic, retrocolic antegastric, or retrocolic retrogastric and anastomosed to the gastric pouch to create a 10-12mm diameter stoma. The proximal stump of jejunum is anastomosed to the alimentary limb either at 75-100cm distal to the gastrojejunostomy (BMI<50) or 150cm (BMI>50).

c) Outcome of LRYGBP:
LRYGBP results in dramatic metabolic & weight changes but with fewer malabsorptive sequelae. Excess body weight loss varies from 60%-75% for 10years and 50% at 14years. Reported rates for comorbidity resolution are diabetes (80%), hypertension (70%), hypercholesterolemia (65%), gastroesophageal reflux disease (75%), and obstructive sleep apnea syndrome (75%). Thirty-day perioperative mortality is 0.5%. Potential vitamin & mineral deficiencies from malabsorptive requiring lifelong monitoring include iron, calcium, folic acid, and vitamin B12. The most severe complications include leaks (0-3%), internal herniation with or without strangulated bowel obstruction (2-5%), and perforated marginal ulcer (1%). Less severe complications include anastomotic stenosis (5-10%). Perioperative (30-day) mortality rates are 0.2% to 1% in most recent published series; however, larger regional surveys have reported up to 2%.

d) Current Status:
The LRYGBP is the most commonly performed procedure accounting, according for 85% of procedures in the United States and 65% worldwide. This is due to its excellent and durable results with low morbidity and mortality rates.

Minigastric Bypass
a) Development:
The Mini Gastric Bypass is a weight loss surgery developed by Dr. Robert Rutledge, a professor from the university of North Carolina. He first developed the Mini Gastric Bypass procedure back in 1997. He based it on the loop gastric bypass first used in 1967. In this original loop procedure a part of the small intestine was looped to bypass a portion of the digestive system. However this loop gastric bypass was abandoned as a weight loss alternative back in in the early 1970’s because of the risk of severe inflammation and or ulceration to the stomach or lower esophagus. Because bariatric surgery has become so popular over the years there is always a demand for new options and treatments. One option has been developed by Dr. Robert Rutledge. He refers to it as the mini gastric bypass. His procedure reverts back to the simpler loop gastric bypass but with some improvements. During the Mini Gastric Bypass Dr. Rutledge developed & created a long narrow pouch with the stomach. Then the new stomach is connected to the side of the small intestine bypassing about six
feet of intestine. In the last 10 years since its development about 12,000 people have chosen this Mini Gastric Bypass procedure.

b) Technique:

The mini gastric bypass (MGBP) works both by restricting the amount of food that can be eaten at any one time, and by causing malabsorption and also by altering gut hormones involved in appetite control.

It is clear that in the case of the MGBP there is only one anastamosis, whereas in the RYGBP there are two – an upper and a lower. Because of this the MGBP can be done in less time than the RYGBP and – at least theoretically – with fewer early complications. Studies show that weight loss and health benefits resulting from mini gastric bypass are probably a little higher than with the standard Roux-en-Y gastric bypass.

In the first part of mini gastric bypass surgery the stomach is divided and a small longitudinal tube of stomach is created which becomes the pouch. This is the restrictive part of the procedure and means that only a very small amount of food can be taken at any one time.

Next, the surgeon brings up a loop of bowel (about 200-300cm long) and joins this to the lower part of the stomach pouch. This means that food passes from the small pouch into the small bowel where it meets the digestive juices which have moved downwards from the main part of the stomach. In effect, therefore, about 2-3metres of small bowel has been bypassed before absorption of food (and calories) can take place. Fewer calories absorbed, means weight loss.

There is one potential problem with mini gastric bypass surgery. Because the pouch is small and is joined close to the flow of digestive juices, it is possible for these juices to “reflux” up into the stomach pouch causing inflammation and painful ulceration.

It must be said that most of the recent studies do not seem to report this as being much of a problem in practice, but if it occurs it is relatively simple to deal with and requires revision to a standard gastric bypass.

At present, the short answer is we do not know. Mini gastric bypass surgery is quicker because it is a single stage procedure, but in practice and in experienced hands the time difference is not great. There is some preliminary evidence to show that the early complication rate of MGBP is lower than that for RYGBP, but operative mortality is the same. Moreover short-term weight loss may be greater with the Mini bypass secondary to the malabsorption it creates. But it is also worth bearing in mind that long-term data for MGBP are not yet available.

BENEFITS OF MINI GASTRIC BYPASS COMPARED TO GASTRIC BYPASS SURGERY

1. Shorter operating time.
2. Less re-routing of the intestines.
3. One single anastomosis which in theory means less chance of a complication.
4. Technically easier for the surgeon.

c) Outcome:

The average operative time 60min, and the median length of stay is 3days. The 30-day mortality and complication rates were 0.08% and 5.9% respectively. The leak rate was 1.08%. Average weight loss at 1 year was 80% of excess body weight. The most frequent long-term complications were dyspepsia and ulcers (5.6%) and iron deficiency anemia (4.9%). Excessive weight loss with malnutrition occurred in 1.1%. Weight loss was well maintained over 5 years, with <5% patients regaining more than 10 kg.

d) Current Status:

Miscellaneous Procedures

Intragastric balloon
Endoscopic placement of an intragastric balloon filled with 400 to 700ml of fluid has seen resurgence in popularity in recent years. It is a temporary procedure with a strict recommendation to remove it within 6 months. Weight loss during this period has been reported up to 33% EWL, with complete weight regain following deflation if a definitive surgery may improve their risk profile with an initial substantial weight loss, but complications such as obstruction, gastric perforation, and death have been reported. The intragastric balloon is at present only investigational in the United States.

**BARIATRIC SURGERY STATUS IN ODISHA:**

In Odisha Bariatric Surgery was started in March 2010 at “Shanti Memorial Hospital Pvt.Ltd”, Cuttack. Till date around 65 procedures have been performed with good results. The following procedures were performed:

1. Sleeve Gastrectomy - 37Nos
2. Roux-Y-Gastric Bypass - 3Nos
3. Mini Gastric Bypass - 25Nos

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**Summary & Conclusion:**

After half a century of growth and development, bariatric surgery is still an array of procedures in evolution. The application of the laparoscope along with improvements in safety and a dramatic reduction in morbidity and mortality has made these procedures more acceptable to patients. Despite their popularity, the large volume of bariatric operations performed has not kept pace with the epidemic rise in obesity rates worldwide.

The armamentarium of procedures to treat obesity attests to the lack of a single ideal surgical remedy. As further refinements are made and new technologies become available, we will undoubtedly see even greater and more durable weight loss, better outcomes for comorbidities, and enhanced safety profiles. This brief overview of existing procedures will hopefully provide the reader a framework in which to evaluate current treatments and integrate future ones.

**References:**

ICU Care Concerns in Critically Ill Obese Patient

N. Pani¹, A.K. Prusty², R. Mahapatra³

Abstract:

Obesity is a serious disorder resulting in a significant impairment of health for which, increasing number of obese patients are being admitted to critical care units for various indications. The intensivist has to face numerous challenges during management of such patients. The present article reviews few of the important clinical and critical care concerns in critically ill obese patients.

Introduction:

The increased prevalence of obesity [defined by a body mass index (BMI) greater than 30 kg/m²] is worldwide and is associated with abnormally high percentage of fat in the body. However, the incidence and prevalence of obesity varies between countries; whereas in Japan and China only 1 in 20 adult women is obese, in the Netherlands 1 in 10 women are grossly overweight compared to 1 in 4 in the UK and Australia, 1 in 3 in the USA¹⁻³. The data from majority of the developing nations are lacking due to non-uniformity and under reporting. However, the latest report from surveys in India is pointing toward an alarming growth of this modern epidemic⁴.

Critically ill obese patients are extremely challenging as these patients are invariably having compromised dysfunction of one or more organ systems besides the deranged pathophysiology due to obesity. ICU physicians need to be aware of the physiologic changes occurring with obesity that become relevant during critical illness.

OBESITY AND ICU OUTCOME. The multisystem physiologic derangements that accompany obesity, it might be expected that obese patients suffer from higher morbidity and mortality in the ICU. Although not statistically significant, similar trends toward improved hospital mortality were observed for overweight as well as morbidly obese patients. There was no difference in ventilator days, but there was a trend toward longer ICU and hospital days among morbidly obese subjects compared to normal-weight control subjects.

CLINICAL CHALLENGES.

Clinical and nursing care for critically ill, morbidly obese patient is a challenge for the entire intensive care unit (ICU) team. It has been widely observed in various clinical situations that obese patients are more prone to develop complications and mortality following any major medical or surgical illness especially associated with longer ICU stay.⁵⁻⁷.

Monitoring Difficulties Blood Pressure/Cardiovascular Monitoring:

Noninvasive blood pressure monitoring by cuff sphygmomanometer is often inaccurate because of difficulties with cuff size selection and placement. In fact, some have suggested that inaccuracies may persist, even when an appropriately sized cuff is available.⁸ Invasive monitoring via arterial line also has limitation; the presence of increased atherosclerosis, changes in arterial wall thickness, and excessive overlying tissue may “dampen” the waveform and affect arterial line reading. As clinical assessment of volume status can be difficult, some have successfully employed stroke volume variation as a useful guide to assess fluid responsiveness in the obese population.⁹

Difficult Vascular Access.

However, the insertion of central venous catheters (FIGURE 1) in these patients tests the clinical skills of even the best of the intensivists.¹⁰ The usual anatomic landmarks are obscure, the distance from skin to vessel is much further than normal, and the angle of approach may be too steep to allow cannulation even after reaching the vessel. The advent and increasing use of ultrasound-
guided vascular access nowadays has brought some relief to the intensivists throughout the globe.[11,12]. A lower-frequency probe may be needed to image deeper vessels in some cases (5 mHz as opposed to 7.5 mHz or 15 mHz). The standard needle used for catheter placement may be inadequate, and longer needles, such as a spinal needle, may be required to clear the excessive soft tissue. Distortions due to excess adipose tissue may alter the insertion angle of the dilator such that it varies significantly from the initial angle of needle insertion. This may result in an irregular track, cause bending or distortion of the wire, and lead to difficulty in threading the catheter smoothly. Therefore, daily reassessment of catheter need, diligent site maintenance, and early planning for more permanent access, if necessary, is crucial to reduce catheter-related infections and catheter-related phlebitis and thrombosis.

1. Nutritional challenges. The basal metabolic rate and the energy requirements of critically ill patients are generally calculated based on actual body weight using the Harris-Benedict equation[13] However, overestimation of the metabolic demand and supply ratio can lead to imbalanced nutrition in these patients, resulting in over feeding. In 2009, the Society for Critical Care Medicine and American Society for Parenteral and Enteral Nutrition released a joint consensus statement in which they endorsed the use of hypocaloric enteral feeding for obese ICU patients[14] In this statement, they suggest providing no more than 60% to 70% of target caloric requirements, or 11 to 14 kcal/kg actual body weight per day. They recommend delivering at least 2.0 g/kg ideal body weight
(IBW) per day as protein in class I and II obesity and at least 2.5 g/kg IBW per day for class III obesity.

2. Imaging: Portable chest radiographs obtained on an obese ICU patient are limited by poor image quality due to inadequate soft tissue penetration. Artificially constricting the girth of the patient by using linen or elastic binders can be helpful but may further compromise comfort as well as the respiratory status, particularly if the patient is already dyspnoeic when lying supine and not on ventilator support.

3. Pharmacological challenges: There are no universal guidelines and protocols for administration of dosing schedules in morbidly obese patients. An in-depth knowledge of basic pathophysiologic aspects concerning the volume of distribution and clearance of hydrophilic and lipophilic drugs is required for determining appropriate dosage regimen. The altered physiology in obese patients is characterized by a larger volume of distribution (Vd) for lipophilic drugs,
increased clearance of hydrophilic drugs, and a decrease in lean body mass and tissue water content, as compared to normal population.[15] These altered mechanisms can predispose the morbidly obese patients to either the limited efficacy of under dosages or systemic toxicity due to over dosages of various pharmacological agents.[16,17]

i. Dosing schedules and strategies. The ideal body weight (IBW) is considered for standard dosing of various drugs like penicillins, cephalosporins, linezolid, corticosteroids, H2-blockers, digoxin, beta-blockers, atracurium, vecuronium, fentanyl, midazolam, lorazepam, phenytoin, and for propofol during sedation in ICU. Total body weight (TBW) is the choice for administration of succinylcholine, rocuronium, unfractionated heparin, enoxaparin, and vancomycin, while Dosing weight (DW) is used for aminoglycosides and fluoroquinolones.

ii. Antimicrobials IBW is appropriate for dose calculation and administration in case of cephalosporins, penicillins, and beta-lactams, TBW is ideal for adjusting the dose titration of drugs like vancomycin and related drugs like daptomycin, quinpristin, and dalfopristin. DW is the standard selection for aminoglycosides.

iii. Sedatives, analgesics, and muscle relaxants However, the dosing schedule for opioids and sedatives like benzodiazepines should be carefully titrated as these drugs have potential to cause respiratory depression in morbidly obese patients.[18] Therefore, initially a small dose can be administered and the strength can be increased on the basis of desired clinical effect. For drugs like fentanyl, remifentanyl, and morphine, IBW is the appropriate standard for the formulation of dosing schedule.[19] The availability of naloxone should be ensured before administration of opioids, especially for non-intubated patients.[20] IBW is again the criterion of choice for administration of drugs like propofol, midazolam, and lorazepam TBW should be considered when administering neuromuscular blocking agents such as succinylcholine and rocuronium, while IBW should be the basis for administration of muscle relaxants such as atracurium and vecuronium.

iv. Anticoagulants The volume of distribution of anticoagulants like heparin in obese patients differs from that in non-obese patients since adipose tissue has a lower blood volume than lean tissue; so heparin dosing requirements do not increase linearly with body weight. There are no established guidelines and protocols for administration of optimal dosing schedule for heparin and low-molecular-weight heparins (LMWHs) in obesity. The literary evidence, however, suggests the use of TBW to calculate the initial bolus dose and infusion rate to achieve a therapeutic partial thromboplastin time (PTT). PTT should be the choice for adjusting the initial rate of these pharmacological agents after an elapse of first 6 hours. Also, it is recommended that initial administration of these drugs should be on the higher side, whether as bolus or continuous infusion. Enoxaparin and LMWH, whenever administered, should be adjusted according to TBW. LMWH, is administered through subcutaneous route as there is variable peripheral perfusion due to morbid obesity. Enoxaparin administered as 40 mg every 12 hours and as 60 mg every 12 hours subcutaneously provides effective prophylaxis against venous thromboembolism in bariatric patients up to a BMI 50 kg/m2 and with a BMI exceeding 50 kg/m2, respectively.

v. Cardiac Medications For administration of cardiac drugs like beta-blockers, digoxin, and calcium channel blockers, IBW should be taken into consideration for titration of doses.

4. Glycemic derangement and Glycemic Control Glucose metabolism definitely gets deranged during prolonged ICU stay due to stress and, as such, glycemic control with insulin and dextrose infusion has been shown to be beneficial in critically ill adults. The morbidity index has shown higher values with intensive glycemic control [target serum glucose 81–108 mg/dL (4.5–6.0 mmol/L)] when compared with conventional therapy [serum glucose less than 180 mg/dL (10 mmol/L)]. Recently, the general consensus has been that sustained hyperglycemia is less detrimental than the fluctuating blood sugar levels, and thus the goal is to maintain normoglycemia.

5. Nursing Care difficulties Nursing staff faces enormous challenges while caring for the obese patient in the ICU.[FIG 2] Simple tasks such as turning the patient can cause injury to staff members and the patient if not performed with adequate staffing, equipment, and training. Obese patients are at risk for
development of pressure ulcers due to limited mobility, and early ulcers may go unnoticed, particularly those in the skin folds. Moisture buildup in intertriginous folds may lead to superimposed skin infections. Recently, there has been renewed interest in promoting early ambulation and mobilization of patients in the ICU. There are potential risks of causing injury during these interventions as well as risk of accidental extubation and dislodgement of invasive vascular lines which can be extremely hazardous. Overall, general nursing care is extremely difficult in grossly obese patients, especially those who are unconscious and/or on mechanical ventilation.

**Pressure sores and stress ulcer prophylaxis**

Developing pressure sores [FIG 3] and stress ulcer are greatly increased in obese individuals as compared to normal individuals. Administration of either H2 receptor antagonists like ranitidine or proton pump inhibitors such as omeprazole, rabeprazole, and pantoprazole is ideal for stress ulcer prophylaxis. The use of soft cotton pads beneath the pressure areas and air mattresses are helpful in these circumstances. Nausea and vomiting can be safely managed in these patients by administration of newer long-acting 5HT3 antagonists like palonosetron and ramosetron.

6. **Thromboembolic prophylaxis**

Critically ill obese patients are the suitable candidates for the prophylaxis of venous thrombosis. The prophylactic use of compression stockings and sequential compression devices [FIG 4] and pharmacological prophylaxis in the form of either LMWH or unfractionated heparin (5000 units subcutaneously three times daily) should be considered in critically ill obese patients. The use of inferior vena cava filter is of immense benefit in patients who either have a contraindication to anticoagulation or have pulmonary hypertension and would have difficulty tolerating the hemodynamic insult of even a small pulmonary embolism (PE).

7. **Airway Assessment And Management In Obese Patients**

The large amount of redundant oropharyngeal tissue, small oral aperture, and short/thick neck with limited range of neck movements can make laryngoscopic visualization of the airway opening difficult.

