

To Compare Efficacy of USG Guided Combined Popliteal and Saphenous Nerve Block Vs NSAID (Diclofenac) For Post-Operative Pain Relief in Below Knee Surgeries

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Abstract

Introduction: Postoperative pain following below-knee orthopaedic surgery can impair comfort and recovery. Ultrasound-guided combined popliteal and saphenous nerve blockade offers targeted analgesia and may reduce systemic analgesic requirements compared with intramuscular diclofenac.

Aim: To compare ultrasound-guided combined popliteal and saphenous nerve blocks with intramuscular diclofenac for postoperative analgesia following below-knee orthopaedic surgery.

Methods: This two-arm, quasi-experimental comparative study was conducted over 18 months among 70 consenting adults aged over 18 years with American Society of Anesthesiologists physical status I or II. Patients were allocated equally to Group B and Group D, with 35 participants each. All underwent surgery under spinal anaesthesia. At surgery completion, Group B received ultrasound-guided combined popliteal and saphenous nerve blocks, whereas Group D received intramuscular diclofenac 75 mg. Patients were monitored for 24 hours. The primary outcome was time to first rescue analgesia. Secondary assessments included total diclofenac consumption, block duration, Numerical Rating Scale pain scores, patient satisfaction, complications, and haemodynamic parameters.

Results: Baseline demographic characteristics and physical status were comparable between groups. Time to first rescue analgesia differed significantly between groups ($p < 0.001$). In Group B, 71.4% required rescue analgesia at 12–18 hours and 20.0% at 18–24 hours; all Group D patients required rescue analgesia within 12 hours. Recorded block duration was up to 12 hours in 77% and 12–16 hours in 23%. Total diclofenac consumption was significantly lower in Group B ($p < 0.001$): 77.1% received 75 mg and 22.9% received 150 mg, whereas 37.1% of Group D received 150 mg and 62.9% received 225 mg. At two hours, all Group B patients and 85.7% of Group D patients were pain-free. At 24 hours, severe pain affected 48.6% versus 77.1%, respectively ($p = 0.005$). Complication profiles favoured Group B ($p = 0.002$), with no complications in 94.3% versus 60.0%. Nausea occurred in 5.7% versus 20.0%, while epigastric discomfort occurred only in Group D (20.0%). Good or excellent satisfaction was reported by all Group B patients, compared with 45.7% in Group D ($p < 0.001$). Haemodynamic parameters remained within clinically acceptable ranges.

Conclusion: Ultrasound-guided combined popliteal and saphenous nerve blockade provided longer postoperative analgesia, reduced diclofenac requirements, and improved satisfaction compared with intramuscular diclofenac. However, substantial severe pain at 24 hours highlights the need for continued pain assessment and supplementary multimodal analgesia. Larger studies are required to confirm effectiveness and assess uncommon adverse events. Interpretation should consider the small sample, limited postoperative follow-up, and uncertainty regarding allocation methods, as the manuscript describes both quasi-experimental design and random assignment procedures.

Keywords: Postoperative analgesia; popliteal nerve block; saphenous nerve block; Ultrasonography; Diclofenac.

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Introduction

Below-knee orthopedic surgeries continue to be associated with postoperative pain despite developments in anesthetic methods and multimodal pain management. Effective pain management during the immediate postoperative period is essential for patient comfort, early mobilisation, shorter hospital stay, prevention of complications, and patient satisfaction. Inadequate pain relief may delay ambulation, heighten the stress response, prolong hospitalisation, and increase healthcare costs. Systemic analgesics, including non-steroidal anti-inflammatory drugs (NSAIDs) and opioids, have traditionally been used for postoperative pain. However, gastrointestinal irritation, renal dysfunction, platelet inhibition, sedation, nausea, vomiting, and respiratory depression limit their use. Consequently, interest has increased in regional anesthesia techniques offering targeted analgesia with fewer systemic side effects [1].

Peripheral nerve blocks (PNBs) have become an effective method of providing postoperative analgesia in lower extremity surgery. These blocks target nerves supplying the surgical site, providing analgesia while preserving motor function in unrelated regions. Compared with systemic analgesics, PNBs can reduce opioid consumption and associated adverse effects, improve patient satisfaction, and facilitate early rehabilitation [2]. Foot and ankle procedures increasingly employ blocks targeting the sciatic nerve and its branches to improve postoperative pain control.

Structures below the knee are predominantly supplied by the sciatic and saphenous nerves. In the popliteal region, the sciatic nerve divides into the tibial and common peroneal nerves, supplying most of the distal lower limb. The saphenous nerve, a branch of the femoral nerve, supplies the medial leg. Therefore, below-knee procedures may require both popliteal sciatic and saphenous nerve blockade for adequate analgesia.

This combination provides extensive sensory coverage of the lower leg and foot, making it suitable for postoperative pain relief [3]. Historically, peripheral nerve blocks were performed using anatomical landmarks or nerve stimulators. Anatomical variations and inability to visualise neural structures sometimes resulted in block failure or complications.

Ultrasound guidance transformed regional anesthesia by allowing real-time visualisation of nerves and surrounding anatomy. It improves needle guidance, facilitates accurate local anesthetic deposition, reduces the required anesthetic volume, minimises vascular puncture, and increases block success [4]. Direct

visualisation has consequently improved the precision and safety of peripheral nerve blockade. Ultrasound-guided popliteal nerve blocks provide effective postoperative analgesia for foot and ankle surgery. Patients receiving these blocks have demonstrated lower postoperative pain scores and reduced systemic analgesic requirements compared with those receiving systemic analgesia alone [5]. Adding a saphenous nerve block extends coverage to the medial leg, which may remain inadequately anesthetised by sciatic blockade alone. Combined blockade therefore provides more complete analgesia for procedures involving the medial leg or ankle.

