

Transversus abdominis plane block as the primary anesthetic for laparotomy

Julie T Vuong, Patrick M McQuillan, Evangelos Messaris¹, Sanjib Das Adhikary

Departments of Anesthesiology, and ¹Surgery, Penn State College of Medicine, Hershey, PA, USA

Abstract

Elderly patients undergoing emergency intra-abdominal surgery are at high risk for morbidity and mortality. The risks and side-effects associated with intubation and mechanical ventilation or neuraxial anesthesia must be balanced against the need to maintain hemodynamic stability while maximizing pain control. Providing anesthesia and analgesia without either of these techniques can be a difficult prospect. We present three cases of ultrasound guided transversus abdominis plane (TAP) block as the primary anesthetic for laparotomy in elderly patients with multiple comorbidities. We have demonstrated the efficacy of and recommend the use of TAP blocks as the primary surgical anesthetic in a selected group of patients undergoing laparotomy.

Key words: Laparotomy, primary anesthetic, transversus abdominis plane block, transversus abdominis plane block

Introduction

The anesthetic management of elderly patients undergoing abdominal surgery is focused on minimizing morbidity and mortality in this highrisk group. Although transversus abdominis plane (TAP) blocks have been used successfully as the primary anesthetic for inguinal hernia surgery, we present a series of cases utilizing TAP blocks as the primary anesthetic for laparotomy.

Even without the usual comorbidities associated with the geriatric population, the usual physiological changes accompanying aging complicate major intra-abdominal surgery. For patients older than 80, mortality has been reported to be as high as 22% during emergency abdominal surgery.^[1] As multiple organ systems are at risk, it is critical to maintain hemodynamic stability, minimize hypothermia, avoid hypoxia and aggressively manage pain. Management

strategies involving less invasive surgical techniques as well as anesthetics avoiding physiological trespass would be optimal. Conventional methods of anesthesia and analgesia in this patient population have their limitations. The risks of intubation and positive pressure ventilation, in light of decreased pulmonary reserve, favor spontaneous ventilation with a natural airway. The benefits of patient-controlled opioid analgesia are frequently outweighed by the risks of respiratory depression and post-operative delirium. Although epidural analgesia can benefit patients with large abdominal incisions, it can be technically difficult or medically contraindicated in the elderly. TAP blocks are a useful technique in providing surgical anesthesia as well as analgesia for abdominal incisions and avoid the risks associated with either neuraxial or general endotracheal anesthesia. We report a series of ultrasound guided TAP blocks used as the primary anesthetic for laparotomy in elderly patients with significant comorbidities.

Case Reports

After Institutional Review Board approval, a retrospective chart review was performed on three patients who each received a TAP block as their primary anesthetic for bowel surgery using an open incision. All patients were consented for their procedure.

In each case, after positioning, sterile prep and draping in the operating room, all patients were sedated with midazolam and fentanyl and monitored with standard American Society of Anesthesiologists monitors. Oxygen was administered through

Address for correspondence: Dr. Sanjib Das Adhikary,
Department of Anesthesiology, Mail Code H187, Penn State College
of Medicine, 500 University Dr. Hershey, PA 17033, USA.
E-mail: sadhikary1@hmc.psu.edu

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nasal cannula. A real-time technique, utilizing in-plane ultrasound visualization, was used during the performance of the TAP block.

Case 1

The first case is about a 92-year-old, weighing 64 kg female, body mass index (BMI) 24, with sigmoid cancer status post-transverse loop colostomy, presented with severe abdominal pain and distal limb ostomy prolapse. Her comorbidities included hypertension, hyperlipidemia, carotid and coronary artery disease, left bundle branch block, as well as cysts in her liver and kidney. After her initial colostomy, she suffered a cerebrovascular accident. Medications included a statin, a beta blocker and aspirin. She underwent an extensive stoma revision with large bowel resection under sedation and TAP block.

Her TAP block was performed, using a 22 gauge Touhy needle, with 1 attempt by the attending anesthesiologist. A total volume of 40 mL of 0.25% bupivacaine was injected in divided doses without any complications. Total procedure time, from preparation for the block to completion of the block, was 10 min. Sedation for the block included 50 mcg fentanyl. During the surgery itself, the patient received intravenous propofol at 20-25 mcg/kg/min. The 1.5 h surgery included resection of 60 cm of bowel as well as creation of an end colostomy and mucous fistula. She tolerated the procedure well and was advanced to a clear liquid diet shortly after surgery. She was discharged home on the post-operative day 4.

Case 2

The second case is a 66-year-old, 115 kg man, BMI 30, was transferred, from an outside hospital, on vasopressors for hypotension during a flare of ulcerative colitis. His comorbidities included multi-vessel coronary artery disease status post-myocardial infarction with left anterior descending stent 14 years prior. He also had chronic systolic heart failure with an ejection fraction of 30%, an automatic implantable cardioverter defibrillator for ventricular tachycardia, obstructive sleep apnea, ulcerative colitis, hyperlipidemia, gastro-esophageal reflux disease (GERD), chronic anemia, osteoarthritis and an abdominal aortic aneurysm. Medications included chronic steroids, a beta blocker, aspirin, a statin, amiodarone, an immunomodulator and nitrates. His hospital course included a hospital acquired pneumonia requiring 3 days on a ventilator and diuresis for volume overload. He also developed bilateral pulmonary emboli, a gastrointestinal (GI) bleed after heparinization and underwent inferior vena cava filter placement. After he was stabilized, extubated and weaned from pressors, he underwent a loop ileostomy under TAP block.

