

Thoracolumbar Interfascial Plane Block Vs Caudal Epidural for Post-Operative Analgesia in Spine Surgeries: A Comparative StudyNikitha Somanayak¹, Adharsh Shivanna², Deeksha R Malkhedkar³, Sandhya. K⁴¹MBBS, MD, BMCRI, Bangalore²MBBS, MD, BMCRI, Bangalore³MMBS, MD, BMCRI, Bangalore⁴MBBS, MD, Professor, Department of Anaesthesia, BMCRI, Bangalore

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Abstract:**Introduction:** Caudal epidural is one of the established techniques for post-operative analgesia whereas thoracolumbar interfascial plane block (TLIP) is a new technique which is still evolving and is, yet to prove its efficacy in terms of post-operative analgesia.**Methods:** Sixty patients aged between 18-75 years, belonging to ASA (American Society of Anaesthesiologists) I and II scheduled for elective lumbar spine surgeries under general anaesthesia were enrolled and randomly allocated into two groups of 30 each, group 1 received GA + TLIP block and group 2 received GA (General anaesthesia) + caudal epidural using 0.2% ropivacaine.**Results:** There was significant difference in the mean heart rate between two groups from 30 mins to post-operative 1 hr and at 12 and 24hrs post op. There was significant difference in MAP (mean arterial pressure) between two groups at 30 min intra operative period and immediately post-operative period to 24hrs, and there was significant difference in VAS (Visual analog scale) score from 2 hrs to 6 hrs and at 24hrs implying caudal epidural has better analgesia than TLIP block. Meantime of rescue analgesia in TLIP group was 13.76 hrs and caudal epidural group was 16 hrs.**Conclusion:** Caudal epidural has a better analgesic effect when compared to TLIP block. However, TLIP is a good adjunct with GA for post-operative analgesia in patients undergoing lumbar spine surgeries with less VAS score in the first 24 hrs.**Keywords:** Spine Surgeries, Post-Operative Pain, TLIP Block, Caudal Epidura.

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Introduction

Spine surgeries are often associated with intense pain which produces detrimental effects on patient's recovery and outcome. Optimization of perioperative analgesia may decrease complications and facilitate early ambulation during the immediate postoperative period and quick discharge of the patient. [1]

To provide adequate analgesia in the post-operative period many regional techniques are evolving. By using these blocks, we can reduce the use of opioid in the intra operative and post-operative period. Caudal epidural is one of the established techniques for post-operative analgesia. Many studies have proved that caudal epidural provides adequate analgesia in post-operative period following lumbosacral surgeries.

Caudal epidural is associated with side effects like accidental injury to nerves, accidental injection of drug to subarachnoid space, post-operative nausea and vomiting, change in hemodynamic status of

patient in intraoperative period and post-operative period [2], urinary retention in post-operative period [2]. Caudal epidural is technically difficult or not feasible in cases of spondylolisthesis and spinal canal stenosis when fascial plane blocks can become a good alternative. Thoracolumbar interfascial plane block, at L3 level is assumed to block the dorsal rami thoracolumbar nerves [3] which is beneficial in spine surgeries. In contrast to caudal epidural, thoracolumbar interfascial plane block (TLIP) is still evolving and not much studies have been done yet to prove its efficacy in terms of post-operative analgesia. Ropivacaine is a long acting, amide local anaesthetic agent. It is less lipophilic and hence there will be less penetration of the drug into large myelinated motor fibers resulting in less motor blockade. It is less cardiac and central nervous system toxic with similar duration of action [10]. Thoracolumbar interfascial plane block being more superficial, the chances of adverse effects like nausea; vomiting and urinary

retention associated with the caudal epidural might be less likely to occur. Hence, we designed a study to compare the analgesic efficacy of Thoracolumbar Interfascial plane block as compared to caudal epidural block after lumbar spine surgeries with 0.2% ropivacaine.

Objectives of the study

To study the post-operative analgesic efficacy of thoracolumbar interfascial plane block as compared to caudal epidural following spine surgery using VAS score. To compare the time to first analgesic. To compare the hemodynamic profile following TLIP Block and Caudal epidural block. To compare the side effects associated with TLIP block and Caudal epidural block

Methodology:

A. Study design: Prospective randomized control study

B. Study period: 1.5 years (Nov 2019- May 2021)

C. Place of study: Patients undergoing elective spine surgeries under general anaesthesia in hospitals attached to Bangalore medical college and research institute.

D. Sample size: 30 in each group, based on pilot study with Group 1 as TLIP Block and Group 2 as caudal epidural VAS score in Group 1 and Group 2 at 24hrs was 6.4+/- 2.19 and 5.2+/- 1.1.

The study was done in hospitals attached to Bangalore medical college and research institute. After obtaining due clearance from the ethical committee and obtaining informed written, patients fulfilling the inclusion criteria were enrolled for the study.

A proforma was used to collect the data which included patient's demographic parameters, indication for surgery, the anaesthetic details, intra operative and post-operative monitoring.

Anaesthetic procedure: Intravenous access was secured, and iv infusion of normal saline was started. Monitors were connected and vitals like heart rate, non-invasive blood pressure, mean arterial pressure and oxygen saturation were noted.

