

Prone spine surgery in a morbidly obese patient: Anesthesia challenges and management

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ABSTRACT

India is seeing a rapid epidemiological transition from underweight to overweight, with an overall prevalence of obesity reported to be 40.3%. Anesthesiology concerns in an obese patient are well known. We elaborate on the anesthesia management in a 68-year-old male patient with a body mass index of 66.3 kg/m² who underwent spine surgery in prone position. Challenges faced ranged from the size of the table to the difficult airway, difficulty in positioning, maintenance of airway and ventilation, maintaining a free abdomen, and anesthesia management with meticulous use of anesthetic drugs for an uneventful recovery.

Key words: Discectomy, Obesity, Prone position

Obese patients are not only prone to metabolic diseases such as hypertension, dyslipidemia, diabetes, and coronary artery disease (CAD) but are also at risk of developing degenerative joint diseases, obstructive sleep apnea, socioeconomic, and psychosocial problems [1]. The outcomes are closely associated with body mass index (BMI) (Table 1) [2]. Effective anesthesia management necessitates an understanding of physiological changes and associated complications, pre-operative evaluation, optimization, and meticulous planning.

We discuss our experience with a morbidly obese patient (BMI 66.3 kg/m²) undergoing laminectomy in a prone position. The aim of our case report is to enumerate the anesthesiology concerns, considerations, and technique that we used for a safe outcome.

CASE REPORT

A 68-year-old male weighing 185 kg and height 167 cm (BMI 66.3 kg/m²) presented with paraparesis from 10 days along with urinary incontinence. He was a known case of hypertension and was on tab amlodipine 15 mg twice a day since 12 years. He also had diabetes since 10 years and was on oral hypoglycemic agents. The patient had undergone bariatric surgery 3 years back.


On examination, he was breathless (rate: 22/min) at rest requiring a propped-up position and room air saturation (SpO₂) was 97%. Difficult airway was anticipated, Malampatti Grade II, neck

circumference: 44 cm with thyromental distance 6 cm. The patient had a STOP BANG score of 4/8 but did not use continuous/ Bi-level positive airway pressure (CPAP/BiPaP) prior to surgery. Neurological examination showed hypoesthesia in the left lower limb with 3/5 power in ankle dorsiflexors and plantar flexors bilaterally.

Magnetic resonance imaging showed significant stenosis in lumbar spine from 1–5 (L1-L5) and anterolisthesis in L3-4. He was diagnosed to have cauda equina syndrome. All investigations were normal, ejection fraction being 61% with the left ventricular hypertrophy on echocardiography.

After informed written consent, reservation of adequate blood, booking an ICU bed, and arranging a CPAP machine for post operative care, the patient was wheeled into the operation theatre. The American Society of Anesthesiologists I and II monitors were attached and an 18G cannula was secured. Heart rate was 89 bpm, blood pressure was 140/90 mmHg, and SpO₂ was 97%. The patient was preoxygenated for 5 min using rapid airway management positioner (RAMP) position.

Premedication in the form of injection (Inj.) Glycopyrrolate 0.2 mg intravenous (i.v), pantoprazole 40 mg, and metoclopramide 10 mg i.v was given 15 min before induction. Induction was done with 50 µg fentanyl, 25 mg ketamine, 60 mg preservative-free lignocaine 2%, propofol 120 mg iv, and succinylcholine 100 mg i.v after confirming ventilation with mask and an oral airway. The patient was intubated with an 8 mm cuffed reinforced tube over a bougie using a video laryngoscope. After confirming bilateral air entry, Inj. Atracurium 50 mg was given. Airway pressure was

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Table 1: Disease risk assessment based on Body Mass Index

	BMI (kg/m ²)	Obesity class	Disease risk (relative to normal weight and waist circumference)	
			Men ≤102 cm; women ≤88 cm	>102 cm; >88 cm
Underweight	<18.5		-	-
Normal	18.5–24.9		-	-
Overweight	25–29.0		Increased	High
Obesity	30–34.9	I	High	Very high
	35–39.9	II	Very high	Very high
Extreme obesity	≥40	III	Extremely high	Extremely High

22 cm H₂O. An intermittent compression pump was applied to both lower limbs. Magnesium 1 g, Dexamethasone 8mg, and tranexamic acid 1 g i.v were given. With the help of 10 staff, the patient was carefully made prone using the log roll technique onto Jackson's spinal table, head stabilized on a gel pad, eyes, and pressure points adequately padded. As it can be seen, we ensured that the abdomen was free (Fig. 1). Airway pressure was ensured to be <30 cm H₂O. Anesthesia was maintained with oxygen, air, desflurane, minimal alveolar concentration being 1 and infusions of dexmedetomidine, and atracurium. Pre-incision i.v ketamine 25 mg and 100 mg preservative-free 2% lignocaine were given. Multimodal analgesia was administered using Paracetamol, subcutaneous infiltration of 0.25% bupivacaine, and 100 mcg i.v Fentanyl.

