

Post-Operative Analgesia for Laparoscopic Cholecystectomy Converted to Open Cholecystectomy with Surgically Placed Subcostal Transversus Abdominis Plane Catheter Infusion: A Case Series

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Abstract:

Subcostal Transversus abdominis plane block is an abdominal fascial plane block that targets the nerve fibres between the transversus abdominis and internal oblique, Transversus abdominis and the posterior rectus sheath just below the costal border. Subcostal TAP block can be used for postoperative pain relief in supraumbilical surgeries like open cholecystectomy. We present a case series of 4 cases where Subcostal TAP catheter infusion was used to for postoperative pain management in patients posted for laparoscopic cholecystectomy converted to open cholecystectomy in between the surgery. TAP catheter was surgically placed after dissecting the layer of the anterior abdominal wall in the transversus abdominis plane. The point of entry of needle for catheter placement was lateral to the lineae semilunaris. A bolus dose of 20 millilitres of Bupivacaine 0.125% followed by infusion at the rate of five to eight ml/hr was started after placement of the catheter. All patients had good pain relief; the catheter was removed after forty-eight hours. None of our patients developed any catheter related complications.

Keywords: Surgically Placed, TAP Catheter, Subcostal TAP, Laparoscopic Converted to Open Cholecystectomy.

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Introduction

Open cholecystectomy is associated with significant post-operative pain. Pain due to incision in open cholecystectomy increases the tone of upper abdominal muscles during expiration and reduces the diaphragmatic function, which can lead to atelectasis, retention of secretions and pneumonia [1,2]. Systemic opioids, patient controlled analgesia infusions, epidural infusions and abdominal wall blocks are the most common modalities of pain management in open cholecystectomy. Subcostal Transversus abdominal block is used for pain management in upper abdominal surgeries. Previous studies have compared TAP catheter infusion with epidural infusions and have concluded that TAP catheter infusions can be as effective as epidural infusions. [3,4]. Unavailability of ultrasound in OT in peripheral hospitals limits the placement of catheter, moreover ultrasound guided placement of catheter requires a higher level of skill and is time

consuming. Surgically placed TAP catheter is an excellent alternative as the catheter placed under direct vision ensures the spread of the local anaesthetic drug along the dissected plane above the transversus abdominis. Our case series includes four patients where surgically placed transversus abdominis plane catheter was used for pain management in patients who underwent laparoscopic converted to open cholecystectomies.

Case Series:

Case 1: 51-year-old ASA grade 1 patient with acute cholecystitis posted for Laparoscopic cholecystectomy, converted to open cholecystectomy as there were dense adhesions. Patient was induced as per institutional protocols with propofol and Vecuronium, maintained on sevoflurane. Intraoperatively patient received Fentanyl for pain. Intraoperatively laparoscopy was converted to open as there were dense adhesions

.TAP catheter was placed by the surgeon before closure and TAP catheter infusion was started. Patient was extubated and shifted to PACU. Patient had good pain relief Visual analogue Scale (VAS) score <3 and did not require any rescue analgesics.

Case 2: 42-year-old ASA1 patient with Cholelithiasis was posted for ERCP followed by cholecystectomy. GA was administered with propofol and vecuronium and isoflurane for maintenance. Patient received fentanyl for intraoperative pain relief. Before closure TAP catheter was placed by the surgeon. Patient was reversed with neostigmine and glycopyrrolate and extubated and shifted to PACU. VAS score was 2 at 2,4, 6, 8, 24 and 48 hours after shifting to post op and patient did not require any require any rescue analgesia.

Case 3: 52-year-old female patient who was a known case of hypertension with Cholelithiasis was posted for laparoscopic cholecystectomy. Patient was induced with propofol and vecuronium, maintained with isoflurane. Intraoperatively patient received 6 mg morphine for pain. Laparoscopy was converted to open procedure as there were dense adhesions and the calot's triangle was closed. Before closure surgical TAP catheter was placed by surgeon and abdomen was closed in layers. As patient complained of pain (VAS 5) immediately after shifting to PACU tramadol 100 mg was given immediately after shifting to PACU. VAS was 3 at 1,2, 4, 6, 8 and 12 hours after surgery. Patient required one dose Tramadol at 16 hours as VAS score was 5. Patient did not develop any catheter related complication

Case 4: 42-year-old female patient with acute cholecystitis was posted for laparoscopic cholecystectomy. Patient was induced with

propofol and vecuronium. Maintained on sevoflurane, fentanyl was used for intraoperative pain management. Intra operatively laparoscopy was converted to open cholecystectomy as there was bleeding. TAP Catheter was placed by the surgeon. VAS score was less than 2 throughout the post-operative period and patient didn't require any rescue analgesia.