**Predictors of difficult airway**

Most of the obese patients can be managed using standard techniques and airway securing by direct laryngoscopy. However, in morbid obesity, the predictors of difficult airway may include but are not limited to short neck with limited range of movements, inadequate mouth opening, higher Mallampatti score, heavy jaw, history of sleep apnea, presence of chronic respiratory airway disease etc. Towels and folded blankets under the shoulders [FIG 5] and head can compensate for the exaggerated flexed position of posterior cervical fat. Stacking i.e to position the patient so that the top of the chin is at a higher level than the chest to facilitate laryngoscopy and intubation.

8. **Difficult airway adjuncts**

The ideal technique in these circumstances is to secure the airway with awake fiberoptic intubation [FIG 6] although direct laryngoscopy can be successful in majority of morbidly obese patients. Nowadays, use of videoscopes, glidescopes [FIG 7] and advanced version of the laryngeal mask airways has made the life of an intensivist quite easier. As a result, the airway management has become easier even in the most of the difficult airways with the advent of modern airway equipment and adjuncts. Bilevel positive airway pressure [FIG 8] can be used to preoxygenate patients before intubation, when mask ventilation has failed.

9. **Risk of aspiration**

One should be cautious while making attempts at intubation in these patients as chance of greater risk of aspiration if there is difficulty securing the airway. Ranitidine, pantoprazole, sodium citrate, metoclopramide, etc. should be administered prior to intubation.

10. **Ventilatory management**

No single mechanical ventilation mode has been shown to be superior for use among obese patients. The development of atelectasis in the dependent lung zones can be managed with the addition of positive end-expiratory pressure during mechanical ventilation. The tidal volume should be adjusted as per body weight and should be kept initially at 8 mL/kg of IBW in patients in whom mechanical ventilation is necessary. However, patients with acute respiratory distress should be ventilated with much lower tidal volume, but can be compensated by increasing the respiratory rate to maintain normal minute ventilation and thus avoiding hypoxemia and hypercarbia. During prolonged ventilation, ventilatory settings are determined by peak.
airway pressures and serial measurements of arterial blood gas values.

11. Extubation, Recovery, and Weaning
Morbidly obese patients should be extubated in fully awake state on achieving a good breathing pattern with adequate tidal volume. Premature extubation can have catastrophic consequences. The role of non-invasive positive pressure ventilation has gained significant popularity recently, but it requires the patient to be extremely co-operative. The ideal preparation post extubation should include incentive spirometry which can possibly decrease the likelihood of respiratory complications. The most challenging aspect in grossly obese patients in ICU is the difficult weaning from the mechanical ventilation. Though various positions such as 30°, 45°, 90°, etc., have been tried to facilitate the weaning process, nothing conclusive has been established.

12. Surgical Airway
Considering the short and thick neck, tracheostomy [FIG 9] can often be technically difficult, and a carefully coordinated plan between general surgeon, ENT surgeon, and anesthesiologist must be designed prior to this intervention. Despite technical difficulties, percutaneous tracheostomies can be performed, and limited reports do exist with regard to its safety.

13. Obstructive hypoventilation syndrome and sleep apnea syndrome
Obesity hypoventilation syndrome and obstructive sleep apnea syndrome are potential risks for the development of peri-operative and postoperative respiratory depression in the morbidly obese patients. The challenges are accentuated during airway management while intubating these patients in ICU as they generally have smaller airways and a component of respiratory failure due to chronic hypercarbia state and various associated co-morbidities. Administration of epidural analgesia are recommended for trauma or pathology in abdominal surgeries to control the harmful effects of postoperative pain during ICU stay. Basal atelectasis, impaired pulmonary functions, and reduced clearing of secretions predispose these patients to a higher incidence of ventilator-associated pneumonias.

14. Complications and Management of Respiratory failure
Obesity complicated by the presence of hypoventilation sleep syndrome is a potential risk factor for developing hypercarbic respiratory failure, and administration of opioids in these patients increases the chances of respiratory depression. All these deranged pulmonary dynamics have significant implications for mechanical ventilation during ICU stay. Ventilatory settings have to be considered on an individual basis, and as such, tidal volume should be based on IBW. Other ventilatory parameters like minute ventilation, inflation pressure, peak and static airway pressures have to be carefully titrated and adjusted also on an individual basis so as to prevent any incidence of hypoxemia or barotraumas. Special considerations should be given to basal atelectasis, impaired pulmonary functions, and reduced clearing of secretions, as these can predispose obese patients to a higher incidence of ventilator-associated pneumonias.

**Recommendations**

1. Atelectasis should be re-expanded with recruitment maneuvers.
2. Adequate PEEP should be used to keep parenchyma open.
3. VT should be maintained between 6 and 8mL/kg of ideal body weight.
4. Peak airway pressure should be below 30 cm H2O.

17. Infection and sepsis
In severely ill, morbidly obese patients besides taking care of sepsis, many other appropriate measures have to be adopted simultaneously, such as source control, appropriate cultures of blood, urine, and sputum, and the administration of broad-spectrum intravenous empiric antibiotic therapy (at least two agents, covering a combination of gram-positive, gram-negative, and anaerobic organisms). Aggressive fluid therapy is the initial treatment of choice in patients suffering from severe sepsis. The vascular status in septic patients can be optimized with 1 L of 0.9% normal saline or Ringer lactate solution which is administered until a CVP of 6–12 mmHg is achieved. Norepinephrine is the vasopressor of choice to maintain hemodynamic stability and should be started if the patient remains hypotensive after adequate volume resuscitation, with a goal of achieving mean arterial pressure (MAP) of 60–65 mmHg. Renal failure should be managed with renal replacement therapy on a daily basis in spite of no established benefits of continuous compared to intermittent renal replacement therapy.
Conclusions:

Obesity poses unique challenges for the ICU team. Important changes in cardiovascular, pulmonary, and immunologic physiology predispose such patients to respiratory failure, thromboembolic disease, abdominal compartment syndrome, and aspiration. Special attention is required when performing routine ICU procedures, such as intubation and insertion of central venous catheters, and limitations in testing capabilities may lead the astute ICU clinician to rely solely on clinical suspicion when making therapeutic decisions. Daily management can be further hampered by uncertainties regarding drug metabolism and pharmacokinetics, nutritional needs, and challenges in bedside nursing care. Dedicated research is much needed in obese patients to allow for formulation of evidence-based guidelines that would further enhance delivery of ICU care for this challenging population.

References:
Acquired Hemophilia A in an elderly woman associated with bullous pemphigoid and clopidogrel use: an unusual case report

S. Mehta1, S. Gulati2, N. Sharma3, L. Harshvardhan4, V. Sharma5, N. Gupta6, D. Kaushik6, A.N. Mangalam6, S. Mehta7

Abstract:
Acquired hemophilia is a rare bleeding disorder, distinctly different from the more common inherited hemophilias. We are presenting a case of an elderly female patient who developed epistaxis, subcutaneous bleeding and melena. She was a known case of bullous pemphigoid and coronary artery disease and had been previously taking clopidogrel for the same. Coagulation studies showed an isolated elevated APTT. Mixing studies showed the presence of time dependent inhibitors to Factor VIII. She was subsequently treated with activated prothrombin complex concentrates and immunosuppression.

Keywords: Acquired Hemophilia A, Bullous Pemphigoid, Clopidogrel

Introduction:
Acquired haemophilia is a rare bleeding disorder characterised by formation of antibodies against coagulation factors VIII and IX (less common). It has been observed to be associated with autoimmune diseases, malignancy, pregnancy and certain drugs in half of the cases, with the other half being idiopathic[1]. We hereby present a case of an elderly lady presenting with unexplained bleeding.

Case report:
A 71 year old lady, known case of Type 2 diabetes mellitus, hypertension, coronary artery disease, bullous pemphigoid and bilateral osteoarthritis with total knee replacement, presented with a history of easy bruising, hematochezia and epistaxis off & on since 6 months. Initially this was suspected to be due to antiplatelet agents (Aspirin and Clopidogrel) that she was taking for CAD, but even after stopping these drugs, her symptoms persisted. Epistaxis rapidly worsened in the week prior to admission and was associated with melena during this time. On presentation, her vital parameters were stable. Physical examination was unremarkable except for pallor and multiple ecchymoses all over body.

She was investigated for a disorder of hemostasis. Hemogram showed anemia with hemoglobin 3.6 g/dL and platelet counts 1.53 lakhs/mm³. Coagulation profile showed an elevated Activated Partial Thromboplastin Time (aPTT) – (control 27-36 seconds; test 67.6 seconds) and normal Prothrombin time (control 11-16 seconds; test 12.6 seconds) and thrombin time (control 15-21 seconds; test 16.8 seconds). The patient was administered multiple units of Fresh Frozen Plasma and anterior nasal packing was done. However, she did not respond to the treatment and had persistent epistaxis. On the second day of admission, she had a bout of massive hematemesis and developed hypovolemic shock. She was managed aggressively for the same with crystalloid, Whole Blood and FFP transfusions in the Intensive Care Unit.

An isolated elevation of APTT with normal PT and TT suggested a defect in the intrinsic arm of the coagulation cascade. Factor VIII and Factor IX activity was tested and showed a low Factor VIII activity (less than 1%) and normal Factor IX activity (108%). Von Willebrand factor levels were also normal (163%). APTT based mixing studies (Table-1) were ordered...
and they revealed the presence of time dependent inhibitors to coagulation factors. This established the diagnosis of Acquired Hemophilia. The patient was started on infusions of activated prothrombin complex concentrates \{Factor Eight Inhibitor Bypassing Activity FEIBA\} in a dose of 70 IU/kg. Her bleeding responded to 6 doses of FEIBA and she subsequently became vitally stable. Her anemia was managed by Packed Red Cell transfusions. She was discharged on immunosuppression in the form of oral prednisolone and cyclophosphamide.

**Discussion:**

Acquired hemophilia is a rare bleeding disorder with a prevalence of approximately 1.5 cases per million.[2] Median age of presentation is 77 years, with increasing incidence with age[2] and no gender preponderance.[1] It is caused by the formation of IgG antibodies against Factor VIII (mostly) and Factor IX (rarely). About 50% cases of acquired hemophilia are idiopathic and the rest are associated with a concurrent autoimmune disease, malignancy, pregnancy or drug intake. Other than age, the previously reported conditions associated with Acquired Hemophilia A (AHA) in our case were Bullous Pemphigoid[2] and clopidogrel use[3], both of which are infrequently reported.

Acquired Hemophilia A most commonly presents as skin and soft tissue bleeding, as was the case in our patient.[2,4] She subsequently went on to develop epistaxis and upper gastrointestinal bleeding which are not very common in patients of AHA. This disease should be suspected in a patient with a bleeding disorder having an elevated APTT with normal PT, TT and platelet counts. APTT based mixing studies are used to confirm the diagnosis (Table-1).[5]

**Table – 1: APTT based mixing study to detect factor inhibitors**

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Factor deficiency</th>
<th>Immediately acting inhibitors</th>
<th>Time dependent inhibitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2. Test</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>3. 50:50 mix of tubes 1 and 2; incubated at 37°C for 2 hours</td>
<td>N</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>4. 50:50 mix of tubes 1 and 2; non incubated</td>
<td>N</td>
<td>↑</td>
<td>N</td>
</tr>
</tbody>
</table>

As of now, no comparative studies exist to support treatment recommendations for patients with AHA. Treatment of acquired haemophilia involves a two-pronged approach to achieve hemostasis and to halt the production of inhibitors by immune suppression.[6] Hemostasis can be achieved by bypassing the dysfunctional intrinsic arm of the coagulation cascade. This is done by using activated Prothrombin Complex Concentrates –aPCCs or Recombinant activated Factor VII (NovoSeven). FEIBA contains activated factors II, VII, IX and X and it increases the generation of thrombin. It is used in doses of 50-100 IU/kg 8-12 hourly till bleeding subsides (maximum of 200 IU/Kg/day). Recombinant FVIIa (NovoSeven) activates the common coagulation pathway and is used in doses of 90μg/kg every 2-3 hours till hemostasis is achieved.[6] Both of them carry a risk of thromboembolic events. Recombinant or plasma derived FVIII and DDAVP is only to be used when bypassing agents are unavailable. Immunoabsorption and/or plasmapheresis can be used if bypassing agents fail.[6] We administered our patient aPCCs (FEIBA) 70 IU/kg 12 hourly, and her bleeding stopped completely after 6 doses.

Prednisolone (1mg/kg/day) alone or combined with cyclophosphamide (1.5-2 mg/kg/day) for 4-6 weeks is the recommended first line therapy for inhibitor eradication. The anti CD-20 monoclonal antibody Rituximab is recommended if first line therapy fails or is contraindicated (off-label use).[6] Remission rates observed with prednisolone and cyclophosphamide are 71%, but relapse rates of 20% have been reported.[2] Our patient was managed with oral prednisolone 1 mg/kg/d and cyclophosphamide (50 mg twice a day). Unfortunately she was lost to follow up.

**Conclusion:**

A combination of high index of clinical suspicion and basic tests of coagulation can readily diagnose acquired haemophilia. Prompt initiation of treatment with bypassing agents and immunosuppression can effectively manage most cases of this potentially life threatening disease.

**References:**


Pulmonary Alveolar Microlithiasis: A Rare Case Report

R. Das¹, J. Patnaik², T. Mohanty³, M.R Dash⁴, S. Pradhan⁵, S. Subhankar⁶

Introduction:

Pulmonary alveolar microlithiasis (PAM) is a rare diffuse lung disease. It was first named in 1933 by PUHR, and is characterized by deposition of spherical calcium phosphate concretions (microliths) in the alveoli. It was first described by Friedrich in 1856 and then by Harbitz in 1918. In 1957 Sosman emphasized that 50% of cases were familial. The disease could remain asymptomatic for decades, with subsequent occurrence of dyspnea, chest pain, and dry cough, and could result in respiratory failure. It is mostly accepted now that the disease has an autosomal recessive inheritance. Recently, a few reports have described the role of mutation in the type IIb sodium-phosphate cotransporter gene (SCL34A2 gene) in the disease pathogenesis. Hereby we present a case of symptomatic PAM in a 34 year old female.

Case Report:

A 34yr. old female was admitted to the Dept. of Pulmonary Medicine with complaints of dry cough and non progressive exertional dyspnea since 2 years. There was no h/o chest pain, palpitations, orthopnea or PND, no h/o similar complaints in the family, no h/o DM, HTN, PTB in the past. She was a washer-woman by occupation. On examination Pt. was conscious, oriented, dyspneic, with vitals WNL, SpO2- 95%, Pallor was present and there was grade 2 clubbing. The respiratory system examination revealed fine inspiratory crepitations in b/l lung fields and predominantly in basal regions. All other routine investigations were within normal limits. Sputum smear for AFB was negative. PFT- Restriction (FVC-26%, FEV1-29%, FEV1/FVC=114). Chest X-ray (pic-1) showed b/l nodules of calcific density, homogenous opacity in mid and lower zones obscuring the heart borders and diaphragm. HRCT Thorax (pic-2 & pic-3) showed the presence of numerous sand-like tiny alveolar calcifications throughout both lungs and Crazy-paving pattern, calcified interlobular septa with ground-glass appearance. On bronchoscopy a patch of size 3-4cm with surrounding erythema seen in lateral wall of rt. main bronchus. The lavage fluid was negative for tuberculosis or fungi or other organisms but microliths were found to be present in BAL fluid. 2D-ECHO and U.S.G of abdomen & pelvis were WNL. Patient was discharged with systemic corticosteroids and was doing well after 3 months of follow up.

Discussion:

PAM is an uncommon disease characterized by widespread localization of calcispherites (salts of calcium and phosphate) in the alveolar spaces in the absence of any known disorder of calcium metabolism. PAM can be seen in any age group. Sex distribution is equal. A familial incidence particularly in siblings is common (autosomal recessive). Recently, the gene

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SLC34A2 has been identified and is considered to be responsible for PAM. This gene codes for type IIb sodium-dependent phosphate transporter and its function may provide insight into the pathogenesis of this disorder. Role of enzyme Carbonic anhydrase has also been documented. It promotes alkalinity of the alveolar surface leading to precipitation of calcareous salts. A striking feature of this disease is lack of significant symptoms despite extensive radiographic changes. Patients may remain asymptomatic for many years and usually become symptomatic between third and fourth decades, the condition may progress slowly leading to progressive dyspnea with or without cough and ultimately end up with respiratory insufficiency and cor pulmonale. Plain film - chest radiograph: Typically demonstrates sand like calcification distributed throughout the lungs (sand-storm appearance). Distribution is bilateral with middle to lower zone predilection. Black pleural lines may be evident. HRCT Thorax better demonstrates numerous sand like calcifications throughout the lungs (typically ~ 1mm). Additional accompanying HRCT features include crazy paving pattern, calcified interlobular septae, small subpleural cysts, black pleura sign and ground glass opacities. Transbronchial lung biopsy confirms the diagnosis by showing presence of calcipherites within alveoli. There is no known medical treatment to reduce or halt the progression of the disease. Palliative treatments with systemic corticosteroids, calcium-chelating agents and serial bronchopulmonary lavage have been shown to be ineffective. Attempts to reduce calcium phosphate precipitation in pulmonary alveoli has been tried with diphosphonate. Lung transplantation remains the only possible treatment for end-stage cases.

**Bibliography:**

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Ovarian Fibroma : An Unusual Case Presentation

S. Singh1, L. Das2, S. Swain3, B. Sahoo4

Abstract:
This paper reports a case of a 19 year old female patient who presented with a large multi septate, predominantly cystic ovarian mass with elevated CA-125 levels. A diagnosis of benign ovarian tumour was made on grounds of pre operative investigations and laparotomy was planned. Histopathological examination however revealed on ovarian fibroma with cystic change reinforcing the non specificity of CA-125 as a marker of ovarian malignancy and establishing the importance of a proper histopathological examination even in the most obvious of cases.

