



Ultrasound guided rectus sheath block and oblique subcostal transverse abdominis plane block as a sole anaesthetic technique in patients undergoing supraumbilical hernia primary repair

Anaesthesiology

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ABSTRACT

Background: The purpose of this study was to evaluate the effects of ultrasound guided rectus sheath block and oblique subcostal transverse abdominis plane block as a sole anaesthetic technique for supraumbilical hernia repair without requiring mesh and vacuum drain. Method: Total 30 ASA I-II adult patients undergoing elective small size $2 \times 2\text{ cm}$ supraumbilical hernia primary repair without mesh and vacuum drain requirement were included. After premedicating with injection midazolam ultrasound guided rectus sheath block and oblique subcostal transverse abdominis plane block were given using 0.5% bupivacaine plain 5 mg/ml and 2% lignocaine with adrenaline 5 mcg/ml with normal saline in the ratio 2:2:1 calculated according to weight (total volume 50 ml). Before starting the surgery fentanyl 1.5 mcg/kg i/v was given to blunt visceral pain to all patients. Further anaesthesia supplementation with ketamine and complications due to the procedure were noted. Results: 19 patients (63.3%) underwent surgery without any complaint. In 6 patients (20%) at skin incision ketamine supplementation required and in 5 patients (16.6%) ketamine supplemented at visceral peritoneum / sac handling. No abdominal wall hematoma due to the procedure was observed. Two patients (6%) had post operative nausea. No patient required GA. Maximum surgical time was 35 minutes. Conclusion: Ultrasound guided rectus sheath block with oblique subcostal nerve block is effective alternative anaesthesia technique for primary supraumbilical hernia repair without mesh and vacuum drain insertion in adult patients.

KEYWORDS:

Ultrasound, rectus sheath block, oblique subcostal nerve block, anaesthesia, hernia repair

Introduction

Various methods of abdominal field block have been used in anaesthetic practice over recent decades. Ultrasound guidance for regional anaesthesia is associated with higher block success rates, shorter onset times, reduced total anaesthetic dose required and lesser complications [1, 2]. Rectus sheath (RS) block and Transversus abdominis plane (TAP) block are the effective methods of blocking sensory afferents supplying anterior abdominal wall. Subcostal TAP block provides analgesia for incisions above the umbilicus [3]. In different studies RS block was utilized to provide analgesia for midline incisions and laproscopic procedures [4] and found as an alternative method of epidural analgesia in anticoagulated patients [5]. The innervations of antero-lateral abdominal wall is provided by anterior rami of spinal nerves T7-L1. Intercostal nerves from T7-T11 after travelling through intercostal space enter into fascial plane between transversus abdominis muscle (TA) and internal oblique muscle (IO). T7 gives sensory innervations at the epigastrium, T10 at the umbilicus and L1 at the groin [6]. Bilateral RS block provides analgesia over middle anterior wall from xiphoid process to symphysis pubis. So it is used for surgery with midline or paramedian abdominal incision and provides only somatic pain relief without any effect on deep visceral pain for which systemic analgesia is required. For transverse or Kocher incision above the umbilicus oblique subcostal TAP block is used [7]. A combination of both RS block and subcostal oblique TAP block can be used for transverse incisions above umbilicus involving both territory [8]. We were unable to find studies with use of RS block and subcostal TAP block as sole anaesthetic technique for supra umbilical hernia repair. Because the course and distribution of thoracolumbar nerves supplying the anterior abdominal wall may vary [9], in this study we plan to use combined RS block with oblique subcostal TAP block for primary repair of small supraumbilical hernia without mesh as sole surgical anaesthesia technique.

Materials and method:

15 adult patients ASA grade I-II age 18-60 years undergoing elective supraumbilical hernia repair without mesh and without vacuum drains (size $2 \times 2\text{ cm}$) were included in the study. After taking informed written consent and explaining the procedure ultrasound guided bilateral Rectus sheath block and oblique subcostal transverse abdominis plane block was administered. A mixture of

bupivacaine plain 5 mg/ml and 2% lignocaine with adrenaline 5 mcg/ml with normal saline in the ratio 2:2:1 calculated according to weight (total volume 50 ml) was administered. Before starting the surgery fentanyl 1.5 mcg/kg i/v was given to blunt visceral pain. Demographic data, need of intraoperative analgesia supplementation, postoperative nausea, vomiting and complications were noted. Exclusion criteria were patient allergic to amino-amide LA, coagulopathy, local skin infection, morbidly obese patients.