Continuous peripheral nerve block techniques have demonstrated sustained pain relief and reduced opioid requirements in orthopedic patients [6]. Nevertheless, single-shot blocks remain popular because of their simplicity, lower cost, and feasibility in routine hospital practice. When performed using long-acting local anesthetics such as bupivacaine, these blocks can provide prolonged analgesia during the early postoperative period.

Reduced systemic opioid use is an important benefit of regional anesthesia. Although effective analgesics, opioids may cause nausea, vomiting, pruritus, urinary retention, respiratory depression, and dependence. Comparative studies of regional anesthesia and general anesthesia or systemic analgesic techniques have reported reduced perioperative morbidity and improved recovery profiles with regional blocks [7]. Effective postoperative analgesia also supports early ambulation and functional recovery.

Complications of peripheral nerve blocks are uncommon, particularly when ultrasound guidance, appropriate technique, and monitoring are used. Potential complications include local anesthetic systemic toxicity, nerve injury, and hematoma formation [8]. Large registry studies have examined neurological morbidity and systemic toxicity associated with ultrasound-guided blocks compared with conventional techniques [9]. These safety considerations remain important when selecting and performing regional analgesia.

The saphenous nerve block has gained recognition for its contribution to postoperative analgesia in lower limb surgery. A randomised controlled trial following major ankle surgery demonstrated improved analgesia and reduced postoperative opioid requirements among patients receiving saphenous blockade [10]. This evidence supports combining sciatic and saphenous blocks to provide more complete analgesia for below-knee procedures. Systematic reviews of lower extremity nerve blocks have demonstrated reductions in

postoperative pain scores and opioid consumption, supporting their effectiveness in distal lower limb orthopedic surgery [11]. Surveys of orthopedic specialists also indicate increasing acceptance of popliteal nerve blocks for foot and ankle procedures because of their favourable analgesic profile [12]. Studies assessing recovery parameters have reported reduced postoperative analgesic administration and shorter post-anesthesia care unit stays following popliteal blockade [13]. Reported complication rates in foot and ankle surgery have generally been low, supporting the clinical usefulness of these techniques [14].

Despite increasing use of peripheral nerve blocks, systemic NSAIDs such as diclofenac remain common postoperative analgesics. Diclofenac is a non-selective cyclooxygenase inhibitor that reduces prostaglandin synthesis, producing analgesic and anti-inflammatory effects. Intramuscular administration is frequently used during the immediate postoperative period because of its relatively rapid action and effectiveness against moderate pain. Although NSAIDs avoid several opioid-related adverse effects, they may cause gastrointestinal irritation, renal dysfunction, and platelet dysfunction, particularly in predisposed patients.

Comparative studies suggest that diclofenac provides useful postoperative analgesia, whereas regional blocks may provide longer pain relief and reduce additional analgesic requirements [15]. Research on acute postoperative pain similarly indicates that diclofenac can provide short-term analgesia, although its duration may be less than that achieved with targeted nerve blockade [16].

Systemic analgesics alone may provide suboptimal pain control following more extensive below-knee procedures. Combined popliteal and saphenous nerve blocks target neural pathways transmitting nociceptive information from the surgical site, whereas NSAIDs act systemically without producing site-specific neural blockade. Comparing these approaches is therefore clinically relevant when selecting postoperative analgesic strategies in routine clinical practice.

With increasing emphasis on enhanced recovery, ambulatory surgery, and opioid-sparing measures, the comparative effectiveness of regional techniques and conventional systemic analgesics requires evaluation. Time to first rescue analgesia and total analgesic requirement during the first 24 hours provide objective measures of efficacy.

Assessment of these outcomes can help determine the duration and adequacy of pain relief while informing practical postoperative care. The present comparative assessment of ultrasound-guided combined popliteal and saphenous nerve block and

intramuscular diclofenac aims to strengthen evidence-based postoperative pain management for patients undergoing below-knee orthopedic surgery. Therefore, the current research is carried out to assess the effectiveness of ultrasound guided combined popliteal and saphenous nerve blocking versus intramuscular diclofenac in relieving postoperative pain among patients that have undergone surgeries that takes place below the knee, with the hypothesis of whether localized anesthesia is effective and offers good-lasting anesthesia in comparison to systemic use of the NSAID drug.

Methodology

The present quasi-experimental study was designed to be a two-arm comparative interventional study, whereby the sampled participants were to be randomly assigned into two groups (Group B and Group D) and observed on post-operative outcomes within the initial 24 hours after surgeries. The research was done in the hospital (patients admitted in the orthopedic male and female wards) who were scheduled to perform surgeries below the knee. The total time of the study was 18 months.

The study was conducted amongst adult patients admitted for orthopedic care and scheduled for below-knee surgeries, who fulfilled the eligibility criteria and provided written informed consent.

Inclusion criteria: Patients posted for below-knee surgeries, Age > 18 years, ASA physical status I and II and patients who provided written informed consent.

Exclusion criteria: Allergy towards NSAID drugs such as diclofenac, contraindications for spinal anaesthesia, allergy to bupivacaine, infection at the anaesthesia injection site deranged renal function and refusal of consent.

