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CASE REPORT

Integrating Quadratus Lumborum and Transabdominal Plane Blocks for Effective Pain Management in Colon Cancer

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ABSTRACT

Background: The Quadratus Lumborum Block (QLB) is an ultrasound-guided posterior abdominal wall block that targets the interfascial plane. This case report investigates the concurrent application of QLB and transabdominal plane block for pain management in a patient with colon cancer-related pain.

Case Illustration: A 53-year-old male patient presented with abdominal pain at the site of an abdominal stoma and his back over the past 3 months. The pain was characterized as sharp and exacerbated by movement. Laboratory tests revealed leukocytosis and a prolonged activated partial thromboplastin time. A 2022 CT scan indicated a residual mass in the transverse colon with associated fat stranding involving the adjacent ileal wall. The patient was diagnosed with cancer-related pain due to colon cancer, and a comprehensive pain management plan involving the combination of QLB, transabdominal plane block, and a Durogesic patch (12.5 mcg/3 days) was devised. The abdominal pain significantly diminished, with an initial resting Numerical Rating Scale (NRS) score of 5-6 and an initial exacerbated NRS score of 7-9, reducing to a final resting NRS score of 1-2 and a final exacerbated NRS score of 2-3 after administering the pain management regimen: QLB with Ropivacaine 0.375% + Methylprednisolone injection 62.5 mg, totaling 20 cc, along with transabdominal plane block using Ropivacaine 0.375% with a total volume of 10 cc. No occurrences of nausea or vomiting were reported.

Conclusion: Employing a combined approach of QLB and transabdominal plane block for pain management holds the potential to alleviate acute and chronic pain while facilitating a robust post-operative recovery. Further research involving a larger patient population is warranted to explore the full efficacy and effectiveness of the QLB technique.

Keywords: Cancer; Carcinoma; Colorectal; Pain; QLB.

INTRODUCTION

Pain is a common and significant issue in colorectal cancer (CRC) patients.[1,2] While various pain management methods exist, they are often ineffective. Improved survival rates mean more patients live with persistent pain, with approximately 5-10% of survivors suffering from severe chronic pain that impairs function.[3,4]

While a multitude of pharmacological and interventional pain management strategies exist, achieving adequate and sustained analgesia is often difficult.[5,6] This challenge is compounded by improved survival rates, which result in a growing population of CRC survivors; estimates indicate that approximately 5-10% of these individuals suffer from severe chronic pain that significantly impairs their quality of life and daily function.[7]

Within the arsenal of interventional techniques, truncal nerve blocks have been a cornerstone of perioperative pain management for over four decades. The Quadratus Lumborum Block (QLB) is an advanced ultrasound-guided interfascial plane block that has gained prominence for its potential to provide superior and prolonged analgesia.[8] The proposed mechanism of action for QLB's extended duration involves the spread of local anesthetic within the fascial planes of the posterior abdominal wall, potentially reaching the paravertebral space and resulting in a more central sympathetic blockade. This mechanism is distinct from other abdominal wall blocks and may explain its clinical advantages.[9,10]

Truncal nerve blocks as part of perioperative pain management were introduced in clinical practice since more than 40 years ago. Quadratus lumborum block (QLB) is an ultrasound-guided posterior abdominal wall block (interfascial plane block).[10,11] A previous study suggested that persistent postoperative pain decreased significantly in a group who received QLB compared to the control group in the first and sixth months after hospital discharge.[12] Furthermore, when directly compared to the more established Transversus Abdominis Plane (TAP) block, research indicates that the QLB provides a longer duration and more effective analgesia. For instance, a study on patients undergoing caesarean section showed that QLB provided superior pain control for up to 72 hours postoperatively, reducing opioid

consumption and improving patient satisfaction. The TAP block, while effective, is generally limited to somatic analgesia of the anterior abdominal wall and has a shorter duration of action, typically not exceeding 24 hours.[13] This case report describes the administration of quadratus lumborum blocks for pain management in patients with cancer pain due to colon carcinoma.

