Section: Anaesthesiology

Original Research Article

ULTRASOUND GUIDED FEMORO SCIATIC NERVE BLOCK FOR POST-OPERATIVE ANALGESIA AFTER BELOW KNEE SURGERIES UNDER SPINAL ANAESTHESIA

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ABSTRACT

Background: Post-operative pain management in lower limb surgeries is critical for early mobilization and preventing chronic pain. While spinal anesthesia (SA) is the gold standard for the surgical procedure, it lacks long-term post-operative analgesia. **Objectives:** To evaluate the efficacy of ultrasound-guided femoro-sciatic nerve block (FSNB) in reducing post-operative pain scores and total analgesic consumption in the first 24 hours. **Materials and Methods:** A descriptive cross-sectional study of 60 patients (ASA I & II) undergoing below-knee surgeries. Group A (n=30) received USG-guided FSNB with 0.25% Bupivacaine after SA regression to T10. Group B (n=30) received no block.
Results: Group A demonstrated significantly lower Numerical Rating Scale (NRS) scores and a prolonged interval before the first rescue analgesia compared to Group B.
Conclusion: USG-guided FSNB is a safe and effective adjunct for prolonged post-operative analgesia.
Keywords:femoro-sciatic nerve block, spinal anaesthesia, below knee surgeries

INTRODUCTION

In patients undergoing below knee surgeries, unrelieved post-operative pain leads to discomfort and predisposes to the development of chronic pain syndromes.[1] Regional anesthetic methods have benefits over general anesthesia like providing excellent pain control, with less adverse effects and reduced duration of stay in the post-anesthesia care unit.[2] Effective post-operative analgesia in below-knee surgeries facilitates early physiotherapy, reduces thromboembolism risk, and decreases hospital stay duration.[3] Traditional methods like spinal anesthesia provide excellent surgical conditions but are often associated with hemodynamic changes and a rapid return of pain once the block wears off.[4]
The Femoro-Sciatic Nerve Block (FSNB) targets the primary sensory innervation of the lower leg. The integration of Ultrasound (USG) guidance has revolutionized this technique by allowing real-time visualization of nerve structures and local anesthetic spread, thereby increasing success rates and reducing complications like local anesthetic systemic toxicity (LAST).[5,6] This study aims to quantify the clinical benefits of USG-guided FSNB in a tertiary care setting.

MATERIALS AND METHODS

Study Design and Ethics: The current study was conducted in the Department of Anesthesiology, NRI Medical college and General Hospital, Andhra Pradesh, India for a period of 18 months. This is a cross-sectional study conducted from May 2023 to November 2024.Informed consent was obtained from all 60 participants.
Inclusion/Exclusion Criteria: Patients aged 20–60 years, ASA I or II, scheduled for below-knee surgery under spinal anesthesia were included. Patients with

neuropathy, local infections at the puncture site, or known hypersensitivity to local anesthetics were excluded.

Anesthetic Procedure: Surgical Phase: All patients received a subarachnoid block (SAB) with 15 mg of 0.5% heavy bupivacaine at the L3-L4 level. Block Phase (Group A): Once the spinal level regressed to T10, patients received: Femoral Nerve Block: 20 mL of 0.25% bupivacaine using an in-plane approach lateral to the femoral artery. Popliteal Sciatic Nerve Block: 20 mL of 0.25% bupivacaine injected at the division of the tibial and common peroneal nerves. Monitoring: NRS scores were assessed at 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 hours. Rescue Analgesia: Breakthrough pain (NRS >4) was managed with intravenous Diclofenac (75 mg) or Tramadol (2 mg/kg).

Primary objective was to compare the post-operative pain score (numerical rating scale) among 60 post operative. below knee surgery cases. Secondary objectives were to compare the time interval until dose of rescue analgesia, to compare the total analgesic requirement in the first 24 hours and to compare the sedation scores.

RESULTS

Data analysis was performed using Microsoft Excel and the free version of Epi Info software (version 7.2.6). A p-value of less than 0.05 was considered statistically significant. Frequencies and percentages were reported, and means along with standard deviations (SD) were used to summarize the data..T-tests were conducted to compare numerical data between two groups, and Chi-square tests were used for comparing categorical data between two groups.

Table 1: Demographic Data

		GROUP A (30)		GROUP B (30)		p value
		Mean	SD	Mean	SD	
AGE(years)		38.50	9.02	40.3667	11.4394	0.4857
BMI		24.2000	2.0745	24.4667	2.2397	0.6341
DURATION OF SURGERY (min)		93.0667	16.5861	93.7000	14.8211	0.8766
ASA STATUS	I	19		25		0.0798
	II	11		5		

Demographical data included age and BMI of patients. ASA status and duration of surgery was compared between both the groups. There was no significant difference in all these parameters in both the groups. Mean time interval between the administration of spinal anaesthesia and performance of block after spinal level regressed to T10 was 99 minutes among group A patients.

