

Anesthetic Management of a Young Obese Patient for Emergency Lower Limb Orthopedic Surgery: A Case Report

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Abstract— Obesity, the new-age epidemic, is a health hazard as it adversely affects the functioning of various organ systems of our body namely, cardiovascular, respiratory, endocrine, hepatic and renal system. Obese patients have various anatomic changes that affects their airway. Also, due to anthropometric changes, they can be difficult to move and position for a regional block, whereas an inadequate block may necessitate performing general anesthesia under less than ideal conditions. Overall, perioperative management of an obese patient is challenging for anesthesia. Emergency ORIF with tibial plating and C-C screw fixation was planned for a 30-year old female patient weighing 80 kg with 160 cm height and BMI of 31.25 Kg/m² who presented with malleolar fracture of right lower limb. The patient had tachycardia with heart rate 102 beats/min, blood pressure 126/87 mmHg and a short thick neck. Case was conducted under spinal anesthesia using a 25-gauge Quincke's spinal needle and 17.5 mg of 0.5% heavy Bupivacaine. With adequate pre-loading, controlled local anesthetic volume as well as spinal anesthesia level, and continuous oxygenation, the hemodynamics remained stable throughout the procedure and the case was conducted successfully in an uneventful manner.

Keywords— Emergency ORIF; obesity; spinal anesthesia.

I. INTRODUCTION

Obesity, on the basis of WHO criteria, is defined as having a body mass index (BMI) ≥ 30 Kg/m². It occurs due to an imbalance in which energy intake exceeds energy expenditure over a prolonged period, with an excessive body fat accumulation to an extent that adversely affects health. Also, obese subjects present an increased risk of type II diabetes mellitus, hypertension, cardiovascular diseases and some cancers.^[1] The prevalence of obesity has reached epidemic proportions in the last two decades, which is now rapidly spreading to developing countries like India as well.

Significant anatomic and anthropometric alterations in the obese individuals have various anesthetic implications. Optimal method of anesthetizing such patients is still debatable.^[2]

The aim of this case report is to discuss the perioperative anesthetic management of a young, obese patient posted for emergency Open Reduction and Internal Fixation (ORIF) with tibial plating and C-C screw fixation of the malleolar fracture of right lower limb.

II. CASE REPORT

A 30-year old female patient weighing 80 kg with 160 cm height and BMI of 31.25 Kg/m² was posted for emergency ORIF with tibial plating and C-C screw fixation of the malleolar fracture of right lower limb.

On pre-operative evaluation, the patient gave a history of fall on the road four days back. There was no history of loss of consciousness, head injury, nausea, vomiting, and ENT bleed. There was no significant medical, surgical, and drug history. There was no history of any co-morbidities or addiction. Family history was not significant.

She presented with pain and inability to bear weight over the right ankle. Local examination showed tenderness, swelling and crepitus present over the right ankle. X-ray of the affected region was suggestive of fracture of lateral malleolus and posterior malleolus of the right lower limb.

On examination, the patient had tachycardia with heart rate 102 beats/min, blood pressure 126/87 mmHg, mouth opening of MPG grade II, short thick neck, neck circumference of 35 cm, neck extension adequate, and thyromental distance of 7 cm.

Investigations showed a hemoglobin of 9.8 gm/dL, WBC count 9,250/mm³, and platelet count 1,24,800/mm³. Random blood glucose level was 78 mg/dL. All other values were within normal limits.

A large bore cannula of 18G inserted and secured on the dorsum of left hand. The patient preloaded with 500 mL of Ringer's Lactate. One unit of packed cell volume reserved. Difficult airway cart prepared and all emergency drugs kept ready.

NIBP cuff, SPO₂ Probe and ECG monitors attached. Patient pre-medicated with Inj. Ondansetron 4 mg I.V. and Inj. Pantoprazole 40 mg I.V.

Spinal anesthesia is given with the patient in sitting position. Under all aseptic precautions, L4-L5 intervertebral space accessed through 25-gauge Quincke's spinal needle (Figure 1). 17.5 mg of 0.5% heavy Bupivacaine given after aspirating free, clear, adequate flow of cerebrospinal fluid using a 5 ml syringe. The patient made supine with a pillow under her shoulders and the table given a slight head-down tilt of 15°. The maximum block height achieved upto T10 level. O₂ supplementation given at 4 L/min using a simple facemask throughout the surgery which lasted for 2 hours 30 minutes. The procedure was uneventful with stable vital parameters.

The patient monitored post-operatively for 30 minutes and then shifted to post-operative ward for further monitoring.