CASE ILLUSTRATION

A 53 years old male patient presented with abdominal pain at the site of abdominal stoma and his back since 3 months ago, the pain felt like being stabbed which radiated to the back. The pain has worsened in the last one month, exacerbated especially when moving, including tilted or sitting position, and this episode of pain occurs continuously. The pain improves after taking pain medication and worsened when patient moves. According to Numerical Rating Scale (NRS), the score of pain was in the range of 7 – 9 out of 10 during episodes of pain while the patient moves and NRS score 5 – 6 at rest. History of medication including *Durogesic* patch, MST 2 x 10 mg, Paracetamol 650 mg, and Amitriptilin 12.5 mg. The patient has an allergy to sulphonamide-class antibiotics, which manifested as hyperpigmented skin lesions. The patient has no history of diabetes mellitus and/or hypertension. However, he has a history of surgery on 2019 and 2021 for stoma insertion and chemotherapy (with leucovorin, Rextra, and SFU regimens) on 2019.

There is no abnormal finding on physical examination. Laboratory examination revealed leucocytosis ($29.54 \times 10^3/mm^3$) and decreased APTT (19.7 / 24.3 seconds). The patient underwent CT scan in 2022 and found a residual mass of the transverse colon accompanied by fat stranding involving the adjacent ileal wall, causing small bowel obstruction, multiple regional lymph nodes (more than 7 in total). Midline peritoneal thickening with suspicion secondary to metastatic processes, multiple calcifications on the transverse colon wall, splenic flexure, bilateral kidney stone with left uretherolithiasis, aortic sclerosis, arteriosclerosis of right common iliac and right internal iliac artery, thoracolumbar spondylosis, bilateral pulmonary basal fibrosis secondary to previous inflammation. This patient was then diagnosed as cancer pain due to colon cancer dan was scheduled to

undergo QLB combined with transabdominal plane block.

The patient was in supine position during quadratus lumborum block, and the abdomen is disinfected from the umbilicus to the lateral. Ultrasound with a high-frequency linear probe is placed on the anterior abdominal wall beside the umbilicus. Using ultrasound, we identify three muscle layers, which are external oblique, internal oblique, and transverse abdominal muscle. Then the probe is shifted to the side reaching the end of the three layers of muscle and continued sideways towards the posterior reaching quadratus lumborum muscle. After we found a quadratus lumborum muscle on the petite triangle area, use 25G in plane *spinocan* needle from the anterior to the posterior abdomen. After confirming that there was no blood in the aspirate, we give ropivacaine 0.375% and methylprednisolone injection 62.5 mg TV 20 cc (Figure 1). These injections are given on both sides of the abdomen in similar procedure. We give ropivacaine 0,375% TV 10 cc for the transabdominal plane block. Significant improvement of abdominal pain was achieved with current NRS of 1-2 and relapse NRS of 2-3, there is no nausea and/or vomiting and the patient could rest well.

