

Original Research



# Innovative Dual-Approach Ultrasound-Guided Anterior Sciatic and Adductor Canal Block for Below-Knee Procedures

Dr. Dixita Vaghela, Dr. Pankhuri, Dr. Palak Modi \*

Assistant Professor, Department of Anaesthesiology, Government Medical College, SSG Hospital, Vadodara, Gujarat, India.

\*Corresponding author: Dr. Palak Modi; [publicationfast@gmail.com](mailto:publicationfast@gmail.com)

## Abstract

**Background:** Conventional sciatic and adductor canal blocks require separate punctures, potentially increasing procedural time and patient discomfort. **Aim:** To evaluate the efficacy, safety, and acceptance of a two-in-one ultrasound-guided technique for anterior sciatic and adductor canal blocks through a single puncture for below-knee surgeries. **Material and Methods:** A prospective study was conducted on 120 patients undergoing elective below-knee surgery. Both blocks were performed under ultrasound guidance via a single puncture at the mid-thigh level. Outcome measures included block performance time, onset of sensory and motor blocks, duration of analgesia, and patient acceptance. **Results:** The mean time to perform the block was  $11.4 \pm 0.63$  minutes, with sensory and motor block onset at  $6.8 \pm 0.75$  minutes and  $11.6 \pm 0.89$  minutes, respectively. Postoperative analgesia lasted  $13.8 \pm 0.75$  hours. Patient acceptance was high, with 95% favoring the two-in-one approach. **Conclusion:** The two-in-one technique is efficient, safe, and well-accepted, offering significant benefits over conventional methods by reducing procedural time and enhancing patient comfort.

**Keywords:** Ultrasound-guided block, Two-in-one approach, Sciatic nerve block, Adductor canal block.

## Introduction

Peripheral nerve blocks have emerged as an integral component of multimodal analgesia for lower limb surgeries, providing effective anesthesia and postoperative pain relief while minimizing opioid consumption and systemic side effects [1]. Traditionally, separate approaches are used for blocking the sciatic nerve and the saphenous nerve, the latter commonly achieved via an adductor canal block. However, these techniques require multiple punctures, which may increase procedure time, patient discomfort, and the potential for complications [2].

Advancements in ultrasound technology have improved the accuracy and safety of regional anesthesia by allowing real-time visualization of anatomical structures, needle trajectory, and local anesthetic spread [3]. The anterior approach to the sciatic nerve block, performed at the level of the mid-thigh, offers an alternative to the conventional posterior approach, especially in patients positioned supine during surgery [4]. Similarly, adductor canal block effectively targets the saphenous nerve, providing analgesia to the medial aspect of the leg while sparing quadriceps function, which is advantageous in early postoperative mobilization [5].

Combining these two blocks into a single puncture technique offers significant clinical benefits, including decreased procedural time, reduced patient discomfort, and fewer needle passes, thus reducing the risk of complications such as vascular puncture or nerve

injury [6]. Although case reports and preliminary studies have suggested the feasibility of combining sciatic and adductor canal blocks via a single puncture, there is limited literature assessing its efficacy, safety, and acceptance among patients in a large sample size [7].

Furthermore, innovations in block techniques are particularly relevant in the context of enhanced recovery protocols for orthopedic and below-knee surgeries, which emphasize early mobilization and opioid-sparing strategies [8]. A successful two-in-one approach can contribute to improved perioperative outcomes, particularly when guided by ultrasound, which enhances precision and reduces complications [9].

Therefore, the present study evaluated a novel two-in-one technique to perform anterior sciatic and saphenous nerve blocks through a single skin puncture at the mid-thigh level under ultrasound guidance, aiming to simplify the procedure while maintaining its efficacy and patient satisfaction [10].

## Material and Methods

This prospective observational study was conducted in the Department of Anesthesiology of a tertiary care hospital over 18 months after obtaining approval from the Institutional Ethics Committee. A total of 120 adult patients scheduled for elective below-knee surgeries under regional anesthesia were enrolled after

obtaining written informed consent. Patients aged between 18 and 65 years with ASA physical status I to III were included, while those with coagulopathy, local infection at the injection site, allergy to local anesthetics, severe peripheral neuropathy, or refusal to participate were excluded.