Keywords: Fibroma, ovary, CA-125

Introduction:
Ovarian fibroma is a stromal tumor, which accounts for 4% of all ovarian tumors. It usually occurs in patients over 40 years of age. Ovarian fibromas usually present as unilateral, solid, hard masses with a bosselated external surface. Edematous tumors may be soft in consistency and cyst formation is common. The cut surface is grey-white and homogeneous with a whorled pattern and occasional areas of calcification. Ovarian fibroma is almost always benign in nature. It may be associated with ascites and hydrothorax known as Meig’s Syndrome. We report a case of ovarian fibroma with an unusual morphological presentation and elevated CA 125.

Case Report:
A 19 year old unmarried female presented to our Out-patient Department with complaints of mass abdomen pain and heaviness in the right lower abdomen for the past 3 month that had suddenly increased during the 7 days prior to reporting to the hospital. She gave a history of increased menstrual flow with passage of clots. She had no complaints of fever, vomiting, or bowel or bladder dysfunction. Her general physical examination was unremarkable. An abdominal examination showed a 28 week size, tender suprapubic mass arising from the pelvis and reaching up to the right iliac region. A vaginal examination revealed an irregular, firm mass non separable from the uterus and felt through all fornices. Routine laboratory tests were within normal limits.

An abdominal ultrasonography was suggestive of a right adnexal solid mass measuring 24cm* 18cm*
16cm. The left adnexa and uterus were unremarkable. The patient’s blood CA-125 levels were raised to 40 U/ml (normal <35 U/ml). based on the clinical presentation and investigations, a provisional clinical diagnosis of benign ovarian tumor was considered and the patient underwent right salpingo-oopherectomy. An exploration of the abdominal cavity did not yield any other abnormalities.

**Pathological findings:**

A gross examination revealed a rt ovarian measuring 25*20* 15 cm. The capsule covering the mass was intact and the outer surface was smooth and bosselated. On sectioning, the mass was predominantly multilobular, irregular hard with degenerative changes. No areas revealing papillary projections, necrosis, or hemorrhage were identified. Normal ovarian tissue was not identified. The left ovary and Fallopian tube were unremarkable. A gross examination suggested a benign / borderline epithelial tumor. However, on microscopic examination, multiple sections taken from the ovarian mass revealed a tumor composed of spindle shaped cells with uniform bland nuclei and scant cytoplasm arranged in fascicles. The tumor showed a variable degree of edema. There were no mitotic figures. Tumor cells were vimentin-positive. Multiple sections were evaluated to rule out any focus of epithelial differentiation. Histological features were consistent with a fibroma ovary.

**Discussion:**

Ovarian fibromas are stromal tumors composed of spindle, oval or round cells producing collagen. Fibromas are usually solid, spherical, slightly lobulated, encapsulated, grey-white masses covered by a glistening, intact ovarian serosa. Fibromas occur at all ages, most frequently during middle age, with an average age of 48 years. Ovarian fibromas are almost always benign. Very rarely, fibromas without any atypical features are associated with peritoneal implants. Surgical removal of these solid ovarian tumors is recommended because of the low probability of malignancy.

CA-125 as an ovarian carcinoma tumor marker has been suggested as a valuable tool to assist in distinguishing between benign and malignant neoplasms. Unfortunately, it has not proved to be a reliable predictor of ovarian cancer as normal values do not exclude the presence of carcinoma and elevated levels can be associated with a benign diagnosis. Spinelli, et al. also reported a case of benign ovarian fibroma with elevated CA-125 levels.

In our case, there was a strong clinical, radiological and serological suspicion of malignancy, so laparotomy was planned. Unlike the guarded prognosis encountered for advanced cases of ovarian carcinoma, the surgical option in this case proved to be curative with an uneventful postoperative course.

The present case report emphasizes the varied presentation and unique gross morphology of ovarian fibroma. It also reinforces the non specificity of CA-125 as a marker of ovarian malignancy. It beckons us to re evaluate the presumption that thorough clinical examinations supported by laboratory investigations and imaging modalities are fool proof in themselves. The role of a histopathological diagnosis should not be underestimated even in cases with a strong suspicion of malignancy.

**References:**


Abstract:

Pemphigoid gestationis (PG) is an uncommon autoimmune bullous disease that almost exclusively presents during pregnancy and occurs in approximately 1 in 50,000 pregnancies\(^1\). Patients typically present with a diffuse blistering and intensely pruritic eruption that begins periumbilically and spreads to involve the rest of the body. Direct immunofluorescence demonstrating C3 in a linear pattern along the dermoepidermal junction confirms the diagnosis of PG. Corticosteroids remain the choice of therapy and early intervention is essential because of possible adverse effects of PG on the fetus. We report a case of PG.

Key Words: Autoimmune; Bullous dermatosis; Pemphigoid gestationis

Introduction:

Pemphigoid gestationis (herpes gestationis) is a rare devastating autoimmune bullous dermatoses occurring in approximately one in 50,000 pregnancies\(^3\). It usually presents during the second or third trimester, but it may be present at any stage of pregnancy or the puerperium\(^3\). Classically, pemphigoid gestationis (PG) is characterized by pruritic, urticarial plaques and tense vesicles and bullae within the lesions\(^6\). The periumbilical site is usually the first area involved. Pruritus is a prominent symptom associated with the onset of disease\(^3\). Blister formation is due to a complex mechanism involving Th2 lymphocytes, cytokines and polymorphonuclear cells\(^5\). In routine histological examination a subepidermal vesicle is detected\(^6\).

Case Report:

A 34 year old pregnant female (second gravida) in her third trimester was admitted to O&G department of SCB Medical College with itchy fluid filled lesions all over the body of seven days duration. She started developing small vesicles filled with fluid on her abdomen 7 days back. These vesicles were small to start with and then gradually increased in size and number. Also these lesions started spreading to other parts of the body. In about 4 days, her entire body was covered with these vesicles. These vesicles were associated with itching, ruptured on slight pressure to reveal raw surface. Her LMP was on 10.2.2014. P1 L1 at gest age 29 weeks married for 14 years. Her 1st pregnancy - term/ male/ VD & RMLE/ hosp/ living. 2nd pregnancy continuing. There is no h/o similar complaints during previous pregnancy. She had 1 ANC visit. No h/o DM, HTN, TB, Epilepsy, Asthma, Cardiac disease No h/o any thyroid ds, bleeding dyscrasias. No h/o previous surgery, no h/o of any drug allergy, no h/o of any other skin disorder during previous pregnancy. No h/o any autoimmune diseases. Conscious, oriented to time, place and person. She had average nutrition.

On examination tense bullous lesions present all over the body. Pallor present. Mild pedal edema present. No icterus, cyanosis, clubbing No thyroid enlargement. No palpable lymph nodes. Temp - 98.4\(^\circ\)FRR - 18/min, regular PR - 82/min, regular, good volume. BP - 130/80 mmHg. With the above history & information so we had a provisional diagnosis of G2 P1 L1 at GA 29 weeks with tense bullous lesions all over the body, suspected of some sort of pregnancy dermatosis.

On local examination multiple vesicles and bullae, tense in nature, some containing clear fluid, hemorrhagic fluid and others containing turbid looking fluid, present almost all over the body. Most of the vesicles were present on erythematous skin. Few of the lesions were healed with hypopigmentation. Patient gives h/o appearance of these lesions first over abdomen periumbilically. H/o prodrome of itching present. No evidence of secondary infection. No lesions on mucosa, scalp, palms and soles. Tab Omna cortisol 30 mg 1 tab
OD at 8 AM after food × 10 days. Tab Teczine 5 mg 1 tab OD before food × 10 days. Daily bath. Banana leaf spread.

Her investigation report shows Hb% : 10.4 gm/dl, PCV:30, TPC:1.9 Lakhs/cumm, BT-2 min 00 s, CT-4 min 15 sec. Blood group: B positive. TLC: 8200/cumm. DC: N-68% E-4% B-0% L-27%. HIV, HBsAg, HCV: all negative. Na+: 142 mEq/L, K+: 5.0 mEq/L. Urine R/M – within normal limit. FBS- 71 mg/dL, 2 hr PPBS- 119 mg/dL. RFT: S. Urea -22mg/dL, S. Creat -0.8mg/dL. Bilirubin [total] - 0.8mg/dL. Bilirubin direct - 0.2mg/dL. SGOT - 38U/L, SGPT - 24U/L. ALP - 159IU/L. Gram stain- Smear shows plenty of pus cells but no bacteria.

On daily examinations, her vitals were within normal limits. Skin lesions along with pruritus significantly improved. USG was done on 02.06.14 which revealed a single live intrauterine fetus of AGA 26 weeks with anterior fundal placenta and adequate liquor. FHR-146 beats/min. In the morning of 06.09.14 at about 3.30 AM patient started experiencing pain abdomen which was associated with hardening of uterus. She was immediately shifted to labour room. Her PV findings at 3.40 AM/06.09.14 were as follows: cervix 80% effaced, 4 cm dilated membranes were applied HS -2. The patient was prescribed cap calcigard 2 capsules 6 hourly and Inj dexamethasone 6mg 12 hrly. But the patient delivered a preterm female baby vaginally at 8 am on 06.09.14 weighing 1 kg. The baby had poor cry and APGAR score was 5. The baby was handed over to the neonatologist and later shifted to SNCU. The baby did not have vesicles or bullae or skin lesions of any kind. The baby expired in SNCU at 3.10 pm on 06.09.14. Patient was continued on tab omnacortil, tab teczine. There were no new lesions and old lesions were healing.

PHOTO 1 & 2: VESICLES FOUND AT LOWER LIMBS AND BACK OF THIGH

PHOTO : 3 SKIN BIOPSY SHOWED LINEAR DEPOSITS WITH EOSINOPHIL
PREDOMINANT INFILTRATE ALONG THE DERMOPIDERMAL JUNCTION PHOTO : 4
VESICLES FOUND AT LOWER LIMBS

PHOTO 5 & 6: VESICLES FOUND AT UPPER LIMBS AND FACE

Discussion:

Pemphigoid Gestationis is a pregnancy associated autoimmune disease. PG is a rare autoimmune subepidermal bullous disease that occurs during pregnancy and postpartum. Most patients develop antibodies against two hemidesmosomal proteins, BP180 (BPAG2, collagen VII) and less commonly BP230. Also known as Herpes Gestationis, these circulating antibodies belong to heat-stable IgG1 subclass. The binding of immunoglobulin g to the basement membrane triggers an immune response, leading to formation of subepidermal vesicles and blisters. Cross-reactivity between placental tissue and skin has been proposed to play a role. It has strong association with HLA-DR3 (61-80%) and HLA-DR4 (52%) or both (43-50%). The placenta is known to be the main source of disparate (paternal) antibodies and can thus present as an immunological target during pregnancy.
The patients classically show a diffuse blistering and intensely pruritic eruption that begins periumbilically and spreads to involve the rest of the body\(^8\). Pruritic urticarial papules and plaques of pregnancy (PUPPP) are among the most common dermatoses of pregnancy\(^9\)\(^1\)\(^1\). PG must be differentiated from PUPPP. Generally PG presents earlier in pregnancy and involves the lower abdomen while sparing the striae. Involvement in or near the umbilicus is common. Target, polycyclic, or vesicular lesions occasionally predominate (no bullae)\(^1\)\(^0\)\(^1\)\(^1\). Coboet al. investigated seven cases of PG with mean age 30 years\(^4\). Main sites of involvement were lower limbs (mainly thighs), forearms, trunk, and abdomen\(^4\). In 2003 Boudaya et al. reported 15 patients with PG\(^1\)\(^2\). This study demonstrated the late occurrence of PG during the course of pregnancy, the high frequency of multi gravid women, however two particularities observed: the frequent involvement of the face and the efficiency of dapsone\(^1\)\(^2\). Exacerbations and remissions are common throughout the pregnancy and up to 75% of women suffer intrapartum flares. In subsequent pregnancies the disease invariably recurs, and it usually does so earlier and is more severe.

Our study revealed that, clinical presentation, laboratory findings, and treatment of the patients. Our PG patients shared many similarities with many other studies performed worldwide. Our PG patients is comparable to the literature in the occurrence of PG during the second and third trimester of pregnancy, initial lesions on the abdomen especially periumblical, the lack involvement of mucosa however were observed: high frequency in primigravida women, and the frequent involvement of the face.

Patients should understand the benign nature of this disease. No adverse sequelae, except SGA neonates and prematurity, are reported. It should be explained to them that PG may recur with subsequent pregnancies, resumption of menses, use of oral contraceptive pills, pregnancy-like states like choriocarcinoma. Increased incidences of premature delivery and small for gestational age neonates. Increased lifetime risk of other autoimmune diseases like Graves’ disease, Addison’s disease, type 1 DM, SLE, Hashimoto’s thyroiditis\(^1\)\(^3\), etc. Infants born to affected women rarely have transient blistering disease. Such infants are at risk for infection, thermoregulatory difficulties and fluid and electrolyte abnormalities. Biopsy samples from the edge of an early blister typically reveal a subepidermal deposit with an eosinophil predominant infiltrate. The inflammatory infiltrate is localized to the dermo-epidermal junction and the perivascular areas. Keratinocyte necrosis and dermal edema are often present. Routine lab studies are not helpful. Most hematological studies are within normal limits. The criteria for diagnosis include an appropriate clinical presentation, histological findings of a subepidermal blistering process and DIF showing a linear band of C3 deposition with/without IgG along the basement membrane. DIF test of patient’s serum can be used to detect circulating antibodies BMZ.

The goals of treatment are to relieve pruritus and to suppress extensive blister formation. Tepid baths, compresses, and emollients may help to alleviate pruritus. Patients with mild disease can be treated with antihistamines and midpotency topical or intralesional steroids like triamcinolone. For severe disease, systemic steroids form the mainstay of therapy. Prednisone at 0.5 mg/kg/d is usually started and response to therapy is gauged by abatement of pruritus and blister formation. Reported steroid sparing agents used as adjuvant therapy include azathioprine, dapsone, methotrexate, IV Ig, cyclosporine, pyridoxine, plasmapheresis and minocycline/nicotinamide\(^1\)\(^4\). Chemical oophorectomy with goserelin may also hold promise.

**Conclusion:**

In summary, PG is an autoimmune disease that occurs almost exclusively during pregnancy. Its clinical course is variable, but eruptions typically respond to steroid therapy. It is important to diagnose and treat PG early, not only to provide symptomatic relief to patients but to prepare for possible adverse outcomes on the fetus.

**References:**


Wegener’s Granulomatosis : A Rare Case Report
S. Kodali¹, J. Patnaik², T. Mohanty³, M.R. Dash⁴, S. Pradhan⁵

Introduction:
Wegener’s granulomatosis (WG) is a multisystemic disease characterized by a necrotizing granulomatous vasculitis affecting predominantly the upper and lower respiratory tract and kidneys (1). The prevalence of the disease is about 3 per 100000 population, equally in both sexes (2). The German pathologist Friedrich Wegener first described the disease in 1936 (3).

Case Report:
29Yrs old male presented with pain and discharge from both ears for 2 months. There was bleeding from nose, cough and hemoptyisis, decreased hearing and skin rashes for 1 month. He developed fever, chest pain and shortness of breath for 10 days and reddish discolouration of eyes for 7 days. There was past history of diabetes for 2 years and hypertension for 2 months.

On examination, there was discharge from left ear and tympanic membrane in right ear showed perforation. On auscultation he had bilateral rhonchi. Neurological examination showed 7th cranial nerve lower motor neuron palsy (IMG 1).

Investigations: Routine blood investigations were within normal limit except FBS- 201 mg/dl, PPBS- 348
mg/dl. Urine routine examination revealed > 100 RBCs and microalbuminuria. Chest X-Ray showed lingular consolidation & bilateral nodules (IMG 2). CT scan thorax showed lingular consolidation and bilateral nodules (IMG 3) with cavitation. X-Ray PNS (IMG 4) and CT PNS revealed bilateral mastoiditis. Laryngeal endoscopy revealed mucosal hyperemia & ulceration (IMG 5). Bronchoscopy revealed mucosal hyperemia & ulcerations of the bronchial wall (IMG 6).

Further investigations revealed C-ANCA : STRONGLY POSITIVE (End point titre is 1:640) , P-ANCA: negative, Anti- GBM Ab: negative. Based on this a confident diagnosis of Wegener’s Granulomatosis was made but biopsy was not done as patient refused.

Treatment was started with corticosteroid and cyclophosphamide and the patient was discharged on request. Fatal outcome occurred very next day of discharge due to massive hemoptysis.

**Discussion:**

WG was first described by Klinger in 1933, followed by Wegener in 1936 and Ringerts in 1947. WG is classified as ANCA positive vasculitis, mostly localized on the small and medium-sized blood vessel. It mostly affects the upper and lower respiratory airways and kidneys (3).

Sex distribution of the disease is equal, most of the patients present in the fifth decade, although the disease can occur at any age.

Various studies have revealed that the lungs are affected in 90 percents of patients (4) with typical radiological presentations being multiple, bilateral, nodular infiltrations, with or without cavities. There may be pleural effusion in 20-50% of patients (4). Atypical presentations are interstitial lung disease, hilar mass or pneumotorax.

In 1990, the American College of Rheumatology (ACR) established the criteria for the classification of WG (5): nasal or oral inflammation, radiologically demonstrated pulmonary infiltrates, abnormal urinary sediment (red cell cast, haematuria), granulomatous inflammation on biopsy. Patient shall be said to have Wegener’s granulomatosis if at least 2 of these 4
criteria are present. The presence of autoantibodies to proteinase 3/ cANCA is not required for diagnosis of WG, by either ACR or Chapel Hill consensus Conference (CHCC) definition (5). Occasionally, patients with infection, inflammatory bowel disease, rheumatic disease, neoplasm develop ANCA.

