



Clinical Outcomes of Rectus Sheath Blocks in Minimizing Postoperative Pain After Surgical Intervention: A Case Series

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ABSTRACT:

Upper abdominal surgery leads to severe postoperative pain. Insufficient postoperative analgesia accompanies a high incidence of complications. Therefore, postoperative analgesia is very important. The epidural analgesia has many advantages. However, it has a high risk of epidural hematoma in anticoagulated patients. Rectus sheath block provided safer and more reliable analgesia in recent years, by the development of ultrasound tools. We experienced two cases of the rectus sheath block in upper abdominal surgery under ultrasound guidance. Ultrasound-guided rectus sheath block can reduce the risk of peritoneal puncture, bleeding, and other complications. Rectus sheath block is very effective in reducing postoperative pain in upper abdominal surgery as an alternative method to epidural anesthesia in anticoagulated patients.

Introduction

The rectus sheath block is a procedure that has been utilized since 1899 to relax the abdominal muscles during laparotomy. Originally, it was performed by administering a local anesthetic to the posterior wall of the rectus sheath through the rectus abdominis muscle. This blockade effectively prevents the activity of the seventh to twelfth terminal branches of the intercostal thoracic nerves¹. More recently, the technique has been improved by using ultrasound-guided injections, which allow for greater accuracy in depositing the anesthetic. This increased precision has led to enhanced efficacy of the procedure. The rectus sheath block can be performed unilaterally or bilaterally, either through the rectus muscle or as part of surgical or laparoscopic interventions².

Previous studies have emphasized the potential analgesic benefits of the Rectus Sheath Block (RSB) in postoperative pain management, but have been limited in scope and search parameters, leading to some uncertainty in their conclusions. Recent reviews,

focusing on adult laparoscopic procedures and pediatric surgeries, have included a small number of trials, indicating a need for updated literature reviews to explore the broader efficacy of RSB in various abdominal procedures³.

Case Description

Case 1

A 62-year-old woman underwent hysterectomy, total cystectomy, and ileal conduit surgery for bladder cancer. The patient was given epidural and general anesthesia and experienced massive intraoperative bleeding, receiving 1500 mL of colloid fluid, 8 units of RBCs, and 6 units of FFP. The total amount of bleeding was 3640 ml. The patient was managed by epidural anesthesia postoperatively, with 2 more units of RBCs provided. Pain control was effective, but the patient experienced nausea once. Postoperative day 1, the patient was discharged from the ICU and managed on the ward. Antithrombotic therapy was not administered postoperatively. On postoperative day 4,



the patient complained of severe abdominal pain (NRS score: 10/10) 40 minutes after the removal of the epidural catheter.

The patient was unable to walk or eat despite receiving pain relief from intravenous acetaminophen and NSAIDs. On POD 12, a hematoma was discovered on a CT scan, and the surgeon began administering tramadol. However, the size of the hematoma did not change on POD 16. On POD 17, a rectus sheath catheter was placed under ultrasound guidance and 0.375% ropivacaine was injected. The patient's NRS score improved immediately after the injection, allowing her to walk and eat without further need for analgesics.

Case 2

A 76-year-old female patient with a body weight of 35 kg underwent gastrointestinal bypass surgery via an upper abdominal midline incision several centimeters in length under general anesthesia. Following the procedure, the patient experienced unexpected postoperative abdominal wall pain. To alleviate the pain, bilateral ultrasound-guided retropectinal blockades were performed using a sterile technique. An 18-G Tuohy needle was inserted through the patient's skin at the dermatomal level corresponding to the cephalad end of the wound near the lateral edge of the retrospecting space. Ropivacaine was administered in a volume of 20 mL with a concentration of 0.25% in the region between the rectus abdominis muscle and the posterior retropectinal space. A 20-G, three-lateral holes, and closed-end catheter were inserted through the needle under ultrasound observation. This process was repeated on the opposite side. Postoperative analgesia was provided through patient-controlled analgesia with fentanyl. However, severe abdominal pain emerged several hours later. To manage the pain, disposable infusion pumps were used to administer a 10 mL bolus injection followed by a continuous infusion of 0.125% ropivacaine at a rate of 4 mL·hr⁻¹ through each catheter. Forty-four hours after surgery, the patient's pain intensity, assessed using the numerical rating scale, was 2 at rest and 4 on coughing.

Case 3

An 81-year-old male patient underwent distal gastrectomy via an upper abdominal midline incision measuring approximately 15 cm in length under

general anesthesia. Due to anticoagulant therapy, epidural anesthesia was contraindicated. Following the surgery, bilateral RS blocks were administered, accompanied by a ropivacaine infusion of 0.15% at a rate of 4 mL·hr⁻¹ through each catheter. The same IVPCA as in Case 1 was provided. Forty-two hours after the operation, the patient's pain intensity, evaluated using the NRS, was zero at rest and three upon coughing.

