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Review Article

Anaesthetic Considerations for the Morbidly and Super Morbidly Obese Patient

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ABSTRACT

The prevalence of obesity has increased significantly in developing countries like India in last decade. More and more number of obese patients is posted for elective and emergency surgery. Although mild degrees of obesity poses few additional problems during perioperative management, morbid and super morbid 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.

Keywords- anaesthesia, morbid, obesity, nerveblock.

INTRODUCTION

Obesity is defined as having a body mass index (BMI) ≥30 kg/m^2. Morbid obesity is defined as a BMI ≥40 kg/m^2, which is again classified into super obesity (BMI ≥ 50 kg/m^2) and super-super obesity (BMI ≥ 60 kg/m^2). [1] Surgery in these groups of patient population poses 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. [2]

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. [3]

Cardiovascular evaluation: Preload, after load 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. [4] 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. [5] 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. [6] 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. [7] 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. [8] 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. [9]

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. [10]

But there is an increased risk of block failure in obese patients compared to those of normal weight. [11] Failure is often due to technical difficulties and limitations of regional anesthesia. In addition, these patients also experience an increased risk of complications. [12] 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. [13] Positioning is an important step in placement of a successful neuraxial anesthetic. Ultrasound imaging can also be helpful to identify spinal processes [14] 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. [15]

In most cases, standard neuraxial needles (9-10 cm) are usually of sufficient in length if placement is midline. [16] 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. [17] 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 populations 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.

POST-OPERATIVE 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.

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