

Thoracolumbar Interfascial Plane Block Provided Hemodynamic Stability and Effective Analgesia in Multilevel Posterior Lumbar Decompression and Stabilization Procedures: A Case Series

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Keywords:

Posterior Lumbar Decompression and Stabilization; pain management; perioperative analgesia; Thoracolumbar Interfascial Plane Block; TLIP block

ABSTRACT

The posterior lumbar decompression and stabilization procedures often were related to severe postoperative pain due to intraoperative spinal muscles, ligaments, and bones tissue trauma and retraction. Severe perioperative pain can trigger unexpected sympathetic responses, increase perioperative morbidity and mortality, prevent early mobilization and rehabilitation, and delay the recovery process. Ultrasound-guided Thoracolumbar Interfascial Plane Block (TLIP) is an interfascial plane block that can provide adequate analgesia during spine surgery. We report 3 cases of posterior decompression and stabilization procedures who had multi-segmental lumbar TLIP block for perioperative analgesia. Despite good postoperative analgesia, we found that TLIP block could effectively provide intraoperative haemodynamic stability with low intraoperative opioid consumption without any complications found.



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1. INTRODUCTION

Spine surgery often resulted in severe postoperative pain, especially in the first days after surgery. Postoperative pain intensity is directly correlated to the number of vertebrae involved during surgery [1]. Posterior decompression and stabilization is a surgical procedure performed to revise spinal instability and deformity; by immobilizing the spine with pedicle screw and rod fixation [2]. Hence, there is extensive dissection of the spinal muscles, ligaments, bones, and tissue retraction at the surgical incision site, which may trigger severe perioperative pain [1], [3], [4]. Good perioperative pain management on posterior lumbar decompression and stabilization procedure is a requisite since it can promote the healing process, prevent excessive sympathetic response, provide early mobilization, and decrease chronic pain incidence.

Thoracolumbar interfascial plane (TLIP) block is a recent regional anesthetic technique performed by injecting local anesthetic solution into the interfascial space between m. Multifidus and m. Longissimus in the lumbar region inhibits the dorsal ramus of the thoracolumbar nerve that runs through the paraspinal muscles [5- 8]. We report 3 cases of posterior decompression and stabilization procedures with multi-

segmental lumbar TLIP block with good perioperative analgesia, stable intraoperative haemodynamic variable, and low intraoperative opioid consumption.

2. Case Presentation

2.1 Case 1

L, 24 years old, underwent decompression and posterior stabilization procedure of 4 lumbar segments L2-L5. Bilateral ultrasound-guided TLIP block was performed in the prone position after induction of general anesthesia at the L-3 level. The high-frequency linear probe (GE, Logic e 12 MHz) ultrasound was used as a guide in identifying m. Multifidus and m. Longissimus is at L-3 height (Figure 1). Injection of local anesthetic Bupivacaine 0.25% 20 ml on each side was performed into the fascia plane between m. Multifidus and m. Longissimus. The surgery was started 20 minutes after. Data regarding vital signs, i.e., blood pressure and pulse rate before the block, during the incision, and intraoperatively can be seen in Table.1. The surgery ended after 360 min. During surgery, there wasn't any fentanyl dose needed. At the end of the surgery, the patient was given intravenous Paracetamol 1g. Postoperative pain was managed by giving Paracetamol 1g/8 hours and PCA morphine. We got good postoperative analgesia, which could be seen from low morphine consumption and numerical rating pain scale at 1, 6, 12, and 24 hours postoperatively. There was no TLIP block complication found.

