

## Case Report

# *Anaesthetic management of morbidly obese patient with proximal humeral fracture: interscalene block and opioid sparing anaesthesia*

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## ABSTRACT

**Anaesthetic management of morbidly obese patient with proximal humeral fracture: interscalene block and opioid sparing anaesthesia**

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We present the case of a 64-year old super-obese female who underwent Open Reduction Internal Fixation (ORIF) for proximal

humeral fracture, and our anaesthetic management. We performed interscalene brachial plexus block prior to induction, and general anaesthesia, following the guidelines for difficult airway. What is interesting about this case, are the technical difficulties that often arise in such obese individuals, concerning both the peripheral nerve block and the airway management. Moreover, due to those difficulties we created a systematic management plan consistent with guidelines so as to minimize the failure risk.

**Keywords:** super-obese, proximal humeral fracture, interscalene block, opioid sparing

## INTRODUCTION

Obesity has had an increased occurrence in the Western world during the last 20 years. It has been calculated to reach a percentage of 42.4%

in USA. Severe obesity, which is defined as BMI more than 40 kg/ m<sup>2</sup>, has reached a rate of 9.2 % in 2018<sup>1</sup>. Morbid obesity has been linked

to a variety of comorbidities. The most common ones are cardiovascular diseases (hypertension, left ventricular failure, pulmonary hypertension), respiratory disorders (Obstructive Sleep Apnea (OSA), asthma), metabolic syndrome and many others<sup>2</sup>. Concerning perioperative management of an obese individual, one has to consider several issues. First, it is relatively common that this population has undiagnosed comorbidities that could function as a risk factor for sympathostimulating state, such as an operation. For example, OSA has been found to be undiagnosed in up to 20% in morbidly obese individuals<sup>3</sup>. This condition is related to several post-operative complications such as cardiorespiratory failure. Moreover, this population seems to be prone to the opioid-induced respiratory depression<sup>4</sup>. Overall, inadequate analgesia, due to down-titration of opioids, combined with transient episodes of hypoxia and hypercarbia, could function as an inflammatory cascade activator. Another important issue concerning general anaesthesia and obesity is difficult airway management, which has been found to be twice more common compared to non-obese individuals<sup>5</sup>. Furthermore, according to the Association of Anaesthetists of Great Britain, regional anaesthesia should be preferred whenever possible<sup>6</sup>. We present the case of a 64-year old super-obese female with proximal humeral fracture, and our anaesthetic management, after taking into consideration all of the above.

## CASE REPORT

A 64-year-old patient was admitted to the upper limb surgery clinic of our hospital for proximal humeral fracture and was scheduled for Open-Reduction Internal Fixation (ORIF) two days after. Height was 155 cm and weight 135 kg (BMI 56 kg/m<sup>2</sup>). Her regular medications include oral amlodipine/ valsartan tablet (5+80 mg/ day) for hypertension, oral levothyroxine (100 mcg/day) for hypothyroidism, and oral metformin hydrochloride (850 mg/day) for Polycystic Ovary Syndrome (PCOS) and pre-diabetic state. She has no history of previous operation.

She arrived in pre-anaesthetic unit and intravenous (IV) access was obtained by two 18-gauge IV catheters.

Our anaesthetic plan was an opioid-sparing technique. For that reason, we decided to perform interscalene brachial plexus block. However, due to patient excessive weight, that could cause potential technical difficulties to the surgeon, we decided to perform general anaesthesia as well. The patient signed informed consent. Pre-operative blood count was, Haematocrit (Hct) of 43 %, Haemoglobin (Hb) of 10.7 g/dL, White Blood Cell (WBC) count of 9 500. As for blood coagulation INR of 1 and Partial Thromboplastin Time (apTT) of 27.8 s.

Airway assessment was performed, and Mallampati score was 3, Thyromental distance (TMD) was 2.5 cm, Upper Lip Bite Test was 3.

Patient was placed in sitting position and attached to the monitor. Additional oxygen was administered. Interscalene brachial plexus block was performed under sonographic guidance in a sterile manner with a 50 mm SonoPlex<sup>®</sup> echogenic, stimulating single shot nerve block needle (PAJUNK<sup>®</sup>). Ropivacaine 0.375 % (10 mL) were injected perineurally. We assessed the block after 10 minutes by testing skin sensation at shoulder level, and muscle strength of the arm. Both were found to be reduced. The block was marked as successful. We proceeded to the operating theater.

She received omeprazole 40 mg, ondasetron 4 mg, dexamethasone 8 mg and paracetamol 1 g intravenously.

The patient was placed on the Troop Elevation Pillow, which remained until extubation, in order to achieve the ramp-position. Patient was attached to the monitor. Her vital signs were SAP/DAP of 180/ 95 mmHg, HR of 93 bpm, and SpO<sub>2</sub> of 91 %. Due to anticipated difficult airway, we decided to use the C-MAC<sup>®</sup> S video laryngoscope from the beginning.

