Case report

Retrolaminar block can provide effective analgesia in nipple-sparing mastectomy with latissimus dorsi flap reconstruction: a report of two cases

ABSTRACT

Aim: Nipple-sparing mastectomy with latissimus dorsi flap reconstruction (NMLR) may cause moderate to severe postoperative pain. Thoracic paravertebral block (TPVB) is recommended as the first-line regional analgesic technique for breast cancer surgery. Multiple-level TPVBs may provide effective analgesia for NMLR but may however, increase the risk of complications. A retrolaminar block (RLB), a known alternative to a TPVB, has a lower risk of complications and multiple-level RLB injections may be safely performed.

Case presentation: NMLR was planned for two patients with breast cancer. Multiple-level RLB injections were administered for postoperative pain management. In both cases, the numerical rating scale measured at rest were low postoperatively, suggesting that multiple-level RLB injections effectively managed postoperative pain.

Discussion and Conclusions: Adequate analgesia was achieved using multiple-level RLB injections without additional drug administration in both patients. Multiple-level RLB injections may be widely used as appropriate dosages of local anesthetics are considered.

Keywords: retrolaminar block, postoperative pain, latissimus flap breast reconstruction, multiple-level injections

1. INTRODUCTION

Nipple-sparing mastectomy with latissimus dorsi flap reconstruction (NMLR) may result in moderate to severe postoperative pain [1]. Although opioids are often used for postoperative analgesia, there are many adverse effects, such as nausea, vomiting, and respiratory depression [2, 3]. Decreasing the use of opioids during the perioperative period may significantly contribute to reducing these side effects. Regional anesthesia techniques are the most crucial in opioid-sparing analgesia management [4, 5]. According to the guidelines for oncological breast surgery [6], a thoracic paravertebral block (TPVB) is recommended as the first-line regional analgesic technique in breast cancer surgery; however, the risk of pneumothorax remains [7]. A retrolaminar block (RLB), which has a lower risk of pneumothorax, is an alternative to TPVB [8]. We report two cases in which multiple-level RLB injections provided good analgesia for two patients who underwent NMLR.

2. PRESENTATION OF CASE

Written informed consent for the future publication of this report was obtained from both patients. This report has been approved by the Nagasaki Rosai Hospital Institutional Review Board (No.04011, 2022/12/06).

Patient 1

A 52-year-old woman (weight 61 kg; height 152 cm) underwent left side NMLR. She had a history of myomectomy and postoperative nausea and vomiting (PONV). She was a non-smoker, and we decided to administer total intravenous anesthesia and peripheral nerve block to prevent PONV. The RLB was planned as part of the multimodal analgesia protocol. The RLB was administered as described below in the “Block procedure” subsection. Before general anesthesia, 20 ml of 0.25% levobupivacaine was administered at the Th5 level. After mastectomy, when the size of the latissimus dorsi flap was established, RLB was administered at the Th8 and Th10 levels, and 15 ml of 0.25% levobupivacaine was administered. General anesthesia was induced and maintained with propofol, remifentanil, and rocuronium to maintain a Bispectral Index value between 40 and 60. During skin closure 0.625 mg of droperidol, 1000 mg of acetaminophen, and 50 mg of flurbiprofen were administered intravenously. After completion of the surgery, the administration of these agents was discontinued, and sugammadex (4 mg/kg) was administered. The total amount of fentanyl used was 350 μg. Hemodynamic stability was maintained throughout the surgery. The numerical rating scale (NRS) was 0-0-1-1/10 at rest and at 0, 1, 6, and 12 h after surgery. There was no incidence PONV.

Patient 2

A 64-year-old woman (weight 50 kg; height 150 cm) underwent left side NMLR; 30 ml 0.25% levobupivacaine was administered at the Th5 level. The size of the latissimus dorsi flap was relatively small, and only one injection of 0.25% levobupivacaine (20 ml) was administered at level Th8. The anesthesia plan was the same as that for Patient 1. The total amount of fentanyl used was 600 μg. During skin closure 4 mg of ondansetron, 1000 mg of acetaminophen, and 50 mg of flurbiprofen were administered intravenously. The NRS was 0-0-1-1-1-0/10 at rest at 0, 1, 6, 12, 24, and 48 h after surgery. There was no incidence of PONV.

Block procedure

The RLB was administered as previously described [9]. The patients were placed in the lateral decubitus position. Ultrasound scanning was started on the ribs approximately 5 cm lateral to the spinous process in the sagittal plane, counting from Th1 and corresponding to the rib level for block administration. We used a high-frequency 13–6 MHz linear transducer (Sonosite SII, Fujifilm Sonosite, Tokyo, Japan). The probe was moved laterally to medially to visualize the transition from the transverse process to the vertebral lamina. Under aseptic conditions, a 20-gauge Tuohy needle (Hakko, Nagano, Japan) was inserted in-plane at approximately 45° in a cranial-to-caudal direction with the needle tip aiming at the vertebral lamina. The criterion for successful puncture was establishment of a hypoechoic space between the lamina and the erector spinae muscles [10].