Clinical presentation can be so diverse that the list of differential diagnoses is vast, ranging from infection, neoplasm, tuberculosis, malignancy, other forms of vasculitis (sarcoidosis, behcet disease, henoch schonlein purpura).

Even though classified in the group of rare pulmonary diseases, high index of suspicion, early diagnosis and the timely beginning of management may considerably influence the further course of disease. Therefore, the application of additional diagnostic tests may be crucial for the prognosis of Wegener’s granulomatosis.

References:

Non Secretory Myeloma Presenting as Plasma Cell Leukemia : A Rare Case

S.N.Das¹, P.K. Rout², M. Pattnaik³, N.R. Parida³, S.Devi⁴, D.R. Darjee⁴

Abstract :

Nonsecretory multiple myeloma (NSMM) is a rare variant of the classic form of multiple myeloma (MM) and accounts for 1% to 5% of all cases of MM characterized by absence of detectable M-protein in the serum and urine. The clinical presentation and radiographic findings of NSMM and MM are the same. The diagnosis of MM requires the detection of a monoclonal gammopathy in the serum or urine. In NSMM, however, no such gammopathy can be demonstrated making the diagnosis more difficult. A report of a case with pathological vertebral fractures, with no M band in serum protein electrophoresis but with typical picture of plasma cell morphology is described.

Keywords: non-secretory, plasma cell leukemia, multiple myeloma

Introduction :

Multiple myeloma is a neoplasm of B cell lineage characterised by excessive proliferation of abnormal plasma cells. These malignant plasma cells secrete an abnormal immunoglobulin causing a monoclonal gammopathy that can be identified in the serum and/or urine by electrophoresis. Patients with MM can present with anemia, hypercalcemia, lytic lesions in bone, and renal failure. If a monoclonal spike is not found but the patient has clinical and radiologic findings similar to those found in MM, then that patient may have a rare variant of myeloma known as the nonsecretory multiple myeloma, the plasma cells fail to secrete an immunoglobulin. The first case of NSMM was reported in 1958.

Two types of NSMM.

TYPE 1 (producer type, true nonsecretory, nonexcretory myeloma)-plasma cells produce immunoglobulin but are not able to secrete it out of the cell. Protein synthesis mechanism may be functioning, but rapid degradation of the immunoglobulin.

TYPE 2 (nonproducer)-plasma cells are unable to produce immunoglobulin. There is problem in assembly process of proteins and thereby lead to difficulty with immunoglobulin heavy and light chain synthesis.

Plasma cell leukemia (PCL) is a rare variant of multiple myeloma (MM), accounting for approximately 1-2% of all plasma cell neoplasms[6]. PCL is characterized by the presence of malignant plasma cells in the peripheral blood (more than 20% of WBCs and/or an absolute number greater than 2×10⁹/L) and has a poor outcome. Nonsecretory myeloma is also a rare form of MM characterized by the absence of monoclonal immunoglobulins on either serum or urine electrophoresis and represents less than 1% of case of MM[7]. Only a few well documented cases of nonsecretory MM presenting as primary PCL have been reported. We here report a elderly case of primary nonsecretory PCL.

Case Report :

A 70 year old female was admitted with complaint of low back ache, generalised weakness for last 3 mnths and have received 3 units of blood transfusion in last 3 mnths. On examination patient is cachectic, afebrile, pallor, cervical lymphadenopathy on left side of neck, bilateral pitting pedal edema, with pulse rate-100/min, BP-170/70 mm Hg. Systemic examination revealed painless vertebral gibbus extending from T10-T12. Laboratory investigations revealed Hb-7.3gm%; TLC-18,000; TPC-1.0; DC- N10 L30; Peripheral plasma cells-60%; comment on peripheral smear-? plasma cell leukemia.

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Second CBC report showing Hb-8.0; TLC-16,900; TPC-80,000; ESR-58; DC-N20 L72; comments on peripheral smear-RBC=mild hypochromic microcytosis,WBC=plasmacytoid lymphocytes.

Serum creatinine-1.1; Sr.urea-32; Sr.calcium(ionised)-1.1; RBS-104; LFT and Lipid profile were normal. USG abdomen and pelvis revealed-B/L acute medical renal disease, RK-13.1*5.2, LK-12.5*5.6, b/l cortical echo increased, pyramids prominent. Bone marrow study revealed plasma cell leukemia(plasmablastic type). Plasma cells markedly increased in number with immature and multinucleated forms that constitute 75% of mononuclear cells(plasmablastic type being 10%). X Ray thoracic spine shows-compression fracture over T10- T12 with intact intervertebral disc. Serum protein electrophoresis-Normal.

Discussion:

Primary PCL occurs in individuals without a preceding diagnosis of MM[8], whereas secondary PCL arises in patients with a history of MM who have progressed to a leukemic phase. The present patient is considered to have primary PCL since they had no previous history of MM. Primary PCL has a more aggressive clinical presentation than MM, with a higher frequency of extramedullary involvement, as well as anemia, thrombocytopenia, hypercalcemia, and renal failure. On the other hand, the presenting features of nonsecretory myeloma are similar to those observed in patients with a detectable level of M-protein, with the exception of the absence of renal function impairment[2].

The coexistence of nonsecretory MM and primary PCL in same patient is of clinical interest. It was not difficult to diagnose PCL since the peripheral malignant cells had a typical plasma cell morphology. We here reported a case, with lack of monoclonal immunoglobulins with the malignant peripheral malignant plasma cells showed a typical morphology.

Conclusion:

The subset of these patients with non-secretory myeloma- a group of patients who do not secrete immunoglobulin or its component parts into either blood or urine has been challenging to treat and to assess for disease response. Newer methods of assessment for plasma cell disorders, such as the widely used serum free light chain assay, have reduced the number of patients with truly non-secretory myeloma to less than 3% of all newly diagnosed myeloma patients[1,2]. Patients with nonsecretory myeloma have prognosis similar to or better than secretory myeloma.
Serum electrophoresis showing no M Band.

PAINLESS VERTEBRAL GIBBUS EXTENDING FROM T10-T12.

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Colloid carcinoma of the breast in a premenopausal woman: A rare case report

L. Pattanayak¹, N. Panda¹, S. Samantaray², N. Rout²

Abstract:
Mucinous breast carcinoma or colloid carcinoma of the breast is a rare type of infiltrating duct carcinoma which accounts for < 2% of all breast cancers. It is most commonly seen in postmenopausal females with a long history and a favorable prognosis. We present a rare case of colloid carcinoma of the breast in a premenopausal female and discuss the histopathological profile, treatment and outcome.

Key words: Colloid, Mucinous, Histopathology, Prognosis.

Manuscript:

Introduction: Mucinous breast carcinoma also called as colloid carcinoma of the breast is a rare type of infiltrating duct carcinoma accounting for < 2% of all breast cancers. The mean age of presentation is 64.3 years, patients usually have longer clinical histories, lower incidence of lymph node metastases and higher survival rate following treatment. We present here a case of colloid carcinoma of the breast in a premenopausal female, the cytological profile and response to treatment.

Case: A 42 years old Hindu premenopausal female presented with a mass in the left breast for 6 months and generalized weakness for 3 months. On examination her general condition was fair, pallor was mild, without any icterus, cyanosis or clubbing. There were no palpable lymph nodes either in the supraclavicular fossae or in the axillae. Abdomen was soft, nontender, without any definite mass, organomegaly or ascites. Both her children were well breast fed and there was no history of any oral contraceptive intake. Physical examination of the mass revealed it to be of about 2 X 2.5 X 3 cm in size in the upper outer quadrant of the left breast. The mass was firm in consistency, mobile, nontender; superficial skin was healthy and not involved by the tumor. There was no nipple discharge. Opposite breast was normal and healthy, neither axillary nor supraclavicular nodes were palpable. Bony tenderness was absent. FNAC from the breast mass showed a thick aspirate, smears were highly cellular, arranged in groups or single in mucinous background suggestive of colloid carcinoma of the breast.

A trucut biopsy from the lesion showed epithelial cells arranged in loose cohesive groups, flat cells and single cells bathed in abundant mucin of variable density. The epithelial cells were monomorphic, round to oval with eccentric round to oval vesicular nuclei with smooth nuclear outline, confirming the diagnosis of colloid carcinoma of the breast. Modified Radical mastectomy was done, and the post operative histopathology report further confirmed the diagnosis. Twelve nodes were resected of which none were metastatic and the pathological TNM stage was pT2N0M0. She received six cycles of adjuvant chemotherapy Inj CEF (cyclophosphamide, epirubicin and 5 fluorouracil) followed by radiotherapy to the chest wall (50 Gray in 25 # # per week for 5 such weeks). She is on regular follow up and 2 years after completion of treatment locoregionally controlled.

Discussion:
Mucinous breast carcinoma also called as colloid carcinoma of the breast is a rare type of infiltrating duct carcinoma accounting for < 2% of all breast cancers. The incidence of mucinous or colloid carcinoma of the breast accounts for 1 – 7% of all invasive breast carcinomas and is estimated to be 1% in women less than 45 years of age. Unlike our patient who is 42 years old, it predominantly affects older women, the mean age of presentation being 64.3 years with longer clinical histories, lower incidence of...
lymph node metastases and higher survival rate following treatment. (R2) Mucinous carcinoma presents with lower incidence of axillary nodal metastases (0-2 %). (R3). About 21.2 % of mucinous carcinoma may not be detected mammographically. (R4). A microlobulated mass with circumscribed margins in the breast of an elderly female suggests the possibility of a mucinous carcinoma. On sonography presence of both cystic and solid components and distal enhancement are important positive signs to suggest diagnosis. A complex mass with solid and cystic components is an unusual feature of invasive duct carcinoma and therefore raises the suspicion of mucinous carcinoma of the breast. (Fig 1) Indistinct margins with irregular shape suggest less favourable histology whereas well circumscribed margins favours pure type mucinous carcinoma with better prognosis.

Mucinous duct carcinomas may be of pure type or mixed type. A breast carcinoma of which more than one third volumes (33 %) is occupied by extracellular mucin is termed pure mucinous carcinoma whereas a mixed variant is one where mucin
accumulation is less than equal to 33 %. The diagnosis of mucinous carcinoma in elderly patients who present with a palpable breast mass can be made by fine needle aspiration while a post operative biopsy allows accurate and detailed histopathological assessment for staging and subsequent treatment. The HP reveals a highly cellular picture, epithelial cells distributed in loose cohesive groups or flat sheets and single cells bathed in abundant mucin. The mucin mostly appears homogeneous, extracellular and is of variable density. The epithelial cells are monomorphic, round to oval with eccentric vesicular nucleus- nuclei with smooth vesicular outlines, granular chromatin and inconspicuous nucleoli.(Fig 4) In the present case although mammogram was not done, the cytology picture was distinctive of colloid carcinoma of breast which was further established by histopathology study.

Mucinous carcinoma of the breast like other breast tumors begins in the milk duct of the breast before spreading to the tissues around the duct. These tumors behave less aggressively than other variants of infiltrating duct carcinoma, of low grade, look like normal cells, and more positive for ER/PR and negative for her’s-2 neu. As these tumors are less likely to involve lymph nodes they carry a favorable prognosis with better treatment outcome.

Treatment in mucinous carcinoma of the breast is based on features of the tumor like types of cells, tumor grade, hormone receptor status, her-2 neu status, stage of the disease as well as general condition of the patient and presence of any comorbid conditions. The prognosis is good in majority of cases with a 10 year survival rate of 90 % or more.

Conclusion:

Colloid or mucinous carcinoma of the breast is a rare occurrence particularly in the premenopausal age group. FNAC provides distinctive cytological details which can be confirmed by histopathology. They are slow growing tumours with a favorable prognosis. The present case not only highlights the pathological details of colloid breast cancer but also emphasizes the favourable prognosis and response in an otherwise rare breast carcinoma.

References:

Functional Hypoparathyroid in Magnesium Deficiency with Hypocalcemic Tetany: A Case Report

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Abstract:
Chronic hypocalcemia is less common than hypercalcemia, however, is usually symptomatic and is manifested by muscle spasms, carpopedal spasms, facial grimacing, and latent tetany confirmed by Chvostek’s or Trousseau’s sign. A report of a case of chronic hypocalcemia with impaired parathyroid secretion in magnesium deficiency presented with carpopedal spasm and latent tetany as confirmed by Chvostek’s and Trousseau’s sign.

Keywords: Chronic hypocalcemia, hypoparathyroid, hypomagnesemia.

Introduction:
Chronic hypocalcemia causes include chronic renal failure, hereditary and acquired hypoparathyroidism, vitamin D deficiency, pseudohypoparathyroidism, and hypomagnesemia. Chronic hypocalcemia is usually symptomatic and requires treatment.

Neuromuscular and neurologic manifestations of chronic hypocalcemia includes muscle spasms, carpopedal spasms, facial grimacing, and, in extreme cases, laryngeal spasm and convulsions[4]. Respiratory arrest may occur. Increased intracranial pressure occurs in some patients with long standing hypocalcemia, often in association with papilloedema. Mental changes include irritability, depression, and psychosis. The QT interval on the electrocardiogram is prolonged. Arrhythmias occur, and digitalis effectiveness may be reduced. Intestinal cramps and chronic malabsorption may occur.

Case report:
A 21 year old female postpartum 2 mnths was admitted with c/o sudden onset abnormal movement of hands for last 1 day. On examination patient was conscious, afebrile with vital parameters in normal limit. Trousseau’s sign present. Systemic examination revealed no abnormality. She had grade 5/5 in both upper limb and lower limbs, with normal deep tendon reflexes. All routine investigations including RFT, LFT, were normal. Initial laboratory investigations showed Serum calcium was 8.2 mmol/L, serum PTH was 3.77 (N:15.0 -65.0), serum phosphorus 4.5(2.5-4.8), serum magnesium 0.5(1.6-2.30), spot urine calcium 9.0 mg/dl(25-100 mg/dl). Patient was treated with oral calcium and magnesium hydroxide replacement and tab. hydrochlorothiazide with advice to drink plenty of water and was discharged. Subsequently on reviewing the follow up reports after 2 months was serum calcium 9.0 mg/dl, serum magnesium was 1.6 mg/dl, serum PTH was 50.33.

Discussion:
Severe hypomagnesemia (<0.4 mmol/L;<0.8 meq/L) is associated with hypocalcemia[1]. Hypocalcemia is typical in severe hypomagnesemia and manifests with tetany as was seen in our patient[3]. Restoration of the total body magnesium deficit leads to rapid reversal of hypocalcemia. As expected, the administration of magnesium increased the circulating calcium and PTH in our patient. There are two causes
of the hypocalcemia—impaired PTH secretion and reduced responsiveness to PTH.

The effect of magnesium on PTH secretion are similar to those of calcium; hypermagnesemia suppresses and hypomagnesemia stimulates PTH secretion. Hypomagnesemia might be expected to increase hormone secretion. It is surprisingly found that severe hypomagnesemia is associated with blunted secretion of PTH . This paradox is found because chronic hypomagnesemia leads to intracellular magnesium deficiency, which interferes with secretion and peripheral responses to PTH. Magnesium deficiency may result in defective cyclic AMP generation in the parathyroid glands and in the PTH target organs[1]. This could be the principle mechanism operative in both impaired PTH secretion and end-organ resistance to PTH which together contribute to the development of hypocalcemia[1].

An important observation noted in our patient was the persistent normal phosphate level as is seen in patients with hypomagnesemia. The presence of hypercalciuria in such patients makes medical treatment challenging[4]. Treatment with calcium and vitamin D should be accompanied by the use of thiazide diuretics to decrease urinary calcium excretion and ensure a urinary volume that is adequate to decrease urinary calcium concentration[4].

Conclusion:

PTH levels are undetectable or inappropriately low in severe hypomagnesemia despite the stimulus of severe hypocalcemia, and acute repletion of magnesium leads to a rapid increase in PTH level[2]. Serum phosphate levels are often not elevated, in contrast to the situation with acquired or idiopathic hypoparathyroidism, probably because phosphate deficiency is often seen in hypomagnesemia[3].

References:
Squamous cell carcinoma of the right kidney with ureterocele and double ureter

L. Pattanayak¹, N. Panda², S. Samataray³

Abstract:
Squamous cell carcinoma of the kidney is very rare accounting for 0.5% of all renal neoplasms and 4 to 5% of all urothelial tumors. A 52 years old female who presented with pain lower abdomen on investigation was found to have squamous cell carcinoma of the kidney. Associated with the renal mass was a ureterocele which could have led to urinary stasis, chronic irritation and thereby the development of a malignant process. This case is reported for the association of a congenital anomaly with squamous cell carcinoma of kidney.

Key words: Squamous cell carcinoma, ureterocele, congenital anomaly.

Manuscript:
Introduction: Squamous cell carcinoma of the kidney is very rare accounting for 0.5% of all renal neoplasms and 4 to 5% of all urothelial tumors. Chronic irritation of the urothelium is the most established cause of squamous neoplasms but its association with congenital anomalies of the kidney is infrequent. We describe a rare case of squamous neoplasm in the background of congenital anomaly like ureterocele and a double ureter.

