

OBESITY AND DAY CASE ANAESTHESIA ANAESTHESIA TUTORIAL OF THE WEEK 291

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QUESTIONS

Before continuing, try to answer the following questions. The answers can be found at the end of the article, together with an explanation.

1. Is there a safe limit of Body Mass Index (BMI) for day case surgery?
2. True or false:
 - a. Patients with obstructive sleep apnoea should always be managed as inpatients.
 - b. Guidelines for the management of the difficult intubation differ for inpatient versus day case surgery.
 - c. Regional anaesthesia is contraindicated in day case procedures.
 - d. Obesity related complications associated with anaesthesia usually occur in the perioperative or immediate recovery phase.
3. The Stop Bang questionnaire includes the following?
 - a. Snoring
 - b. BMI
 - c. Oximetry
 - d. Neck circumference

INTRODUCTION

Obesity is a growing problem all over the world, particularly in westernised countries. According to a recent WHO publication, being overweight or obese is the fifth leading risk for global deaths ⁽¹⁾.

Body mass index (BMI) is the most common method used to classify adult weight. It is defined as weight in kilograms divided by the square of height in metres (kg/m^2). Table 1 shows BMI ranges as defined by the World Health Organisation (WHO).

61% of the UK population is overweight ($\text{BMI} >25 \text{ kg}/\text{m}^2$). In 2010, just over a quarter of adults were classified as obese ($\text{BMI} >30 \text{ kg}/\text{m}^2$) by the NHS Information Centre. With obesity prevalence increasing at the same rate, it was predicted that in 2012 32.1% of men and 31.0% of women would be classified as obese.

By 2015, the foresight report estimates that 36% of males and 28% of females (aged between 21 and 60) will be obese and by 2025 it is estimated these figures will have risen to 47% and 36% respectively ⁽²⁾. In the USA, more than one-third of the adult population suffers from obesity ⁽³⁾.

Table 1

Classification	BMI (kg/m²)
Normal range	18.5–25
Overweight	≥25
Pre-obese	25–30
Obese	≥30
Obese class I	30–35
Obese class II	35–40
Obese class III (morbidly obese)	≥40

SELECTION CRITERIA IN THE DAY SURGERY UNIT

Complications associated with obesity usually occur intra-operatively or in the immediate recovery phase although they can occur at later stages. Day case anaesthesia provides benefit to these patients by promoting early mobilisation and reducing the incidence of hospital acquired complications such as infection.

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) state that even morbidly obese patients can be safely managed as day cases by expert staff with appropriate resources and that the absolute level of BMI should not be used as the sole indicator for suitability for day case surgery. In 1992, the Royal College of Surgeons recommended that patients with a BMI of greater than 30 kg/m² should be excluded from day case procedures ⁽⁴⁾. However, in 2002, the NHS Modernisation Agency raised the limit to at least 35 kg/m² and up to 40 kg/m² for many procedures ⁽⁵⁾. It has now become common practice to accept for day surgery patients in whom management would not be altered by in-patient admission.

The fourth edition of the British Association of Day Surgery directory of recommended day surgery and short stay surgical procedures was published in June 2012. It contains over 200 procedures categorised by surgical specialty and assigns each procedure to one of four treatment options - Procedure room, Day case, 23 hour stay and under 72 hours stay. It also includes a National Dataset of outcomes for England during 2011 showing the percentage of procedures successfully carried out on a day case basis ⁽⁶⁾.

PREOPERATIVE ASSESSMENT

Co-morbidities

An extensive preoperative assessment is needed to elicit co-morbidities as many obese patients have a high prevalence of conditions such as hypertension, ischaemic heart disease, diabetes, hypercholesterolaemia and gastric reflux. See Anaesthesia Tutorial of the Week 21 (Obesity and Anaesthesia) for a more comprehensive review of the systemic complications of obesity. This tutorial will go into further depth on the subject of obstructive sleep apnoea, a condition that is more common, but not exclusive to, obese patients.

Obstructive Sleep Apnoea

Definition

Obstructive Sleep Apnoea (OSA) is defined as the cessation of airflow during sleep, preventing air from entering the lungs where decreased upper airway muscle tone causes upper airway collapse.

