

CASE REPORT

Ultrasound Subcostal Approach Transversus Abdominis Plane Block in Morbidly Obese Patient

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ABSTRACT

As general population of obese patients in Malaysia rapidly increases, more obese patients are requiring anaesthesia for various operative procedures. Obesity is associated with anatomical and physiological differences and co-morbidities that influence on the choices of anaesthesia care. A surgical case with general anaesthesia is used as a basis of discussion. A 37-year-old female, history of untreated hypertension and gastro-oesophageal reflux disease (GORD), BMI of 41 admitted for laparoscopic cholecystectomy for symptomatic cholelithiasis under general anaesthesia. She presented with pain at the upper right abdomen and associated with bloated abdomen, nausea and vomiting after intake of meals. General anaesthesia and right ultrasound-guided transversus abdominis plane (TAP) block for abdominal wall blocks via subcostal approach was performed. Operation was removal gallstones in the common bile duct via laparoscopic approach. Post-operation patient was extubated successfully. She was prescribed paracetamol 1g 4 hourly and started on fentanyl patient-controlled analgesia (PCA) for next 2 days. In this case report, there is the description of the application of TAP block which when used in obese abdominal surgical procedure, can provide excellent postoperative pain relief, early mobilization and recovery.

INTRODUCTION

World Health Organization (WHO) reported 650 million adults worldwide have a BMI > 30kg/m² and are thus classified as obese. With an increasing obese population, it is not surprising that the number of obese

patients being anaesthetised is also rising¹. It is well known that obesity is a risk factor for many health conditions such as ischaemic heart disease and respiratory problems². Anaesthesiologists and surgeons should be aware of this high-risk candidate case for operation under a well-equipped operating theatre for difficult intubation and impending potential difficult resuscitation. Obesity is involving both respiratory and cardiovascular systems and overall metabolic functions of liver, kidneys and pituitary gland and, therefore, multidisciplinary assessment to evaluate is required. Early anaesthesia clinic visit is consulted to assess the pain and provide adequate pain relief before operation³.

CASE PRESENTATION

A 37-year-old female with a BMI of 41 (height 1.68 m, weight 113 kg) electively required laparoscopic cholecystectomy for symptomatic cholelithiasis under general anaesthesia. Her co-existing co-morbidities consisted GORD and untreated hypertension. She had no known any food or drug allergies. She had 2 previous caesarean sections. Further history revealed witnessed snoring, multiple episodes of awakening from sleep, and daytime somnolence. Her STOP-Bang score was 5 with high possibility of moderate/severe obstructive sleep apnoea (OSA)⁴. Due to lack of equipment and facility, sleep study could not be done to evaluate the degree of sleep deficiency and apnoea/hypopnoea index (AHI).

After securing 18G branula for intravenous access on the dorsum of the right hand, vital parameters blood pressure, pulse, oxygen saturation and ECG were monitored on the left hand. She was in ramp position with multiple pillows placed from back of both shoulders to head to facilitate tracheal intubation. Preoxygenation 3 minutes with 100% oxygen, rapid sequence induction with Sellick manoeuvre were applied and administration of intravenous fentanyl 100 mcg, propofol 100 mg, and suxamethonium 100 mg. When the patient loss of

consciousness, intubation was performed using C-MAC® video laryngoscope, a current and preferred method in obese patients⁵. The cricoid pressure was maintained until five consecutive end tidal carbon dioxide (ETCO₂) readings were confirmed. The times to optimal glottis view and to securing the airway displayed on video laryngoscope screen, defined as the time lapsing holding the C-MAC laryngoscope to the best glottis exposition was 14 seconds with single attempt intubation. Endotracheal tube size 7.5 was anchored at 21 cm at lip level and auscultation of both basal and upper lungs confirmed equal air entry to both sides of the chest. The lowest arterial oxygen saturations were 93% and 95%. Anaesthesia was maintained with inhalational agent desflurane 6% in oxygen mixture air at 3 litres/min each and intermittent boluses of rocuronium 10 mg every 20 – 30 minutes. Invasive arterial line and 18G intravenous line were inserted on the right hand. Mechanical ventilation settings were adjusted according volume-controlled mode at minimum respiratory rate of 15 per minute, minimum tidal volume of 6 ml per kg.

