

Can ultrasound-guided subcostal transverse abdominis plane block be used as sole anesthetic technique?

ABSTRACT

Subcostal transverse abdominis plane (TAP) block anesthetizes area of the abdomen with cutaneous innervation of T6–T10 dermatomes. These abdominal field blocks become very advantageous when cardiac patient presents for noncardiac surgeries as sole anesthetic or as a part of multimodal anesthesia. A 58-year-old male came for open surgical repair of subxiphoid incisional hernia developed post coronary artery bypass grafting (CABG). Echocardiography showed hypokinesia of left ventricle (LV) in the left anterior descending (LAD) artery territory, dilated LV, and ejection fraction of 30%, and coronary angiography after 6 months of CABG showed 70% stenosis of LAD. Surgery was successfully accomplished under ultrasound-guided bilateral subcostal TAP block except for a brief period of pain and discomfort when hernia was being reduced which required narcotic supplementation. The patient remained comfortable throughout the procedure as well as 24 h postoperatively without any analgesic supplementation. Thus, subcostal TAP block can be a safe alternative to neuraxial or general anesthesia for epigastric hernia repair in selected patients.

Key words: Epigastric hernia; subcostal transverse abdominis plane block; ultrasound

Introduction

Administration of anesthesia in patients with preexisting cardiac disease presents varied challenges to anesthesiologist depending on their current cardiac status and extent of surgery.^[1] Regional techniques are increasingly being used in such patients either for perioperative analgesia or as sole anesthetic.

Subcostal transverse abdominis plane (TAP) block is an abdominal field block which involves the deposition of local anesthetic (LA) in TAP to block T6–T10 dermatomes.^[2] It has been described as a part of multimodal analgesia following upper abdominal surgeries, but there is limited literature on its role as sole anesthetic technique.^[3,4] We report a case of

large incisional hernia developed after midline sternotomy for coronary artery bypass grafting (CABG) surgery, successfully repaired under ultrasound-guided (USG) bilateral subcostal TAP block as sole anesthetic.

Case Report

A 58-year-old male weighing 70 kg with body mass index of 27.5 presented for the open repair of large symptomatic but reducible, subxiphoid incisional hernia developed post CABG done 8 months back. Patient currently had dyspnea of the New York Heart Association Grade II. Preoperative electrocardiogram (ECG) revealed that old changes of myocardial infarction (MI) and echocardiography showed

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hypokinesia of the left ventricle (LV) in the left anterior descending (LAD) artery territory, dilated LV with moderate mitral regurgitation, regional wall motion abnormalities and ejection fraction of 30% with no evidence of clots, vegetation, or pulmonary artery hypertension. Coronary angiography after 6 months of CABG showed 70% stenosis of LAD. He was on clopidogrel and aspirin 75 mg each per oral after CABG. Clopidogrel was stopped 7 days before surgery. Ultrasound abdomen showed a defect of 7 cm in rectus sheath with herniation of omentum and bowel loops [Figure 1].

We discussed with the surgical team about cardiac status of patient and it was planned to perform open surgical hernioplasty under bilateral subcostal TAP block instead of laparoscopic repair to avoid hemodynamic fluctuations. Appropriate patient counseling was done about anesthetic technique and written, and informed consent was obtained.

In operation theater, routine anesthesia monitors comprising ECG, noninvasive blood pressure, SpO₂, and EtCO₂ were attached. Under all aseptic precautions, bilateral subcostal TAP block was given using ultrasound system (GE Healthcare, USA) by the technique described by Hebbard *et al.*^[2] The USG probe (5–10 MHz frequency) was placed obliquely over the anterior abdominal wall along the subcostal margin near the midline [Figure 1] and moved laterally to identify neurofascial plane between the rectus and transversus abdominis muscle. A 100 mm long and 22 gauge block needle (Sonoplex, Pajunk, Germany) was advanced in the plane of USG beam to approach TAP plane and 20 ml 0.25% bupivacaine with 30 µg clonidine was injected bilaterally while observing the expansion of intermuscular plane by injectate [Figure 2].

Surgery was started after the confirmation of block adequacy. In epigastric area, a 15 cm long incision was made, and hernia sac was separated from margins, and fascial closure was done with extraperitoneal placement of surgical mesh. Heart rate, blood pressure, and SpO₂ were recorded perioperatively. The patient remained comfortable throughout surgery except for a brief period of pain and discomfort when hernia was being reduced which was treated with midazolam 1 mg and fentanyl 100 µg intravenous. No other analgesic supplementation was

required throughout surgery as well as 24 h postoperatively after which oral supplementation was allowed. The patient had given his written consent for scientific publication of this case.