3. DISCUSSION

We administered multiple-level injections of an ultrasound-guided RLB for latissimus flap breast reconstruction. The RLB provided effective analgesia in both patients. To the best of our knowledge, there are three reports of postoperative analgesia after latissimus dorsi flap breast reconstruction. Unkart et al. reported that continuous TPVB did not provide a statistically significant benefit for pain control in patients who underwent latissimus flap breast reconstruction [1]. Buggy et al. reported that continuous TPVB at Th3 or Th4 levels significantly improved the dynamic visual analog scale in patients

who underwent latissimus flap breast reconstruction [11]. Swisher et al. reported continuous multilevel-TPVB provided optimal analgesia without causing postoperative hypotension in patients who underwent latissimus flap breast reconstruction [12]. TPVB at a single level does not seem to adequately cover the area needed for analgesia, and we considered administering multiple-level injections of TPVB. Terkawi et al. reported that multiple-level injections of TPVB are associated with better analgesic pain at rest [13]. However, they also reported that multiple-level injections of TPVB increased the risk of pneumothorax and vascular puncture; therefore, we decided to use an RLB as an alternative to TPVB. The efficacy of an RLB has been confirmed by a comparison of postoperative analgesia after breast surgery [14].

The advantage of an RLB is that the endpoint of an RLB is the lamina, which is the bony structure easily visualized on an ultrasound, thereby reducing complications [15]. Onishi et al. reported that the RLB group had a longer time to initial analgesic administration than the control group; the NRS scores of the RLB group were significantly lower than those of the sham block group [16]. However, an RLB is not recommended in the PROSPECT guideline for oncological breast surgery due to a lack of evidence [6].

The disadvantage of an RLB is that the optimal dose required to achieve adequate analgesia remains unclear [17]. Diffusion of a local anesthetic into the paravertebral space may be crucial for achieving an adequate anesthetic effect on the anterior thoracic wall [18]. Higher volumes of local anesthetics are more likely to reach the paravertebral space. This was reported in both a human- and porcine cadaver study [8, 10]. In a pilot study by Murouchi et al., a 20 ml RLB was highly satisfactory compared to 10 or 15 ml, and no significant difference was observed between 25 ml and 20 ml [14].

Onishi et al. also reported that a local anesthetic may not reach the paravertebral space with a 15 ml dose [16]. In a cadaver study, the dye reaching the paravertebral space seemed related to the injection volume; dye was observed in 0% of the paravertebral space in the 10 ml group, 33% in the 20 ml group, and 83% in the 30 ml group [8]. Based on these results, we decided to administer 20–30 ml in breast cancer surgery. In Patient 1, two RLB procedures were performed at the level of the latissimus dorsi flap. In Patient 2, only one RLB procedure was performed at the level of the latissimus dorsi flap because its size was relatively small. In the cadaver study by Aamir et al., the dye in the retrolaminar space spread was not volume-dependent [8]. In summary, dye spread into the paravertebral space seemed to be volume dependent, whereas dye spread into the retrolaminar space did not.. A single injection provided effective analgesia at the level of the latissimus dorsi flap. We administered 20–30 mL of levobupivacaine 0.25% at each level. Adequate analgesia was achieved without continuous administration in both patients. Swisher et al. reported continuous TPVB at multilevel provided optimal analgesia in patients who underwent latissimus flap breast reconstruction as mentioned above [12]. They administered 10 mL of ropivacaine 0.5% as an initial dose. The RLB is a paravertebral block by proxy, but it is a different block, and the doses are not easily comparable with the TPVB; however, the initial dose of RLB in our report was higher than that reported by Swisher et al. [12], and thus continuous administration may not have been necessary. Further studies are needed to determine the optimal dose of local anesthetics for RLB and whether continuous administration is necessary for NMLR.

The main limitation of this report is that the patients were only evaluated for pain at rest. We also did not assess the dermatomal distribution after RLB.

4. CONCLUSION

We herein reported two patients who were administered two or three ultrasound-guided RLBs as part of a multimodal analgesic technique for NMLR. Adequate analgesia was achieved without additional drug administration in both patients. Obtaining estimates for the optimal local anesthetic dose, and the best combination of injection level and timing are essential to establish an appropriate RLB method for NLMR.

CONSENT

Written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. This report has been approved by the Nagasaki Rosai Hospital Institutional Review Board (No.04011, 2022/12/06).

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

NMLR: nipple-sparing mastectomy with latissimus dorsi flap reconstruction
TPVB: thoracic paravertebral block
RLB: retrolaminar block
PONV: postoperative nausea and vomiting
NRS: numerical rating score