GUIDELINES FOR THE MANAGEMENT OF OBESE PATIENTS COMING FOR SURGERY

COLLEGE OF ANAESTHESIOLOGISTS
ACADEMY OF MEDICINE OF MALAYSIA

IN COLLABORATION WITH

MALAYSIAN SOCIETY OF ANAESTHESIOLOGISTS

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MESSAGE

Dear Friends and Colleagues

The Guidelines for the Management of Obese Patients Coming for Surgery is indeed timely. Malaysia has been rated as amongst the highest in the Asian countries for obesity. The findings from The Lancet in May 2014 showed that 49% of women and 44% of men in this country were found to be obese. This is a huge problem and has implications on the general health of the population and will put a further strain on the medical resources and facilities.

Anaesthesia and surgery may entail considerable risk for obese patients. Obesity involves a multi-system disorder, in particular to the respiratory and cardiovascular system. There are certain challenges and technical difficulties which will present in these patients. Special consideration should be given to proper preoperative assessment and preparation, patient positioning, choice of anaesthetic technique and postoperative care.

I would like to commend Dr Norliza Mohd Nor and Dr Mohd Rohisham Zainal Abidin for coming up with the Guidelines.

Dr Sushila Sivasubramaniam
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INTRODUCTION

Obesity is a global health problem with an increasing prevalence which has nearly doubled since the 1980s. The World Health Organization (WHO) characterised obesity as a pandemic issue where its prevalence is higher in women than men. In 2008, 35% of adult aged 20 and over were overweight and 11% were obese.[1] Locally, data in 2011 showed 33.6% of adult Malaysians were overweight and 19.5% were obese.[2] Overweight and obesity are leading risks for global deaths, whereby around 3.4 million adults die each year as a result of these two conditions.[1]

Obesity has been identified as a significant risk factor for anaesthesia and anaesthesia-related mortality. The concurrent medical problems and their complications mandate that anaesthesiologists to have a thorough understanding of the pathophysiology that occurs in this group of patients. The common associated medical conditions include hypertension, diabetes mellitus, coronary artery disease, obstructive sleep apnoea (OSA) and end-organ complications. Furthermore, intra-operatively, the anaesthesiologists would be challenged with technical difficulties, such as intravenous access, airway management and accurate monitoring.

Obesity is frequently associated with OSA. Among patients with a body mass index (BMI) greater than 28, OSA is present in 41%. The prevalence of OSA can be as high as 78% in morbidly obese patients who present for bariatric surgery.[3] A person with OSA has frequent episodes of apnoea during his or her sleep. This disorder results from an obstruction of the upper airway during sleep that occurs because of inadequate motor tone of the tongue and/or airway dilator muscles.[3] The severity of OSA can be assessed preoperatively using the STOP-BANG questionnaire[4] (***Appendix I***). This guideline will not discuss OSA in detail. For further information, please refer to Anaesthetic Clinic Protocol, published by the Ministry of Health.[5]

DEFINITION OF OBESITY

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.The BMI is a simple index of weight-for-height relationship that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of the height in meters (kg/m^2), as shown in **Table I**.

Table I: WHO classification of Obesity[1]

Classification	BMI : kg/m^2	Risk of co-morbidities
Normal	18.5 - 24.9	Average
Overweight	≥ 25	
Pre-obese	25 - 29.9	Increased
Obese class 1	30 - 34.9	Moderate
Obese class 2	35 - 39.9	Severe
Obese class 3	≥ 40	Very severe

Morbidly obese patients are commonly referred as patients with BMI >40kg/m^2

MANAGEMENT OF OBESE PATIENTS

- Management of obese patient should be at a specialist level[6,7]
- Morbidly obese (BMI >40 kg/m^2) patients should be managed in specialist-based hospitals (hospitals with trained personnel and ICU or HDU facility)
- Elective cases - Early referral to the Anaesthetic Clinic (if available)
  - Early referral to the anaesthetist
- Emergency cases - early anaesthetic assessment in the ward

The principles of anaesthetic management of obese patients include:-

- **History**
  - Elicit existing co-morbidities such as: hypertension, diabetes mellitus, coronary artery disease, OSA, obesity hypoventilation syndrome (OHB), metabolic syndrome and end-organ impairment
  - Previous anaesthetic history - type of anaesthesia, technique provided, such as special method of securing the airway and any difficulties encountered
  - Medication history
  - Special requirements such as propped up position, CPAP machine and psychological support