The surgery was uneventful with blood loss of 400 ml and urine output around 1 ml/kg/h. Post-surgery, the patient was made supine, given a 30° propped-up position and when extubation criteria were met, was extubated uneventfully with nasal (no.7.5) airway *in situ*. He was shifted to recovery on nasal prongs with O₂ at 2 L/min and monitored overnight in the ward. Incentive spirometry, chest physiotherapy, and chemoprophylaxis for deep vein thrombosis (DVT) were initiated postoperatively. The patient was gradually mobilized, he recovered and was discharged on the 19th post-operative day.

DISCUSSION

In India, it is predicted that the prevalence of overweight and obesity will be 30.5% (27.4–34.4%) and 9.5% (5.4–13.3%) among men and 27.4% (24.5–30.6%) and 13.9% (10.1–16.9%) among women, respectively, by 2040 [3,4] suggesting an inevitable increase in non-bariatric surgeries in obese patients. We elaborate on challenges encountered in the anesthesia management of obese patients in a prone position.

Pre-anesthetic evaluation should focus on understanding the difficulty associated with airway (mask ventilation and intubation), i.v cannulation, and the possibility of a need for invasive blood pressure monitoring. Pre-operative optimization of independent risk factors such as hypertension, diabetes, and CAD are prudent for better post-operative outcomes. These patients also have snoring tendencies and may have obstructive sleep apnea with pulmonary hypertension. They benefit from BiPAP/CPAP which helps alveolar recruitment during inspiration preventing expiratory collapse thereby improving

**Figure 1: Prone position on Jackson's table**

oxygenation preoperatively. Incentive spirometry and respiratory physiotherapy perioperatively are important in respiratory pre and rehabilitation [5]. Premedication must include anxiolysis, analgesia, and anti-aspiration prophylaxis. We gave i.v proton pump inhibitor and metoclopramide (prokinetic) in view of past gastric bypass surgery to reduce gastric volume and acidity.

Major concerns of spine surgery in the prone position include the risk of airway loss due to the kinking of the endotracheal tube, obstruction due to mucous plug or blood clot, and accidental extubation [6]; difficulty in positioning, and severe cardiopulmonary compromise. If the abdomen is not maintained free, there is a worsening of prevailing epidural venous engorgement due to obesity, enhancing blood loss in spine surgeries. Orbital edema, along with temporary and permanent acute vision loss [7], is common. Obese patients are prone to easy pressure necrosis and other complications such as skin breakdown, damage to breasts or genitals, and nerve damage which can be prevented by adequate padding [8]. Cardiac arrest and fibrillation [9] due to cardiac abnormalities, air embolism, poor positioning, and reduced venous return have been reported. Ventilation in a prone position is, however, better due to low V/Q mismatch, provided the abdominal wall is maintained free; hence, we used Jackson's table.

Bariatric patients are prone to DVT, especially during the first 30 days after surgery [10]. In our case due to added risk of prolonged immobilization, aggressive measures such as elastic compression stockings [10], heparin chemoprophylaxis, and early ambulation were taken. Hypoventilation causing hypoxia with hypercarbia due to the residual effect of drugs like opioids is common in the immediate post-operative period. Hence, we tried to minimize the opioid requirement by the use of ketamine, preservative-free lignocaine, and non-opioid analgesics. Extubation once fully awake and after the achievement of complete recovery from

the depressant effects of anesthetic agents is essential, as urgent reintubation is catastrophic which was ensured in our patient. Perioperative morbidity is directly proportional to the duration of surgery, blood loss, soft-tissue dissection, and retraction. Despite all efforts, our patient stayed for 19 days in the hospital as compared to 2–4 days [11] for other open lumbar decompression surgeries due to delayed neurological recovery.

CONCLUSION

Patient counseling, adequate pre-operative optimization, anticipation, and measures to circumvent complications with a multidisciplinary team approach are essential to reduce morbidity and mortality after surgical intervention in obese patients.

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