The apnoea/hypopnoea index (AHI) is used to assess severity of OSA by measuring the frequency of apnoeas (complete cessation of airflow for at least 10 seconds) and hypopnoeas (a 10 second event where there is at least a 50% reduction in ventilation compared to a baseline but not a complete cessation of airflow) divided into the number of hours of sleep. Measurement requires a formal sleep study.

The severity of OSA can be graded according to the AHI ⁽⁷⁾:

Mild: AHI 5-14/hr
Moderate: AHI 15-30/hr
Severe: AHI >30/hr

Aetiology and Pathophysiology

Characteristics that are commonly associated with upper airway narrowing and subsequent collapse during sleep include obesity, a large neck circumference and upper airway anatomical or craniofacial abnormalities.

Frequent arousals result in sleep disruption, excessive daytime somnolence, impaired memory, anxiety and depression. In addition, sympathetic over-activity and oxygen desaturation may contribute to cardio-respiratory co-morbidities such as hypertension, ischaemic heart disease, pulmonary hypertension and right heart failure, endocrine problems such as diabetes mellitus or reduced growth hormone / testosterone levels and gastro-intestinal manifestations most commonly gastro-oesophageal reflux ⁽⁸⁾.

Assessment

OSA may be first diagnosed at a pre-operative assessment appointment. Subsequent assessment should include a comprehensive review of medical records with reference to any history of airway difficulty with prior anaesthetics, medical co-morbidities and sleep studies, if available. A thorough history and examination should be performed to evaluate symptoms and signs of OSA and there are many scales and scoring systems available to assess its severity.

The main symptoms of OSA are excessive sleepiness, impaired concentration and snoring. OSA is clinically significant when the AHI is greater than 15 along with unexplained daytime sleepiness or a minimum of two of the other features of the condition (Table 2) ⁽⁷⁾.

Table 2: Features of Obstructive Sleep Apnoea

Excessive daytime sleepiness
Impaired concentration
Snoring
Lack of refreshing sleep
Choking episodes during sleep
Witnessed apnoeas
Restless sleep
Irritability / personality change
Nocturia
Decreased libido

Epworth Sleepiness Scale

This is a self-administered questionnaire with 8 questions ⁽⁹⁾. It provides a measure of a person's general level of daytime sleepiness. It asks people to rate, on a 4-point scale, their usual chances of dozing off or falling asleep in 8 different situations which most people engage in as part of their daily lives.

The total ESS score is the sum of the 8 scores and can range between 0 and 24. The higher the score, the higher the person's level of daytime sleepiness. Most people can answer the ESS, without assistance, in 2 or 3 minutes.

Use the following scale to choose the most appropriate number for each situation:

- 0 = would never doze
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

Situation:

- Sitting and reading
- Watching television
- Sitting inactive in a public place (e.g. a theatre or a meeting)
- As a passenger in a car for an hour without a break
- Lying down to rest in the afternoon
- Sitting and talking to someone
- Sitting quietly after a lunch without alcohol
- In a car, while stopped for a few minutes in traffic

TOTAL (max. 24)

STOP BANG Questionnaire

This is a validated tool used to screen patients for obstructive sleep apnoea (OSA). A recent Canadian study demonstrated the value of the STOP-BANG questionnaire in identifying and risk-stratifying surgical patients⁽¹⁰⁾. It can help the health care staff spot unrecognised OSA and guide patients to diagnosis and treatment of this condition in order that they avoid long term complications of OSA as well as reducing the associated peri-operative risks.

Table 3: STOP-BANG questionnaire. Yes to ≥ 3 questions = high risk of OSA.

S - (Snore)	”Have you been told that you snore?”
T - (Tired)	”Are you often tired during the day?”
O - (Observed)	”Has anyone observed you stop breathing while sleeping?”
P - (Pressure)	Hypertension (treated or not)
B - (BMI)	BMI >35 kg m ⁻²
A - (Age)	Age >50 years
N - (Neck)	Neck circumference >40 cm
G - (Gender)	Male

OSA and Day Surgery

The ASA practice guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea emphasise that patient selection for ambulatory surgery should depend upon the severity of OSA, invasiveness of surgery, associated co-morbidities, type of anaesthesia, postoperative opioid requirements and adequacy of post-discharge observation⁽¹¹⁾. OSA on its own should not be a contraindication to day surgery.