Study Groups: The overall number of the sample participants amounted to 70 people (35 participants per arm Group B and Group D) using standard sample size calculation formula.

After enrollment, participants were randomized into two groups:

- **Group B (Block group):** Participants received USG-guided combined popliteal and saphenous nerve blocks at the end of surgery for postoperative analgesia.
- **Group D (Diclofenac group):** Participants received inj. diclofenac 75 mg IM for postoperative analgesia.

Both groups underwent the planned below-knee surgery under spinal anaesthesia, and postoperative monitoring was carried out similarly in both groups.

Study Parameters: The following study parameters were recorded as per the objectives and planned case record format:

Primary outcome parameter: Time for first requirement of rescue analgesia after surgery.

Secondary outcome parameter

1. Total dose of analgesia required within 24 hours after surgery.
2. To determine duration of peripheral block.
3. To determine efficacy of block and Nsaids (Diclofenac)

Additional monitored clinical parameters: As part of routine PACU monitoring and intra/postoperative documentation, the following were also recorded: Pulse rate (PR), Respiratory rate (RR), Blood pressure (BP) and SpO₂.

Complications were also documented (Yes/No, with description if present).

Study procedure: All participants were managed using a standardized perioperative workflow. After consent and enrollment, patients were prepared for surgery and postoperative analgesia as follows:

Anaesthesia technique: All participants received spinal anaesthesia for below-knee surgery at the L4–L5 interspace injection bupivacaine heavy 0.5%. Surgery proceeded under spinal anaesthesia as planned by the orthopedic surgical team.

Postoperative analgesia intervention (at the end of surgery) -At the end of surgery, postoperative analgesia was provided based on group allocation:

Group B (USG guided combined nerve block group): Participants received ultrasound-guided combined popliteal and saphenous nerve block at the end of surgery as follows:



Figure 1: Popliteal nerve block technique

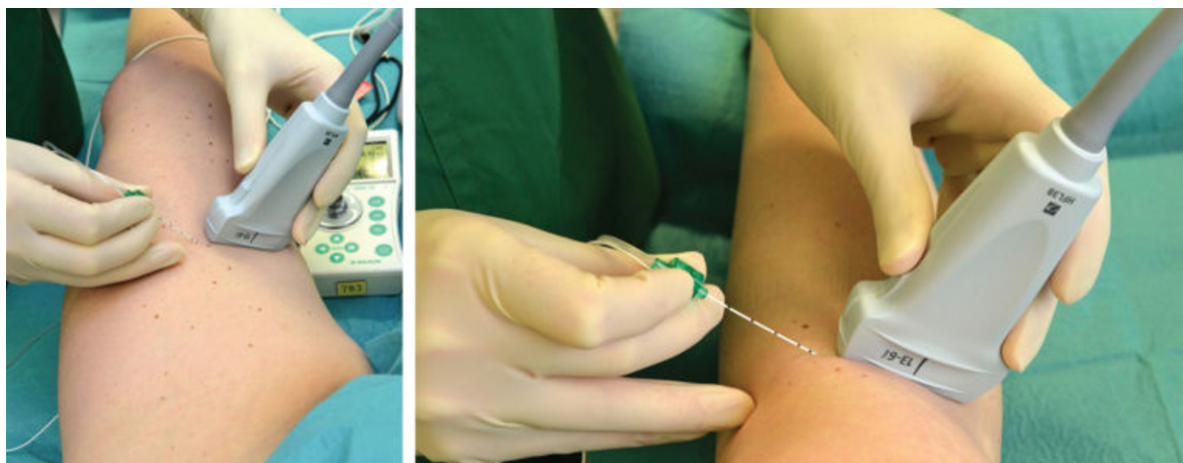


Figure 2: Saphenous nerve block technique

Post-block documentation: Time of completing block was documented. Successful block was confirmed by spread of local Anaesthesia drug around the nerve under USG guided

Group D (Diclofenac group): Participants received: Inj. diclofenac 75 mg IM

The time of diclofenac administration was documented.

Postoperative monitoring

- Participants were shifted to the PACU.
- Patients were monitored every 2 hours for 24 hours in the PACU.
- Vital parameters (PR, RR, BP, SpO₂) were recorded as per the monitoring chart.
- Duration of peripheral block was recorded for Group B from completion of block to first perception of pain (NRS ≥ 1).
- Efficacy of block and NSAID was assessed by comparing time to first rescue analgesia, total 24-hour diclofenac dose, NRS scores at 2,6,12,24 hours, patient satisfaction, and complication rates between Group B and Group D.
- The time to first requirement of rescue analgesia was noted.
- The total dose of analgesia required over 24 hours was recorded based on medication charts and case records.
- Any complications were monitored and documented.

Outcome measures:

- Time to first rescue analgesia requirement

- Total dose of analgesia required in 24 hours
- Duration of peripheral block (Group B only): Time from completion of nerve block to first perception of pain (NRS ≥ 1), recorded in hours.
- Efficacy of block and NSAID: Comparative data between Group B and Group D including time to first rescue analgesia, total 24-hour diclofenac dose, NRS scores at 2,6,12,24 hours, patient satisfaction score, and complication rates

Complications: presence/absence and description if present.

All entries were made contemporaneously from direct observation, PACU charts, anaesthesia records, and postoperative medication charts.

Data analysis: Collected data were entered into MS Excel and analyzed statistically. All statistical testing was performed as per the pre-specified plan, and findings were interpreted in relation to the study objectives.