Case: A 52 years old female presented with heaviness of lower abdomen for 6 months and pain in the right flank for 4 months. This was associated with fever off and on with vomiting and loss of appetite for 3 months. There was no history of diabetes, hypertension or chronic use of analgesics. Clinical examination revealed her general condition to be good with no pallor, icterus, cyanosis or clubbing. There were no palpable lymph nodes, abdomen was soft with tenderness more on the right side, ascites was absent. Biochemical examination showed Hemoglobin to be 8 gm %, lymphocytic leucocytosis with total WBC count of 14000/cmm. Urea and creatinine as well as serum bilirubin were within normal limits while urine examination showed plenty of pus cells. USG of the abdomen and pelvis showed 61 x 52 mm cystic heterogeneous area in the right upper pelvicalyceal system with internal echo suggestive of right upper pole ureterocele with duplex moiety (Fig 1). CECT abdomen and pelvis further showed dilated upper and lower pole moiety pelvicalyceal system (Fig 2). Correlation with the USG showed echogenic content inside the dilated upper pole moiety with no internal vascularity. The upper pole moiety calyceal system drained into the dilated ureter which joined the urinary bladder forming an ureterocele. Middle part of the ureter showed mild thickening of the wall. There was no evidence of calculi giving a radiological impression of right sided hydronephrosis with dilated upper and lower pole moiety with ureterocele. Two dilated pelvicalyceal systems gave the picture of double ureter and the echogenic content was suggestive of pyonephrosis. With a clinicoradiological diagnosis of right ureterocele with duplex moiety and pyonephrosis and a right ectopic ureter at the bladder neck, a right radical nephrectomy was done. On cut section the specimen was partly solid and cystic with a tumor on the upper pole of 4cm diameter. Microscopic picture revealed neoplastic squamous cells with moderate to marked nuclear pleomorphism, prominent nucleoli, increased mitoses and moderate to abundant cytoplasm with evidence of keratin pearls. Histopathology confirmed the diagnosis of infiltrating well differentiated squamous cell carcinoma of kidney, capsule of which was infiltrated by tumor tissue (Fig 3 & 4). Renal pelvis and ureter were free, renal vessel was unremarkable with chronic pyelonephritis. Postoperative period was uneventful and a postoperative USG showed non visualization of right.
kidney and a dilated distal ureter. Left kidney was normal in size and shape with normal parenchymal echogenecity, cortical thickness and corticomedullary differentiation. There was mild left sided hydroureter and hydronephrosis. Postoperative CT scan showed postnephrectomy changes with multiple paraaortic and right common iliac lymphadenopathy. The case was discussed in the Institutional Tumor Board and was planned for adjuvant radiation therapy to the renal bed.

Discussion:

Primary neoplasms of the renal collecting system are rare accounting for 4 to 5% of all urothelial tumors (Ref 1). Squamous cell carcinoma accounts for 1.5% of all renal malignancies and 0.5% of all neoplasms of the renal collecting system (Ref 2). Chronic irritation of the renal collecting system leads to squamous metaplasia and malignant progression which finally leads to squamous cell carcinoma. Etiological factors include long standing calculi particularly impacted long standing staghorn calculus, surgery for calculi, chronic renal infection, analgesic abuse and history of radiotherapy. Smoking and tobacco addiction in any form have also been implicated as predisposing factors. Review of literature shows in a series 100% of patients of squamous cell carcinoma had staghorn calculi (Ref 3).

Although our patient presented with fever and chronic pyelonephritis there was no evidence of any calculi. The association of any congenital anomaly with renal malignancy has not been reported. The present case showed association of a double ureter with ureterocele along with squamous cell carcinoma of kidney. The pathogenesis of this congenital anomaly with a renal malignancy cannot be fully elucidated.
Squamous cell carcinomas of the kidney are usually nonpalpable unless associated with obstruction which leads to hydroureter and hydronephrosis and may become palpable.

Most of squamous cell carcinomas present in advanced stage, high grade and stage and are very aggressive with metastases and a dismal prognosis (Ref 4).

Surgery i.e nephrectomy is the standard treatment followed by radiotherapy as per postoperative indications (Ref 5). Chemotherapy with or without radiotherapy is reserved for metastatic presentation. There is lack of significant evidence regarding survival benefit with CTRT after surgery but is done with the hope of improving survival.

Conclusion: Squamous cell carcinoma of the kidney in the absence of calculi is a rare presentation. Association with a ureterocele which has led to urinary stasis and has developed a malignant process is even rarer. More number of similar cases needs to be evaluated for definite treatment guidelines.

References:
Anaphylaxis Induced by Hydroxyethyl Starch During Spinal Anesthesia for Emergency Lower Segment Caesarean Section - A Case Report

P. Mishra¹, S. Chavali²

Abstract:

Hydroxyethyl starch (HES) solutions are synthetic non protein colloid solutions used to treat hypovolemia. However, their use is not free from the risk of allergic reactions. A 25-year-old female was scheduled to undergo emergency lower segment Caesarean section (LSCS) for fetal distress. She had no previous history of allergies. Near the end of surgery, and within minutes after HES administration, generalized erythema, angioedema, tachycardia, hypotension and bronchospasm developed. HES infusion was discontinued under the estimation of anaphylaxis. The patient received ephedrine, epinephrine, pheniramine, ranitidine and hydrocortisone with hydration. After restoration of vital signs, patient was discharged from the ICU without complication after 24 hours.

Keywords: Anaphylaxis, Bronchospasm, Erythema, Hydroxyethyl Starch, Angioedema.

Introduction:

Hydroxyethyl starch (HES) solutions and widely used plasma substitute for correcting intraoperative hypovolemia and hypotension. HES refers to a class of synthetic non protein colloid solutions that are modified natural polysaccharides similar to glycogen and derived from amylopectin, consisting of hydroxyethylated polymers of glucose. HES preparations are defined by concentration, molar substitution, molar substitution ratio and average molecular weight. The possible side effects of HES are allergic reactions, alterations of the hemostasis resulting in increased bleeding, renal failure, tissue storage and pruritus. Allergic reaction induced by HES is caused by the substance itself (starch), and the incidence of allergic reactions is lowest compared with that of other colloids. There are very few reported cases of anaphylactic reactions to HES, particularly in parturients. We present a patient who developed a severe intraoperative anaphylactic reaction soon after the initiation of HES infusion, along with a review of literature.

Case Report:

A 25-year-old primigravida (weight 65kg, height 155 cm) was posted for emergency LSCS for obstructed labour with fetal distress. Her previous medical history was insignificant, and there was no history of any allergies, either for the patient herself or her family. There were no abnormalities in the preoperative physical examination, hematological tests and ECG.

Upon arrival in the operating theatre, she was preloaded with IV crystalloid (10ml/kg) and pre-anesthetic blood pressure (BP), heart rate (HR) and oxygen saturation (SpO2) were 128/83mmHg, 88bpm and 100%, respectively. Subarachnoid block was performed with 10mg hyperbaric bupivacaine in the left lateral decubitus position, using the median approach. Sensory block up to the T6 dermatome was verified using pinprick, and the surgeons were asked to proceed. Intraoperatively, the BP was maintained at 90/50mmHg in spite of repeated boluses of 5mg Inj. Ephedrine. HES 6% (200/0.5) was administered through peripheral IV line for volume therapy. About five minutes from the time when HES administration was started, erythema was observed in the palms, face and neck, with rise in body temperature. Within about 10 minutes from initiation of the HES infusion, and after approximately 150mL was given, BP suddenly dropped to 74/40mmHg, and HR increased to 130bpm. SpO2 decreased to 90% and the patient started complaining of dizziness and discomfort. Angioedema...
was noted in the palms, soles and face of the patient. On auscultation, mild wheezing was noted in both lung fields. All signs, including erythema, angioedema, hypotension and bronchospasm fulfilled the clinical criteria for diagnosing anaphylaxis. Because antibiotics or blood components were not used during the operation, bupivacaine was injected before 30 minutes without any complication and the anaphylactic reaction occurred within minutes of HES exposure, HES was suspected as the culprit and its infusion was discontinued. The newborn had an APGAR score of 3/1/1, and could not be resuscitated. The patient was allowed to ventilate spontaneously on 100% oxygen at high flow, and 0.25mg Inj. epinephrine was administered intravenously over five minutes. Inj Pheniramine Maleate 25mg, Inj Hydrocortisone Succinate 100mg and Inj. Ranitidine 50mg were also administered. Fluids were administered liberally, with up to 2L IV crystalloid given, and the patient’s vitals returned to normal subsequently.

The patient was then shifted to the ICU, and placed under observation. Angioedema and erythema resolved over the next three hours, and the patient was discharged from the ICU after 24 hours. As there was persistent pruritus, patient was advised to take Tab. Prednisone 50mg and Tab. Cetirizine 10mg OD for three days. Subsequent follow-up revealed no abnormalities but skin testing carried out 2 weeks later was positive for hypersensitivity to HES.

Discussion:

The World Allergy Organization has proposed that anaphylaxis refers to a ‘severe, life threatening, generalized or systemic hypersensitivity reaction.’ They further suggested the term ‘allergic anaphylaxis’ to be used when this reaction is mediated by an immunologic mechanism and that anaphylaxis from a non-immunologic mechanism should be termed ‘non-allergic anaphylaxis.’ Therefore, the term ‘anaphylactoid’ has been eliminated[1]. Foods and medications cause most of the anaphylaxis cases for which the cause can be identified, but virtually any agent capable of either directly or indirectly activating mast cells or basophils can cause this syndrome. Anaphylaxis due to drugs can be caused either by IgE-dependent events or the IgE-independent reactions. The mechanisms are different, but clinically indistinguishable and unpredictable[2].

Anaphylaxis is diagnosed with high likelihood based on clinical criteria[1]. These criteria are fulfilled with clinical signs and symptoms onset after allergen exposure, involving the skin or mucosal tissue, plus either respiratory difficulty or a low BP. Traditionally, apart from its clinical features, serum tryptase, plasma histamine and 24-hour urinary histamine metabolites have been clinically used to confirm the diagnosis of anaphylaxis. Other diagnoses that may indicate symptoms similar to anaphylaxis should be excluded. Skin tests and allergen-specific IgE tests can provide confirmatory evidence of sensitization to a specific allergen. In general, skin tests appear to be more sensitive, but less specific than in vitro allergen-specific IgE tests[1].

During general anesthesia, hypotension followed by bronchospasm is the first manifestation of anaphylaxis. In the patient undergoing anesthesia, bronchospasm occurs in less than half of cases and skin and mucosal presentations may be late or obscured[3,4]. After all, especially during general anesthesia, increased awareness is very important, because the early symptoms cannot be taken directly from the patient, and other administered anesthetics, as well as the surgical situation, might confuse the differential diagnosis.

In the case presented here, facial erythema was the very first sign, and the subsequently developed bronchospasm, in addition to hypotension, was helpful in the diagnosis of anaphylaxis. Although a cause-effect relationship could not be proven, the absence of any other IV medications or exposure to other potential allergens in the 30 minutes prior to the event, and also development of typical signs within minutes of HES exposure, strongly suggested the association with HES. While this case fulfilled the clinical criteria for diagnosing anaphylaxis, laboratory tests, including serum tryptase, plasma histamine, and 24-hour urinary histamine metabolites should have provided more confirmatory diagnosis for anaphylaxis. Skin testing was done, and was suggestive of hyperreactivity to HES.

pentastarch 250/0.45, and Kreimeier et al[8] to 10% pentastarch (200/0.5). In contrast, no data on the incidence of anaphylactic reactions after IV administration of the HES 130/0.4 are available. However, it is unlikely that the use of the third generation of HES may have resulted in increased anaphylactic potency, because allergic reaction appears to be induced by the substance itself (starch) and not by the modifications of the substrate. Prediction of anaphylaxis caused by HES is difficult to be made only on the basis of history of drug allergy[9]. And in this presented case, the patient did not have any history of allergy.

**Conclusion :**

In conclusion, anaphylaxis induced by HES is uncommon, and life-threatening anaphylaxis is rare. In addition, the diagnosis of anaphylaxis is difficult to be made under anesthesia, when various types of medication are simultaneously used. Therefore, it is essential to understand the criteria for the diagnosis and treatment of anaphylaxis, to make a prompt diagnosis, and to provide a proper treatment. Although we could not perform measurement of serum tryptase, plasma histamine or allergen-specific IgE, this case was diagnosed as anaphylaxis induced by HES, because of the typical signs with skin rash, hypotension and bronchospasm developed within minutes after initiation of HES, without using any other agent 30 minutes before the event and subsequent skin testing was positive.

**References :**

Tuberculosis in Congenital Cystic Adenomatoid Malformation: A Rare Case Report

H.K. Sethy¹, G. Panda², B.P. Trilochan³, D.P. Acharya⁴

Introduction:

Congenital adenomatoid malformations are rare developmental anomalies of tracheo-bronchial tree and occur as an overgrowth of terminal bronchioles with subsequent suppression of alveolar growth in the first 35 days of gestation, but the etiology is unknown. These lesions have intra-cystic communications and a connection to tracheobronchial tree.

The fundamental pathological feature of the lesion is adenomatoid proliferation of bronchioles that from cysts at the expense of normal alveoli. Generally, they present as acute respiratory distress secondary to compressive effect of expanding cysts in neonates. They may remain asymptomatic and, in later life, may present as incidental finding on chest X-ray or as superadded recurrent infections, but superadded infection with tuberculosis is a very rare presentation.

We hereby present a case of congenital cystic adenomatoid malformation in a young female with co-existent Pulmonary Tuberculosis of the left lung.

Case Summary:

A 14 year old girl was admitted to the Dept. of Pulmonary Medicine, SCBMCH with chief complaints of fever, low grade, intermittent, cough with scanty mucoid expectoration and shortness of breath since 4 months. She also complained of malaise, loss of appetite since 4 months. Birth and development of her was uneventful and she had been routinely immunized since birth. On general examination, pallor present. Respiratory system examination revealed decreased vocal fremitus with percussion note dull over Left infra-clavicular and mammary area. Breath sounds were reduced over Left anterior chest. Routine investigations showed anemia [Hb 8g/dl], microcytosis and ESR of 113/1 hr. All other routine investigations were within normal limits. Sputum for AFB was negative. Chest X-Ray (Pic-1) showed non-homogenous opacity over left hemithorax. 2D Echo study and USG Abdomen & Pelvis were normal. HRCT of the Thorax (Pic-2 & 3) revealed multiple cystic cavitory lesions of various sizes in bilateral lung field suggestive of congenital cystic adenomatoid malformation of the lung. Left Lung type-1 and Right Lung type-2 CCAM. Patient was started on CAT I DOTS (PC14+ PC14). Patient started improving clinically and radiologically (Pic-4) during the treatment and completed 6 months Anti Tubercular
Therapy. Patient remained asymptomatic after 6, 9 and 12 months follow up.

**Discussion:**

Congenital cystic adenomatoid malformation (CCAM), also known as congenital pulmonary airway malformation (CPAM), is an abnormality characterised by a multicystic mass of pulmonary tissue with an abnormal proliferation of bronchial structures. The vast majority of cases are diagnosed in the first 5 years of life, however cases have also been detected in adults up to 64 years of age. The pathophysiologic effects of CCAM may be divided into prenatal and postnatal effects. Large respiratory distress. Polyhydramnios has also been associated with CCAM. CCAM may remain undiagnosed until it is discovered as an incidental finding later in life; however, its usual postnatal presentation is respiratory distress in the newborn period. This may be due to pulmonary hypoplasia, mediastinal shift, spontaneous pneumothorax, and pleural effusions secondary to hydrops. Recurrent chest infections and risk of malignant transformation in later years is noted. The cause of CCAM is not understood. One theory holds that it is the result of bronchial structures failing to mature properly at approximately the fifth or sixth week of gestation, about the time the lungs begin to form and another theory holds that CCAM is due to an abnormal growth pattern of lung tissue due to bronchial obstruction. In 1977, Stocker grossly classified CCAM into 3 types based mostly on cyst size. Type I CCAM includes multiple large cysts (>2 cm in diameter) or a single large cyst surrounded by numerous smaller cysts. Type I is the most common type of CCAM and is associated with an excellent prognosis. Type II CCAM has multiple small cysts, usually less than 2 cm in diameter, and accounts for over 40% of cases of CCAM. Type III CCAMs are a solid mass without obvious cyst formation and account for less than 5% of all cases. No specific medical therapies are described for congenital cystic adenomatoid malformation, aside from antibiotics in children with CCAM complicated by pneumonia and supportive care, ranging from oxygen supplementation to mechanical ventilation, in older children with respiratory distress. Surgical intervention is the mainstay lesions may be associated with the development of hydropsfetalis in as many as 40% cases and is a poor prognostic sign. The other main prenatal event is compromised pulmonary growth. Resultant pulmonary hypoplasia may lead to the postnatal development of
of therapy for CCAM including fetal surgery and postnatal surgical approaches.

References:


Spontaneous reduction of irreducible hip dislocation in a 4 yrs old child posted for surgery, following caudal block

D. Swain¹, N. Sahoo², P. Patel³, P. Panda⁴

Abstract:

Close reduction under General anesthesia is a preferred technique in case of hip dislocation irrespective of the age. In this case a 4yrs old male child was posted for close manipulation under anesthesia in the Orthopedics OR. Under general anesthesia without airway intubation three attempts were made by the orthopedic team of surgeons to proceed with close reduction. But failed to reduce. The possible explanation was tissue or blood clot interposition. The team decided to proceed with surgery. Open reduction and fixation of the joint with Steinmann pin is a preferred technique in case of irreducible hip dislocation. The procedure is normally conducted under anesthesia, preferably GA. In this case caudal block with regional anesthetics was opted for additional benefit of post operative analgesia. But following the block the dislocation was spontaneously reduced and surgery abandoned. Patient was discharged from the hospital next day with a hip plaster.

Key-words: Hip dislocation, open reduction with Steinmann pin fixation, general anesthesia, spontaneous reduction, Caudal block

Key Messages: Regional block can be beneficial than General anaesthesia in cases of irreducible joint dislocation and surgery can be avoided.

Introduction:

Traumatic hip dislocation is not uncommon in day to day medical practice. It is a real emergency and requires immediate attention and correction of dislocation to prevent necrotic changes around head of the femur. Most of the cases are uncomplicated and respond to close reduction under anesthesia.