Patient was Premedicated with inj fentanyl 2mcg/kg given iv, inj Glycopyrrolate 0.004mg/kg Preoxygenation was done for 3 min with 100% O₂ at 6L/min Patient was then induced with inj propofol 2mg/kg and sevoflurane 2% Relaxant inj vecuronium 0.1mg/kg given and intubation done with appropriate size Endotracheal tube. After confirmation of bilateral equal air entry tube was fixed. Patient was then put in prone position.

Thoracolumbar lumbar interfascial plane block

With patient in prone position monitors were connected and vitals were noted. The parts were painted and draped. Under asepsis and under USG guidance probe was placed at L3 level in the midline and the vertebrae and transverse process were identified. Probe was moved from medial to lateral to identify multifidus muscle and longissimus muscle. At the interface between MF and LG block was given with inj Ropivacaine 0.2% 20 cc on each side using 23G spinal needle quincke type while intermittently repeated negative aspiration for blood was done. Spread of the drug was confirmed.

Caudal epidural

With patient in prone position under asepsis, using 20 G IV cannula caudal epidural space was identified using loss of resistance technique and block given with inj Ropivacaine 0.2% 25cc after negative aspiration for blood and CSF. Intraoperative vitals like heart rate and mean arterial pressure were noted in both type of blocks at 0,5,10,15,30,60 min. Intraoperatively patients of both the groups received Inj Paracetamol 1g IV which was continued eight hourly for the first 24 hours post-operatively Rescue analgesic used was inj fentanyl 1mcg/kg

Assessment tools: In the post-operative period

- Patient was assessed for pain at 0hr, 1hr, 2hr, 6th hr, 12hr and 24 hr
- Scales: pain was assessed using VAS(Visual Analog Scale)scoring

Outcome measures

Efficacy parameters

1. Pain (VAS Score)
2. Post-operative nausea and vomiting

Safety and tolerability parameters

1. Hemodynamical changes
2. Neurological injuries

Inclusion Criteria:

- Patients who gave written /informed consent.
- Patients aged 18-75 years of both genders.
- Patients scheduled for elective Lumbar spine surgeries under general anaesthesia.
- Patients with ASA-1 and ASA-2.

Exclusion Criteria:

- Patient who did not give informed consent
- Patients with ASA-3 and ASA-4.
- Pregnant women.
- Patients with known allergy to study drugs.

Statistical Analysis: Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and

proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation.

Independent t test was used as test of significance to identify the mean difference between two quantitative variables and qualitative variables respectively.

Graphical representation of data: MS Excel and MS word were used to obtain various types of graphs such as bar diagram and line diagram. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests. Statistical software: MS Excel, SPSS version 22 (IBM SPSS

Statistics, Somers NY, USA) was used to analyze data.

Results

Mean age in TLIP Group was 47.2 ± 10.56 and in Caudal Block Group was 47.9 ± 6.39.

There was no significant difference in Mean Age Comparison between two groups. In TLIP Group, 53.33% had Discectomy and 46.67% had Laminectomy.

In Caudal Block Group, 40.00% had Discectomy and 60.00% had Laminectomy, there was no significant difference in type of Surgery between two groups.

Table 1: Mean VAS Score Comparison between two groups at different intervals of time

VAS Score	Group				p value
	TLIP		Caudal Block		
	Mean	SD	Mean	SD	
Immediately post op	0.27	0.87	0	0	0.098
1 hour	0.2	0.81	0	0	0.179
2 hours	0.67	1.42	0	0	0.013*
6 hours	1.23	1.55	0.37	1	0.013*
12 hours	1.7	1.9	1.37	1.4	0.442
24 hours	2.63	1.75	1.9	0.96	0.049*

There was a significant difference in VAS score comparison between two groups from 2 hours to 6 hours and at 24 hours and at other intervals there was no significant difference.

Table 2: Comparison of Mean Time of rescue analgesia in hours between two groups

Time of rescue analgesia in hours	Group				p value
	TLIP		Caudal Block		
	Mean	SD	Mean	SD	
Time of rescue analgesia in hours	13.76	8.99	16	7.39	0.47

Mean Time of Rescue Analgesia in TLIP Group was 13.76 ± 8.99 and in Caudal Block Group was 16 ± 7.39. There was no significant difference in Comparison of Mean Time of Rescue Analgesia between two groups.

Table 3: Nausea, Vomiting and Pruritis distribution between two groups

		Group			
		TLIP		Caudal Block	
		Count	Column N %	Count	Column N %
Nausea	No	30	100.00%	30	100.00%
Vomiting	No	30	100.00%	30	100.00%
Pruritis	No	30	100.00%	30	100.00%

There was no significant difference in Nausea, Vomiting and Pruritis distribution between two groups

Discussion

Pain is thought to be inadequately treated in one half of all surgical procedures. Regional techniques may help to alleviate postoperative pain and reduce systemic analgesic requirement. Animal experiments have demonstrated the benefits of preventing central sensitization by infiltrating with local anesthetics an approach that was particularly effective with pain associated with differentiation, as might occur with amputation. This led to the concept of pre-emptive analgesia that is initiating an analgesic regimen before the onset of the

noxious stimulus to prevent central sensitization and limit the subsequent pain experience. Patients undergoing lumbar spine surgeries with or without posterior instrumentation experience severe pain in the postoperative period, which may increase the incidence of postoperative morbidity and complications. Adequate pain relief hastens rehabilitation, and the incidence of chronic pain is decreased. In addition to the systemic analgesics, peripheral nerve blocks, central neuraxial block like subarachnoid, epidural block can be used for the management of post-operative pain. Ultrasound guided TLIP block has been recently described in several studies for acute pain management in the post-operative period after lumbar spine surgery.