Immediately post-surgery, NRS scores were low in both groups due to the residual effects of spinal anesthesia. A significant divergence in pain intensity occurred as spinal anesthesia regressed. In Group B (Control), mean NRS scores rose sharply, peaking at 6.8 ± 1.2 by hour 10. In contrast, Group A (Block) maintained significantly lower scores, remaining below 2.4 ± 0.8 during the same period. While scores in Group A gradually increased as the bupivacaine block wore off, they remained consistently lower than Group B's throughout the 24-hour window

Table 2: Post-operative NRS scores at different time intervals

Time Interval (Hours)	Group A (Block) Mean NRS	Group B (Control) Mean NRS	P-Value
0 (Baseline)	0.2	0.2	-
2	0.4	0.6	>0.05
4	0.8	1.5	<0.05
6	1.2	3.8	<0.01
8	1.8	5.2	<0.01
10	2.4	6.8	<0.01
12	2.6	6.4	<0.01
14	2.8	5.8	<0.01
16	3.1	5.2	<0.01
18	3.4	4.8	<0.01
20	3.6	4.5	<0.05
22	3.8	4.2	>0.05
24	4.0	4.0	>0.05

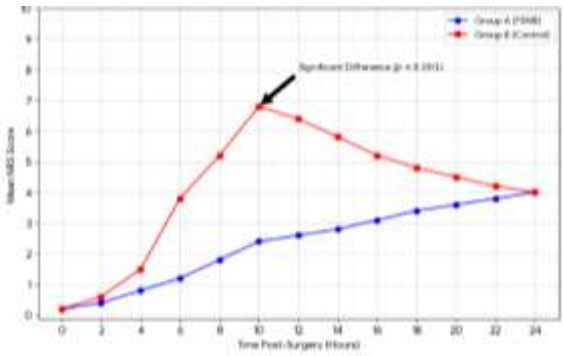

Figure 1: Mean NRS scores over 24 hours

The Time to first rescue analgesia was drastically prolonged in Group A (724±48 minutes) compared to Group B (186±22 minutes). Furthermore, the total cumulative dose of Diclofenac in the first 24 hours was significantly lower in the block group (mean 1.1 doses vs. 2.0 doses in control). Similarly, Tramadol requirement for breakthrough pain was utilized in 63% of Group B patients compared to only 10% in Group A.

There is no significant difference in side effects like nausea and vomiting in between two groups of patients. Overall nausea vomiting were seen among 10 patients. Among them 5 belonged to group A and 5 belonged to group B of patients in this study.

There is significant difference in mean sedation score in between two groups of patients. Mean score was more in B group of patients as tramadol used was more among B group of patients. Mean sedation score in A group was 2.83 in this study.

Table 3: Secondary Outcomes

Outcome Measure	Group A (Block)	Group B (Control)	Statistical Significance
Time to First Rescue Analgesia	724 ± 48 minutes	186 ± 22 minutes	<0.001
Total 24h Diclofenac Dose	82.5 ± 12 mg	150.0 ± 15 mg	<0.001
Tramadol Requirement (%)	10%	63%	<0.001
Ramsay Sedation Score	2.0 (Stable)	2.4 (Higher variability)	<0.05

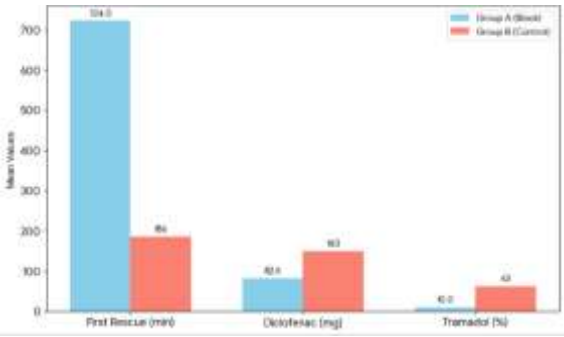

Figure 2: Secondary outcomes

DISCUSSION

Uncontrolled postoperative pain not only causes significant discomfort but also delays recovery by impairing mobility, increasing the risk of complications like deep vein thrombosis, and prolonging hospital stays. Effective pain management is therefore critical to enhance patient satisfaction, support early mobilization, and reduce the risk of chronic postoperative pain. Multimodal analgesia, which combines various pharmacologic and non-pharmacologic strategies, is the gold standard.