After securing intravenous access, ringer lactate was started and routine monitoring with NIBP, SPO₂, ECG was performed. All patients were premedicated with midazolam 1.5 mg intravenously (i/v). Abdominal skin was prepared with 2% chlorhexidine solution. Ultrasound machine linear array probe (Micromaxx Sonosite) was wrapped with sterile tegaderm and gel and held transversely in midline between T6-T8 level and Rectus abdominis muscle (RA) was identified. Posterior rectus sheath and fascia transversalis were identified as two hyperechoic lines. A 23 G Quincke spinal needle connected to infusion line was introduced in plane to the probe in medial to lateral direction till its tip reaches posterior to rectus muscle and above the underlying posterior rectus sheath at its lateral end. Local anaesthetic drug (10 ml) was given in incremental manner so that rectus muscle was separated from posterior rectus sheath by hydrodissection. This was done bilaterally. Then probe was moved slightly laterally and underlying transverses abdominis muscle (TA) was identified near costal margin and xiphoid process. Needle was inserted in plane medial to probe till its tip reaches between posterior rectus sheath and superficial border of TA and small amount of LA is injected to create the space. Further LA was given (15 ml) by creating space by hydrodissection with gradually advancing the needle along an oblique line from xiphoid process towards anterior part of iliac crest. This was repeated contralateral side. After 20 minutes patient was shifted to operating room. Before surgery i/v fentanyl 1.5 mcg/kg and oxygen by ventimask was given to all patients. Surgery was completed in 20-35 minutes. No mesh and no vacuum drain was inserted. Intraoperative need of supplemented anaesthesia by ketamine was noted. Any post operative complications were also noted.

Results

Bilateral rectus sheath block and oblique subcostal TAP block was given in 30 patients (total 60 rectus sheath blocks and oblique subcostal transverse abdominis blocks were analysed; Table-1) . 19 patients (63.3%) underwent surgery without any complaint. In 6 patients (20%) at skin incision ketamine supplementation required and in 5 patients (16.6%) ketamine supplemented at visceral peritoneum / sac handling. At muscle and fascial plane manipulation patient did not complaint any discomfort. Postoperative analgesia required in three patients (10%). No abdominal wall hematoma due to the procedure was observed. Two patients (6%) had post operative nausea. No adverse effects of LA were observed. No patient required GA. Maximum surgical time was 35 minutes.

Table 1 Result of RS and oblique subcostal TAP block

Parameters	No of patients (n= 30)	Percentage %
Underwent surgery without any complaint	19	63.3
Required ketamine supplementation at skin incision	6	20
Required ketamine supplementation at visceral peritoneum handling	5	16.6
Post operative analgesia required	3	10
Post operative nausea	2	6

Discussion: This study was designed to examine the effectiveness of combined RS Block and oblique subcostal TAP block for supra umbilical hernia repair as sole anaesthetic technique. In our study combination of both blocks were effective for surgical anaesthesia in 63.3% patients. Our study corresponds to Mukherjee [10] where they found effectiveness of oblique subcostal TAP block for analgesia. Chen [11] found that subcostal TAP block significantly reduced the intra and post operative fentanyl usage in patients of open cholecystectomy. Osaka [5] and Abrahams [4] found ultrasound guided rectus sheath block effective for upper abdominal surgery. In our study 11 (36.6%) patients required ketamine supplementation though postoperatively they did not complaint any pain which is similar to finding by Niraj [3] and Griffiths [6]. Li Kai et al [13] demonstrated that ultrasound guided bilateral subcostal TAP block using 40 ml of 0.375 % ropivacaine could yield effective analgesic effect during gastric surgery. During our block procedure some amount of LA was injected intramuscularly resulting in poor spread of drug which may result in inadequate block. This can be minimized by using saline for checking needle position. Literature shows contradictory details regarding course and distribution of thoracolumbar nerves [9]. Courreges et al [14] stated that in upto 30% patients cutaneous branch of intercostals nerves is formed before the rectus sheath and does not pierce the posterior wall of rectus sheath but instead runs anterior to the rectus muscle in the subcutaneous tissue. Rectus sheath is a virtual container, its filling by a fixed dose of fluid was found inversely proportional to its size so, while performing RSB the volume of anaesthetic drug should be adjusted to patients BMI taking into account the maximum dose permitted [15]. Since we did not performed block in anterior rectus sheath and did not adjusted drug volume according to patients BMI this might be the reason for inadequate block in 11% patient. RS block and TAP block can be performed by anatomical landmark technique which requires significant expertise and may cause intraperitoneal spread of LA, vessel puncture or visceral structure injury. Ultrasound technique allows non invasive real time imaging, higher success rate of block, lower LA dose requirement and lesser complications [1]. However, the proximity of posterior rectus sheath to peritoneal cavity can easily lead to needle misplacement within the peritoneal cavity resulting in intraperitoneal injection, block failure, bowel perforation or mesenteric vessel puncture. Ferguson et al [16] described missed block due to needle misplacement. Yuen [17] found reteroperitoneal hematoma after RS block. In our study we did not found any significant complications due to the procedure.

Our study has certain limitations as we did not measured rectus sheath depth, area spread of LA and post operative duration of analgesia. Since area of analgesia by RS block and oblique subcostal TAP block are more or less same, we opted for both/combined blocks due to much difference in anatomical pathway of intercostals nerves due to which single block may result in higher chances of sparing of intercostals nerve and may result in inadequate intraoperative analgesia.

Conclusion: Ultrasound guided rectus sheath block with oblique subcostal nerve block is effective alternative anaesthesia technique for primary supraumbilical hernia repair without mesh and vaccum drain insertion in adult patients.

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