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Case Report

Anaesthetic implications in a case of super obesity with multiple comorbidities: A conundrum of challenges

Sathya Narayanan K^{1,*}, Ilango Ganesan¹, Gowtham Rajan², Nithya Dhanabal¹, Teresa Mary¹, Rajalakshmy Aarthya¹¹Dept. of Anaesthesiology, ESIC Medical College & Hospital, Chennai, Tamil Nadu, India²GEM Hospital, Coimbatore, Tamil Nadu, India

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ABSTRACT

The fast paced lifestyle with no control over diet and lack of exercise has led to rapid rise in obesity in worldwide population. India being a developing country is no exception to this.

A body mass index (BMI) $\geq 50 \text{ kg m}^{-2}$, referred to as super obese necessitates optimum anaesthetic expertise during perioperative period. We faced a conundrum of challenges while managing a case of necrotizing fascitis in a superobese patient with multiple comorbidities.

Peripheral nerve block was an ideal technique for this patient but for local site skin infection and deep nerve location, spinal anaesthesia with 5 inch (12.7 cm) spinal needle was administered.

Regional anaesthesia in obese patients comes with a lot of difficulties including localizing the intervertebral space, narrow subarachnoid space, increased pressure, positioning the patient. Restricted fluid intake due to acute kidney injury leading to decreased preload compounds the above factors.

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1. Introduction

Obesity is a modern chronic disease having multitude of detrimental implications on the human physiology.¹ Lifestyle changes in today's world with fast paced technology available at hand deprives people of physical activity and promotes consumption of unhealthy food thereby accentuating metabolic illnesses like dyslipidaemia, coronary heart disease, obstructive sleep apnoea syndrome, cancers, gall bladder stones, thyroid disorders and many more.²

Body Mass Index is a tool to measure obesity. It is measured by Body weight in kilogram by height in metre squared.³ The World Health Organization uses the body mass index (BMI) to define a normal weight as 18.9 to 24.9 kg/m^2 , overweight as 25 to 29.9 kg/m^2 , and obese as 30

kg/m^2 or more. Class I obesity is defined as BMI 30 to 34.9 kg/m^2 , class II obesity as BMI 35 to 39.9 kg/m^2 , and class III obesity as BMI 40 kg/m^2 and above.⁴ BMI 40 kg/m^2 and above is defined as morbid obesity, and BMI 50 kg/m^2 and above is defined as super morbid obesity.^{4,5}

BMI is one of the important predictor for failure of intubation due to difficult airway.⁶ The anatomical variation and altered metabolism due to obesity complicates the technique as well as alters the pharmacokinetics of the drugs administered.

We report a case of superobesity with multiple comorbidities posted for debridement of lower leg necrotizing fascitis under spinal anaesthesia putting the anaesthetists in a quandary.

* Corresponding author.

E-mail address: sathyavaan4444@gmail.com (S. Narayanan K).

2. Case Report

A 50 year old super obese male with body mass index of 54.2 kgm^{-2} (body weight of 153 kg and height of 168 cm respectively) was posted for debridement of lower leg necrotizing fasciitis under ASA - PS IV E. (Figure 1)

He presented to the emergency department with five day history of breathlessness, swelling over left lower limb, difficulty in walking, low grade fever and decreased urine output.

During his pre anaesthetic evaluation, he gave history of multiple comorbidities including chronic left lower leg lymphedema, hypothyroidism since last 16 years (was on tab. thyroxin 175 micrograms once daily) after he underwent total thyroidectomy in 2006, history of hypertension on medications, acute kidney injury on hemodialysis. He also has history of obstructive sleep apnea, has incisional and umbilical hernia with abdominal binder, history of chronic venous insufficiency.

He had undergone reduction surgery for chronic left lower limb edema in 2017 and nodovenous shunt repair for secondary lymphedema with elephantiasis in 2018 under spinal anaesthesia which was uneventful. He had also underwent right nephrectomy for right renal cell carcinoma in 2019 under general anaesthesia and was transfused one unit packed red blood cells intraoperatively.

He was shifted to the intensive care unit for postoperative mechanical ventilation due to failed extubation and metabolic acidosis and was weaned off ventilator after two days. His risk factors includes tobacco sniffing.

He was on restricted fluid intake of one and a half litres per day and started on Injection Metronidazole 400 mg intravenously thrice daily, injection frusemide 100 mg twice daily intravenously, syrup lactulose 15 ml one table spoon per oral at night, and potassium bind 15 g thrice daily per oral.