Results: A total of 70 participants were involved in the study and they were equally divided into the two study groups. Group B consisted of 35 participants, which is a half of the population in the study, whereas Group D also consisted of 35 participants, which is one of the halves of the population in the study. This was a balanced group to compare the postoperative analgesic results of the USG-guided combined popliteal and saphenous nerve blocks group with small number against the diclofenac group.

Table 1: Hemodynamic Parameters in Group B at Different Time Intervals

Group B [Median(Q1,Q3)]	PR	RR	SBP	SPO2	DBP
Baseline	76(74,81)	16(14,17)	121(117,127)	98(97,99)	78(73,82)
2h	79(74,85)	16(14,17)	116(108,124)	98(97,98)	77(72,81)
4h	79(74,86)	16(14,18)	122(110,129)	98(97,99)	76(71,80)
6h	80(74,85)	16(14,18)	123(114,131)	98(97,99)	74(70,79)
12h	80(74,85)	16(14,18)	120(114,131)	98(97,99)	74(70,79)
24h	78(74,83)	15(15,17)	113(108,122)	97(97,99)	73(68,78)
P value within	0.092	0.561	<0.001	<0.001	0.024

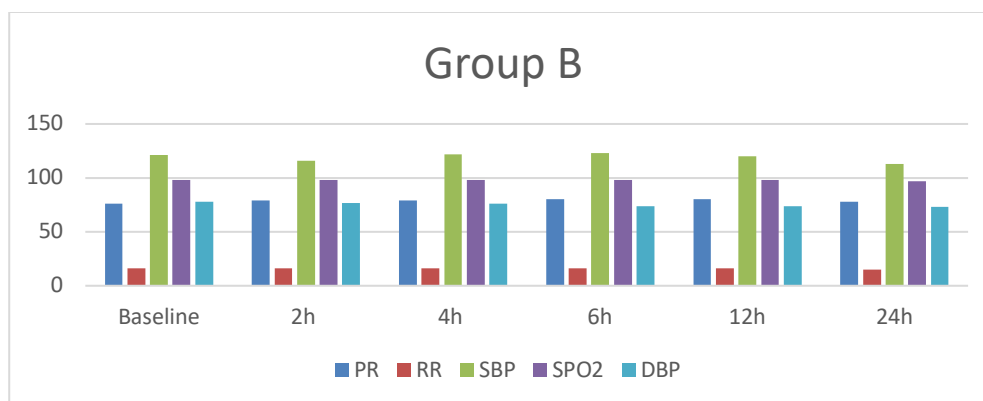


Figure 1: Hemodynamic parameters in Group B at different time intervals

Hemodynamic Parameters in Group D at Different Time Intervals: Pulse rate, respiratory rate, and systolic blood pressure showed no statistically significant change with time in Group D with $p = 0.325$, 0.965 and 0.099 resulting respectively. Nevertheless, a statistically significant change was detected using SpO₂, having a p -value of 0.004 , and the diastolic blood pressure also

changed significantly at various times with a p -value of 0.034 .

Comprehensively, the median hemodynamic parameters were not out of the clinically acceptable ranges during the 24 hours period that followed the surgery.

Table 2: Hemodynamic Parameters in Group D at Different Time Intervals

Group D [Median(Q1,Q3)]	PR	RR	SBP	SPO2	DBP
Baseline	80(74,86)	16(15,18)	121(115,126)	98(97,99)	77(72,82)
2h	82(77,86)	16(15,18)	118(110,126)	98(97,98)	76(71,83)
4h	81(75,87)	16(14,19)	117(113,129)	97(97,98)	75(72,80)
6h	80(77,88)	16(15,19)	118(113,129)	97(96,98)	74(68,79)
12h	81(75,84)	17(15,18)	116(111,124)	98(97,98)	74(68,79)
24h	80(74,84)	16(14,18)	114(111,124)	97(96,98)	74(67,78)
P value within	0.325	0.965	0.099	0.004	0.034

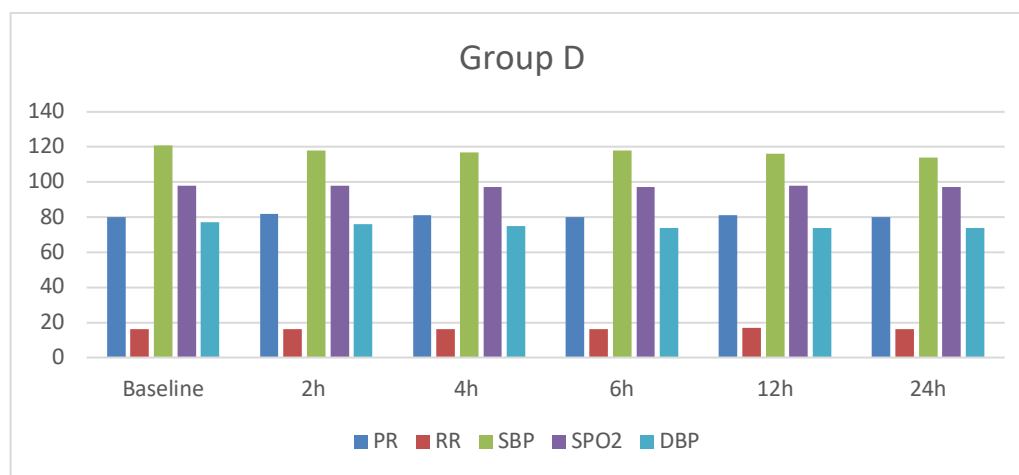


Figure 2: Hemodynamic parameters in Group D at different time intervals

Association of Time to First Rescue Analgesia with Study Group: Group B and Group D varied significantly in terms of time to first rescue analgesia ($p < 0.001$), which suggests that there was a statistically significant difference in the length of the postoperative analgesia that was achieved by the two interventions. In Group D most of the participants took rescue analgesia in 6-12 hours (77.1%), 22.9 take it in 1-6 hours.