Right TAP blocks via subcostal approach was performed under sterile technique. A high frequency linear ultrasound probe was covered by a sterile plastic and placed perpendicular to the abdominal wall, directed parallel to the subcostal margin (Figure 1). An ultrasound needle of 100 to 150 mm was placed near the medial side of the ultrasound probe and the local anaesthetic was firstly deposited between transversus abdominis fascia and the rectus abdominis sheath, or between the rectus abdominis sheath and the posterior rectus sheath if transversus was not visible. Then needle was directed inferolaterally to deepen gradually in order to distend the transversus abdominis plane (Figure 2). Two injection points were to ensure that local anaesthetic was deposited adequately along the plane. In total of 30 ml of 0.5% ropivacaine was administered. Prophylaxis of post-operative nausea and vomiting (PONV) using intravenous dexamethasone 8 mg was administrated.



Figure 1 A high-frequency linear ultrasound probe was placed on the abdominal wall directed towards the costal margin as shown

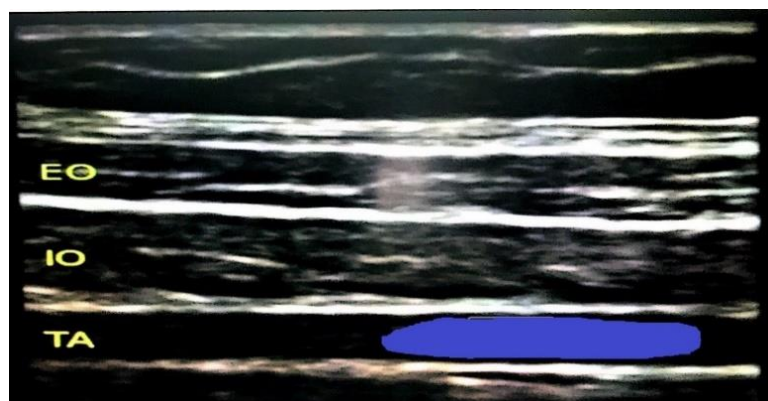


Figure 2 Illustration depicting the ideal placement of the local anaesthetic drug in blue coloured region (EO: external oblique muscle, IO: internal oblique muscle, TA: transversus abdominis muscle)

The surgery lasted for 168 mins. Estimated blood loss during the surgery was less than 500 ml. The entire operation lasted 2 hours 30 minutes, with no untoward events intra-operatively. Anaesthesia was reversed with injection 200 mg sugammadex and she was extubated successfully. She was on face mask with 3 litres per minute fresh gas flow for 40 minutes until her dizziness subsided at the recovery. She was started intravenous paracetamol 1 g 6 hourly, intravenous enoxaparin 40 mg 12 hourly and fentanyl PCA for 2 days by the acute pain service doctor. Her pain score was 2/10 scale in the ward, and she was able to breathe comfortable at rest and weaned of fentanyl PCA after 24 hours post-operation.

DISCUSSION

Morbid obesity has many detrimental effects on various body systems. It is frequently related to dyslipidaemia, diabetes, increased risk of myocardium ischemia, increased oxygen consumption, increased carbon dioxide production and predisposed to gallbladder diseases. The pharmacokinetics parameters in morbid obesity patients altered depending on volume of distribution (Vd), clearance (Cl) and protein binding and drug elimination pathways. These values can be deviated 20 – 40% in a morbidly obese patient.

Morbidly obese patients are well known at critical risk with regards to aspiration and upper airway obstruction following endotracheal tube removal post-operation. Prompt and fast reverse from anaesthesia

is needed for early return of cough reflex to protect the airway from aspiration and oesophageal regurgitation⁶. Thus, our preferred choice of induction agent and muscle relaxant were short and medium acting anaesthetic agents such as fentanyl, propofol, desflurane, rocuronium and sugammadex. Desflurane has the lowest lipid solubility compared with other inhalational agents in the market and is quickly eliminated from the various organs and systems irrespective of duration of use. Besides that, the haemodynamic parameters such as blood pressure, cerebral perfusion pressure, pulse and cerebral oxygen consumption is less fluctuated, and that post-operative recovery was shorter duration and post-operative hypoxemia risk was reduced⁷.