Discussion

A median sternotomy incision for cardiovascular surgeries extending toward epigastric area can weaken the upper abdominal wall muscles and can lead to the development of subxiphoid incisional hernia with a reported incidence of 1–4.2%.^[5]

The extent of surgery, hernia content, need for visceral manipulation, comorbid conditions, body habitus, patient positioning as well as technique of surgery (open vs. laparoscopic) are main factors to determine appropriate anesthetic technique.^[6] A Large epigastric hernia is usually repaired under general anesthesia with or without epidural catheter for perioperative analgesia. Such an anesthetic technique might increase risks in cardiac patients with regard to hemodynamic instability or possible coagulopathy.^[7]

The TAP block is an abdominal field block and works on myocutaneous nerve supply of anterior abdominal wall. It was first described in 2001 by Rafi as a traditional blind landmark technique using the lumbar triangle of Petit.^[8] Under USG guidance, TAP block can be performed through classical posterior and subcostal approach. Subcostal approach blocks the higher levels of sensory nerves ranging from T6 to T10 and therefore appropriate for surgeries with supraumbilical incision.^[2]

Although subcostal TAP block has been demonstrated useful adjunct to multimodal analgesia following various upper abdominal hepatobiliary and gastrointestinal surgeries.^[7,9] Few reports have also shown its utility as sole anesthetic technique. Hasan *et al.* reported a case series of 5 patients that were operated for open gastrotomy under bilateral subcostal TAP block.^[3] Lee *et al.* reported a case of high-risk

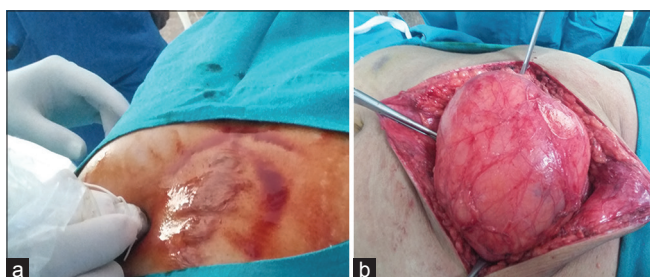


Figure 1: (a) Placement of ultrasound-guided probe (b) incisional hernia

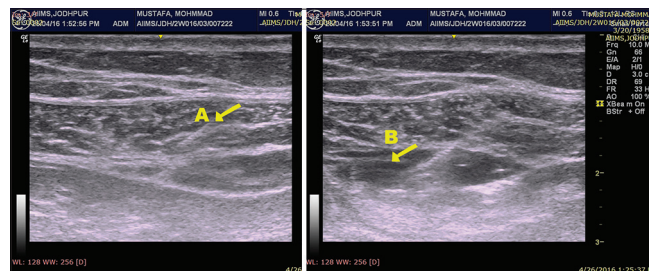


Figure 2: (A) Direction of needle advancement (B) expansion of intermuscular plane by injectate

elderly patient operated for open gastrostomy under left subcostal TAP block.^[4]

Potential advantages of subcostal TAP block over general anesthesia are minimal hemodynamic fluctuations, lesser consumption of perioperative narcotic, and opioids resulting thus resulting in fewer incidences of postoperative pulmonary complications, nausea and vomiting.^[10] Subcostal TAP block is not associated with the physiological sympathectomy that accompanies neuraxial block hence avoiding hemodynamic fluctuations.^[7] In addition, unlike neuraxial technique, this block may be a viable option with recent use of antiplatelet or anticoagulants. Although for anticoagulants current guidelines recommend similar precautions for neuraxial techniques and peripheral blocks, but complications related to bleeding will be less hazardous with peripheral and superficial compartment than bleeding in a central neuraxial or deep plexus compartment.^[11] Other added advantages of subcostal TAP block are better postoperative analgesia and early ambulation with less incidences of deep vein thrombosis, pulmonary atelectasis, and respiratory infections resulting in fast-track recovery of patients.

Bupivacaine and ropivacaine have been found similar for cumulative rescue analgesic consumption in 24 h period and in view of slower systemic absorption of LA from TAP block, bupivacaine was considered equally safe.^[12] Although duration of analgesia after subcostal TAP block is not clear-cut mentioned, studies on posterior TAP blocks (single shot) have all reported a prolonged duration of action ranging from 16 to 24 h. The addition of dexmedetomidine or clonidine to LA has been reported to increase the duration of postoperative analgesia.^[13] Being a relatively avascular TAP results in slower systemic absorption of LA resulting in less untoward complications such as bradycardia and hypotension.

This patient had limited cardiorespiratory reserve with poor ejection fraction and diastolic dysfunction and was on antiplatelet and low-molecular-weight heparin, though they had been withheld in preoperative period as per the American Heart Association guidelines. Administration of general or neuraxial anesthesia in this patient could have resulted in adverse cardiac events such as MI, arrhythmia, etc., in the perioperative period. With subcostal TAP block, sensory afferents to the upper abdominal wall were effectively blocked, and surgical procedure was carried out without patient discomfort, though during visceral manipulation patient required narcotic supplementation as visceral sensations are carried via autonomic nervous system which are not blocked by abdominal field blocks.

Conclusion

With increasing the popularity of the perioperative use of ultrasound, subcostal TAP block can be a safe alternative to local anesthetic infiltration or monitored anesthesia care for epigastric hernia repair in selected patients who pose multiple anesthetic risks.

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Conflicts of interest

There are no conflicts of interest.

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