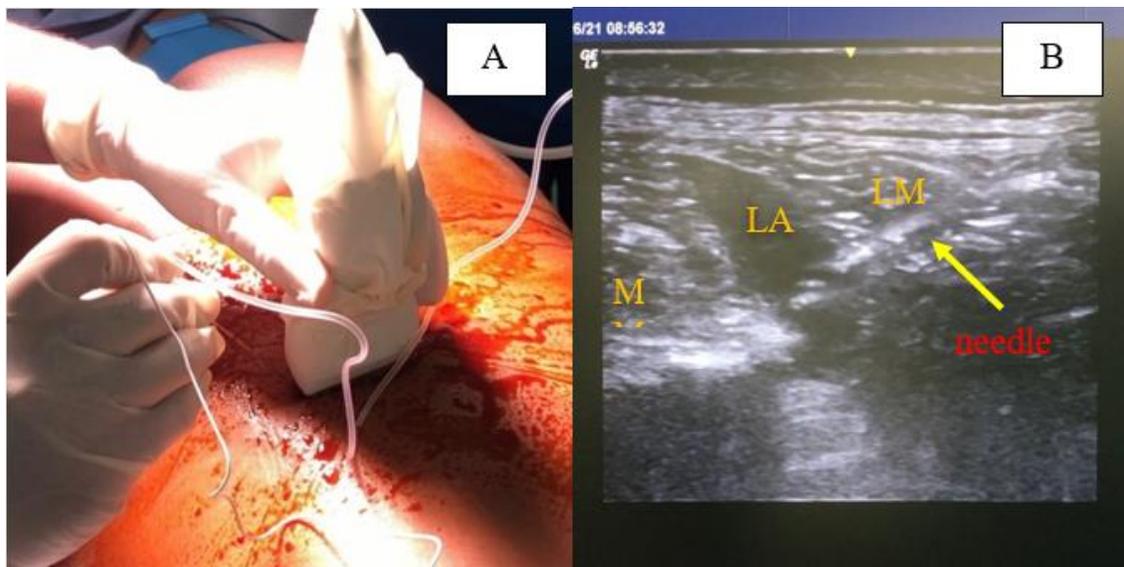


Figure 1A. the position when the TLIP block is performed. 1B shows the spread of local anesthetic in the fascia between m. multifidus and m. longissimus. MM: m. multifidus; LM; m. longissimus

2.2 Case 2

W, 52 years old, underwent a posterior stabilization and decompression procedure of 2 lumbar segments, L4-L5. We performed bilateral ultrasound-guided TLIP block after general anesthesia induction while the patient was in the prone position. We injected 20 ml Bupivacaine 0.25% into the interfascia plane between m. Multifidus and m. Longissimus on each side. Twenty minutes after the TLIP block, the surgery was started. Anesthesia went uneventful during 300 minutes of surgical duration, without any additional fentanyl required intraoperatively. The patient's hemodynamics was stable throughout the surgery. We got good 24 hours postoperative analgesia, with paracetamol 1 g/8h and PCA morphine 5 mg/ 24 h. The first PCA dose was needed 980 minutes postoperatively.

2.3 Case 3

W, 40 years old, underwent posterior lumbar decompression and stabilization procedure of 2 lumbar segments, L4-L5, with a surgical duration of 270 minutes. We performed bilateral ultrasound-guided TLIP block after general anesthesia induction while the patient was prone. Twenty milliliters Bupivacaine 0.25% was injected into the interfascia plane between m. Multifidus and m. Longissimus on each side. The surgery was started twenty minutes after. During the surgery, there was no intraoperative additional fentanyl dose needed. Patient's haemodynamic was stable throughout the surgery, and the anesthesia went uneventful. Time of first pressing PCA button at 960 min postoperatively, with total morphine consumption in the first 24 hours was only 2 mg. We didn't find any complications of TLIP block.

Comparison of NRS and 24-hour morphine consumption can be seen in Table 1, which shows a low NRS value 24 hours after surgery. All patients had low NRS and 24-hour morphine consumption postoperatively.