Sugammadex was chosen for our patient because sugammadex provides more effective and more secure recovery in comparison with neostigmine in morbidly obese patients⁸. The dose of sugammadex used is depending on the depth of neuromuscular block at the end of operation and the last dose of rocuronium served. The patient's neuromuscular block train of four (TOF) ratio was 0.5 and 200 mg sugammadex was administered and desflurane was stopped. Patient woke up in approximately 3 minutes and did not encounter any problem in the recovery phase as well as the post-operative follow-up.

TAP is a simple yet often overlooked peripheral block targeting the exit points the intercostal nerves of the anterior abdominal wall. The block has been proven to be effective adjunct post-operative pain relief for various gynaecologic and abdominal surgeries. The longstanding technique of identification of lumbar triangle of Petit followed by hearing 2 'pop' sounds indicates the first 'pop' sound represents the penetration of external oblique fascia followed by second 'pop' sound indicates the penetration internal oblique fascia that was used before the advance of ultrasound

high-frequency linear probe. Both in-plane needle approach and short-axis approach nerve visualization techniques were able to access clearly the expansion site under the ultrasound scan and depth of deposition of local anaesthetic solution under the abdominal tissue. A success rate TAP block will be more predictable at approximately 70% and reduce complication rate by 20%⁸.

A systematic review of the published literatures recognised a total of 7 randomized clinical trials (RCT) looking into the beneficial outcomes of TAP block on post-surgical pain, including 180 patients from total 364 patients who received TAP blockade during operation⁹. The surgical procedures included various bowel resection surgeries with a midline abdominal incision, caesarean delivery via the Pfannenstiel incision, gynaecological hysterectomy with a transverse abdominal wall incision, minor operations such as open appendectomy and laparoscopic cholecystectomy⁹. The outcomes compared were pain score at immediate post operation period, 24 hours post-operation and 48 hours post-operation period, the total amount of opioid requirement, the side effects of PONV, respiratory depression, drowsiness, and satisfaction score among the patients.

CONCLUSION

In general, the outcomes of TAP blocks in any gynaecologic and abdominal surgeries are very promising and various studies have proven significant reduction of opioid use and pain and subsequently opioid overuse or opioid intolerance such as sedation and PONV. In this case report, the application of TAP block was in obese abdominal surgical procedure. This caused an excellent postoperative pain relief, early mobilization and recovery. More works are necessary to elicit the outcomes of the previous studies in order to establish the use of TAP blocks extensively.

CONFLICT OF INTEREST

The authors declare that they have no competing interests in publishing this case.

CONSENTS

Written informed consent was obtained from the patient to publish the case with its related pictures. A copy of the written consent is available for review by the Chief Editor.

REFERENCES

1. Zammit C, Liddicoat H, Moonsie I, Makker H. (2010). Obesity and respiratory diseases. *Int J Gen Med* 3: 335 – 343.
2. World Health Organization (2017). Obesity and overweight. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
3. Domi R, Laho H. (2012). Anesthetic challenges in the obese patient. *Journal of Anesthesia* 26 (5): 758 – 765.
4. Chung F, Subramanyam R, Liao P et al. (2012). High STOP-Bang score indicates a high probability of obstructive sleep apnoea. *British Journal of Anaesthesia* 108 (5): 768 – 775.
5. Gaszyński T. (2014). Clinical experience with the C-Mac videolaryngoscope in morbidly obese patients. *Anestezjologia Intensywna Terapia* 46 (1): 14 – 16.
6. Kristensen MS. (2010). Airway management and morbid obesity. *European Journal of Anaesthesiology* 27 (11): 923 – 927.
7. Malek L, Vadam C, Marmuse JP et al. (2012). Postoperative recovery after desflurane, propofol, or isoflurane anesthesia among morbidly obese patients: A prospective, randomized study. *Anesthesia & Analgesia* 91(3): 714 – 719.
8. Carron M, Veronese S, Foletto M, Ori C. (2013). Sugammadex allows fast-track bariatric surgery. *Obesity Surgery* 23 (10): 1558 – 1563.
9. Petersen PL, Mathiesen O, Torup H, Dahl JB. (2010). The transversus abdominis plane block: A valuable option for postoperative analgesia? A topical review. *Acta Anaesthesiologica Scandinavica* 54 (5): 529 – 535.