However few cases may need surgical correction due to failure of close manipulation; as a result of fractures, tissue interposition such as bones, muscles or blood clots interfering with alignment of the joint. Surgical interventions require prolonged hospital admission and are subjected to high expenditure; also not free from peri-operative complications.

Case Report:

A 4yrs old male child was admitted to the orthopedics emergency unit with a history of trauma and severe pain associated with reduced mobility around the left hip. Clinical examination and radiological evidence revealed dislocation of the left hip joint (Image-1). With the consent of the parents close reduction of the dislocation under anesthesia was planned. Blood samples sent for routine investigation and child kept NPO for 4hrs as had semisolid diet. Pre-anesthetic evaluation revealed no specific disorder or abnormality which may influence administration of anesthesia. General examination showed normal hemodynamic parameters except tachycardia, normal cardio-respiratory physiology and adequate mouth
opening (Modified Malampati score–class I). CNS status was normal with GCS 15. Child was afebrile and with 14.5 kg body weight. General anesthesia without airway intubation was preferred as the procedure was of short duration.

With written consent from parents the child was shifted to emergency operating room (OR). After securing routine monitoring devices, a 20 G peripheral IV catheter was inserted on the right forearm. Pentazocine 8mg iv, Midazolam 0.5mg iv, and Glycopyrrolate 0.1mg iv was administered as premedication. Intravenous Thiopentone sodium (5mg/kg) was delivered as the anesthetic drug and surgeons were asked to proceed with the procedure. But three consecutive attempts with additional doses of Thiopentone failed to restore the joint in its socket (Image-2). Suspecting tissue interposition, it was decided to proceed with open reduction and fixation with Steinmann pin after 6 hrs. The child recovered from the anesthetic effects of Thiopentone and shifted to the recovery room with IV fluid till the arrangement of necessary equipments were made. The NPO status continued.

After 6hrs the child was again transferred to the Emergency OR and Ketamine 0.5 mg/kg along with Glycopyrrolate 0.1 mg delivered intravenously for analgesia; and Midazolam 0.5mg iv for sedation. The anesthesia team proceeded with caudal block by using a mixture of 2% Lidocaine with adrenaline and 0.5% Bupivacaine at a ratio 1:1 with estimated volume 0.7 ml/kg body weight (total 08ml) in right lateral decubitus position. Patient turned supine and airway protected, vitals monitored. The surgical team was asked to wait for 15 minutes in order to ensure complete block.

At the end of 15 minutes, it was notice that the left joint has been fully reduced and the bony landmarks have been restored in their normal anatomical position. Radiological evaluation in the OR revealed spontaneous correction of the dislocation (Image-3). The surgical procedure abandoned. The child was provided with hip plaster and shifted to recovery room for observation (Image-4). Six hrs later patient shifted to ward and discharged next day.
Discussion:

The hip joint is a ball-and-socket synovial joint; the ball is the femoral head, and the socket is the acetabulum. The joint is the articulation of the pelvis with the femur, which connects the axial skeleton with the lower extremity. Adult hip bone is formed by the fusion of the ilium, the ischium, and the pubis, which occurs by the end of the teenage years. The 2 hip bones form the bony pelvis, along with the sacrum and the coccyx, and are united anteriorly by the pubic symphysis.

Hip dislocation, regardless of their etiology, are orthopedic emergencies that require immediate diagnosis, evaluation, and treatment. The adult hip joint is remarkably stable. It is reinforced with thick capsular and labral structures. The presence of a dislocation injury indicates a large force from a traumatic mechanism (a traction force of at least 90 lb) or the presence of underlying pathology leading to inherent instability of the joint. Posterior dislocations make up 80-95% of traumatic hip dislocations. Pediatric hip dislocations may occur with smaller amounts of force and have been documented after gymnastic manœuvres and falls from standing. Posterior traumatic hip dislocations occur when the force acts with adduction, internal rotation, and some degree of flexion of the hip. The incidence of this injury has increased in recent decades because of high-velocity motor vehicle use. The increasing popularity of extreme sports has also led to an increase in hip dislocations. Posterior hip dislocations are also seen following total hip arthroplasty; relatively minor forces, such as flexing the hip to pick an item up from the floor, can result in post-operative hip dislocation. Typically, the patient with a posterior traumatic hip dislocation presents with a notably shortened lower limb held in a position of hip flexion, adduction, and internal rotation. The presence of the femoral head may sometimes be palpable at the ipsilateral buttock.

Plain film radiographs are usually the diagnostic modality of choice, as these can be performed and evaluated in a very short amount of time. An anteroposterior (AP) view of the pelvis, including adequate views of the bilateral hips, is commonly the only film acquired before the diagnosis is confirmed. An additional lateral or oblique view of the pelvis may add more information about the presence and direction of the dislocation.

Multiple studies have demonstrated that the ultimate morbidity for the patient increases as the time interval from injury to reduction increases. Complications such as osteonecrosis of the femoral head, arthritic degeneration of the hip joint, and long-term neurological sequel become more likely as reduction is delayed. While the goal is to perform an adequate reduction as quickly as possible, careful pre-reduction evaluation must be performed to properly diagnose the injury. If adequate closed reduction cannot be attained or if a nerve palsy becomes apparent after closed reduction is achieved, emergent operative reduction is required.

Anesthesia for both close as well as open surgical procedures can be achieved both by general anesthesia and regional techniques such as caudal block using local anesthetic drugs. The technique of caudal epidural block involves palpation, identification and puncture. Patients are evaluated as for any epidural block, and the indications and relative and absolute contraindications to its performance are identical. A full complement of noninvasive monitors is applied, and baseline vital signs are assessed. One must decide whether a continuous or single-shot technique will be employed. Several positions can be used in adults, compared with the lateral decubitus position in neonates and children. The lateral position is efficacious in pediatrics because it permits easy access to the airway when general anesthesia or heavy sedation has been administered prior to performing the block. In pediatric patients, blocks may be performed with the patient fully anesthetized; the same is not recommended for older children and adults. In adults, the prone position is the most frequently utilized, but the lateral decubitus position or the knee-chest (also known as knee-elbow) position may be employed. In the prone position, the procedure table or operating room table should be flexed, or a pillow may be placed beneath the symphysis pubis and iliac crests to produce slight flexion of the hips. This maneuver makes palpation of the caudal canal easier. The legs are separated with the heels rotated outward to smooth out the upper part of the anal cleft while relaxing the gluteal muscles. The skin folds of the buttocks are useful guides in locating the
underlying sacral hiatus. Alternatively, a triangle may be marked on the skin over the sacrum, using the posterior superior iliac spines as the base, with the apex pointing inferiorly. Normally, this apex sits over or immediately adjacent to the sacral hiatus. The hiatus is marked and the tip of the index finger is placed on the tip of the coccyx in the natal cleft while the thumb of the same hand palpates the two sacral cornua located 3-4 cm more rostrally at the upper end of the natal cleft. The sacral cornua may be identified by gently moving the palpating index finger from side to side. The palpating thumb should sink into the hollow between the two cornua, as if between two knuckles of a fist. A sterile skin preparation and draping of the entire region is performed in the usual fashion. A small-gauge 1.5-in. needle is then utilized to infiltrate the skin over the sacral hiatus using 2-3 mL of 2% plain lidocaine HCl. If fluoroscopy is utilized, a lateral view is obtained to demonstrate the anatomic boundaries of the sacral canal. With fluoroscopy, the caudal canal appears as a translucent layer posterior to the sacral segments. The median sacral crest is visualized as an opaque line posterior to the caudal canal. The coccyx may be seen articulating with the inferior surface of the sacrum.

Once the tissues overlying the hiatus have been anesthetized, a 17- or 18-gauge Tuohy-type needle for adult or a 18 G/20 G needle for pediatric age group is inserted either in the midline or using a lateral approach, into the caudal canal. A feeling of a slight “snap” may be appreciated when the advancing needle pierces the sacrococcygeal ligament. Once the needle reaches the ventral wall of the sacral canal, it is slowly withdrawn and reoriented, directing it more cranially for further insertion into the canal. A syringe loaded with either air or saline containing a small air bubble is attached to the needle, and the loss-of-resistance technique is used to establish entry into the epidural space. Followed by the drug in its desired volume is slowly administered into the space.

In this case there was no evidence of fractured fragment causing obstruction or there was damage to the acetabulum. Had it been blood clot or any other soft tissue then following the regional block the femoral head would not have returned to its natural socket. Cases of interposition of piriformis muscle causing complete obstruction have been reported before. In this context we presume that Thiopentone with its usual dose was not adequate to relax the muscles around the hip joint. Whereas the regional block provided complete relaxation of all the muscles around hip joint including that of the piriformis and allowed full rotation of the head of femur, with an unexpected benefit of spontaneous reduction. As a result surgery along with its associated prolonged hospital stay and unnecessary expenditure could be avoided.

Conclusion:

Adequate Regional anesthesia can provide better muscle relaxation than general anesthesia. There is no harm in approaching with regional blocks, in cases of irreducible joint dislocation before proceeding with surgical intervention as RA not only limits anesthetic complications related to general anesthetic drugs but also can reduce the chance of surgery, prolonged hospital stay and associated expenses.

References:

Congenital arachnoid cyst in a neonate

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Abstract:

A full term female baby who revealed a cystic intracranial lesion on USG abdomen of the mother at 36 weeks of gestation delivered by LSCS presented with increase in the size of the head and large fontanelle. CT and MRI revealed a large interhemispheric cystic lesion. A cystoperitoneal shunt inserted in view of the rapid increase in head size. Shunt did function well in spite of high protein content in the fluid. Intracranial pressure was stabilised.

Key words: Arachnid cyst, raised ICP, cystoperitoneal shunt, craniomegaly, ultrasonography.

Introduction:

Arachnoid cysts are either congenital or acquired. Acquired arachnoid cysts result from previous infection, trauma or hemorrhage. The cysts are congenital when present in the prenatal period and there is no history of trauma or infection. The wall of the congenital cyst consists of a thin layer of connective tissue which does not adhere to surrounding structure. Cyst fluid is colorless and clear with varying protein content. Arachnoid cyst represent about 1% of all intracranial mass of new born. [1] The most common location are the surface of the brain at the main brain fissure such as Sylvain, rolandic, interhemispheric fissure, anterior cranial fossa and middle cranial fossa. Interhemispheric arachnoid cyst is extremely rare. [1]

Here we present a case of symptomatic huge congenital arachnoid cyst treated successfully by cystoperitoneal shunt.

Case Report:

A female Baby of 1 ½ months, first child of 22 year old mother, with unremarkable medical history. At 36 week of gestational age an ultrasonography revealed a cyst towards right side of midline [Figure 1]. The baby was delivered by cesarean section. The

Figure 1: USG abdomen of the mother at 36 week showing the intercranial cyst in fetus.

Figure 2: MRI brain at 1½ months showing a large arachnoid cyst located in the inter hemispheric region.

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on 17.12.2013, 38 cm on 23.12.2013 and 43 cm on 15.01.2014. No congenital anomaly was observed. Neurological examination revealed no abnormality. CT showed arachnoid cyst about 43 mm diameter in size in interhemispheric area with compression of the left lateral ventricle. MRI revealed a large cystic lesion in between two lateral ventricles with pressure atrophy of the left parietal cortex and partial agenesis of corpus callosum [Figure 2].

Routine hematologic, serum electrolyte, urea and creatinine examination were normal. Head circumference was much larger than normal range for her age and fontanelle was bulging. It was decided to insert a cystoperitoneal shunt in view of rapid rise of intra cranial pressure.

The patient underwent cystoperitoneal shunt on 21.01.14. Preoperative head circumference was 43 cm. Post operative head circumference was 40 cm with fontanelle depressed. CT scan done at age of 3 months revealed collapsed arachnoid cyst with VP shunt in situ [Figure 3]. The baby had normal development with head circumference compatible with age. Now she is 11 months old with head circumference 40 cm.

Diagnosis of interhemispheric cyst was made at 36 weeks of gestation in the present case. It was confirmed by CT/MRI after birth. There was bulging fontanelle and increase of head size not compatible with age (43 cm at 1 month 15 days). Due to rapid progression of ICP. Cystoperitoneal shunt was done. Follow up reveals patient is showing normal physical and mental development.

Discussions:

The conservative approach for asymptomatic arachnoid cyst is recommended with time to time radiological imaging. The optimal surgical treatment is under debate. Fenestration of the cyst by open surgery or endoscopy or placement of cystoperitoneal shunt is most frequently chosen surgical procedure.[2] Among the methods Cystoperitoneal shunting is simple procedure with low risk and few complication, low morbidity, low mortality and low recurrence rate.

The known complication of shunt such as post operative infection, seizure, subdural hygroma, shunt block are known draw back. On the other hand major operation like craniotomy in an infant most not be under estimated. Total cyst collapse does not occur endoscopically treated interhemispheric arachnoid cyst.

Interhemispheric arachnoid cyst with agenesis or hypogenesis of corpus callosum is rare. This case was diagnosed in prenatal period. She had macrocephaly for which LSCS was done. Head size increased rapidly in postnatal period not compatible with age. She had no obvious neurological problem. Cystoperitoneal shunt was done which functioned well inspite of high protein content of the cyst fluid. High protein content of the fluid was possibility due to old hemorrhage or sequestration of the cyst from the subarachnoid CSF. She did well postoperatively with increased head size compatible to her age.

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Conflict of Interest:

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References:


Sarcoidosis : A Case Report

S.N. Das², P.K. Rout¹, M. Pattnaik¹, N.R. Parida³, S. Devi³, D. Darjee⁴

Abstract:

Sarcoidosis is a multisystem inflammatory disease of unknown cause characterized by the presence of non-caseating granulomas. A report of a case with lung involvement and generalised lymphadenopathy and 7th cranial nerve paralysis is described.

Introduction:

Sarcoidosis is a granulomatous disease of unknown origin, with pulmonary findings in more than 90% of patients[1]. Characterised by non-caseating granulomas in any organ[2]. Clinically sarcoidosis often presents with hilar lymphadenopathy, pulmonary infiltration, ocular and skin lesions[2]. Extrapulmonary involvement is common and all organs can be involved (especially lymph nodes, eyes, joints, central nervous system). Neurologic disease is reported in 5-10% of sarcoidosis patients and any part of the central or peripheral nervous system can be affected[1,3]. Up to 33% of patients who develop neurosarcoidosis have neurologic manifestations either preceding the disease or at the time sarcoidosis is first diagnosed[3]. Certain areas of the nervous system are more commonly involved in neurosarcoidosis. These include cranial nerve involvement, basilar meningitis, myelopathy, and anterior hypothalamic disease associated diabetes insipidus[1,2]. Of the cranial nerves, seventh nerve paralysis (most common presentation - 50% of cases) can be transient and mistaken for Bell’s palsy[1,3]. Because this form of neurosarcoidosis often resolves within weeks and may not recur, it may have occurred prior to definitive diagnosis of sarcoidosis[1,2]. We report here a case pulmonary sarcoidosis with systemic sarcoidosis and neurosarcoidosis noticed.

Case Report:

A Woman aged 48 yrs presented with history of fever and pain abdomen for last 1 mnth followed by right facial nerve paralysis for last 10 days. On general examination patient was afebrile with vital parameters stable, no lymphadenopathy and nodules on left chest and left thigh. Neurologic examination revealed 7th nerve LMN palsy on right side. Other systemic examination revealed no abnormality. All routine investigations including RFT, LFT were normal. Serum calcium-2.4 mmol/l, serum creatinine-1.2 mg/dl, ACE-126 U/L, Mantoux test - negative, ESR=50 min. USG abdomen and pelvis= multiple perigastric and periportal lymphadenopathy largest of size 23*15 mm. Chest X ray revealed B/L hilar lymphadenopathy. HRCT lungs revealed multiple mediastinal lymph nodes. USG guided FNAC of abdominal nodes revealed granulomatous lesion. FEV1/FVC=87%. The patient was put on tab, prednisolone with tapering dose over 4 wks.

Discussion:

This woman presented with h/o recent lower motor neuron facial palsy. She was found to have mediastinal lymphadenopathy with rounded pulmonary opacities. This was associated with markedly raised angiotensin converting enzyme concentrations. Facial palsy is one of the most common manifestations of neurosarcoidosis.

Neurosarcoidosis is treated with oral prednisone (60 to 80 mg/day) [3]. The diagnostic yield of lymph node biopsy is more than 90%[3]. ACE levels are elevated in 40% to 90% of sarcoidosis patients[3], but not diagnostic of sarcoidosis[3].
Conclusion:

The laboratory findings such as ACE, calcium were not diagnostic. Chest X ray and USG abdomen and pelvis, HRCT thorax were important but the diagnosis was established only with the histological examination of abdominal lymph nodes. This latter required to differentiate sarcoidosis from tuberculosis and other infections, metastasis or malignant lymphoma. And associated neurosarcoidosis is a rare finding reported.

CHEST X RAY SHOWING B/L HILAR LYMPHADENOPATHY.

HRCT THORAX: multiple mediastinal lymph nodes.

References:

A Case Report of Pulmonary Embolism in Absence of Any Underlying Causes

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Introduction:

Pulmonary Embolism, defined as blockage of pulmonary artery or one of its branches by thrombus, fat, amniotic fluid, or air\textsuperscript{11}. In a young healthy patient, pulmonary embolism is uncommon in absence of provoking factors. Hereby, we present such a case of pulmonary embolism in absence of any underlying causes.

Case Report:

A 38 year old non-smoker male presented with fever, cough with blood tinged sputum, breathlessness and left sided pleuritic chest pain for 1 week. On examination, patient was febrile, tachypneic, hypoxic and had tachycardia. On auscultation, diminished breath sounds with fine inspiratory crepitations in left basal area. Total leukocyte count was 49970 cells/cumm. Chest x-ray showed left lower zone consolidation with effusion (img1) and ECG s/o sinus tachycardia. The patient was started on empirical antibiotics for pneumonia.