Side effects of general anaesthesia include sore throat, postoperative nausea and vomiting (PONV), dry mouth, cardiovascular events, muscle aches, and confusion. Neuraxial anaesthesia can be associated with post dural puncture headache, hypotension, hematoma formation and meningitis. Epidural anaesthesia in postoperative period can also be associated with hypotension.[7-13]

NSAIDS used in the postoperative period can increase the risk of gastritis and renal impairment. Postoperative opioids can be associated with respiratory depression and other opioid related side effects.

Nerve blocks play a crucial role by providing site-specific analgesia with fewer systemic side effects, making them especially beneficial in major orthopedic procedures involving the hip, knee, ankle, or foot. One recent Cochrane review on USG by Lewis SR et al. showed that ultrasound guidance produces superior peripheral nerve block(PNB) success rates along with decrease in the incidence of complications like nerve damage. It also shows other benefits like precise needle insertion, less administration time for block, providing good block quality and reduced dosage of local anaesthetic (LA). But benefits are limited by relatively less duration of action of Local anaesthetics.[14]

This study demonstrates that ultrasound-guided femoro-sciatic nerve block (FSNB) provides a superior and continuous analgesic profile for patients undergoing below-knee surgeries. By targeting the primary nerve supply of the lower limb, the block effectively addresses the pain that typically emerges once the effects of spinal anaesthesia diminish.

In our study block is integrated with spinal anaesthesia.

The decision to perform the block after the regression of spinal anaesthesia to the T10 level is a critical aspect of our methodology. This timing allows for the assessment of the patient's neurological status while ensuring that the block is established before the onset of intense surgical pain. The findings confirm that FSNB acts as an ideal analgesic bridge, preventing the sharp rise in NRS scores that often characterizes the recovery phase of lower-limb orthopaedic procedures.

The use of ultrasound guidance was instrumental in achieving a 100% success rate. The real-time visualization of the fascia iliaca for the femoral block

and the Vloka's sheath for the popliteal sciatic block ensured precise drug deposition. This anatomical accuracy allows for a lower volume of 0.25% bupivacaine to be effective, reducing the risk of local anaesthetic systemic toxicity (LAST) while providing dense sensory blockade.

The reduction in NRS scores directly correlates with a decreased reliance on systemic opioids. By minimizing Tramadol consumption, we reduced the potential for opioid-related side effects such as nausea, vomiting, and respiratory depression. This opioid-sparing effect, combined with stable sedation scores (Ramsay Score 2), facilitates a more comfortable recovery and potentially speeds up the transition to early physiotherapy and mobilization.

Our choice of 0.25% Bupivacaine provided a favorable balance between duration and safety. While adjuvants like dexmedetomidine or dexamethasone can further extend block life to over 10–14 hours, plain bupivacaine alone offered a reliable 8–12 hour window of intense analgesia. This window is critical for "numbness-to-pain transition," allowing patients to manage breakthrough pain more effectively with oral or mild intravenous NSAIDs.

In a meta-analysis done by S GRAPE et al,[15] they assessed the postoperative analgesic efficacy of sciatic nerve block when combined with femoral nerve block after total knee arthroplasty under spinal anaesthesia. The analysis included twelve randomized controlled trials involving 600 patients. The primary outcomes assessed were resting pain scores, intravenous morphine consumption at 12, 24, and 48 hours postoperatively, when combined with femoral nerve block, sciatic nerveblock significantly reduced resting pain scores at 12 h postoperatively with a mean difference of 10 (95% CI: -15 to -5; $p < 0.00001$). Intravenous morphine consumption at 12 h, 24 h and 48 h postoperatively were also significantly reduced. They concluded that sciatic nerve block confers additional postoperative analgesia within the first 12 postoperative hours compared with femoral nerve block alone for patients undergoing total knee arthroplasty.

Similarly, Young-Mo Kim et al,[16] studied the role of USG-guided femoral and sciatic nerve blocks on pain management and opioid consumption after Total knee Arthroplasty (TKA) under spinal anaesthesia. Their study was done for a period of two years and included 100 patients who were divided into Group 1 - received pre-operative, single-injection, USG-guided femoral and sciatic nerve blocks, Group 2 did not receive nerve blocks. The following were recorded-Postoperative VAS scores and opioid consumption. The results showed that the mean VAS in the postoperative period and the mean amount of opioid taken was lower in Group 1. Their study concluded that pre-operative USG-guided, femoral and sciatic nerve blocks provided effective pain control after TKA and significantly reduced opioid consumption postoperatively which is similar to our study.