His TAP block was performed, using a 20 gauge, 8 cm Stimuplex needle, with one attempt. A total of 60 mL of local anesthetic was injected in divided doses. This included a 30 mL mixture of 0.25% ropivacaine and 1% lidocaine in a 50/50 mix on each side. The block was successfully performed by a 1st year anesthesia resident without any complications. Total procedure time from preparation for the block to completion of the block was 10 min. During the block itself, the patient received intravenous sedation, including 2 mg midazolam and 75 mcg fentanyl. He received no further sedation during the 1.5 h surgery. The patient remained hemodynamically stable throughout the procedure. His diet was advanced on the first post-operative day and he was discharged home on the post-operative day 7.

Case 3

The third case is about a 91-year-old, 70 kg female, BMI 31, was admitted with a GI bleed. Her comorbidities included atherosclerotic heart disease, diastolic dysfunction with left ventricular hypertrophy and abnormal relaxation, as well as aortic, mitral and tricuspid regurgitation. She also had a pacemaker for symptomatic bradycardia secondary to type 2 atrioventricular block, stage 3 chronic renal insufficiency, hypertension, hyperlipidemia, anemia, gout, hypothyroidism, GERD and Parkinson's disease. Medications included clopidogrel, aspirin, a calcium channel blocker, a beta blocker, nitrates, anti-Parkinson drugs and a diuretic. Her hospital course included transfusions of packed red blood cells for melena and hematochezia. She underwent a wedge resection of a large cecal adenocarcinoma under TAP block.

Her TAP block was performed, using a 22 gauge pencil point spinal needle, with one attempt. A total of 40 mL of 0.25% bupivacaine was injected in divided doses. Total procedure time from preparation for the block to completion of the block was 30 min. The block was successfully performed by a 3rd year anesthesia resident without any complications. For the block, the patient received intravenous 2 mg midazolam and 50 mcg fentanyl. During the 3 h surgery, she had an additional 100 mcg of fentanyl and 25 mcg/kg/min propofol. Post-operatively, her diet was advanced and she was discharged to an extended care nursing facility on the post-operative day 7.

Discussion

Overall mortality for patients greater than 70 years of age undergoing emergency abdominal surgery has been reported to be as high as 22%.^[1] Various factors including comorbidities, time from onset of symptoms to surgery, colorectal surgery, age greater than 80 and malignancy correlate with increasing mortality. Systemic morbidity is highest for the respiratory system (11.5%).^[1]

TAP blocks have been used for many types of surgery involving the lower abdominal wall and have been used in upper abdominal surgery as well.^[2] These blocks have been described using various techniques based on anatomic landmarks or ultrasound. While many practitioners use TAP blocks for post-operative pain control, we have demonstrated their efficacy and recommend them, as the primary surgical anesthetic in a carefully selected group of patients undergoing laparotomy. With the TAP block technique, it is possible to avoid airway management as well as hemodynamic instability that might be associated with induction of general anesthesia. It is also a viable anesthetic plan for any patient who might need minimal airway or neuraxial intervention. For patients who are elderly and suffer multiple comorbidities and a potentially complicated perioperative hospital course, it is well worth a pre-operative discussion with the surgeon to assess the feasibility of using a TAP block as the primary anesthetic for limited bowel surgery. Further studies need to be done to establish additional types of surgeries compatible with the TAP block method.

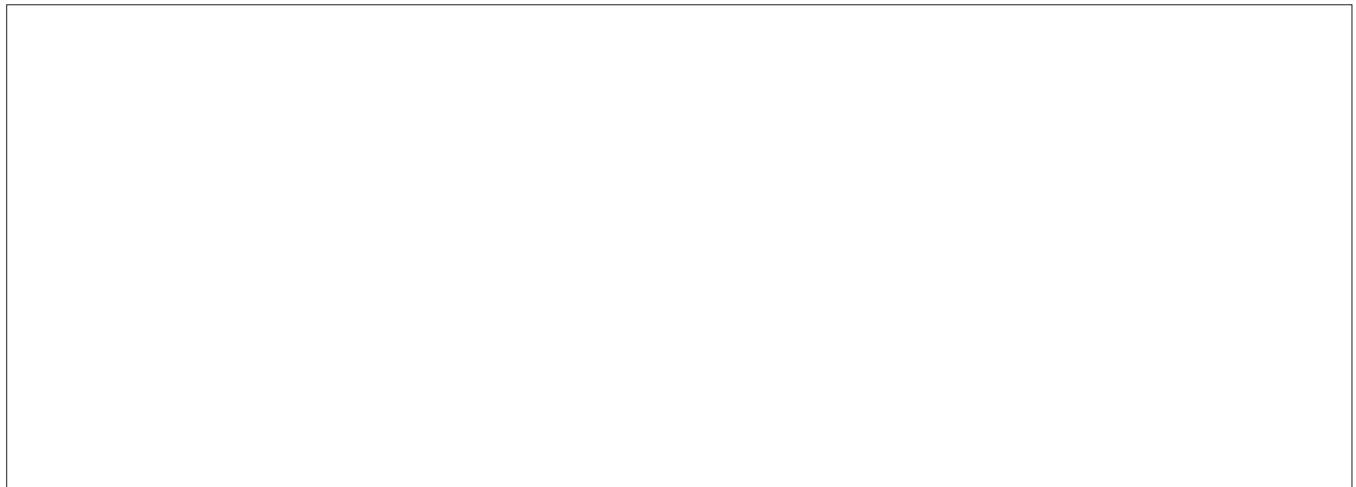
While there are complications associated with any anesthetic technique, TAP blocks are quite safe. Complications include intraperitoneal injection, bowel hematoma, transient femoral nerve palsy, visceral organ injury as well as local anesthetic toxicity. Precautions should be taken to minimize risks including using a small gauge short bevel blunt needle.^[3] We also recommend using real-time ultrasound to visualize intra-abdominal contents and vascular structures while performing these blocks.

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