A more recent consensus statement from the Society for Ambulatory Anesthesia has updated some of the ASA practice guidelines⁽¹²⁾. This is based upon recently published literature that demonstrates the value of the STOP-BANG questionnaire as a screening tool and case series that demonstrate success with day case laparoscopic bariatric surgery. They recommend that patients with diagnosed and treated OSA and stable co-morbidities should not be excluded from day case surgery whilst those at risk, according to screening tools, with stable co-morbidities should also be offered day case surgery providing that post-operative pain can be adequately treated with non-opioid analgesia. Meanwhile, patients with non-optimised co-morbidities or those requiring opioid analgesia post-operatively are not ideal candidates for the day case setting.

The day surgery unit should have access to difficult airway equipment and respiratory care equipment as well as access to radiology (e.g. portable chest x-ray) and laboratory facilities (e.g., haemoglobin,

blood gas and electrolyte analysis). As with any day case facility, the provision for in patient admission should be available without difficulty.

Patients who use CPAP devices at home should be advised to bring their device to the hospital for postoperative use.

The nature of the surgery and the need for postoperative opioids appear to be more important determinants of postoperative complications than anaesthetic technique but local or regional anaesthesia is likely to be the preferred option for OSA patients ⁽¹¹⁾.

As with non-obese patients, morbidity may be increased by residual neuromuscular blockade. The reduced respiratory reserve of the obese makes it even more important that neuromuscular blockade is carefully monitored and reversed.

Tracheal extubation should be performed when the patient is fully awake, alert and following commands with complete reversal of neuromuscular blockade. Whenever possible, extubation should be performed in a semi-upright (30° head-up) or reverse Trendelenburg position to optimise respiratory mechanics ⁽¹²⁾.

Airway Management

The recent NAP4 report of the Royal College of Anaesthetists shows that obese patients have twice the risk of major airway problems during anaesthesia, compared to non-obese patients ⁽¹³⁾. Therefore, a thorough airway assessment should be carried out for obese patients in anticipation of difficulty with mask ventilation and intubation. All day surgery units should have the same standard equipment and trained staff as in the inpatient setting in order to manage such an eventuality.

Pre oxygenation is mandatory in the morbidly obese with a head up or ramped position and tight fitting mask, as their reduced functional residual capacity and increased basal oxygen consumption will accelerate desaturation after the onset of apnoea.

Consideration should be given to securing the airway awake via fibre-optic intubation where appropriate. The role of muscle relaxants in the safe management of difficult airways should also not be forgotten. NAP4 referred to many situations where delay in administration of muscle relaxants could actually make managing an airway more difficult. And of course, it may be advisable not to list patients as day cases where significant difficulty is anticipated.

Airway control is best achieved by use of an appropriate dose of induction agent and relaxant, good positioning (head elevation, ramping, head-up tilt) and the help of a skilled assistant. The role of airway adjuncts, such as the video laryngoscope, is under evaluation. Such airway adjuncts may prove valuable, but at present their use depends on the skills of the individual clinician. CICV situations ('can't intubate, can't ventilate') should be managed as per the Difficult Airway Society guidelines ⁽¹⁴⁾.

MANAGEMENT IN THE DAY SURGERY UNIT

Principles of enhanced recovery should be followed.

Preoperative

- Careful preparation and explanation at pre assessment, including expectations for resumption of oral intake, fasting guidelines and keeping hydrated up to 2 hours before surgery.
- Distribution of information leaflets at pre assessment for procedures and guidance on what to expect as per local guidelines.
- Prophylaxis with antacid and analgesia with paracetamol and NSAIDS if not contraindicated.