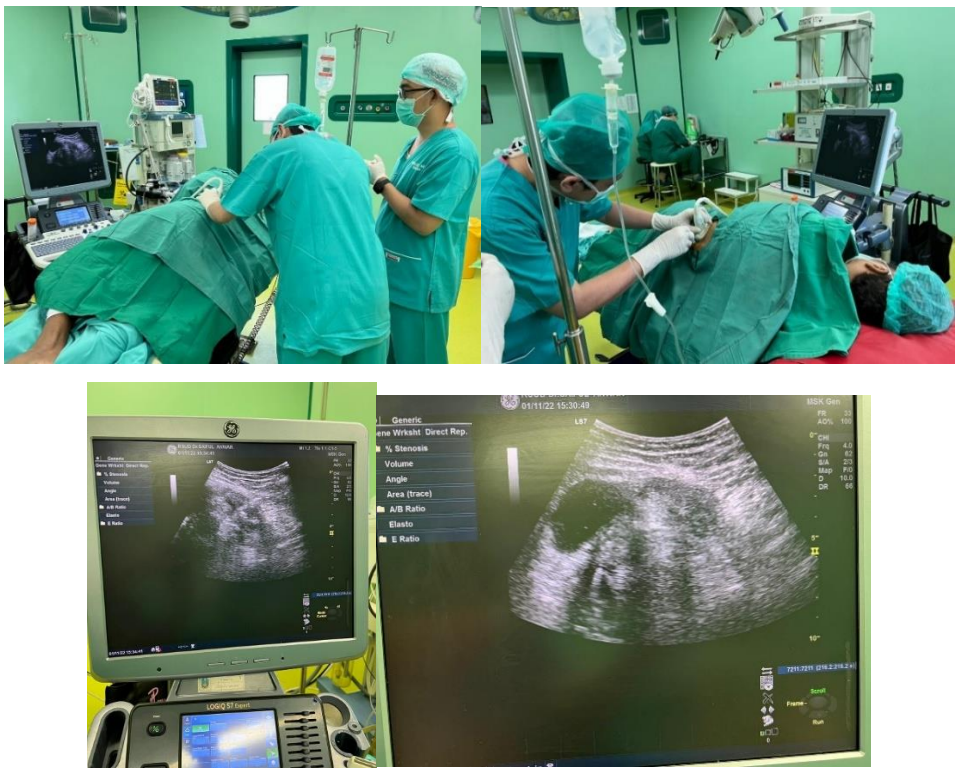

Figure 1. Quadratus Lumborum Block

After procedure, we give ibuprofen infusion 800 mg every 8 hours for 30 minutes and paracetamol infusion 750 mg every 6 hours. Three hours after the procedure, the patient can sit on the bed, and 8 hours after surgery, the patient was admitted back to the ward. Postoperative pain observation findings according to the numerical rating scale (NRS) and vital signs are presented in Table 1

Tabel 1. Results of postoperative pain observations.

	NRS		Vital signs		
Hours	**Rest**	**Move**	**Blood pressure**	**Pulse rate**	**Respiratory rate**
0	0/10	0/10	100/70	74	18
4	0/10	0/10	100/65	82	16
8	0/10	1/10	110/75	78	20
12	1/10	1/10	120/70	80	18
24	2/10	2/10	120/80	82	18

DISCUSSION

This case demonstrates the successful management of complex cancer-related pain in a colon cancer patient through a synergistic combination of a Quadratus Lumborum Block (QLB) and a Transversus Abdominis Plane (TAP) block. The patient's presentation, featuring sharp, movement-exacerbated pain at the stoma site and radiating to the back, indicated a mixed pain etiology, likely involving somatic, visceral, and neuropathic components. The significant reduction in NRS scores from 5-9/10 pre-procedure to 1-3/10 post-procedure underscores the efficacy of this combined regional anesthesia approach

Ultrasound-guided transversus abdominis plane (TAP) block has become a common analgesic method after surgical procedures involving abdominal wall. Because TAP blockade is limited to somatic anesthesia in abdominal wall and relies heavily on interfascial spread, various new approaches have been proposed to enhance analgesia, both as an adjuvant to TAP block or as a single modality.[4] Specifically, variants of quadratus

lumborum block (QLB) have been proposed as more consistent methods aiming to achieve both somatic and visceral abdominal analgesia. Current evidence, especially case reports, suggests that different QLB variants have different analgesic effects and mechanisms of action, although this has not been formally validated. In particular, transmuscular QLB or also mentioned as QLB2 may provide a more extensive and longer sensory block compared to TAP block (T4-L1 in QL block vs. T6-T12 in TAP block).[14,15]