TAP Catheter insertion: In all patients Transversus abdominis plane catheter was placed by the surgeon under strict aseptic precautions before the abdominal incision was sutured in layers. The transversus abdominis and the internal oblique was identified, the TAP plane between the transversus abdominis and internal oblique laterally and transversus abdominis and linea semilunaris medially was dissected at the upper incision. 18-gauge Touhy's needle was introduced piercing the internal oblique aponeurosis and directed upwards till 2 to 3 centimetres of the needle has pierced through the skin. The point of entry was lateral to the linea semilunaris.

Epidural catheter was threaded through the needle and needle was removed, leaving 4 to 5centimeters of the catheter obliquely along the upper subcostal TAP Plane(Figure one). 2 ml of saline was injected through the catheter to observe the spread and the catheter position was adjusted accordingly. Abdomen was closed in layers. After closure Bupivacaine 0.125% bolus dose 20 ml was given through the TAP catheter and infusion was started at the rate of 5 to 8 ml per hour.

Patients were shifted to PACU. All patients received paracetamol 20mg/kg as IV infusion after induction of anaesthesia and 8th hourly in the PACU. None of the patients developed any catheter related complications.



Figure 1: Subcostal TAP plane catheter

Discussion

Sandhya *et al.*

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Post-operative pain if not managed adequately can amplify the surgical stress response, impair breathing, increase tone of upper respiratory muscle, and reduce gastrointestinal motility thus increase postoperative morbidity and delay recovery. Multimodal analgesia with opioids, NSAIDs, patient controlled analgesia, epidural analgesia, abdominal wall blocks are used to control post-operative pain. Transversus abdominis plane block has gained popularity over last two decades and has been used along with intravenous NSAIDs to reduce postoperative pain. Transversus abdominis plane block is an abdominal wall block that targets the T6 to L1 thoracolumbar nerves in the anatomical plane above the transversus abdominis muscle. [5,6,7]. TAP block was described by Rafi in 2001 [6,7] and the term transversus abdominal plane block was coined by O'Donnell [9]. Hebbard et al published the first article on ultrasound guided TAP block [6,7].

The nomenclature regarding approaches to TAP block still remains controversial. [7] Posterior, lateral, subcostal approaches have been described. [8] In subcostal TAP block the local anaesthetic is injected in the TAP plane parallel to the lower costal margin medial or lateral to semilunaris [9]. A single shot subcostal TAP block 5-to-10-centimetre lateral to the umbilicus covered T9 to L1 dermatome. [10] As single injection may not ensure adequate spread of local anaesthetic TAP block with multiple punctures along oblique subcostal line has also been described. [11] Although ultrasound guided TAP is considered a low-risk procedure liver lacerations have been reported.[6] Other complications include Abdominal wall hematoma, bowel or diaphragm perforation, vascular injury and local anaesthetic toxicity. Placement of catheter under ultrasound requires a higher level of skill and an anaesthesiologist experienced in regional anaesthesia.

Placement of catheter after surgery may be challenging due to the surgical dressing and post-surgical distortion of anatomy, moreover presence of air and edema impairs the ultrasound visualisation. Surgically placed catheter is an excellent alternative; the catheter is placed under vision ensuring spread of local anaesthetic in the right plane. As TAP block is a field block large volume of local anaesthetic (minimum of 15 ml on each side) may be required when given as a single shot injection. Local anaesthetic volume from 5 to 15 ml as infusion [3,4] have been used previously, in our cases we have used volume as low as 5 ml.

Further studies are required to study the drug spread in surgically placed TAP catheter and compare effectiveness and failure rate with ultrasound guided transverse abdominal plane catheter, compare different approaches to catheter

placement and the volume of local anaesthetic infusion required for adequate pain relief.

Conclusion

Our case series affirms that TAP catheter placed by the surgeon under direct vision at the end of the surgery provides excellent, cost-effective, and safe alternative for post-operative pain relief in laparoscopic converted to open cholecystectomy.

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