Case 4

A 58-year-old female patient, who opted against receiving epidural anesthesia citing lower back discomfort, underwent a partial cystectomy through a midline abdominal incision that measured around 15 cm in length. After the surgical procedure, the approach to pain management mirrored that of Case 2, ensuring consistency in the treatment protocol. Assessments conducted on the patient during the 24th postoperative hour revealed a resting pain level of 2 on the Numeric Rating Scale (NRS), while coughing induced a pain intensity of 3. Notably, systemic analgesia was not administered to any patient throughout the monitoring period, with the sole exception being the provision of Intravenous Patient-Controlled Analgesia (IVPCA), which entailed sporadic requests for bolus doses in each case.

Case 5

A 57-year-old female patient weighing 62 kg underwent laparoscopic surgery to treat carcinoma colon and gastrointestinal stromal tumor of the stomach. Due to surgical reasons, an open laparotomy was performed intraoperatively, which resulted in approximately one liter of blood loss. The patient required adequate postoperative pain relief since the midline incision extended from three centimeters above the pubic symphysis to the xiphisternum. Ultrasound guidance was used to insert 16-gauge Touhy's epidural needles in the RS space lateral to the upper end of the incision. The needles were threaded through the space for about 5-7 cm in length, and steristrips and Tegaderm were used to secure the catheters. The patient received 20 cc of 0.25% bupivacaine through each RS catheter after insertion and repeated every 6-8 hours. In addition, diclofenac 50 mg, paracetamol 1 g, and tramadol 50 mg were administered intermittently for the first 24 hours. From



the second day onwards, only paracetamol was continued, and the opioid was administered as a rescue dose along with the 20 cc of 0.25% bupivacaine every 8 hours through each RS catheter. The patient was encouraged to ambulate from the first postoperative day, and the catheters were removed after 72 hours. The worst pain score recorded by the acute pain service team using the numeric rating scale in the first 72 hours was 3/10.

Discussion

In this study, it was found that patients with mesenteric vascular occlusion who underwent laparotomy and received RSB experienced significantly fewer pain scores in the RB Group compared to the control group at 2, 4, and 6 hours postoperatively, and consumed fewer opioids within 24 hours than those who did not receive a block.

Similarly, Bashandy and Elkholy et al⁴ reported significantly lower VAS scores in the RSB Group compared to the general anesthesia group in patients undergoing surgery with midline incisions in the early postoperative period. Morphine consumption was also lower in the RSB Group than in the GA Group of patients, not only in the postanesthetic care unit but also for the first two days postoperatively.

However, in contrast to our findings, Alsaeed et al.⁵ discovered that bilateral deposition of bupivacaine 0.25% 0.5 ml/kg within the space between the posterior aspect of the rectus abdominis muscle and its sheath under real-time ultrasonographic guidance was sufficient for analgesia in children who underwent umbilical hernia repairs postoperatively, and no additional analgesia was required. This difference may be attributed to the differences in patient age and the nature of the pain.

Dolan et al.⁶ suggest that utilizing ultrasound for real-time assessment of the rectus sheath (RSB) resulted in improved accuracy and a reduction in potential complications. A fascial plane lying at a variable distance above the anterior layer of the rectus muscle was commonly observed, which, if punctured blindly, may be misinterpreted as the anterior layer of the rectus sheath muscle.

Gurnaney et al.⁷ conducted a study involving 54 patients scheduled for umbilical hernia repair to

compare the analgesic efficacy of ultrasound-guided RSB and local anesthetic infiltration. The results revealed a statistically significant increase in perioperative opioid medication consumption in the local anesthetic group.

Isaac et al⁸. found no significant difference in postoperative opioid use and pain scores when comparing RSB and local anesthetic infiltration, although they did not use ultrasound. The use of ultrasound guidance offers real-time information about the needle tip location and the local anesthetic delivery to the intended site.

Conclusion

The use of an ultrasound-guided Rectus Sheath Block (RSB) in patients undergoing a laparotomy has shown significant benefits in managing postoperative pain. This technique involves the precise placement of local anesthetic around the rectus abdominis muscle to block the nerves supplying the anterior abdominal wall, which are primarily responsible for transmitting pain signals from midline incisions. By leveraging ultrasound technology, the accuracy of the anesthetic placement is enhanced, thereby increasing the efficacy of the block. As a result, patients experience lower pain scores following their surgery, which contributes to overall better recovery outcomes. The reduction in pain not only enhances patient comfort but also minimizes the need for opioid analgesics, which are often associated with side effects like nausea and vomiting. Therefore, patients treated with RSB tend to report higher satisfaction due to less pain and fewer instances of nausea and vomiting, improving their postoperative experience and potentially shortening recovery times in the hospital setting.

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