Fig. 1. Spinal anesthesia to a young obese female

III. DISCUSSION

Obesity is a multi-factorial chronic disease involving social, cultural, physiologic, psychological, metabolic, endocrine, genetic, and behavioral components resulting in excess adipose and tissue mass. In the older definitions, obesity is defined as more than 20% of the predicted ideal body weight.^[3] According to the WHO, it is defined as BMI \geq 30 Kg/m². Obesity, identified as a nutritional disorder, thirty years ago, continues to be one of the most important yet preventable, health hazards whose prevalence has been on the rise in keeping with the rapid economic growth and surplus of food combined with marked decrease in physical activity.^[4] It is a predecessor for many related conditions like diabetes, dyslipidemia, hypertension and coronary heart disease. One consequence of the worldwide obesity epidemic is that every day in operating rooms and ambulatory treatment centers, obese patients present with all types of surgical procedures.^[5] It has been reported that obese subjects with fracture present several markers of frailty, and that in these subjects, there is poorer protective response to falling and the higher impact of the fall owing to high body weight. In addition, the risk of falling may be increased in obese subjects as a result of reduced muscular strength and mobility. In fact, due to the rapidly rising incidence of obesity and the greater risk of non-union and postoperative complications in obese patients with fracture, the economic burden of fractures in obese subjects is expected to markedly increase over the coming years.^[1]

Keeping all this in mind, a successful regional anesthetic technique will offer distinct advantages over general anesthesia in an obese patient. The benefits include minimal airway intervention, a reduction or complete avoidance of cardio-pulmonary depressant agents and improved post-operative analgesia.^[5] Also, these obese patients display altered pharmacokinetics which can lead to post-operative respiratory depression due to the use of opioids intra-operatively.^[2] Hence, spinal anesthesia was the technique of choice in this case. However, this is also technically challenging in obese patients as the identification of anatomic

landmarks in the back poses difficulty.^[2] The increased abdominal mass in obese patients, and possible increased epidural fat, may decrease the CSF volume and therefore increase the spread of local anesthetic and block height. Other reports have correlated obesity and higher cephalad spread of sensory block with spinal anesthesia. Also, CSF density is higher in males, thereby reducing the baricity of local anesthetic solution and possibly limiting the extent of cephalad spread.^[6] Considering all these factors, in an obese female, the total volume of local anesthetic needed to achieve the same height of neural blockade should be less than that in normal weight patients.

Spinal anesthesia was given with the patient in sitting position as midline approach in lateral position in obese patients can be difficult. In this patient, the midline was estimated by imagining a line between the C7 prominence and the intergluteal cleft. After choosing L4-L5 intervertebral space as it had the least overlying fat^[6], a 25-gauge Quincke's spinal needle was inserted in the middle to upper part of this space^[7] and subarachnoid space was accessed. 17.5 mg of 0.5% heavy Bupivacaine was injected after aspirating free, clear, adequate flow of cerebrospinal fluid using a 5 ml syringe. After making the patient supine with a pillow under her shoulders and the table given a slight head-down tilt of 15°, the maximum block height was restricted upto T10 level.

Due to adequate pre-loading, controlled local anesthetic volume as well as the spinal anesthesia level, and continuous oxygenation the hemodynamics remained stable throughout the procedure.

In conclusion, with a thorough peri-operative evaluation of the patient, pre-operative examination and assessment, adequate anesthetic preparation and intra-operative monitoring, emergency lower limb orthopedic surgery of a young, obese female patient was conducted in an uneventful manner.

REFERENCES

- [1] Stefano Gonnelli, Carla Caffarelli, Ranuccio Nuti, "Obesity and fracture risk," Dept. of Internal Medicine, Endocrine-Metabolic Science and Biochemistry, University of Siena, Siena, Italy, 2014.
- [2] Supriya Kulkarni, Shilpa Gurav, Uma Gothivarekar, "Anaesthetic Management of a Super Obese Patient for Emergency Lower Limb Fasciotomy," Dept. of Anaesthesiology, Maharashtra Institute of Medical Education and Research, Pune, Maharashtra, India, 1988.
- [3] Fun-Sun F. Yao, "Morbid Obesity, Obstructive Sleep Apnea, and Bariatric Anesthesia" in *Yao & Artusio's Anesthesiology: Problem-oriented patient management*, xiiith ed. Philadelphia: Wolters Kluwer, pp. 1161-62, 2016
- [4] Deepa R, Sandeep S, Mohan V, "Abdominal obesity, visceral fat and type 2 diabetes – "Asian Indian phenotype"" in *Mohan V, Rao GHR, editors. Type II diabetes in South Asians: Epidemiology, risk factors and prevention*: Jaypee Brothers Medical Publishers (P) Ltd., pp. 138-52, 2006
- [5] Pedro P. Tanaka, Jay B. Brodsky, "Regional Anesthesia and Obesity," Dept. of Anesthesia, Stanford University Medical Center, Stanford, CA, United States, 2009.
- [6] Ronald D. Miller, "Spinal, Epidural, and Caudal Anesthesia," in *Miller's Anesthesia*, xiiith ed. Philadelphia: Elsevier Saunders, pp. 1694-95, 2015
- [7] Paul G. Barash, "Neuraxial Anesthesia," in *Clinical Anesthesia*, xiiith ed. Philadelphia: Wolters Kluwer, pp. 924-25, 2017