Securing the airway in obese individuals is challenging both in the operation theatres as well as in the intensive care. Laryngoscopy in morbidly obese is difficult due to the pathophysiological changes in the upper airway and neck. Supraglottic airway device can be used alone to maintain the airway during short surgical procedures or it can act as a conduit for passage of endotracheal tube during major surgical procedures or in the intensive care. Studies have shown there need not be any fear of airway related complications while using supraglottic airway device in obesity. In this review, we emphasize how supraglottic airway device is a saviour in difficult airway situation.

Keywords: Obesity, SAD, LMA, BMI.
INTRODUCTION
Obesity is a condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems. The term is derived from Latin word ‘Obesus’ which means ‘fattened by eating’. Airway of an obese individual is a major concern for an anaesthesiologist while providing general anaesthesia or securing the airway in the intensive care unit (ICU). With an incidence of 11% of the global population according to world health organization (WHO) being obese, an anaesthesiologist will encounter obese patients quite often. Endotracheal intubation is usually done in most surgeries but incidence of difficult intubation in an obese patient is much higher than normal weight patients.

Why the Obese have a Difficult Airway?
Obese have a limited neck movement due to restriction of atlantoaxial joint and cervical spine by upper thoracic and lower cervical fat pads. Obese individuals usually have short thick neck. The excessive tissue fold in mouth may be missed during routine preanaesthetic check-up. They also have suprasternal, presternal and posterior cervical fat and a very thick submental fat pad. All these factors contribute to a difficulty in laryngoscopy and tracheal intubation.

PATHOPHYSIOLOGICAL CHANGES IN OBESITY
About 5% of obese individuals present with obstructive sleep apnoea characterized by episodes of apnoea or hypopnoea during sleep. This occurs when pharyngeal airway collapses due to decreased tone and leads to narrowing of airway causing turbulent airflow and snoring. Due to the added thoracic cage and abdominal weight there is a reduction in the motion of the diaphragm. Functional residual capacity, expiratory reserve volume and total lung capacity are also reduced in these patients. Obese patients also have systemic as well as pulmonary hypertension and are at high risk for IHD. Due to the increased blood volume and risk of ischaemic heart disease they are also prone for right and left ventricular hypertrophy leading to biventricular failure. Among the obese, tidal breathing falls within the closing capacity and airway closure occurs. So these individuals desaturate rapidly especially when anesthetized.

OBEITY MEASUREMENT
Obesity is measured by certain indices

1. Ideal body weight = height (cm) – x
   (x is 100 for adult males and 105 for adult female).
2. An individual can be called obese if his weight> 20% of ideal body weight
3. Body Mass Index (BMI) or ‘Quetelet Index’
   BMI is calculated as Body weight (kg) / height(m²).
4. Waist circumference exceeding 102 cm (40 in) in men and 89 cm (35 in) in women indicates increased risk in overweight.
5. Waist to height ratio > 0.5 is critical at age below 40yrs and > 0.6 above 40yrs.
6. Waist-to-hip ratio (WHR) >0.9 in women and >1.0 in men is associated with a higher risk of morbidity and mortality

CLASSIFICATION OF OBESITY
BMI is simple easy and very useful index in differentiating an individual in to underweight, normal, overweight, severe obese, morbidly obese and super obesity as given in Table 1.

<table>
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<tr>
<th>Table 1 Classification of Obesity</th>
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<tr>
<td><strong>BMI</strong></td>
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<td>&lt; 18.5</td>
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<tr>
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THE CHOICE OF SUPRAGLOTTIC AIRWAY DEVICE IN OBESE

Since its invention by Archie Brain, Laryngeal mask airway (LMA) has found its place on the anaesthesia cart. In 2011, 20 years after its invention, 56% of anesthetics in UK were done using supraglottic airway device\(^6\). The growing researches and modifications on this device truly suggests that supraglottic airway device (SAD) can be considered as a valuable equipment in the hands of an anesthetist. Laryngeal mask airway (LMA) is a great choice for morbidly obese individuals. Widad Abdi et al showed that LMA Supreme\(^{TM}\) could be considered as a standard airway management tool for both elective and rescue airway management of morbidly obese patients\(^7\).