- **Physical examination**
  - Determine the BMI (must be measured and not simply be the patient's own estimation).
  - A detailed airway assessment to assess for the presence of difficult airway
  - The following may indicate the presence of significant underlying respiratory disease and should prompt consideration of preoperative arterial blood gas (ABG)[7]
    - Respiratory wheeze at rest
    - SpO_2 on air < 95% in room air

- Cardiovascular assessment should include identification of metabolic syndrome[7]
- Screening for OSA : STOP-BANG questionnaire
- Spine examination - if central neuraxial blockade is planned

- **Investigation**

  The investigations include the following :-
  - Full blood count
  - Renal profile
  - Fasting blood sugar / HbA1c (or dextrostix monitoring)
  - ECG
  - CXR

  Diagnostic testing such as ABG, ECHO, lung function test, overnight oxymetry, polysomnography should be based on the complexity of the surgery and the need to evaluate co-morbidities[6,7]

  The requirement for specific cardiac investigations should be based on:-
  - The degree of exercise tolerance
  - The presence of co-morbidities
  - The site and extent of anticipated surgery

- **Preoperative preparations of patient**
  - Cessation of smoking preoperatively
    - Patient should stop smoking at least 4 weeks and preferably 8 weeks or more before surgery to reduce postoperative respiratory complications[8]
  - Referrals to other units for optimization may be necessary as part of multidisciplinary approach including physiotherapist consult
  - The use of CPAP machine during the perioperative period has been shown to have a favorable outcome for patients with OSA[9,10]

- **Preoperative medications**
  - Aspiration prophylaxis prescription as part of the pre medication
    - Oral ranitidine 150 mg on the night before and morning of surgery
    - Oral sodium citrate 0.3 M 30 mls stat when the patient is called to theatre
  - Antiemetic prophylaxis
    - IV Dexamethasone 4 mg and/or
    - IV Ondansetron 4 mg[11,12] / Granisetron 1 mg[11,12]
  - Avoid sedative premedication

- **High risk anaesthetic consent**

- **Issues that need to be discussed with the patient and family**
  - The effect of anaesthesia on the patient's current medical condition
  - Difficult venous access and extravasation might not be immediately apparent. Patients should be warned about the difficulties and the possible need for central venous cannulation
  - Although regional anaesthesia is the preferred anaesthetic technique, it might be technically difficult
  - In potential difficult airway, video laryngoscopy or awake fibreoptic intubation may be planned. The choice of method will depend on the findings of airway assessment and level of expertise available. If an awake intubation is indicated, the patient should be briefed regarding the procedure as his/her full cooperation is needed
  - The need for high dependency postoperative care (ICU or HDW). Obesity alone is not a clinical indication for high dependency care but the presence of co-morbidities and the extent of the surgery might warrant it[7]
  - Clarify the importance of thromboprophylaxis and early mobilisation in the postoperative period[7]

INTRAOPERATIVE MANAGEMENT

- Care provided should be at specialist level with adequate manpower[7]
- Anticipation of problems and effective preparation in terms of equipment and monitoring
- Bariatric operating table, able to incorporate arm boards, table extensions and attachments leg supports for lithotomy position[7]
- Invasive blood pressure monitoring may be needed if appropriate non invasive blood pressure cuffs are not available, impractical or inaccurate
- Anticipate difficult intravenous access:
  - Ultrasound could improve the success rate for peripheral or central venous cannulation
  - Central venous cannulation may be required if peripheral veins are deemed difficult to access

- **Choice of anaesthesia**
  - Although regional anaesthesia, either a central neuraxial block or peripheral nerve block, is preferred to general anaesthesia, a proper plan for airway management is still mandatory[5,7,10,13]
  - Role of ultrasound in regional anaesthesia:
    - Facilitates visualisation of the underlying anatomy when landmark technique proves to be difficult.[9,14]
    - Improve the success rate for regional anaesthesia technique.[9,14]
  - General anaesthesia, if required, should be provided with tracheal intubation and controlled ventilation. However, supraglottic airway devices may be used for highly selected patients undergoing short surgery[7]
    - Anticipate difficult intubation and/or difficult ventilation. A robust airway strategy must be planned and discussed.[7]
    - The following items should be made readily available prior to induction of anaesthesia:
      - Various types of laryngoscopes to facilitate vocal cord visualisation, for example McCoy laryngoscope, short-handle laryngoscope and video laryngoscope.