Notably, none of the Group D participants stuck with analgesia over 12 hours. Group B, on the other hand, showed a significantly extended analgesic period, with 71.4% participants prompted to receive rescue analgesia 12-18 hours and 20.0% between 18-24 hours.

Group B: only 8.6% of the people in Group B needed rescue analgesia in 6-12 hours, none in the first 6 hours.

Table 3: Association of Time to First Rescue Analgesia with Study Group

Time to first rescue analgesia hrs Group	Measure	Group B	Group D	P Value	Significant/Not Significant
1-6hr	Count	0	8	<0.001	Significant
	% within Group	0.00%	22.90%		
6-12hrs	Count	3	27		
	% within Group	8.60%	77.10%		
12-18hrs	Count	25	0		
	% within Group	71.40%	0.00%		
18-24 hrs	Count	7	0		
	% within Group	20.00%	0.00%		
Total	Count	35	35		
	% within Group	100.00%	100.00%		

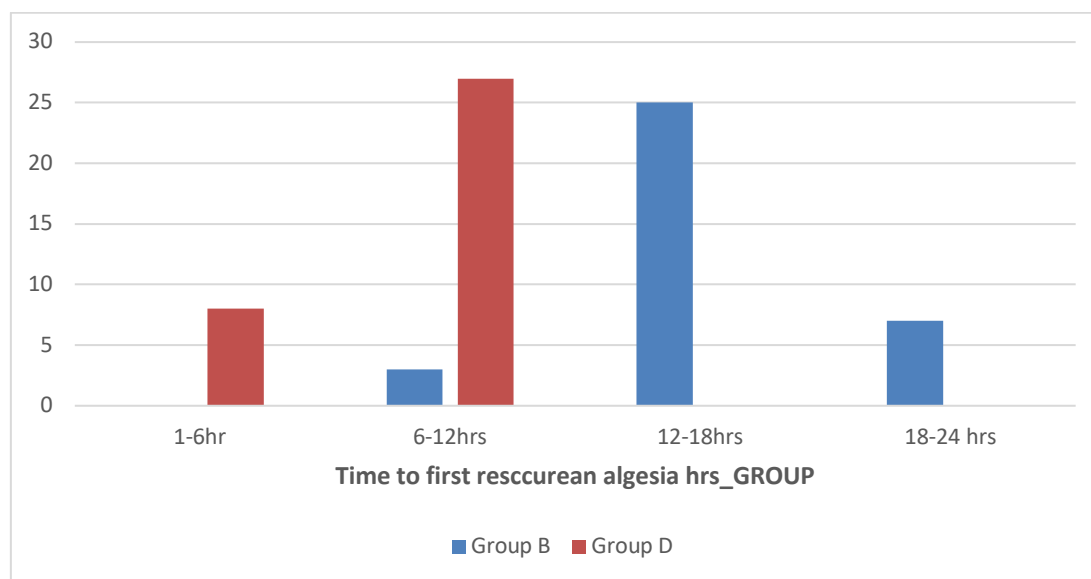


Figure 3: Association of time to first rescue analgesia with study group

Duration of Block: In the 35 patients blocking was done using a block, the block duration was 0-12 hours in 27 patients taking 77 percent of the total cases. The other 8 patients or 23 percent had a duration of blocks that was 12-16 hours. In this

way, the majority of patients in the block group had an analgesic coverage during the initial 12 hours whereas almost a quarter had coverage within a duration of up to 16 hours.

Table 4: Duration of Block

Duration Of Block	Frequency	Percentage
0-12 Hrs	27	77%
12-16 Hrs	8	23%
Total	35	100%

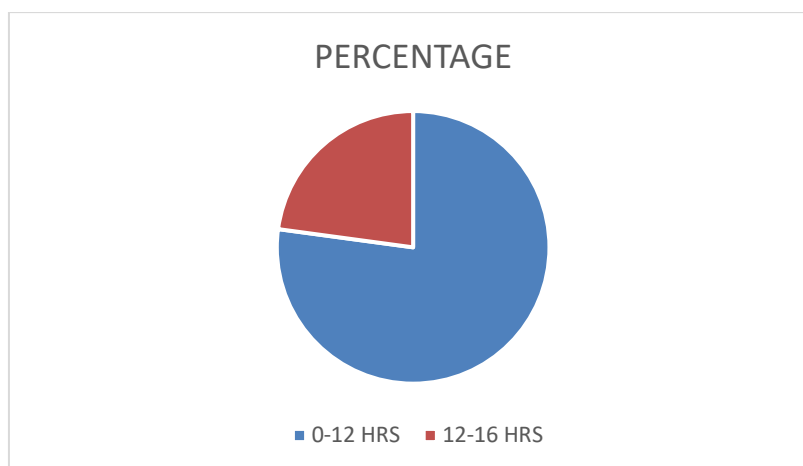


Figure 4: Duration of block

Association of Total Diclofenac Dose in 24 Hours with Study Group: There was a significant difference in the amount of diclofenac that was required in the first 24 hours post-surgery in Groups B and D ($p < 0.001$).