Contrary to our study, L Frassanito et al,[17] studied the efficacy of intrathecal morphine and single-shot ultrasound-guided femoral nerve block on post-operative analgesia after TKR. Their study included 52 patients who were divided into ITM group - Patients who received intrathecal morphine group and FNB group - Patients who received femoral nerve block. Postoperatively all patients received postoperative patient-controlled-analgesia. Lower visual analogue pain score values was noted in the ITM group, lower Morphine consumption was noted in the ITM group and zero difference in opiate consumption was noted between 2 groups. No difference in treatment groups in the use of antiemetic and antipruritic medication. Their study concluded that morphine is safe and more efficient than femoral nerve block after TKA.

Limitations: This was a single-centre study with a sample size of 60. While statistically significant, larger multi-centre trials are required to confirm the impact of FSNB on long-term outcomes such as the incidence of chronic post-surgical pain or the development of Post-operative Delirium (POD) in elderly populations.

CONCLUSION

The ultrasound-guided FSNB is a safe, effective, and reliable technique for managing post-operative pain. It offers a more stable analgesic course than spinal anaesthesia alone and should be considered a standard adjunct in multimodal analgesia protocols for below-knee surgeries.

Conflict of interests: None

REFERENCES

1. Vadivelu N, Mitra S, Narayan D. Recent advances in postoperative pain management. Yale J Biol Med. 2010;83:11–25. [PMC free article] [PubMed] [Google Scholar]
2. Liu SS, Wu CL. The effect of analgesic technique on postoperative patient-reported outcomes including analgesia: A systematic review. Anesth Analg. 2007;105:789–808. [PubMed] [Google Scholar]
3. Choi P, Bhandhari M, Scott K, et al. Epidural analgesia for pain relief following hip or knee replacement. Cochrane Database of Systemic Reviews. 2003;3:CD003071
4. Spasiano A, Flore I, Pesamosca A, Della Rocca G. Comparison between spinal anaesthesia and sciatic-femoral block for arthroscopic knee surgery. Minerva Anestesiol. 2007 Jan-Feb;73(1-2):13-21. PMID: 17159764.
5. Gray AT. Ultrasound guided regional anesthesia current state of art. Anesthesiology. 2006;104:368–73.
6. Lewis SR, Price A, Walker KJ, et al. Ultrasound guidance for upper and lower limb blocks (Review). The Cochrane Library. 2015;9:22.
7. Wafcha ME, White PF. Postoperative nausea and vomiting. Anesthesiology 77:162-184, 1992.
8. Monroe MC, Gravenstein N, Saga-Rumley S. Postoperative sore throat: effect of oropharyngeal airway in orotracheally intubated patients. AnesthAnalg 1990; 70:512-6.
9. Philip B. Ambulatory anesthesia. Semin Surg Oncol 1990; 6:177-83.
10. Schneider M, Ettlin T, Kaufmann M, ela!. Transient neurological toxicity after hyperbaric subarachnoid anesthesia with 5% lidocaine. AnesthAnalg 1993; 76:1154-7.

11. Cruickshank RH, Hopkinson JM. Fluid flow through dural puncture sites. An in vitro comparison of needle point types. Anesthesia 1989; 44:415-8.
12. Pflug AE, Aasheim GM, foster C. Sequence of return of neurological function and criteria for safe ambulation following subarachnoid block (spinal anesthetic). Can Anaesth Soc 11978; 25(2): 133-9
13. Vloka JD, Hadzic A, Mulcare R, Lesser JB, Kilain E, Thys DM. Femoral nerve block versus spinal anesthesia for outpatients undergoing long saphenous vein stripping surgery. AnesthAnalg 1997; 84:749-52
14. Oberndorfer U, Marhofer P, Bösenberg A, Willschke H, Felfernig M, Weintraud M, et al. Ultrasonographic guidance for sciatic and femoral nerve blocks in children. Br J Anaesth. 2007;98:797–801. [PubMed] [Google Scholar]
15. Grape S, Kirkham KR, Baeriswyl M, Albrecht E. The analgesic efficacy of sciatic nerve block in addition to femoral nerve block in patients undergoing total knee arthroplasty: a systematic review and meta-analysis.Anaesthesia. 2016 Oct;71(10):1198-209. doi: 10.1111/anae.13568. Epub 2016 Jul 29. PMID: 27469381.
16. Kim Y-M, Kang C, Joo Y-B, Lee S-H. The role of ultrasound-guided single-shot femoral and sciatic nerve blocks on pain management after total knee arthroplasty. Knee [Internet]. 2019 [cited 2024 Sep 4];26(4):881–8.
17. Frassanito L, Vergari A, Zanghi F, Messina A, Bitondo M, Antonelli M. Post-operative analgesia following total knee arthroplasty: comparison of low-dose intrathecal morphine and single-shot ultrasound-guided femoral nerve block: a randomized, single blinded, controlled study. Eur Rev Med Pharmacol Sci [Internet]. 2010 [cited 2024 Sep 4];14(7):589–96.