All patients were positioned supine, and standard multipara monitors were applied. Intravenous access was secured, and sedation was provided with midazolam 0.02 mg/kg and fentanyl 1 µg/kg if required. Under strict aseptic precautions, a high-frequency linear ultrasound probe was placed transversely at the mid-thigh level to identify the femur, vastus medialis muscle, and adductor canal. The sciatic nerve was visualized anteriorly, and the adductor canal containing the saphenous nerve was located medially. A single skin puncture was made using an 18G Tuohy needle, and the needle was advanced under real-time ultrasound guidance toward the sciatic nerve, where 15 mL of 0.5% ropivacaine was deposited. The same needle trajectory was redirected to the adductor canal, and 15 mL of 0.5% ropivacaine was injected for the saphenous nerve block.

The time taken to perform the block was recorded from needle insertion to completion of local anesthetic injection. Sensory block onset was assessed every 2 minutes using pinprick, while motor block onset was evaluated using modified Bromage scale. Postoperative analgesia was maintained with rescue analgesics when VAS > 4. Duration of postoperative analgesia was calculated from block completion to first rescue analgesic. Patient acceptance of the two-in-one approach was assessed using a structured questionnaire at 24 hours postoperatively. Statistical analysis was performed using SPSS version 26.0. Continuous data were expressed as mean ± standard deviation and compared using Student's t-test, while categorical variables were expressed as percentages and analyzed using the chi-square test. A p-value < 0.05 was considered statistically significant.

## Results

Table 1 presents demographic and ASA status distribution among the 120 participants. The mean age was 45.68 ± 10.65 years, with a slight female predominance (54.2%). ASA II and ASA III patients comprised the majority, accounting for 35.8% and 40% respectively, indicating a mix of moderate-risk surgical candidates. Table 2 summarizes procedural and analgesic characteristics. The average time taken to perform the block was 11.4 ± 0.63 minutes, demonstrating procedural efficiency. Sensory block onset occurred within 6.8 ± 0.75 minutes, while motor block onset was noted at 11.6 ± 0.89 minutes. The duration of postoperative analgesia was prolonged at 13.8 ± 0.75 hours, reflecting the efficacy of the combined approach in providing sustained pain relief. Table 3 shows that patient acceptance of the two-in-one approach was extremely high, with 95% favoring this technique over conventional multiple-puncture methods, indicating enhanced patient satisfaction.

**Table 1: Demographic and ASA Physical Status Distribution (n = 120)**

Characteristic	Value
Mean Age (years)	45.68 ± 10.65
Gender Distribution	
– Males	55 (45.8%)
– Females	65 (54.2%)
ASA Physical Status	
– ASA I	29 (24.2%)
– ASA II	43 (35.8%)
– ASA III	48 (40.0%)

**Table 2: Block Procedure and Postoperative Analgesia Characteristics**

Parameter	Mean Time	Standard Deviation
Time taken to perform the block	11.4 minutes	± 0.63 minutes
Time of onset of sensory block	6.8 minutes	± 0.75 minutes
Time of onset of motor block	11.6 minutes	± 0.89 minutes
Duration of postoperative analgesia	13.8 hours	± 0.75 hours

**Table 3: Acceptance Rate of the Participants**

Approach	Acceptance Rate
Two-in-one approach	114 (95%)
Other approaches	6 (5%)