Group B had most of the participants taking less medication (77.1%) of 75 mg of diclofenac with only 22.9 children taking the 150 mg. No

participant of Group B needed a cumulative dose of 225 mg. However, Group D showed a significantly greater analgesic need, with 62.9% of the participants needing 225 mg of diclofenac and 37.1% in need of 150 mg of the drug. None of the Group D participants managed to control pain satisfactorily taking 75 mg of diclofenac. These results suggest that participants of Group B had a better postoperative analgesic effect, as it led to

much lower levels of rescue analgesic use than in Group D.

Table 5: Association of Total Diclofenac Dose in 24 Hours with Study Group

Total Diclofenac dose in 24h (mg)	Measure	Group B	Group D	P Value	Significant/Not Significant
75	Count	27	0	<0.001	Significant
	% within Group	77.1%	0.0%		
150	Count	8	13		
	% within Group	22.9%	37.1%		
225	Count	0	22		
	% within Group	0.0%	62.9%		
Total	Count	35	35		
	% within Group	100.0%	100.0%		

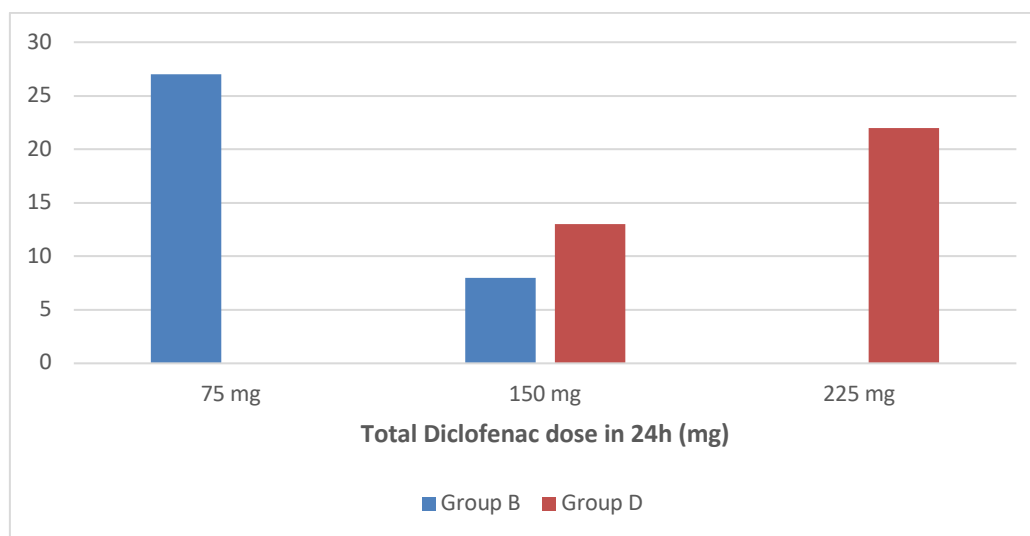


Figure 5: Association of total diclofenac dose in 24 hours with study group

Association of NRS at 2 Hours with Study Group:

These subjects overall held great pain control at the 2 hours postoperative period in both groups. Group B, 100.0% of respondents in the group did not suffer pain (NRS score 0). Group D had 85.7% percent of respondents with no pain, and 14.3% with mild pain (NRS score 13). None of the representatives of both groups experienced moderate (NRS 46) or severe pain (NRS 710). The pain scores were low in both groups, although during the early postoperative follow-up, the proportion of individuals in Group D and who experienced mild pain was small.

Association of NRS at 24 Hours with Study Group:

Significantly, there was a statistical difference in the pain scores at 24 hours after

surgery between Group B and Group D ($p = 0.005$). At this point, none of the individuals in either group was pain free. In Group B, 22.9% of them reported mild pain, 28.6 % moderate, and 48.6 % severe pain.

Comparatively, Group D had a poorer pain profile, with 2.9% of the participants being in the mild category, 20.0% in the moderate category, and a significantly greater percentage (77.1%), in the severe category.

The percentage of patients who experienced severe pain was significantly higher in Group D compared to Group B and the percentage of those with mild and moderate pain scores in Group B was higher compared to Group D.

Table 6: Association of NRS at 24 Hours with Study Group

NRS at 24h	Measure	Group B	Group D	P Value	Significant/Not Significant
No pain (0)	Count	0	0	0.005	Significant
	% within Group	0.0%	0.0%		
Mild Pain (1-3)	Count	8	1		
	% within Group	22.9%	2.9%		
Moderate Pain (4-6)	Count	10	7		
	% within Group	28.3%	20.0%		

Severe Pain (7-10)	Count	17	27		
	% within Group	48.6%	77.1%		
Total	Count	35	35		
	% within Group	100.0%	100.0%		

