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ORIGINAL ARTICLE

A novel transperitoneal abdominal wall nerve block for postoperative pain in laparoscopic colorectal surgery

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Summary *Background:* Although the laparoscopic approach reduces pain associated with abdominal surgery, postoperative pain remains a problem. Ultrasound-guided rectus sheath block and transversus abdominis plane block have become increasingly popular means of providing analgesia for laparoscopic surgery.

Methods: Ninety patients were enrolled in this study. A laparoscopic puncture needle was inserted via the port, and levobupivacaine was injected into the correct plane through the peritoneum. The patients' postoperative pain intensity was assessed using a numeric rating scale. The effects of laparoscopic nerve block versus percutaneous anesthesia were compared.

Results: This novel form of transperitoneal anesthesia did not jeopardize completion of the operative procedures. The percutaneous approach required more time for performance of the procedure than the transperitoneal technique.

Conclusion: This new analgesia technique can become an optional postoperative treatment regimen for various laparoscopic abdominal surgeries. What we mainly want to suggest is that

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the transperitoneal approach has the advantage of a higher completion rate. A percutaneous technique is sometimes difficult with patients who have severe obesity and/or coagulation disorders. Additional studies are required to evaluate its benefits.

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1. Introduction

Postoperative pain control is an important aspect of postoperative recovery. Laparoscopic procedures are associated with significantly less postoperative pain and opioid consumption, faster recovery, and shorter hospital stays than open procedures.¹ Regional anesthetic techniques such as ultrasound-guided rectus sheath (RS) block and transversus abdominis plane (TAP) block have become increasingly popular for achieving analgesia in laparoscopic abdominal surgery with small incisions.^{2–4} RS and TAP blocks have gained popularity because of their high success rates.^{5–7} The RS block, a regional anesthetic technique, was first described in 1899 by Schleich.⁸ It has been used to treat chronic abdominal wall pain in pediatric patients.^{9,10} The TAP block is a relatively new regional anesthetic technique that provides analgesia of the parietal peritoneum, anterior abdominal wall, and skin.¹¹ These procedures have been performed percutaneously and before inducing pneumoperitoneum. The few complications of these anesthetic techniques include RS hematomas if the vessels have been damaged, liver injury, and inadvertent puncture of bowels, which are located posterior to the peritoneum.¹² These adverse events occur more frequently in children and elderly people, who have thin abdominal tissue. Use of the transperitoneal approach with a laparoscopic puncture needle, which is herein described, is possible in such patients, and even in severely obese patients and high-risk patients with a coagulation disorder. Our objective was to compare the efficacy and adverse effects of a new transperitoneal approach with those of percutaneous nerve block. This is the first report of a transperitoneal technique to achieve anesthesia by RS and TAP blocks in laparoscopic colorectal surgery.

2. Methods

The Research Ethics Board of our institution approved this study and written informed consent was obtained. Percutaneous injection was performed before 2015. After 2015, all laparoscopic colorectal surgeries were performed using the transperitoneal approach of nerve block. All patients underwent laparoscopic surgery with a navel incision and lateral abdominal incisions under general anesthesia with 8% sevoflurane via a facemask. After making a skin incision for the umbilical port, pneumoperitoneum was induced with the pressure standardized to 10–12 mmHg. In the laparoscopic group, after inducing pneumoperitoneum, under laparoscopic visualization and with ultrasound guidance, transperitoneal RS and TAP blocks were performed intraoperatively to minimize abdominal wall pain. At the end of

the laparoscopic procedure, ultrasound was performed with a linear array probe (6–13 MHz, SonoSite M-Turbo; SonoSite Inc., Bothell, WA, USA). A probe was placed longitudinally in the patient's abdominal wall, while the tip of a Needle-Master (Olympus Co., Ltd., Tokyo, Japan), used as a laparoscopic puncture needle, was inserted through the peritoneum under laparoscopic vision via the 5-mm port (Figure 1). A total of 60–80 mL (2 mg/kg) of 0.25% levobupivacaine (Maruichi Pharmaceutical Co., Ltd., Osaka, Japan) was injected into four points in the peritoneum as follows: posterior to the rectus muscle and above the underlying RS (RS block; Figure 2 and Video 1) and into the correct layer located between the internal oblique and transverse abdominal muscles (TAP block; Figure 3); the procedure was performed bilaterally.⁷ Infiltration into the correct plane without leakage was confirmed by a combination of laparoscopic viewing and ultrasound imaging. The procedure time was measured from the start of ultrasound image evaluation to the end of injection of levobupivacaine. Similarly, RS and TAP blocks were also performed in the percutaneous group. A skin puncture needle was inserted before the induction of pneumoperitoneum in the percutaneous group. The procedure time of the percutaneous block was measured from the puncture of the patients' skin to the end of injection of levobupivacaine. The patients' vital signs were continuously monitored postoperatively in the post-anesthesia care unit. The severity of pain was assessed according to a numeric rating scale (no pain = 0 and worst possible pain = 10). The postoperative numeric rating scale scores for pain while moving at 3 hours, 6 hours, 12 hours, 24 hours, and 48 hours were recorded.

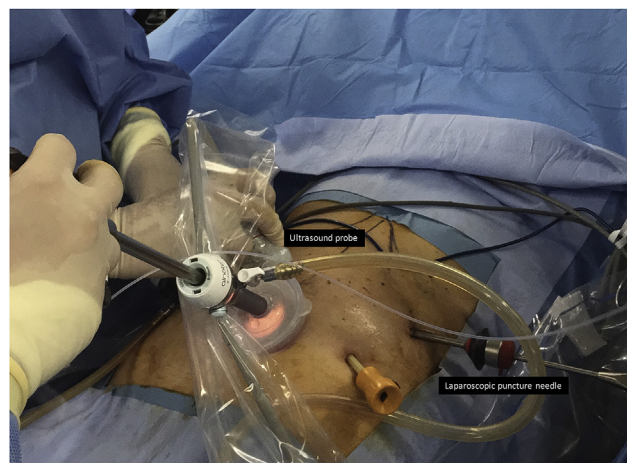


Figure 1 Intraoperative photograph showing the positions of instruments and surgeons during the procedure. A laparoscopic puncture needle has been inserted via a 5-mm port.

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