On examination, his general condition was toxic and local examination revealed bilateral pitting pedal edema, left lower limb lymphedema, skin pigmentation with ulcerations, warmth and tenderness and absent distal vessels pulsations. His pulse rate was 82/ min and regular, non invasive blood pressure (NIBP) of 132/80 mmHg, respiratory rate of 22/ min, and oxygen saturation of 88% at room air in sitting position and 100% on 8 litres per minute on facemask. On respiratory system examination, bilateral air entry was equal with crepts. Rest of the systemic examination was normal.

Airway examination revealed mallampati class IV, short thick neck, thyromental distance of $<3 \text{ cm}$, hyomental distance of $<2 \text{ cm}$, inadequate mouth opening (allowing 2 fingers) with normal temporomandibular joint. Palpation of spine was difficult due to obesity. Preoperative investigations revealed a hemoglobin of 11.6 g\% , total leucocyte count of $20400/\text{cmm}$, platelets of $2.02\text{lac}/\text{cmm}$, blood urea of 208.27 mg/dl and serum creatinine of 8.3

mg/dl , serum sodium of 126 mmol/L and serum potassium of 6.48 mmol/L . Rest of the routine blood investigations were normal.

Electrocardiogram (ECG) showed LV hypertrophy with strain pattern, two - dimensional echocardiography showed mild hypokinesia with ejection fraction of 40%. Adequate NPO status was confirmed and high risk consent obtained and debridement was planned under spinal anaesthesia due to local site infection and deeper location of nerve.

The patient was shifted to the operation theatre. Two tables were attached side by side to accommodate the patient's size. Standard ASA monitors including pulse oximetry (SpO_2), NIBP with extra large cuff, ECG, temperature were attached and urine output was measured. Intravenous (IV) access was made using two wide bore (18 G) IV cannulae. He was supplemented with oxygen through O_2 mask at $8\text{L}/\text{min}$. Difficult airway cart was kept ready. Preloading was limited to 250 ml and patient placed in the sitting position, and under all aseptic precautions, a spinal needle 3.5 inch (8.9 cm) 23 Gauge quincke needle was inserted which did not traverse upto subarachnoid space and so a 5inch (12.7 cm) 23 gauge quincke needle was inserted into the L4–5 interspinous space in the sitting position in the midline approach.

After confirmation of cerebrospinal fluid, 0.5% hyperbaric bupivacaine 12.5mg and buprenorphine 0.15 mg were injected into the subarachnoid space. After the subarachnoid block, sensory level upto T8 dermatome and Bromage grade III motor block was achieved. The debridement surgery proceeded with minimal blood loss. Three episodes of hypotension was observed intraoperatively which was managed with vasopressors. Postoperatively, he was monitored in postanaesthesia care unit where he had two more episodes of hypotension in which was managed with vasopressors and shifted toward after his modified aldrete score assessed was 9/10. He was administered intravenous paracetamol one gram infusion six hourly and was started on thromboprophylaxis by the surgeon after 12 hrs. His postoperative course was uneventful.

3. Discussion

A conundrum of challenges were faced by the anaesthesiologists due to the deranged physical and physiological status of the patient. Morbid obesity [body mass index (BMI) $>40 \text{ kg/m}^2$] due to significant physiological attributes presents a significant surgical and anesthetic challenge.⁷ Fluid intake was restricted due to acute kidney injury and congestive cardiac failure resulting in decreased preload and hypotension episodes. Due to local site infection and deeper location of peripheral nerves, femoral-sciatic nerve blocks could not be done. Increased BMI and ASA PS IV are also independent risk factors for block failure.⁸