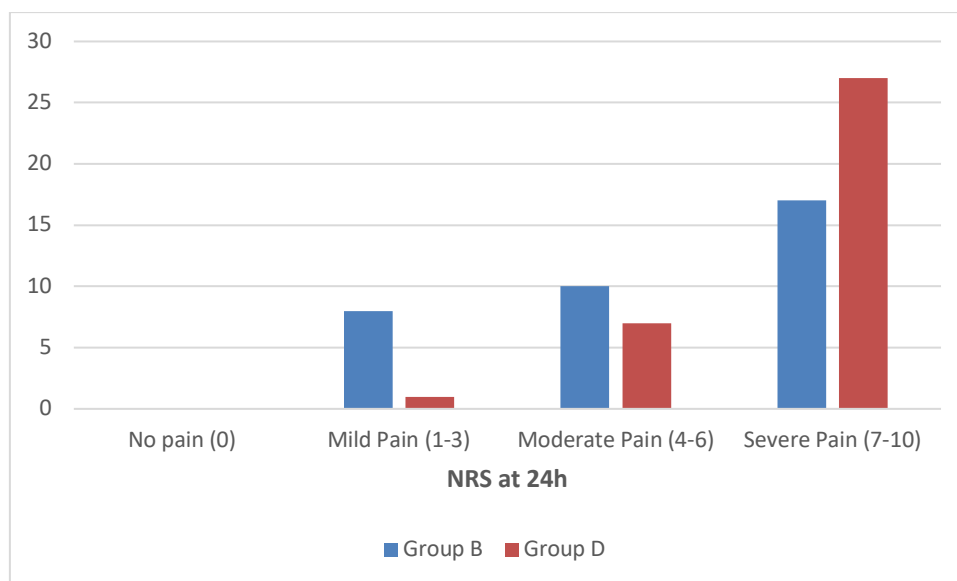


Figure 6: Association of NRS at 24 hours with study group

Association of Complication Details with Study Group: Details of complications had a statistically significant correlation with study group with a p value of 0.002. Group B showed 94.3% patients had no complications, nausea was reported in 5.7% of patients and no patient had epigastric discomfort.

Complications were also more common in Group D, with 20.0% reporting epigastric discomforts, and 20.0% reporting nausea, and 60.0% of patients having no complications. This indicates that Group B tolerates better than Group D.

Table 7: Association of Complication Details with Study Group

Complication details	Measure	Group B	Group D	P Value	Significant/Not Significant
Epigastric discomfort	Count	0	7	0.002	Significant
	% within Group	0.0%	20.0%		
Nausea	Count	2	7		
	% within Group	5.7%	20.0%		
Nil	Count	33	21		
	% within Group	94.3%	60.0%		
Total	Count	35	35		
	% within Group	100.0%	100.0%		

Association of Patient Satisfaction Score with Study Group: Patient satisfaction score showed a statistically significant association with study group, with a p value of 0.000. In Group B, 42.9% of patients reported excellent satisfaction and 57.1% reported good satisfaction, with no patient

being unsatisfied. In contrast, Group D had only 14.3% excellent satisfaction and 31.4% good satisfaction, while 54.3% were unsatisfied.

These findings indicate markedly better patient satisfaction in Group B compared with Group D.

Table 8: Association of Patient Satisfaction Score with Study Group

Patient satisfaction score	Measure	Group B	Group D	P Value	Significant/Not Significant
Excellent	Count	15	5	<0.001	Significant
	% within Group	42.9%	14.3%		
Good	Count	20	11		
	% within Group	57.1%	31.4%		
Unsatisfied	Count	0	19		
	% within Group	0.0%	54.3%		
Total	Count	35	35		
	% within Group	100.0%	100.0%		

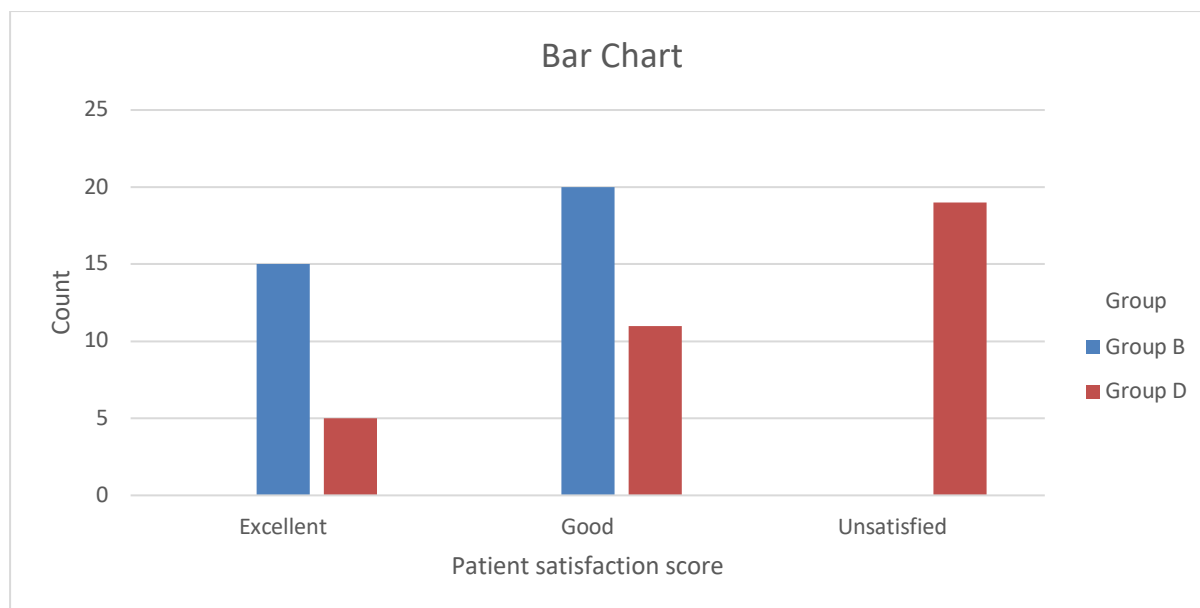


Figure 7: Association of patient satisfaction score with study group

Discussion

The principal finding was significantly superior postoperative analgesia in Group B, demonstrated by delayed rescue analgesia, reduced diclofenac requirements, lower postoperative pain scores, fewer reported complications, and greater patient satisfaction. These findings support the effectiveness of combined regional blockade compared with diclofenac alone, while the comparable baseline characteristics provide a basis for interpreting differences between the groups.