However, the patient showed no signs of improvement. CECT thorax revealed left lower lobe airspace consolidation with minimal pleural thickening and effusion. Bronchoscopy was normal.

Bronchial wash culture showed \textit{pseudomonas aeruginosa} and antibiotics were changed accordingly.

Simultaneously, the patient developed left lower limb pain and swelling with tenderness. Doppler study showed venous thrombosis of left femoral vein and its branches. D-dimer was positive. Echo was normal. USG Abdomen and Pelvis was normal. CT Angio of chest revealed bilateral pulmonary artery thrombus extending into descending branches (img2 and img3). Antiphospholipid antibody, anti-thrombin antibody activity, CEA antigen were normal. But, protein C and protein S activity was low. The patient was started on low molecular weight heparin and changed to oral warfarin subsequently. Final diagnosis- hereditary deficiency of protein C and protein S leading to deep vein thrombosis and pulmonary embolism precipitated by pneumonia.

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Our patient had no acquired factors or any predisposing factors for thromboembolism confirming hereditary deficiency of protein C and protein S. As the chance of thrombosis recurrence within a year is greater than 9% without treatment, patient was advised lifelong oral warfarin therapy with PT-INR monitoring.

**Discussion:**

Protein C and protein S deficiency disorders are associated with increased risk of venous thromboembolism with incidence being 0.03 to 0.13% in general population (3) with prevalence in thrombotic patient being 1 in 33000 (3).

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Anaesthetic Management of A Case of Pheochromocytoma Posted for Tumour Resection

N. Pani¹, A. Swain², R. Mohanty³, L.K. Panigrahy⁴

Summary:
A 20 year female patient presenting with impaired vision followed by palpitation and sweating was diagnosed as having Pheochromocytoma after CT-scan abdomen and catecholamine level estimation. Patient was posted for excision of tumour. Pre-operative blood pressure was controlled with prazosin and nifedipine. Anaesthetic technique used was Epidural along with general anaesthesia. Prompt control of episodes of hypertension were done using Sodium nitroprusside infusion during tumour manipulation. Judicious fluid replacement was done according to CVP monitoring.

Introduction:
Pheochromocytoma are Chatecholamine secreting neuroendocrine tumours arising from chromaffin cells of sympahtoadrenal system found usually in adrenal gland but extra adrenal sites like sympathetic ganglia are also seen. These tumours though rare are a great challenge to the anaesthetist. The perioperative morbidity and mortality in an undiagnosed/untreated pheochromocytoma is up to 50% but less than 2% in planned surgery.

Case Report:
A 20 year young female weighing 39 kg was admitted in VSS Medical College with impaired vision 1year back and was diagnosed as Gr-IV Hypertensive retinopathy with a BP 220/134 mmHg. On USG found right adrenal mass and was referred to Department of Endocrinology SCB Medical college. She reported at S.C.B. Medical College 3 month back with profuse sweating and palpitation where further investigations revealed Sr.PRA(plasma renin activity)-34.7 ng/ml/hr (1.6-7.4), 24hr urinary Metanephrine-99.88 mic.gm/24 hrs (<276.1 mic.gm), 24hr urinary Nor-Metanephrine-6710 mic.gm/24 hrs(<549.6 micgm), Sr.Na-118 mmol/L (135-150), Sr.DHEAS-18.60 mic.gm/ml(65-380), Sr.Cortisol-13.98 mic.gm/ml(AM-5-23,PM-3-16), CT Abdomen-Intensely enhancing heterogenous Space Occupying Lession with central necrosis involving right. Adrenal gland of size-6.4'4.5'6.5 cms. All other investigations like Hb%, DC, TLC, Urea and Creatinine were within normal limits. She was diagnosed as Pheochromocytoma and was started Tab. Prazocin XL-5mg BD, Tab. Calcigard R-20 mg BD. She was advised for plenty of salt and water intake, and was referred to Department of Experimental Surgery for tumour resection.

Anaesthetic Management:
Clonazepam(0.25 mg) and pantoprazole (40 mg) per oral was given the night before surgery, morning dose of antihypertensives i.e. Tab Nicardia R (20mg), Prazopress (5mg) were continued, Pre-operative HR-108/min,BP-150/105 mmHg were recorded with right, arm supine. IV access with 18G canulla was done in right forearm and Ringers lactate was started. All the monitors for measurement of NIBP, SpO2, ECG were attached. Patient was positioned and an 18 G epidural catheter was given in the L2-3 inter space by Loss of Resistance technique. 5 ml of 1% lignocaine (preservative free) was administered. Pt. was pre medicated with Inj.Midazolam-2 mg, Inj.Fentanyl-80 mg. IV.

Figure-1
Pt. was pre-oxygenated with 100% O2 for 3 min and was induced with inj. Propofol-80 mg IV. Inj. Rocuronium bromide-50 mg IV was used as muscle relaxant. Inj. Esmolol-40 mg IV was administered 90 sec before laryngoscopy to obtund the adverse cardiovascular response to intubation. Pt. was intubated with Cuffed Endotracheal Tube-7.5 mm ID by direct laryngoscopy. After induction it was recorded, HR-83/min, BP-138/85 mmHg, and after intubation HR -116/min, BP-149/107 mmHg. Left radial artery was cannulated using a 20 G arterial cannula for better BP monitoring. A 7 Fr.CVP catheter was introduced into Right Internal Jugular Vein.

Maintenance of anaesthesia was done using N2O:O2=2:1 with IPPV and Isoflurane 1 vol% and titrated, with supplemental doses of Inj. Nalbuphine, Inj Vecuronium bromide, Inj. Diclofenac.

Intra-Operative:

A solid tumour weighing 105 gms involving whole of right adrenal gland was removed in total along with another soft nodule of size 2 cms present in the gastro-hepatic omentum (? Lymph Node, ?extra-hepatic Pheochromocytoma). During excision and tumour manipulation there was wide fluctuations in BP reaching a maximum of 214/144 mm Hg, which was controlled immediately by infusion of Sodium Nitroprusside (50 mg in 500 ml D5) in a titrated dose. Capillary blood sugar was monitored intra-operatively which reached a maximum of 236 mg/gl (by glucometer) for which no insulin was required as per advice of the Endocrinologist who was present throughout the procedure. Inj. Hydrocortisone 200mg was administered after removal of the tumour mass and a bolus of 500 ml of fluid (RL) was infused rapidly anticipating a fall in BP. Incision line was infiltrated with 0.25 % bupivacaine (20 ml) before suturing. Urine output was monitored throughout the procedure and was adequate, CVP was maintained at 12 cm as these patients require large amounts of fluid after tumour resection which is a major factor in reducing perioperative mortality. Our patient required a total of 2.5 litres of colloid and crystalloids during the entire procedure. Post-operatively residual neuro-muscular blockade was reversed using inj. Neostigmine 2 mg, with inj. Glycopyrolate 0.4 mg IV. Patient was extubated and was shifted to CICU for continuous monitoring of BP, HR, CVP, CBG. Top-up doses of Epidural were given as post operative analgesia.

Discussion:

Pheochromocytoma patients, usually have sustained hypertension and also arteriolar and venous vasoconstriction due to excessive nor-epinephrine hence a reduced blood volume. Our primary objective was resolution of symptoms pre-operatively to avoid wide variations. Roizen et al recommended the following preoperative conditions prior to surgery for pheochromocytoma: (a) blood pressure < 160/90 mmHg

Figure-2

Figure-3
for 24 hr before surgery, (b) postural hypotension > 80-45 mmHg, (c) ECG should be free of any ST-T changes for a week and (d) no PVCs more than 1 in five min. In our case we strictly adhered to Roizen’s criteria. This was achieved by anti-adrenergic drugs i.e. Tab. Prazocin (Alpha blocker) first which causes vasodilation and tachycardia which could be controlled by beta-blockers. A significant postural drop in BP to less than 80/45 mmHg indicates inadequate hydration and can be managed with extra salt and water intake. ECG should be free of ST changes before taking up the case .Drugs causing Histamine release (eg. Atracurium, Morphine) should be avoided. Suxamethonium can produce a catecholamine surge by muscle fasciculation. Drugs like Benzodiazepines, Propofol, Etomidate, Fentanyl, Rocuronium, Vecuronium, Isoflurane, Sevoflurane are considered safe in pheochromocytoma. We used Inj. Esmolol (1 mg/kg) before intubation to prevent adverse cardiovascular response to laryngoscopy, other drugs like Inj. Lignocaine (preservative free) can be used IV.

**Conclusion:**

Although peri-operative mortality is significantly high in pheochromocytoma more so in undiagnosed/untreated cases, a thorough grasp of the pathophysiology and pharmacology along with early involvement of anaesthesiologist is essential for tailoring of perioperative strategy for individual patients. Early diagnosis with CT-scan, MRI, 24-hr urinary catecholamine and its metabolites estimation has lead to adequate pre-operative preparation of the patient with antiadrenergic drugs. Newer techniques of anaesthesia and monitoring devices along with availability of newer drugs and judicial use of vasodilators as well as vasoactive drugs has made surgical resection of pheochromocytoma as safe as other tumour resection.

**References:**

A Case of UV Prolapse with Myiasis

S.R. Panigrahy¹, H.K. Tripathy²

Summary:
A post-menopausal rural habitat poor hygienic status of 80 years old widow diagnosed as 3rd degree uv prolapse, DU, multiple leiomyomas with moderate anaemia with calcified maggot undergone wardmayos hysterectomy & B.T biopsy showed T.B endometrium now under ATT for 18 months. She had symptom free till date & under regular follow up.

Case Report:
A post menopausal woman of 80yrs of rural habitat illiterate low socio-economic status complaining of blood tinged white discharged since 2months and something descending through vagina since 20 yrs.

HPI-A post menopausal woman of rural area with poor hygienic status of low socioeconomic group[BPL] attending OPD for blood tinged white discharge which is profuse in amount and Painless, non smelling to start with then turn to severe foul smelling which drag attention of family members and the woman compelled to used pad for the blood stain discharge which created all inconveineance for her day to day activities. HPI-Nothing suggestive . OBH-P7L4, all were term, VD, attended by dhai and relatives, home delivery. LCB-42 yrs back, no permanent method of sterilisation . MH-Menopause -32 yrs back. Previous cycles -3-5/28-30days, pain-, clot-absent. Occupational history-fisher woman. Personal history- Widow, low socio-economic status, addicted to tobacco, pica. Family history-NS.

OE-Thin body built, mild - moderate pallor, P-90/M, BP-140/92MM HG, all other clinical parameters were normal.

P/A-NAD, P/S-Complete uv prolapse, cystocele moderate–severe, rectocele-present, CX hypertrophied, parous, a DU-P, ant. Lip and post lip, blood tinge foul smelling discharge, lax perineal outlet, P/V-Uterus RV, Bulky, irregular, firm consistency, mobility mildly restricted, tende fx both side, free. Probable diagnosis was 3RD Degree uv prolapse, cystocele, rectocele, decubitus ulcer, fibroid uterus. Pt subjected to investigations.

1. Haematological - HB-7gm%, all other tests were N. Blood gr-o positive,
2. USG abdomen and pelvis - ut measured 8.1x5.6x4. 8cm, lower position, endo. Thickness-3.1x2.2mm, both ovaries visualised, multiple fibroids of 3-4 no, size varies 3-4cmx2-3cm in ant wall, hyper – echoic area of 5.6x3. 4cm in post wall, POD-minimal fluid. 3. PAP TEST-Inflammatory smear, squamous dysplasia seen, no malignant cell seen. 4. Colposcopy-A large ulcer seen in cx, squ. columnar seen, punctuation present, neo vascularisation seen over ulcer. 5. ECG & Cardiological Evaluation normal.
Treatment:

Pt posted for planned wardmayos hysterectomy and pre-operative preparation done as followed—the procedentia is dressed daily with glycerine magnesium sulphate solution, tampon with antiseptic ointment to reduce the tissue odema and to improve the vascularisation. Patient transfused with 3 units of whole blood and oral antibiotic given for infection.

After dressing done—patient passed multiple, small size, white coloured, multi faceted, firm, stone like thing, which had needle point opening in surface, 12 in no, very difficult to break & collected in tampon surface. Correlated to hyper-echoic area in usg—calcified maggot-uterine myiasis. The entomological evaluation of larvae could not be done due to lack of facility and financial constraint.

Pt posted for surgery after attaining HB status of 11 gms and healing of decubitus ulcer. With 1 unit of whole blood at hand, Patient under gone ward-mayos hysterectomy under SA. Gross pathology showed uterus 10 wks, firm irregular anterior surface with 2 fibroids, one fibroid in post wall. Uterus and ex sent for biopsy. Post-operative period uneventful. Biopsy report came as TB endometrium, leiomyomas of uterine muscle, Cervix showed no malignancy.

Patient subjected to available routine investigation for TB. ESR mildly raised [26], Antibodies for TB present, mx test positive [not significant], x ray chest negative. Patient under ATT for 18 months.

She is continuing the treatment and had regular follow up till date and clinically symptom free.

Discussion:

Uv prolapse is very common in peri and post menopausal age, multiparity, repeated vaginal birth, lesser adaptation to contraception, recurrent respiratory infection, constipation, Association of uv prolapse with asymptomatic multiple leiomyomas in a post menopausal women is very rare occurrence. The presence of fibroids can certainly complicate matters and place even more undue pressure on the downward advanced of a woman's organ. On the other hand fibroids that are quite large, can serve as a blocking mechanism to prolapse. Uv prolapsed with multiple fibroids in an elderly woman is very rare association [<1%] and that to asymptomatic variety.

That to calcified maggot inside the uterine cavity in uv prolapse not seen commonly in practice, giving a picture of hyper-echoic area inside cavity and elled after the pre operative care really an astonishing case.

Myiasis is the infestation of the tissues of vertebrate animals by the larvae of flies (maggots). As the condition generally occurs in exposed areas of the body, genital myiasis is a rare condition, and myiasis of the uterine cavity is even rarer, only one case having been previously described in the literature. The case reported here describes myiasis of the uterine cavity and ulcerated vaginal mucosa of an 89-year-old woman with a severe (third-degree) genital prolapse. This case describes an extremely rare situation, and emphasizes the need for good hygiene and surgical correction in patients with a genital prolapsed. Human genital myiasis is usually present with concomitant STD, vaginal carcinoma, immunocompromise individuals, lack of personal hygiene and anaemia, poor nutritional status.

After hysterectomy the specimen found to be a case of tubercular endometrium, without giving any asymptoms in a so aged woman that case highlighting the some rare to rarest complicatioun of uv prolapse.

A study showed women with postmenopausal tuberculosis of the genital tract incidence was 3.7%.
The age incidence of gynecologic tuberculosis has changed in recent years; the proportion of patients over 40 years of age is now much higher. A combination of rifampicin, ethambutol, and isoniazid has been employed in the treatment of this disease. No patient showed evidence of recurrence at follow-up.

References:
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Modern Treatment for Breast Cancer

D.N. Tripathy¹, S. Panda²

The greatest advantage of NCT is that it can cure cancer with metastases (if the speed of cancer tissue growth is not more than the speed of accumulation of Vitamin B12 with radioactive cobalt and cadmium in that tissue).

If there is too much summary mass of cancer tissue and radioactive cobalt has no enough time to be accumulated in all cells and stop them, as same as anti cancer vaccine, in case of too many cancer cells and patient’s immune system has no enough time (after radiation and chemotherapy also strength) to destroy them all. We prefer the strategy to make sleep cancer cells. Main difference between NeT and modern oncological treatment are the followings.

1) The presence of metastasis means that official oncology can offer palliative treatment only.

2) NCT gives chance for complete cure and recovery (in condition that metastasis has no high speed of growth and has no big summary mass).

Another condition of NCT complete cure is the condition of vital functions of organism of patients. If they have failed, the patient dies from that failure not by cancer. Unfortunately, in Armenia when a patient comes to my clinic after chemotherapy and radiation therapy, NCT is offered as palliative treatment only for patients (for life prolongation). However, NCT as a palliative treatment is much more effective and safe compared with chemotherapy and radiation therapy. Because, NCT does not destroy patient’s organism. Our successful cases of cancer complete cure have taken place in patients with relatively small primary tumors or small metastases after primary tumor removal.

Chemotherapy and radiation therapy significantly decrease NCT effectiveness. It is difficult to offer you an universal check sheet for cancer patients, but you know the main cornerstones of that check: is the history of chemotherapy and radiation therapy bad, many metastasis are bad, general health condition is important, fast growing tumor is bad. The worst cancers are melanoma, pancreatic cancer, some kinds of lung cancer. NCT is most effective in breast cancer, prostatic cancer, colon cancer. The problem is that cancers are quite different in their speed of growth and, for example, lung cancer may grow with quite different speeds depending upon the maturity (malignancy) of cancer cells. So, detailed information regarding microscopical type of cancer is crucial as well.

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Because, NCT does not destroy patient’s organism. Our successful cases of cancer complete cure have taken place in patients with relatively small primary tumors or small metastases after primary tumor removal.

Chemists have designed nanoparticles that can deliver three cancer drugs at a time. Such particles could be designed to carry even more drugs, allowing researchers to develop new treatment regimen that could better kill cancer cells while avoiding the side effects of traditional chemotherapy. “We think it’s the first example of a nanoparticle that carries a precise ratio of three drugs and can release those drugs in response to three distinct triggering mechanisms,” says the leader researcher.

A new type of treatment called “light-activated drug delivery” is showing promise as a way to give doctors control over precisely where and when drugs are delivered inside the patient’s body. Now, researchers have developed a light-activated way to target cancer cells without hurting healthy tissue by using drug-carrying nanoparticles.