We pre-oxygenated the patient for 4 minutes in anti- Trendelenburg position, until ETO<sub>2</sub> was 85%. The following drugs were administered intravenously for Rapid Sequence Induction, propofol (200 mg), fentanyl (100 mcg), rocuronium (100 mg). She was intubated without any adverse events. Volatile anaesthetic was used for maintainance, so that MAC was 0.8 throughout the surgery. Vital signs after intuba-

tion were, SAP/DAP of 120/65, HR of 65 bpm, SpO<sub>2</sub> of 98%. They were maintained relatively stable throughout the operation without the use of remifentanyl infusion. No other opioids were administered. No vasopressors were administered. No blood transfusion was needed. The operation lasted for approximately 2 hours and the patient was awakened 10 minutes after the volatile anaesthetic termination. Her Visual Analogue Scale (VAS) was 2 and Richmond Agitation Sedation Scale (RASS) was 0 after she left Post-anaesthetic care Unit (PACU) (1 hour) . She noted no pain for the next 3 days that she was hospitalized. She was discharged 4 days after without any adverse events.

## DISCUSSION

Peri-operative management of obese individuals poses a challenge to anaesthesiologists worldwide for a variety of reasons. Obesity prevalence was calculated to be approximately 30% in 2000 and according to CDC, it has had an 30 % increase in the past 20 years. Additionally, severe obesity (BMI > 40 kg/m<sup>2</sup>) was 4.7 % and has doubled in the past 20 years<sup>1</sup>.

Peri-operative risks of this population are multiple. Respiratory physiology differs between lean and obese individuals. Due to increased intra-abdominal pressure, chest wall compliance decreases, facilitating areas of atelectasis. For the same reason, Functional Residual Capacity (FRC), which functions as an oxygen reserve for lean individuals, is significantly

reduced, making them prone to hypoxemia both pre- and post-operatively<sup>7</sup>.

As a matter of a fact, it has been demonstrated that abnormal respiratory drive, defined as central chemoreceptor response to CO<sub>2</sub>, is responsible for the hypoventilation syndrome in obesity, rather than solely mechanical factors<sup>7</sup>.

Moreover, OSA is also common as previously mentioned. It is distinguished from central apnea by existence of peripheral muscle respiratory effort, which is non-existent in the latter<sup>7</sup>.

Those conditions often co-exist, and result in hypoxic pulmonary vasoconstriction (HPV), pulmonary hypertension and cor pulmonale<sup>2</sup>.

Furthermore, concerning opioids, it has been reported that even patient-controlled opioid analgesia has caused respiratory depression in obese individuals, especially with OSA<sup>8</sup>.

Post-operative Nausea and Vomiting (PONV) also noted increased prevalence in this population<sup>8</sup>.

For all the reasons mentioned above, we decided to perform interscalene brachial plexus block for analgesia, in an effort to spare the total amount of opioids used.

However, technical difficulties in performing regional techniques are an important issue in obese individuals and it has been reported in the past<sup>8</sup>. Therefore, even though regional techniques seem like a sensible alternative to the use of excessive amounts of opioids, it is not always technically feasible, since it requires trained personnel and adequate equip-

ment. In our case, the block was tested and marked as successful prior to induction. Finally, one has to bear in mind that interscalene blocks often cause unilateral diaphragmatic paralysis, due to phrenic nerve blockade. Therefore, it could cause respiratory distress to an already hypoventilating individual. Monitor should always be attached to such patients, additional oxygen should be administered, and total anaesthetic administration should not exceed 10 mL.

Additionally, anticipated difficult airway is another usual problem with obese patients and this patient in particular.

According to AAGBI guidelines, patients should be placed in ramp position, and pre-oxygenation should be performed in anti-Trendelenburg position<sup>5</sup>. Moreover, RSI is not considered necessary, but it could prevent possible aspiration. Thus, we decided to perform RSI with the aid of videolaryngoscope, since according to NICE, it improves patient's safety<sup>5</sup>.

Following afore-mentioned guidelines, and using the afore-mentioned equipment, patient was intubated and extubated without any adverse events.

Concerning the type of fracture, according to a large retrospective study of 1351 patients, obesity is a risk factor for humeral fractures. Also, obese individuals were found to have increased incidence of local and systemic complications<sup>9</sup>. For this reason, it is crucial that

analgesia is adequate, so that stress -induced inflammatory cascade is suppressed.

According to our knowledge, there have not been a lot of reports concerning anaesthetic management of super-obese individuals in orthopedic fractures including peripheral nerve blocks. Kilicaslan A. et al reported the case of a morbidly obese male (BMI= 58 kg/m<sup>2</sup>) with a tibial fracture, to whom they performed femoral and sciatic block, after two failed attempts of spinal anaesthesia<sup>10</sup>.

Finally, the patient was discharged after four days. She seemed satisfied with peri-operative management, since her VAS remained low throughout her hospitalization, her breathing was not distressed and she had no PONV.

## CONCLUSION

In conclusion, peri-operative management of obese individuals is often difficult because one has to weigh up risks and benefits of any technique used. According to studies so far, regional anaesthesia seems to be a safer alternative to general anaesthesia, since respiratory depressant effects of opioids are avoided, however, performance of such techniques is often a challenge. Moreover, specialized and trained personnel is required, which is not always available. Furthermore, in patients with anticipated difficult airway, preparation for general anaesthesia should always be made prior to any potential intervention.

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## Authors' contributions:

PD drafted the paper and is the lead author. DA contributed to planning and the critical revision of the paper. TP contributed to planning and the critical revision of the paper. PT contributed to planning and the critical revision of the paper. BA contributed to planning and the critical revision of the paper.

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