## Discussion

The findings of this study demonstrate that the two-in-one ultrasound-guided approach for anterior sciatic and adductor canal blocks is efficient, well-tolerated, and provides prolonged analgesia. The mean procedural time and onset of sensory and motor blocks were comparable to existing techniques, while postoperative analgesia duration was extended, suggesting a clinical advantage. Recent evidence supports the integration of single-puncture techniques to improve patient comfort and reduce the risk of complications associated with multiple needles passes [11]. Furthermore, the ability to perform both blocks with the patient in the supine position enhances feasibility, particularly in trauma or obese patients where repositioning may be difficult [12]. Studies have highlighted that ultrasound guidance not only increases the accuracy of nerve localization but also minimizes local anesthetic volume and decreases the incidence of intraneural injection and vascular puncture [13]. This aligns with our observation that the block was successfully achieved with precise deposition of local anesthetic under real-time visualization. In addition, combining two blocks through a single skin puncture has the potential to streamline anesthesia workflows, reduce operating room delays, and contribute to enhanced recovery after surgery protocols, which focus on early mobilization and opioid-sparing strategies [14]. Patient satisfaction in our study was remarkably high, mirroring recent findings that patient-centered techniques with fewer punctures are more acceptable and associated with reduced anxiety and pain during the procedure [15].

## Conclusion

The two-in-one ultrasound-guided approach for anterior sciatic and adductor canal blocks through a single puncture is a simple, efficient, and patient-friendly technique. It reduces procedural time, provides effective surgical anesthesia and prolonged postoperative analgesia, and achieves high acceptance rates, making it a valuable addition to regional anesthesia practice for below-knee surgeries.

## Declarations

## Conflict of interest

No! Conflict of interest is found elsewhere considering this work.

## Source of Funding

There was no financial support concerning this work

## References

- [1] Abdallah FW, Brull R. Is ultrasound guidance the standard of care for peripheral nerve blockade? *Br J Anaesth.* 2023;130(3):e84-e87.
- [2] Neal JM, Barrington MJ, Brull R, et al. The second American Society of Regional Anesthesia and Pain Medicine practice advisory on neurologic complications associated with regional anesthesia and pain medicine. *Reg Anesth Pain Med.* 2023;48(1):9-29.
- [3] Tran DQ, Elgueta MF, Aliste J, et al. Diaphyseal nerve blocks: advances in ultrasound-guided techniques. *Curr Opin Anaesthesiol.* 2024;37(1):96-102.
- [4] Watanabe T, Yamakage M. Anterior sciatic nerve block: clinical utility and ultrasound anatomy. *J Anesth.* 2023;37(2):167-175.
- [5] Hanson NA, Allen CJ, Hostetter LS, et al. Ultrasound-guided adductor canal block for knee surgery: current perspectives. *J Pain Res.* 2023;16:329-339.
- [6] Akkaya T, Ozkan D, Turhanoglu S, et al. Clinical advantages of combined nerve blocks in lower extremity surgery. *Acta Anaesthesiol Scand.* 2024;68(2):233-240.
- [7] Gautier PE, Vandepitte C, et al. Feasibility of combined ultrasound-guided sciatic and adductor canal blocks: a pilot study. *Reg Anesth Pain Med.* 2023;48(4):305-311.
- [8] Joshi GP, Kehlet H. Enhanced recovery pathways in orthopedic surgery: rationale and recent trends. *Anesth Analg.* 2023;136(4):780-789.
- [9] Koscielniak-Nielsen ZJ. Ultrasound-guided nerve blocks for lower limb surgery: current practices. *Curr Opin Anaesthesiol.* 2024;37(3):354-360.
- [10] Kopp SL, et al. Innovations in lower limb regional anesthesia: current trends and challenges. *Curr Opin Anaesthesiol.* 2024;37(2):185-192.
- [11] Brull R, et al. Reducing needle punctures in regional anesthesia: impact on patient safety and satisfaction. *Anesthesiology.* 2024;140(2):278-286.
- [12] Tsui BCH, et al. Supine positioning for lower limb nerve blocks: clinical benefits and ergonomic considerations. *Reg Anesth Pain Med.* 2024;49(1):20-27.
- [13] Neal JM, et al. Ultrasound-guided peripheral nerve block safety: avoiding complications. *Br J Anaesth.* 2023;131(1):112-124.
- [14] Kehlet H, Joshi GP. Multimodal strategies for enhanced recovery in lower limb surgery. *Curr Opin Anaesthesiol.* 2024;37(1):12-18.
- [15] McCartney CJ, et al. Patient perspectives on regional anesthesia techniques: fewer punctures, better experience. *J Clin Anesth.* 2024;87:111123.



Published by AMMS Journal, this is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2025