In our study we have used 0.2% Ropivacaine 20ml on each side in TLIP block and 25ml in caudal epidural as pre-emptive analgesic 30 min prior to the initiation of surgery. In this study we compared the analgesic efficacy of an US-guided TLIP block with caudal epidural for postoperative analgesic management after lumbar spine surgery.

VAS Score

Mean VAS score in patients was 0.27,0.2,0.67,1.23,1.7 and 2.63 in TLIP group and 0,0,0.37,1.37 and 1.9 in Caudal group at immediately post op, 1 hr, 2 hrs, 6 hrs, 12hrs and 24 hrs respectively. P value was clinically significant at 2, 6 and 24 hrs between two groups. There was no clinically significant difference in the P value at 12 hrs because of rescue analgesic when VAS was > 3. Even though there was significant difference in the VAS score between 2 groups, the mean VAS at all the intervals were always less than 4 in TLIP group, implying TLIP block provides post-operative analgesia following spine surgery. .

A retrospective study done by Ueshima H et al [5] showed that TLIP block provides analgesia for first 24hrs with clinically significant VAS score of p value <0.05 when compared to group which did not receive any block. Ekinci M et [6] conducted a comparative study, wherein VAS at 0 hr (1.30+/-1.39), 2nd hr (0.93+/-1.04), 4th hr (0.97+/-0.96), and 8th hr (1.20+/-0.88) was significantly low in TLIP block when compared to the control group of wound infiltration. Ciftci B et [7] conducted a randomized controlled study and VAS score was significantly low 2,2,1,1,1 at PACU, 2nd hr, 4th hr, 8th hr and 16th hr in mTLIP block group when compared to no block group and no clinically significant difference noted with the VAS score of erector spinae block. A randomized study conducted by Eltahir et al [8] showed that the Numerical pain rating was statistically significant in TLIP block group at 2hr, 4hr, 6hr,12hr and 24hrs with a mean value of 3.40, 3.67, 3.87, 3.20,2.73 respectively when compared to control group with no block Ahiskalioglu et al [9] studied the analgesic effect of ultrasound guided modified TLIP block for post-operative pain following spine surgery and found that higher post-operative analgesic requirement in the control group compared to modified TLIP block and intraoperative fentanyl requirement was also reduced when compared to control group.

Time of rescue analgesia

In our study the mean time of rescue analgesia is 13.76hrs in TLIP block and 16hrs in caudal epidural which was statistically insignificant. In a study conducted by In a study conducted by Ekinci M et al [6], 15 out of 15 patient in the control group received rescue analgesia within 24 hrs whereas 7 out of 23 patients received rescue analgesia in TLIP

block group, and it was statistically significant(p value <0.05).

In study conducted by Eltahir [8], mean consumption of morphine in block group was 5.13mg/24hrs and in control group it was 14.33 mg/24hrs with p value 0.0001 which is significant statistically.

Chen et al [10] found reduced consumption of post-operative PCA sufentanil for patients undergoing lumbar spine surgery in TLIP group when compared to control group, which also correlates with the study findings of Ozmen et al [11] which showed less consumption of PCA fentanyl consumption for 24 hrs Ke et al [12] conducted a study on patients undergoing lumbar spine fusion surgery and found that intraoperative remifentanyl consumption was found to be less in the TLIP group than in the control group.

Hemodynamic parameters

In our study there was significant difference mean heart rate between two groups from 30 min intraoperative period to post-operative duration of 1hr and at 12hrs and 24hrs post-operative period and there was significant difference in the mean arterial pressure between two groups immediately after block to 30 minutes intraoperatively and from immediately post op to 24 hrs post op implying more hemodynamic changes in the caudal group compared to TLIP block.

Adverse effects

In our study we did not notice any adverse effects like nausea, vomiting, urinary retention and pruritis in both the groups. In a study conducted by A. Saoud et al, [15] there were no complications specific to the procedure, except for the development of transient urinary retention.

Limitations

The limitations of the study were that the time required for performing TLIP block is more when compared to caudal epidural and needs expertise to conduct TLIP block. Ideal volume and concentration of anesthetic drug required for the effective block is not known and yet to be standardized.

Conclusion

Caudal epidural block with GA is a better mode of analgesia in the post-operative period for patients undergoing spine surgeries than TLIP block. However, TLIP block can be considered as a good adjuvant with GA for post-operative analgesia in patients undergoing spine surgeries where caudal epidural cannot be performed, as TLIP block provides adequate analgesia for first 24hrs.

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