RESPIRATORY PROBLEMS

Obese individuals being at a greater risk for desaturation and reduced respiratory compliance, plan to secure the airway should be foolproof. Zoremba et al. suggests that using an LMA and avoiding muscle relaxation reduce post-operative deterioration of lung function, compared with tracheal intubation, in moderately obese patients undergoing a minor surgery\(^8\). A study by Yu and Beirne, reported that the use of the LMA resulted in a statistically and clinically significant lower incidence of laryngospasm, postoperative hoarse voice and coughing than when using an endotracheal tube (ETT)\(^9\). Laryngeal mask airway could replace ETT in obese individuals as the latter is known to cause bronchoconstriction and atelectasis especially during induction of anaesthesia\(^{10,11}\). The NAP4 project also states that SADs were associated with a lower reported incidence of major airway complications per million than other devices in UK during 2010-11\(^12\).

CARDIOVASCULAR RESPONSE

Obese patients are prone for several cardiovascular complications. LMA can be identified as better option in them as it reduces the pressor response and provide better haemodynamic stability compared to laryngoscopy and intubation\(^{13,14}\). An intubating LMA can be used if intubation is required especially when they come for cardiovascular surgeries\(^15\).

SAD IN DIFFERENT SURGERIES

The low frequency of coughing during emergence may be beneficial to patients following open eye or ENT surgery where excessive straining is potentially harmful\(^16\). Intraocular and Intracranial tension caused due to SAD is lesser compared to endotracheal intubation which makes it ideal for neuro surgeries as well as ophthalmic surgeries such as glaucoma or cataract operations. ProSeal\(^{TM}\) can be used as a temporary ventilatory device before tracheal intubation in obese individuals\(^17,18\).

SECURING THE AIRWAY WITH SAD

Obesity predisposes to difficult airway scenario. Emergency as well as elective situations of obese should be handled using an SAD by skilled individuals or paramedical staff, as its ease in securing and ventilating the airway is good\(^19\). The time spent on securing the airway using an SAD is also lesser.\(^19\) Laryngeal mask anaesthesia is also fundamental skill, required by all anaesthetists. The subject should be taught with the same attention to detail as tracheal intubation. This involves patient selection, indications and contraindications for use and practicalities such as insertion, confirmation of correct positioning, management during maintenance and removal of SADs. Positive pressure ventilation is possible using SADs in patients with low respiratory compliance. The NAP4 report in 2011 had made a number of recommendations pertaining to the use of SAD\(^12\).

THE ‘FEAR OF ASPIRATION’ WITH SAD

Since the advent of SAD, there has been the fear of aspiration associated with its use. A metaanalysis involving 12,901 patients with LMA usage, showed that clinical evidence of pulmonary aspiration using the LMA was comparable to anesthesia administered with an endotracheal tube (ETT) (2.3 per 10000)\(^20\). The 2011 NAP4 project done in United Kingdom, shows only a 4% chance of aspiration associated with second generation airway devices, compared to 35% chance seen with tracheal tube. This makes SAD a superior choice\(^21\).
OTHER ADVANTAGES OF SAD

The reduced anaesthetic requirement for airway tolerance makes supraglottic airway device cost effective. Joseph Brimacombe has found 13 advantages of LMA over ETT and four over Face mask based on a number of articles, which proves without doubt the superiority of SADs over other airway management devices. It is possible to maintain the airway in case of a failed intubation, especially using a ProSeal™ LMA without regret.

COMPARISON WITH ENDOTRACHEAL INTUBATION

Despite many studies supporting SADs, many anaesthesiologists prefer control of airway with endotracheal intubation in obese. This could be because positive end expiratory pressure (PEEP) and vital capacity (VC) manoeuvres can be applied better with endotracheal intubation. Of the supraglottic airway devices ProSeal™ would be a safer option in obese individuals due to the better seal and the esophageal vent. ProSeal™ is a better choice before intubating as compared to other SADs.

CONCLUSION

Difficult laryngoscopy and difficulty in intubation are the common problems that an anaesthesiologist will face when an obese patient comes to the emergency department, ICU or for surgery. In such situations supraglottic airway device should be made available. ProSeal™ would be the best option in such individuals.

CONFLICTS OF INTEREST

None declared

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Morbid Obesity and Supraglottic Airway Devices


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