Intra-operative

- Special equipment may be required as per inpatient cases, including operating tables, trolleys and beds specified to appropriate patient weights, table attachments, pressure reducing mattresses, gel pads and monitoring equipment. Some day surgery units use electrically operated trolleys so as to avoid problems with manual handling of patients.
- Use short acting anaesthetic agents and/or regional anaesthesia. Spinal anaesthesia (perhaps using agents such as hyperbaric prilocaine) or peripheral nerve blocks can be advantageous in promoting rapid recovery in obese patients. Performing these procedures can be challenging due to difficulty in locating landmarks, but potential higher failure rates should not preclude their use in day case patients.

Postoperative

- Where feasible systemic opioids should be avoided whilst multimodal analgesia with simple analgesics such as paracetamol and NSAIDS should be used by default unless contra-indicated⁽¹⁵⁾.
- Keeping well hydrated with pre-operative drinking and intra-operative intravenous fluids can help speed the return to oral intake.
- A multimodal approach based on local protocol should be used to treat and prevent PONV.
- Patients should be mobilised as soon as possible to minimise the risk of thromboembolism. Some day surgery units perform gastric banding procedures and such patients should be considered for 10-14 days treatment with low molecular weight heparin.

Spinal Anaesthesia for Day Case Surgery

- Low doses of hyperbaric 2% prilocaine have been used widely in a day surgery scenario in UK and many parts of Europe to provide shorter acting spinal anaesthesia. A dose of 60 mg can lead to the onset of a sensory block to a T12 level in 4 minutes. Further information comparing prilocaine and bupivacaine in terms of the regression of motor and sensory blocks, time to discharge from recovery and discharge to home are given in the table below (Table 4)⁽¹⁶⁾. This reference described spinal anaesthesia for general surgery (inguinal hernia repair, haemorrhoidectomy), orthopaedic surgery (knee arthroscopy), urological surgery (TURBT, TURP) and gynaecological procedures (hysteroscopy, TVT - tension free vaginal tape). There were 113 women and 118 men in the group with a mean duration of surgery of 35 minutes. The use of hyperbaric formulations frequently led to a faster onset of motor and sensory blocks⁽¹⁷⁾.
- The addition of low dose fentanyl to the intrathecal injection improves the onset and quality of the block, allowing the anaesthetist to use lower doses of prilocaine, which allows patients to ambulate fairly quickly⁽¹⁸⁾.
- Typical practice would be the use of 20-50 milligrams of intrathecal prilocaine with 10-20 micrograms of fentanyl to provide adequate spinal anaesthesia for lower abdominal and lower limb surgery. This gives good anaesthesia with a quick regression of the motor block, a low risk of urinary retention and high patient satisfaction.
- In the three day surgery units in the west of Scotland we audited 50 patients who received 30-50 milligrams of hyperbaric prilocaine with 10 micrograms of fentanyl intrathecally in the sitting position for hernia repair, arthroscopy or ano-perineal / urological / gynaecological procedures. We recorded time to independent ambulation and discharge and the need to convert to general anaesthesia. All the patients completed a satisfaction survey and were followed up at 48-72 hours. Median time to ambulation was 124 (74-220) minutes and to discharge 180 (150-240) minutes. All patients self-voided before discharge. Four patients required GA - three cases where there was a failure or slow onset of spinal anaesthesia and

one case where the surgery was prolonged. At follow up, 2 patients had low back pain but 48 patients were highly satisfied with the experience.

Table 4 ⁽¹⁵⁾

Parameters	2 % hyperbaric Prilocaine	0.5 % hyperbaric Bupivacaine
Dose	60 mg	15 mg
Sensory block T12 n. patients	38	39
Regression of sensory block to S1 (min)	240	360
Regression of motor block - Bromage score =0 (min)	135	210
Time to void (min)	306	405
Discharge from recovery room (min)	91	150
Time to home discharge (min)	308	407

IMPORTANT POINTS-

- Obesity is not a contraindication to day surgery procedures.
- All patients should be thoroughly pre-assessed and referred for further follow up or anaesthetic review as per local protocols.
- A multimodal approach including regional / local anaesthesia, short acting opioids, paracetamol and NSAIDS (unless contraindicated) are key to safe and prompt recovery.
- Early mobilisation with day surgery reduces the risk of thromboembolism.
- The complications associated with obesity tend to most commonly occur during the intra-operative and immediate post-operative period. Careful planning and attention to detail can help to manage these problems and reduce their incidence.