- Various types of supraglottic airway devices, for example LMA Classic™, LMA Proseal™ or an intubating supraglottic airway device.
- Simple airway adjuncts, such as a bougie.
- Difficult airway trolley.

- Optimal positioning for intubation (see the figure below) - Aligning the tragus of the ear to the sternal notch (ramped position or sniffing position). This can be achieved by using blankets / troop pillow / stacking.[15]

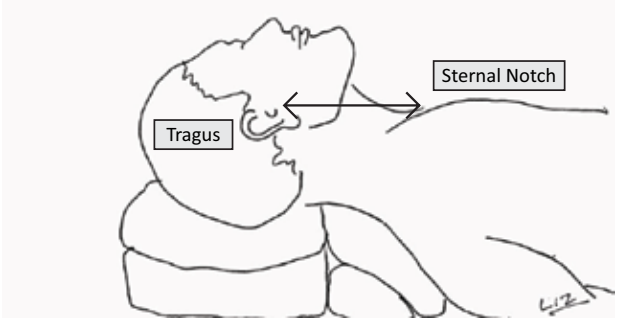

Figure 1: Ramped position or sniffing position. Note the tragus is aligned to the sternum

- Pre-oxygenation

  Obese patients tend to desaturate rapidly during the apnoeic period following the induction of general anaesthesia. The strategies which can help to overcome this occurrence include:

  - Pre-oxygenation with 100% oxygen which aims to increase oxygen reserve.[9] An easy way to assess the efficacy of pre-oxygenation is to measure the end-tidal oxygen fraction (FEO_2), which will give an approximation of the alveolar oxygen fraction (FAO_2).[16] Effective preoxygenation is when $FEO_2 > 0.9$.[16]
  - Inducing anaesthesia in the head up position.[9,16] Oxygen insufflation during the apnoeic period.[9]

- Induction of anaesthesia

  Easily reversible drugs, with fast onset and offset, are the agents of choice for obese patients.[7] The options for induction of general anaesthesia include the following:-

  1. Intravenous induction
     - Modified rapid sequence induction with propofol, opioids (fentanyl/remifentanil) and muscle relaxant (suxamethonium or rocuronium - with the availability of sugammadex)
  2. Inhalational induction
     - The anaesthesia is deepened with inhalational agent (sevoflurane in 100% oxygen). Gentle laryngoscopy is performed. If the laryngoscopic view is adequate, neuromuscular blocking agent suxamethonium or rocuronium may be considered. Sugammadex must be available in the event of failed intubation after administration of rocuronium
     - However, in patients with OSA, this technique may be difficult as the airway may become obstructed during the process, making it difficult to get an adequately deep level of anaesthesia
     - If laryngoscopic view is not favourable, further management should follow the Difficult Airway Algorithm
  3. Awake fibreoptic intubation

- Ventilation strategies

  There is no particular mode of controlled ventilation which has been proven to be superior.[11] However, greater tidal volume for a given peak pressure can often be achieved with pressure controlled ventilation.[11] The addition of sufficient PEEP and recruitment manoeuvers are known to reduce intra and postoperative atelactasis.[11]

- Anaesthetic drugs and obese patient

  - The physiological changes associated with obesity alter the pharmacokinetic properties of most drugs.[7,17] Drug administration based on total body weight can result in overdose. Conversely, administration of drugs according to ideal body weight can result in sub-therapeutic doses.[17]

- Lean body weight (LBW) is the optimal dosing scalar for the majority of anaesthetic drugs, including opioids and induction agents. For neuromuscular blocking agents, ideal body weight (IBW) is used except for depolarizing neuromuscular blocker, whereby the dosage is calculated according to total body weight (TBW).[7,17] Neuromuscular monitoring should always be used whenever neuromuscular blocking agents are used.[7]
- The choice of inhalational agents would be the ones with a rapid wash out profile. Desflurane has been shown to have a significantly faster recovery profile as compared to sevoflurane.[18]

Table II: Suggested anaesthetic drugs dosing scalar for obese patients.