Jeffrey Zink, professor of chemistry and biochemistry, and Fuyu Tamanoi, professor of microbiology, immunology and molecular genetics, both at University of California Los Angeles in the US, and colleagues report their findings in the journal SMALL. Their method uses nanoparticles - particles that are so small, their size is compatible with cell dimensions - to carry chemotherapy drugs directly to tumor cells and release them when activated by a two-photon laser in the infrared red wavelength. Not only can the nanoparticles ferry drugs to precisely targeted areas of the body, but they are fluorescent and the scientist new type of treatment called “light-activated Modern treatment for Breast Caner is termed also as NCT is that it can cure cancer with metastases (if the speed of cancer tissue growth is not more than the speed of accumulation of Vitamin B12 with radioactive cobalt and cadmium in that tissue).

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genetics, both at University of California Los Angeles in the US, and colleagues, report their findings in the journal SMALL. Their method uses nanoparticles - particles that are so small their size is compatible with drug delivery,” which uses fluorescent nanoparticles to deliver chemotherapy drugs directly to tumor cells, meaning their progress can be tracked.

Cancer Treatment NCT, Germany and Russia. It is innovative because its main function was developed based on the analysis of basic NCT is an innovative new cancer therapy which was developed under collaboration among 3 research centers in Armenia metabolism of cancer cells making it possible to treat and cure recurrent cancers and metastatic cancers which are difficult to cure by conventional cancer therapies. The main part of NCT is Vitamin B12 with radioactive cobalt and several other components which were found effective for the treatment of cancers.

*Why B12 is essential for the treatment of cancers? We found that cancer cells avidly accumulate and use all available in organism nutrients for their growth. They take these nutrients also from healthy cells and as a result the latter are in deep nutrient deficit. All nutrients that enter to organism with food also are totally used by cancer cells for their metabolism and growth. These nutrients include hydrocarbons (glucose), proteins, fat and numerous other growth factors: vitamins, minerals, peptides, hormones, etc. We revealed that the most used and necessary for growth vitamin is Vit.B12. Cancer cells use organism’s all vitamin B.12 and as a result many cancer patients suffer from B12-deficit anemia. Injections of B12 do not correct anemia, because all injected B12 is used by cancer cells for acceleration of their growth. The main structural component ‘If B12 is cobalt and cancer cells are programmed to absorb cobalt. Taking into account this important phenomenon, we started our experiments with radio active cobalt, used as per oral powder and intra muscular injections. We have revealed that cancer cells accumulate low radioactive cobalt and after irradiation by cobalt their growth stops. The radiation of low radioactive cobalt does not affect healthy cells because it is low and its action spreads only till the outer membrane of a cancer cell. We also found that the accumulation of radioactive cobalt in cancer cells increases when we mix radioactive cobalt and Vit. B12 together. The final mode of use of low radioactive cobalt is per oral administration of low radioactive cobalt + injection of B12. But this approach is rational in case of absolute deficit of B12 in organism. If the condition of a patient is stable and there is no significant B12 deficit and anemia, the powder of radioactive cobalt may be used without B12 injections. After that we studied also some other essential nutrients for cancer cells and found three more essential factors for cancel cell growth. Using the same pattern as for Vit. B12, we developed a treatment called "New Cancer Treatment” NCT. After practicing NCT we have come to conclusion that in some cases it is reasonable to “freeze” cancer tissue instead of killing the cells. Destroying the tumor we should be confident that patient’s organism, especially liver and kidney, are able to eliminate the toxins and remnants of killed cancer cells. So, we have developed our own tactics and strategy regarding treatment of cancer taking into account the stage.

*Vitamin B12 with radioactive cobalt therapy Cobalt is the main part (co-enzyme) of Vitamin B12. The metal cobalt in Vitamin 812 is coordinated with a tetrapyrrrole ring. Vitamin B12 is a water-soluble vitamin and Vitamin 812 is indispensable for the growth of any cell. B12 is needed to make DNA, the genetic material in all cells and cancer cell grows very fast and so it needs huge amount of Vitamin B12(100 times more than normal cells). Cancer cells absorb all Vitamin B12 and causes its deficit in healthy cells. Taking Vitamin B12 by a patient stimulates cancer cells growth without mitigating B12 deficits in healthy cells. Cancer cells cannot differentiate low radioactive cobalts and Vitamin 812 each from other because Vitamin B12 contains cobalt inside of Vitamin B12 tetrapyrrrole ring. Cancer cells accumulate low radiation cobalt instead of Vitamin 812 and the radioactive cobalt stop cancer cell growth. Low radiation cobalt does not affect healthy cells because its radioactive effect is confined by the inner space of cancer cells. Cancer cells accumulate radioactive cobalt by mistake detecting the latter as cobalt in Vitamin B12 of cancer and the condition of patient. Low radiation cobalt is effective especially in case of small cancer tumors and single or multiple metastases of small size. During
administration of low radiation cobalt patient should follow special diet otherwise the medication will not be absorbed by cancer cells and will be excreted by them rapidly.

*Administration of Vitamin B12 with radioactive cobalt therapy. The medication is taken orally as a powder. One powder a day is the necessary dose. Low radiation cobalt therapy has no side effect. Low radiation cobalt may be taken with juice. For better absorption a special diet should be kept. Schedule of the treatment is determined by the case. In some cases 10 ng term therapy is needed.

NCT is very effective and safe treatment, but the patient should not be in terminal Stage of disease. NCT is like a fire crew - it can extinguish fire but can do nothing with ash. A patient in advanced stage is actually dead, he lives by inertia and nothing can save him/her - all healthy cells are in parabiotic condition because of cancer + chemotheraphy + radiation therapy. Surely, the patient should come to Armenia while it is not too late, at least he/she should be able to walk, eat, etc. by him/herself and tolerate the distance (air fly) patient’s country-Armenia and back. If a patient is full of metastases and his vital organs and system are totally exhausted, nothing will save such patient.

The power of modern ends when even one small metastasis develops. Official Medicine can cure cancer when it is possible to remove entirely the primary tumor and there are no metastasis ( in such cases radiation therapy and chemotherapy usually are added to surgery or “prevention of metastasis” but really they cannot do that). As soon as the first tiny metastasis develops somewhere in the body it means that further treatment (radiation therapy + chemotheraphy) will only more or less prolong the patient’s life.

The power of modern oncology ends when even one small metastasis develops. Official Medicine can cure cancer when it is possible to remove entirely the primary tumor and there are no metastasis ( in such cases radiation therapy and chemotherapy usually are added to surgery or “prevention of metastasis” but really they cannot do that). As soon as the first tiny metastasis develops somewhere in the body it means that further treatment (radiation therapy + chemotheraphy) will only more or less prolong the patient’s life.

Radiation therapy + chemotheraphy also are used as a palliative treatment for slowing down cancer development when cancer is inoperable. So, even only one tiny metatasis means that in all other places also the “seeds of cancer” available and soon they start grow. So the word “metastasis” actually means incurable advanced cancer. So the border between life and death is this word: metastasis.

Only stable cobalt isotope is the only isotope to exist naturally on Earth. 22 radioisotopes have been characterized with the most stable being 60Co with a half-life of 5.2714 years, 57 Co with a half-life of 271.8 days, 56CO with a half-life of 77.27 days, and 58CO with a half-life of 70.86 days. All of the remaining radioactive isotopes have half-lives that are shorter than 18 hours, and the majority of these are shorter than 1 second. This element also has 4 meta states, all of which have half-lives shorter than 5 minutes.

The isotopes of cobalt range III atomic weight from 50 !! (50Co) to 73 U (73CO). The primary decay mode for isotopes with atomic mass unit values less than that of the most abundant stable isotope, 59Co, is electron capture and the primary mode of decay for those of greater than 59 atomic mass units is beta decay. The primary decay products before 59CO are element 26 (iron) isotopes and the primary products after are element 28 (nickel) isotopes. Isotopes are variants of a particular chemical element which differ in neutron number, although all isotopes of a given element have the same number of protons in each atom. The term isotope is formed from the Greek roots isos (“equal”) and topos (“place”), meaning’ the same place”. Thus, different isotopes of a single element occupy the same position on the periodic table. The number of protons within the atom’s nucleus is called atomic number and is equal to the number of electrons in the neutral (non-ionized) atom. Each atomic number identifies a specific element, but not the isotope; an atom of a given element may have a wide range in its number of neutrons. The number of nucleons (both protons and neutrons) in the nucleus is the atom’s mass number, and each isotope of a given element has a different mass number.
For example, carbon-12, carbon-13 and carbon-14 are three isotopes of the element carbon with mass numbers 12, 13 and 14 respectively. The atomic number of carbon is 6, which means that every carbon atom has 6 protons, so that the neutron numbers of these isotopes are 6, 7 and 8 respectively. Massachusetts Institute of Technology have designed regimens that could better kill cancer cells while avoiding the side effects of traditional chemotherapy. “We think it’s the first example of a nanoparticle that carries a precise ratio of three drugs and can release those drugs in response to three distinct triggering mechanisms,” says the lead researcher and author. Such Chemists have designed nanoparticles that can deliver three cancer drugs at a time. Such particles could be designed to carry even more drugs, allowing researchers to develop new treatment particles could be designed to carry even more drugs, allowing researchers to develop new treatment regimens that could better kill cancer cells while avoiding the side effects of traditional chemotherapy. In the LACS paper, Johnson and colleagues demonstrated that the triple-threat nanoparticles could kill ovarian cancer cells more effectively than particles carrying only one or two drugs, and they have begun testing the particles against tumors in animals.

References:
7. NCT clinical cancer program in Breast Cancer in the getenet by expertise.
Airway Management of Obese Patient Undergoing Surgical Procedures

R.K. Das¹, R. Das², U. Hansda³

Abstract:

The obese patient presents many challenges to both anesthesiologist and surgeon. A good understanding of the pathophysiologic effects of obesity and its anesthetic implications in the surgical setting is critical. Addressed from an organ systems approach, the purpose of this review is to provide surgical specialists with an overview of the anesthetic considerations of obesity.

Introduction:

Every clinician is aware of the complexity of caring for obese patients, the increasing prevalence of obesity, and the expected continuation of this trend. Management of airway during anesthetic procedures always remains a great challenge to anesthesiologist.

Definition:

Obesity is the condition of excessive body fat. The concept of the ideal body weight (IBW) can be estimated from the formula IBW (in kg) = Height (in cm) – X, where X is 100 for adult males and 150 for adult females. The body mass index (BMI) is a more robust measure of the relationship between height and weight, and is widely used in clinical and epidemiological studies. It is calculated as follows:

\[ \text{BMI} = \frac{\text{body weight (in kg)}}{\text{height}^2 \text{(in meters)}} \]

A BMI of <25 kg m⁻² is considered normal; a person with a BMI of 25 – 30 kg m⁻² is considered overweight but at low risk of serial medical complications, while those with a BMI of >30, >35 and >55 kg m⁻² are considered obese, morbidly obese and super morbidly obese, respectively. Morbidity and mortality rise sharply when the BMI is >30 kg m⁻².

Respiratory PATHOPHYSIOLOGY IN OBESITY

The obese patient has decreased chest wall compliance, lung compliance, and chronic hypoxemia. The decreased total pulmonary compliance leads to reduced functional residual capacity (FRC) (figure-1). Also, supine position and anesthesia independently worsen ventilation and perfusion mismatch. The clinical result of the above factors is rapid arterial oxygen desaturation with apnea upon induction of anesthesia. Techniques used to optimize the respiratory system in an obese patient include head up position, positive end expiratory pressure (PEEP), larger tidal volumes, and high fraction of inspiratory oxygen.¹

Airway Management:

Morbidly obese (MO) patients have a higher potential for difficult mask ventilation, laryngoscopy, and intubation. The obese patient’s large tongue, redundant oropharyngeal tissue, atlanto-axial joint limitation due to cervical and thoracic fat pads, and pre-sternal fat deposits inhibit movement of the laryngoscope and increase the difficulty of direct laryngoscopy (DL). Factors such as a higher Mallampati classification (figure-2) and neck circumference are predictive of a difficult airway. In practice, the astute anesthesiologist integrates patient history and physical

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clues such as thyromental distance, mouth opening, neck range of motion, and prognathism, to predict conditions for airway management.

The patient’s position will need to be optimized for airway management. The head elevated laryngoscopy position (HELP) uses preformed pillows to elevate the patient’s upper body such that the external auditory meatus is in horizontal plane with the sternal notch, compensating for the fixed flexion brought about by cervical fat. Regular blankets and towels available in any operating room can be used to achieve this same optimal positioning. It is important to preoxygenate and denitrogenate the patient before inducing general anaesthesia (GA) to avoid desaturation while securing the airway. Preoxygenation, or denitrogenation, is a simple preventive step that can help delay or avoid harmful consequences due to apnea, especially in the obese population. Patient should be allowed to breathe 100% O2 at high flows by a snug-fitting face mask until the end-tidal (E\textsubscript{T}) oxygenation is >80% while lying supine in the HELP position. Apneic oxygenation describes the continued application of oxygen, despite apnea, to prolong the period to desaturation. The rationale is to fill the FRC continuously with passive movement of O\textsubscript{2} despite apnea.\[3\]

Once the patient loses consciousness, the pharyngeal musculature and the tongue relax, allowing for airway occlusion. Oropharyngeal or nasopharyngeal airway is often necessary to maintain a patent airway and to facilitate mask ventilation. Correct size and placement of airways are important, as improper technique can worsen. For the obese patients with excess facial soft tissues, the two-hand technique for mask ventilation is necessary for effectiveness.

The use of an appropriately sized laryngoscope is important for a successful intubation. The best blade (curved or straight) to use is the one with which the intubating person is most skilled. The Mac-Coy blade offers additional advantage as the tip can be manipulated for visualization and offers good plane of intubation for a more anteriorly placed or malaligned larynx. In the patients where the airway looks highly unfavorable, an awake intubation is the best choice provided the patient is cooperative. This is possible with a good locally anaesthetized larynx and upper airway or conscious sedation. Video laryngoscopes offer a variety of blades as regard their angles and integrated channels to make difficult intubation possible through monitor.

![Figure-3. Laryngeal mask airway.](image)

The worst-case scenario happens with an unexpected difficult airway in which both ventilation and intubation are difficult. In that situation, the laryngeal mask airway (LMA) (figure-3) remains a rescue device. Although the LMA can also be used for ventilation throughout the surgery, it is unreliable for delivery of effective positive pressure ventilation. Obese patients will hypoventilate and de-recruit alveoli over time during spontaneous ventilation under GA. In addition they also carry the risk of aspiration. Securing the airway with a cuffed endotracheal tube (ETT) and controlled ventilation is the most appropriate option.\[4\] Fibreoptic intubation is the most reliable armamentarium that makes intubation with a ETT successful in the most difficult airway and requires skill and practice.

**OBSTRUCTIVE SLEEP APNEA:**

Obstructive sleep apnea (OSA) is a serious comorbidity of obesity that is often underestimated. In patients with history of OSA is associated with difficulty in effective mask ventilation, hypoxemic events, coronary artery ischemia, arrhythmias, and sudden
death, all of which are magnified in the context of anesthetic drugs. The postoperative period is the most dangerous time because the residual anesthetics and pain medications impair the respiratory drive for hypoxemia and hypercarbia, worsens obstruction, and leads to hypoventilation and adverse events. For the patient with OSA, the anesthetic management focuses on minimizing the use of opiates, benzodiazepines, and other respiratory drive-suppressing drugs.[5]

**Conclusion:**

Modern anaesthesia in combination with good surgical practice, optimal use of advanced airway devices, careful preoperative evaluation and appropriate anaesthetic plan ensures safety even in morbidly obese patients with cardiac, pulmonary, renal, and hepatic dysfunction undergoing surgery.

**References:**

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Cushing’s Syndrome

J.K Panda¹, M.R. Behera²

Cushing Syndrome is seen in patients with abnormally high levels of cortisol which commonly occur due to over use of corticosteroids.

Signs and Symptoms:

- weight gain, obesity, fatty deposits, especially in the face (round "moon" face), between the shoulders, the upper back, and midsection, stretch marks on the breasts, arms, abdomen, and thighs, thinning skin that bruises easily, cuts, insect bites, and infections that are slow to heal, acne, fatigue, muscle weakness, glucose intolerance, increased thirst, increased urination, bone loss, high blood pressure, headache, cognitive dysfunction, anxiety, irritability, depression. Women may also notice extra facial and body hair, as well as absent or irregular menstruation. Men may also have: erectile dysfunction, loss of sexual interest, decreased fertility. Children with this condition are generally obese and have a slower rate of growth.

Causes:

High stress levels in the final trimester of pregnancy, Athletic Training, Malnutrition, Alcoholism, Depression or Panic Disorders.

The most common cause of Cushing syndrome is the use of corticosteroid medications (like prednisone) in high doses for a long period of time. These medications are generally prescribed to prevent rejection of a transplanted organ. They are also used to treat inflammatory diseases (like lupus and arthritis). High doses of injectable steroids for treatment of back pain can also cause this syndrome. Lower dose steroids in the form of inhalants (like those used for asthma) or creams (like those prescribed for eczema) usually are not enough to cause Cushing syndrome.

Other causes include: Pituitary gland tumor, also known as Cushing’s disease (the pituitary gland releases too much adrenocorticotropic hormone, or ACTH), ectopic ACTH syndrome (tumors usually found in the lung, pancreas, thyroid, or thymus gland), familial Cushing syndrome (Cushing syndrome is generally not inherited, but there may be an inherited tendency to develop tumors of the endocrine glands) adrenal gland abnormality or tumor.

People are at increased risk of this disorder if you are obese, or if you have type 2 diabetes with uncontrollable blood glucose levels and high blood pressure.

Reference:

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