ANSWERS TO QUESTIONS

Question 1

Obesity per se is not a contraindication to day surgery. Although the AAGBI has stated that morbidly obese patients can be safely managed with appropriate resources, many day surgery units refer patients with BMI > 40 kg/ m² to an anaesthetist. There should be local guidelines and a dedicated department lead for management of obese patients.

Question 2

- a. F
- b. F
- c. F- Regional anaesthesia provides excellent pain relief. Low dose anaesthetic agents with opioid mixtures are ideal. Patients can be discharged home with some residual motor and sensory block if the limb is protected. Spinal anaesthesia can also be safely undertaken if appropriate anaesthetic agents and low doses are used.
- d. T

Question 3

- a. T
- b. T
- c. F
- d. T

REFERENCES

1. www.who.int/mediacentre/factsheets/fs311/en/index.html
2. NHS Information Centre, Statistics on Obesity, Physical Activity and Diet: England 2010
3. www.cdc.gov/obesity/data/adult.html
4. Royal College of Surgeons of England. Commission on the provision of surgical services. Guidelines for day case surgery, London. HMSO, 1992
5. NHS Modernisation Agency. National good practice guidelines on pre operative assessment for day surgery, 2002
6. BADS Directory of Procedures, 4th Edition, June 2012
7. <http://www.sign.ac.uk/pdf/sign73.pdf>
8. Loadsman JA, Hillman DR. Anaesthesia and sleep apnoea. *Br J Anaesth* 2001; 86: 254–266
9. <http://www.epworthsleepinessscale.com>
10. Chung F, Subramanyam R, Liao P, Sasaki E, Shapiro C, Sun Y. High STOP-Bang score indicates a high probability of obstructive sleep apnoea. *Br J Anaesth* 2012;108(5): 768-775.
11. Gross JB et al. Practice guidelines for the perioperative management of patients with obstructive sleep apnea: a report by the American Society of Anesthesiologists Task Force on Perioperative Management of Patients with Obstructive Sleep Apnea. *Anesthesiology* 2006;104:1081–93
12. Joshi G, Ankichetty S, Gan T, Chung F. Society for Ambulatory Anesthesia Consensus Statement on Preoperative Selection of Adult Patients with Obstructive Sleep Apnea Scheduled for Ambulatory Surgery. *Anesth Analg* 2012; 115(5),1060–1068
13. 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society: Major complications of Airway Management in the UK. March 2011.
14. <http://www.das.uk.com/guidelines/cvci.html>
15. Joshi GP. Multimodal analgesia techniques and postoperative rehabilitation. *Anaesthesiology Clin N Am.* 2005;23:185–202
16. Camponovo C. Ultrashort local anaesthetics: spinal hyperbaric prilocaine. *Perimed* 2008; 26-32.
17. Camponovo C, Fanelli A, Ghisi D, Cristina D, Fanelli G. A prospective, double blinded, randomized, clinical trial comparing the efficacy of 40 mg and 60 mg hyperbaric 2 % prilocaine versus 60 mg plain 2 % prilocaine for intrathecal anaesthesia in ambulatory surgery. *Anesth Analg* 2010;111(2):568-572
18. Black AS, Newcombe GN, Plummer JL, McLeod DH, Martin DK. Spinal anaesthesia for ambulatory arthroscopic surgery of the knee: a comparison of low dose prilocaine and fentanyl with bupivacaine and fentanyl. *Br J Anaesth* 2011;106(2):183-8

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WEBLINKS AND FURTHER READING

Day case and short stay surgery, Association of Anaesthetists of Great Britain and Ireland guideline May 2011, <http://www.aagbi.org/sites/default/files/Day%20Case%20for%20web.pdf>

Peri-operative management of the morbidly obese patient, AAGBI guideline June 2007.
<http://www.aagbi.org/sites/default/files/Obesity07.pdf>

Day Case Surgery (Oxford Specialist Handbooks). Smith I, McWhinnie D, Jackson I. 2011.