Lean Body Weight	Ideal Body Weight	Total Body Weight
Propofol (Induction)[7,17]	Rocuronium[17]	Propofol (TCI)[17]
Thiopentone[7,17]	Atracurium[17]	Suxamethonium[17]
Fentanyl[7,17]	Cisatracurium[17]	Sugammadex[7]
Morphine[7]	Neostigmine[7,18] (max 5mg)	
Remifentanil[17]		
Bupivacaine[7]		
Lignocaine[7]		

- The use of target-controlled infusion (TCI) delivery systems has improved the accuracy of anaesthetic drug delivery during the maintenance of anaesthesia. However, most of the pharmacokinetic models used by TCI are derived from normal weight subjects. Owing to the lack of pharmacokinetic and pharmacodynamics parameters specific for morbidly obese population, the use of TCI can result in inappropriate dosing in morbidly obese patients.[7,17] Depth of anaesthesia monitoring should be considered especially when total intravenous anaesthesia is used in conjunction with neuromuscular blocking drugs.[7]

- Intraoperative analgesia
  - Intravenous opioids should be titrated to response in obese patients. Doses should be based on ideal body weight (IBW) rather than total body weight (TBW).[7,15] Short acting opioids such as remifentanil is preferred. However fentanyl and morphine can be used with caution, especially in patients who have or are suspected to have OSA.
  - Multimodal analgesia, employing various pharmacological approaches such as regional anaesthesia and analgesia techniques, NSAIDs and paracetamol, is ideal.[7,13,19,20] This targets different analgesic mechanisms and reduces the doses of individual agent (opioid-sparing).
- Reversal
  - Upper airway obstruction, hypoventilation, hypercarbia and hypoxia can occur during reversal of general anaesthesia in obese patients.
  - Monitoring the depth of neuromuscular blockade and readiness for reversal is mandatory.
  - Neostigmine dose is calculated using IBW (0.04-0.08mg/kg with a maximum dose of 5mg).[18]
  - Complete reversal of rocuronium-induced neuromuscular blockade can be achieved with sugammadex (2-4mg/kg TBW-according to the TOF count). In obese patients, sugammadex has been shown to be superior to neostigmine.[21]
  - Extubation should be attempted only in awake patients with the return of airway reflexes and adequate tidal volumes.[9]
  - A 30° head-up tilt is a more favourable position for extubation than supine in the obese population.[22]
  - Application of CPAP post-extubation reduces the occurrence of desaturation.[9]

POSTOPERATIVE CARE

- Close monitoring
  - Admission to high dependency (HDU or ICU) setting for monitoring.
  - Patient can return to the general ward for postoperative monitoring provided:
  - o The surgery is minor.
  - o The obesity is mild or the co-morbidities are not severe.
  - o Existing provision to monitor vital signs at frequent intervals including continuous SpO_2 monitoring.
  - o Guaranteed provision for high nursing:patient ratio.
- CPAP and nasal pharyngeal airway are helpful in obese patients with OSA.
- Early mobilization & physiotherapy:
  - Encourage ambulation
  - Adequate pain control
  - Adequate assistance and support for ambulation
- Antithrombotic prophylaxis:
  - Prophylactic measures should be started prior to surgery and then continued until the patient is fully mobile.[23]
  - Risk stratification and prevention strategies in medical and surgical patients. Please refer Management of Venous Thrombosis. Clinical Practice Guidelines July 2013, published by the Ministry of Health Malaysia **(Appendix II and Appendix III)**.