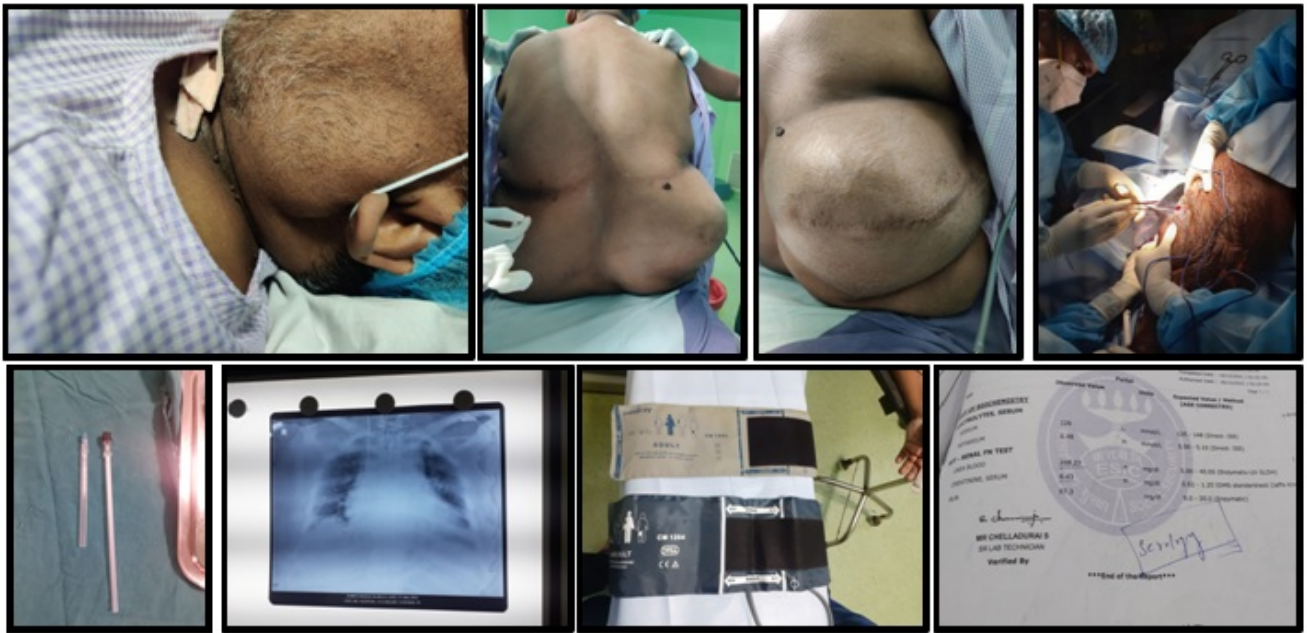


Fig. 1: Serial images showing super obesity with curved spine, sacral edema, difficult spinal anaesthesia administration, longer spinal needle, chest x-ray showing cardiomegaly with cardiogenic pulmonary edema, larger Blood pressure cuff and deranged renal function tests

The combination of super obesity with short neck and other factors like anticipated difficult airway and mask ventilation avoided the use of general anaesthesia. Regional anaesthesia in obese patients comes with a lot of difficulties including localizing the bony landmarks, narrow subarachnoid space causing increased intrathecal pressure, risk of high spinal, deeper location of subarchnoid space, positioning the patient in sitting, insufficient block and false loss of resistance through fatty tissue.^{9,10} Hence ultrasound guided spinal anaesthesia is helpful in such obese patients.¹¹

Patient was dyspneic on supine due to reduced functional residual capacity. Supplemental oxygen was given throughout the intraoperative period to improve the reduced functional residual capacity. Super obese patients are at high risk post operative hypoxemia and postoperative pulmonary complications.^{12,13}

It was prudent to start prophylactic anticoagulant in this patient to prevent thromboembolic complications. Haemodynamic collapse should be anticipated in such a patient and difficult airway cart and inotropes and a backup team for tracheostomy must be ready. In such scenarios, plan for postoperative mechanical ventilation should be in the mind of the anaesthesiologist.

4. Conclusion

Obstructive sleep apnoea, hypertension, hypothyroidism, acute kidney injury on hemodialysis, chronic venous insufficiency are independent risk factors for increased mortality. This case presenting with multiple comorbidities

and multiple surgeries posed a great anaesthetic challenge to the anaesthetists and was managed successfully. Such cases add to our knowledge and give us exposure to the use of longer spinal needles, extra large cuff and bigger tables.

5. Source of Funding

None.

6. Conflict of Interest


None.

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Author biography

Sathya Narayanan K, Assistant Professor  <https://orcid.org/0000-0002-9348-7190>

Ilango Ganesan, Professor and Head  <https://orcid.org/0000-0002-7218-5417>

Gowtham Rajan, Consultant Anaesthesia  <https://orcid.org/0000-0001-5462-6701>

Nithya Dhanabal, Post Graduate Junior Resident  <https://orcid.org/0000-0002-4532-5760>

Teresa Mary, Post Graduate Junior Resident  <https://orcid.org/0000-0003-0762-7255>

Rajalakshmy Aarthy, Post Graduate Junior Resident  <https://orcid.org/0000-0003-3327-414X>

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