The results of this case report indicate a minimal pain response after quadratus lumborum (QLB) nerve block. Previous study stated that QLB has an excellent analgesic effect in reducing pain up to 1-2/10 based on the visual analogue scale (VAS) or numerical rating scale (NRS). Patients receiving QLB as part of postoperative pain therapy had lower pain levels both at rest and on movement, which is crucial for early mobilization.[7] The analgesic effect is comparable with opioids, without unwanted opioid effects such as nausea and vomiting. Quadratus lumborum block provides a rapid and pain-free outcome in most patients, allowing early ambulation, which is one of the most important steps in the prevention of deep vein thrombosis and thromboembolic complications.[10,16]

The rationale for employing a dual-block technique, rather than either block in isolation, is rooted in their distinct but complementary mechanisms of action. The QLB, particularly the posterior (QLB2) approach used in this case, is theorized to provide extensive cranio-caudal spread of local anesthetic. By depositing the solution in the vicinity of the quadratus lumborum muscle, the anesthetic can potentially diffuse to the thoracolumbar fascia and the paravertebral space, achieving not only somatic analgesia of the abdominal wall but also significant visceral analgesia and a sympathetic blockade. This makes it particularly effective for deep, visceral, and referred back pain, which were key features of this patient's complaint

Another study by Wang et al., 2021 showed that quadratus lumborum posterior block significantly increased postoperative analgesia, reducing opioid consumption, and accelerating postoperative patient recovery after open radical colon cancer surgery. In previous study, posterior quadratus lumborum block was associated with lower

postoperative pain scores and reduce the need for postoperative opioids after open radical colon surgery in patients who received QLB in combination with general anesthesia.[17] Successful use of quadratus lumborum blocks with all approaches has been published in case reports has been published in case reports for the following surgical procedures: proctosigmoidectomy, hip surgery, amputation above the knee, abdominal hernia repair, breast reconstruction, colostomy closure, radical nephrectomy, lower extremity vascular surgery, arthroplasty total hip, laparotomy, and colectomy. An additional mechanism of local anesthetic action is related to the presence of a thick network of sympathetic nerves in the thoracolumbar fascia (TLF). There is are mechanoreceptors that play a role in acute and chronic pain in the TLF.[18]

The majority of QL block indications are based on case reports and clinical experience. There has been no study that compares the safety and efficacy between the three types of QL block. Various QL blocks have similar indications as the TAP blocks, for example: colon resection, open/laparoscopic appendectomy, and cholecystectomy; caesarean section, total abdominal hysterectomy; open prostatectomy, kidney transplant surgery, nephrectomy, abdominoplasty, iliac crest bone graft; ileostomy; exploratory laparotomy, bilateral block for midline incision.[19,20]

TAP block, as well as TQL and QLB1 blocks are “tissue plane” blocks, therefore require large volumes of local anesthetic to achieve satisfactory block. A minimum volume of 15 mL is recommended for every TAP block.[4] The dose of local anesthetic needs to be considered according to the patient size to ensure that the maximum safe dose is not exceeded, especially with bilateral double TAP blocks. The QL region is relatively as the lumbar artery lies posterior to the muscle. The absorption of local anesthetics into the circulation depends primarily on the vascularity of the site of deposition. Because the QL muscle is well vascularized and requires large amounts of local anesthetic, the dosage must be calculated accurately to prevent high peak plasma concentrations of local anesthetic in this type of block.[4,21]

Despite the advantages, QLB has several complications and contraindications. Absolute contraindications to QLB are local

infection, allergy to local anesthetics, and bleeding diathesis associated with other nerve blocks.[4,21] Relative contraindications include anatomic abnormalities, hemodynamic instability, and known neurological disorders. Complications of QLB include prolonged motor block and lower extremity weakness. There is one study reported the incidence of hypotension after administration of QLB.[22]

CONSLUSION

Pain management using QLB method may reduce acute and chronic pain and promotes postoperative recovery. Further study with larger population is warranted to explore the efficacy and effectiveness of QLB block.

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