- **Postoperative analgesia**
  - In the obese patient, the goal of postoperative pain management is the provision of comfort, early mobilisation and improved respiratory function without causing sedation and respiratory compromise.[20]
  - The pathophysiology of obesity, typical co-morbidities and the high prevalence of OSA amongst obese patients make safe analgesic management challenging and difficult.[20]

- If opioids are necessary, delivery via Patient Control Analgesia (PCA) technique is preferred to continuous intravenous infusion or regular intermittent boluses.[10,13,22,24]
- Multimodal analgesic therapy should be adopted to minimise the use of opioids as a sole analgesic therapy.[10,13,22]
- A combination with regional anaesthetic techniques with other analgesic modalities is preferred to obtain optimum pain control. For example, peripheral nerve blocks and Transversus Abdominis Plane (TAP) block, with NSAIDs or paracetamol given orally or as suppositories.[13,22]

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APPENDIX I

STOP-BANG Questionnaire.[4]

S	Do you **S**nore loudly? *(Louder then talking or can be heard through closed doors)*	Yes/No
T	Do you often feel **T**ired, fatigue or sleepy during day time? *(Such as falling asleep during driving)*	Yes/No
O	Has anyone **O**bserved you stop breathing or choking/ gasping during your sleep?	Yes/No
P	Do you have or are being treated for high blood **P**ressure?	Yes/No
B	Body mass index more than 35 kg/m^2?	Yes/No
A	**A**ge older than 50 years old?	Yes/No
N	**N**eck size large? *(Measured around Adams apple)* *Male = 17 inches / 43 cm or larger?* *Female = 16 inches / 41cm or larger?*	Yes/No
G	**G**ender - Male?	Yes/No

Scoring Criteria: For general population

Low risk of OSA*: Yes to 0-2 questions*
Intermediate risk of OSA: Yes to 3-4 questions
High risk of OSA*: Yes to 5-8 questions*

or Yes to 2 or more of 4 STOP questions + male gender
or Yes to 2 or more of 4 STOP questions + BMI > 35kg/m2
or Yes to 2 or more of 4 STOP questions + neck circumference 17 inches / 43cm in male or 16 inches / 41cm in female

APPENDIX II

2.3.1.2 Prophylactic Recommendation For Medical Patients
Based on the risk assessment score, recommendations for VTE prophylaxis can be made for medical patients (Table 2.3.1.2)[74]

Table 2.3.1.2: Risk Stratification of Medical Patients and Prophylatic Recommendation

Category	Recommendations	Grade
Low Risk		
PPS <4	No prophylaxis	B
High Risk		
PPS >4	LMWH Fondaparinux	A B
High Risk for bleeding		
IMPROVE score >7 (see Table 2.4)	1. Leg Compression Device (IPC or GECS) only 2. Switch to anticoagulant prophylaxis as soon as bleeding risk is considered to be low 3. Early ambulation	C B B
Cancer		
Prior VTE Immobilizations Angiogenesis inhibitors-lenalidomid, thalidomide Hormonal therapy	LMWH daily	B
High risk on long-distance flights		
Cancer Previous VTE Severe obesity Pregnancy	1. Encouraged to get uo and walk around periodically, flex calf muscles and sit in an aisle seat when possible 2. Consider using below-the-knee compression stockings at 15-30 mmHg 3. Aspirin or anticoagulant is not recommended for the purpose of prohylaxis against VTE on a long-distance flight	B C B

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APPENDIX III

2.3.2 Surgical patients

For surgical patients, the primary prophylactic measures depend on the risk stratification of the individual patient and the clinical situation (Table 2.3.2).[75,76]

Table 2.3.2: Risk Stratification of Surgical Patients and Prophylatic Recommendation

Risk category	Recommendations prophylaxis	Grade
Low Risk		
• Ambulatory patient <40 years without risk factor* • Minor surgery (<30 min) • Knee arthroscopy with no additional risk*	Early aggressive ambulation	A
Moderate Risk		
• Patient with an extra risk* • Patient 40-60 years without risk* • Major surgery (>30 min) for benign disease	LMWH Fondaparinux LD-UFH, 12 hrly GESC, IPC, VFP	A A B C
High Risk		
Surgery in patient • >60 years • 40-60 years with an extra risk* • with multiple risk factors* Major surgery for cancer Major trauma, Spinal Cord Injury	LMWH Fondaparinux LD-UFH, 8 hrly Warfarin INR 2-3 plus IPC or GESC	A A B B A
Highest Risk		
Hip arthroplasty Knee arthroplasty** Hip fracture surgery	LMWH > fondaparinux > warfarin, and IPC** Rivaroxaban	A A

Management Of Venous Thrombosis. Clinical Practice Guidelines July 2013. MOH/P/PAK/264.13 (GU)