Table 1. Pain Scale and 24-hour Morphine Consumption

	Case 1	Case 2	Case 3
Surgery duration (minutes)	360	300	270
Number of Lumbar Segment operated	4	2	2
Intraoperative Fentanyl (mcg)	0	0	0
First Pressing PCA Button (minutes)	955	980	960
Total 24 h Morphine Consumption (mg)	3	5	2
NRS 1 h	1	1	0
NRS 6 h	2	3	2
NRS 12 h	2	2	2
NRS 24 h	3	2	2

The intraoperative hemodynamic data of the three cases can be seen in Table.3. All patients had stable haemodynamic. There wasn't any significant increase in intraoperative blood pressure, and pulse rate found indicating inadequate intraoperative analgesia. (Table 2).

Table 2. Intraoperative Hemodynamic

	Case 1	Case 2	Case 3
BP			
- Pre-block	125/70	100/64	116/85
- 15 minutes post block	100/76	98/71	101/75
- Incision	102/77	110/80	93/71
- 15 minutes post incision	94/75	99/60	98/77
HR			
- Pre block	70	58	100
- 15 minutes post block	57	58	60
- Incision	60	65	61

- 15 minutes post incision	56	67	65
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3. Discussion

Thoracolumbar interfascial plane (TLIP) block is a regional anesthetic technique recently introduced by [9]. TLIP block is performed by injecting a local anesthetic into the interfascial space between m. Multifidus and m. Longissimus in the lumbar region aims the dorsal ramus of the thoracolumbar nerve that runs through the paraspinal muscles and provides analgesia providing anesthesia to the lower back [10]. This case series report found that ultrasound-guided bilateral TLIP block provided good intraoperative analgesia, which can be identified from the hemodynamic stability and no additional fentanyl consumption throughout the anesthesia. All of the cases presented here were complex spine surgery, defined as spine surgery with instrumentation, laminectomy at three or more levels, or scoliosis surgery [11]. Posterior lumbar decompression and stabilization procedure will involve instrumentation to immobilize the spine with pedicle screw and rod fixation. Complex spine surgery is associated with significant postoperative pain [11].

The effectiveness of the TLIP block in stabilizing intraoperative hemodynamics and as perioperative analgesia is due to its ability to block nerve conduction on the spinal nerve dorsal ramus, which innervated lumbar structure. Dorsal ramus is associated also with sympathetic and parasympathetic innervation [4]. Had shown it before in their cadaveric study in which color additives local anesthetics could spread to the dorsal ramus of the lumbar nerves [7].

It is crucial for an anesthesiologist to provide haemodynamic stability in spine surgery, such as posterior lumbar decompression and stabilization procedures. Haemodynamic stability can significantly reduce blood loss and enable better surgical field on spine surgery. Haemodynamic stability is also related to rapid recovery for early postoperative neurologic assessment and complications management [12]. Hence, anesthesia on spine surgery must elaborate several techniques for allowing haemodynamic stability. In this case series, TLIP block is one modality that might significantly reduce intraoperative pain and provide better haemodynamic stability.

Adding TLIP block in anesthesia for spine surgery resulted in low intraoperative opioid consumption. High intraoperative opioid consumption is related to delayed postoperative emergence or delirium, postoperative nausea, vomiting, pruritus, urinary retention, respiratory depression, and the potential for developing acute tolerance or opioid-induced hyperalgesia [13- 16]. Adding TLIP block to general anesthesia in spine surgery might reduce complication rate due to high intraoperative opioid consumption.

TLIP block also provided extended lasting postoperative analgesia, which was identified from the average of time to first opioid requirement in all 3 cases was 16 hours postoperatively (Table 1). The long duration of analgesic effect in TLIP block might be due to the slow local anesthetics absorption rate from the injection site in the fascia. The low postoperative pain scale in the first 24h postoperative was in line with the low postoperative morphine consumption. There were no complications related to the use of TLIP blocks or local anesthetics in these three patients. A previous study by found that the TLIP block was safe and effective as postoperative lumbar discectomy analgesia [6].

4. Conclusion

TLIP blocks effectively reduce perioperative pain and 24-hour morphine requirements, resulting in intraoperative hemodynamic stability.

5. References

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