Baseline Comparability and Haemodynamic Stability: The groups were well balanced before intervention. ASA I patients constituted 54.3% and 60.0% of Groups B and D, respectively, while ASA II patients constituted 45.7% and 40.0%. Such comparability is important because systemic disease, physical status, and demographic factors may influence postoperative pain, drug metabolism, and haemodynamic responses.

Haemodynamic parameters remained clinically stable throughout the 24-hour postoperative period. In Group B, pulse rate and respiratory rate showed no statistically significant variation ($p = 0.092$ and $p = 0.561$, respectively). Although systolic blood pressure, diastolic blood pressure, and SpO_2 showed statistical variations, values remained clinically acceptable. In Group D, pulse rate, respiratory rate, and systolic blood pressure did not vary significantly ($p = 0.325$, $p = 0.965$, and $p = 0.099$, respectively). Variations in SpO_2 and diastolic blood pressure were not associated with clinically significant instability. These findings correspond with Xu et al., who reported effective analgesia, stable hemodynamics, and improved perioperative comfort following ultrasound-guided combined popliteal sciatic and saphenous nerve

block in hallux valgus surgery [17]. Kamel et al. similarly demonstrated effective analgesia, motor block, and patient satisfaction with ultrasound-guided sciatic and saphenous nerve blocks in leg and foot surgery [18]. Although the present study did not compare ultrasound guidance with nerve stimulation, these findings support the clinical reliability of ultrasound-guided blockade.

Time to First Rescue Analgesia: Time to first rescue analgesia showed a highly significant difference between groups ($p < 0.001$). No patient in Group B required rescue analgesia during the first 6 hours, and only 8.6% required it within 6–12 hours. In Group B, 71.4% required rescue analgesia at 12–18 hours and 20.0% at 18–24 hours. Conversely, 22.9% of Group D required rescue medication within 1–6 hours and 77.1% within 6–12 hours. Overall, 91.4% of Group B patients remained without rescue analgesia for at least 12 hours, whereas all Group D patients required rescue medication within 12 hours.

In the present study, 77% of patients had a documented block duration of 0–12 hours and 23% of 12–16 hours. Despite this relatively shorter recorded duration, 91.4% required rescue analgesia only after 12 hours. Residual sensory blockade and reduced nociceptive input may have contributed to continued analgesia after measurable block regression, although this explanation remains inferential.

Li et al. reported prolonged time to first analgesic request, lower VAS scores at 4–16 hours, and reduced rescue analgesic requirements with ultrasound-guided popliteal sciatic nerve block compared with systemic analgesia ($p < 0.001$) [19]. Maagaard et al. demonstrated median analgesia durations of 1572 and 1400 minutes in

dexamethasone-containing groups compared with 870 minutes in the placebo group following combined popliteal and saphenous blockade ($p < 0.001$) [20]. Wu et al. reported durations of 31.7 and 31.9 hours with 0.25% and 0.375% ropivacaine, respectively [21]. Although analgesia in the present study was shorter, it remained significantly prolonged compared with diclofenac alone. The combined approach is particularly relevant because the sciatic nerve supplies most of the distal lower limb, whereas the saphenous nerve supplies the medial leg. Blocking both territories addresses the anatomical distribution of pain following below-knee procedures. The observed delay in rescue medication is therefore consistent with the intended coverage of the intervention and its targeted analgesic mechanism.

Total Diclofenac Requirement: Total diclofenac consumption during the first 24 hours was significantly lower in Group B ($p < 0.001$). Most Group B patients (77.1%) required only 75 mg, while 22.9% required 150 mg and none required 225 mg. Conversely, 37.1% of Group D required 150 mg and 62.9% required 225 mg; none were controlled with only 75 mg. These findings demonstrate an analgesic-sparing effect of combined nerve blockade.

Bendtsen et al. reported lower morphine consumption with successful ultrasound-guided continuous popliteal sciatic blockade [22]. Li et al. similarly observed reduced rescue analgesic requirements following popliteal sciatic nerve block [19], while Maagaard et al. demonstrated prolonged analgesia with combined blockade, particularly with dexamethasone [20]. These findings support the role of effective regional analgesia in reducing systemic medication requirements.

Reduced diclofenac exposure may also offer clinical benefits because repeated NSAID administration can increase gastrointestinal and renal adverse effects in susceptible patients. Epigastric discomfort occurred only in Group D, although the present observations alone cannot establish a causal relationship between drug exposure and individual complications.

Taken together, the rescue analgesia and consumption findings indicate that the benefit was not confined to a single pain assessment. Patients receiving the block generally required their first additional analgesic later and accumulated a lower total diclofenac requirement during the first postoperative day. This consistency across outcomes supports the analgesic advantage demonstrated by the regional technique. These advantages are clinically relevant to postoperative comfort and patient recovery.

Postoperative NRS Pain Scores: Postoperative NRS scores demonstrated a sustained analgesic advantage with combined blockade. At 2 hours, 100% of Group B and 85.7% of Group D reported no pain; the reported difference was not statistically significant ($p = 0.52$). This early similarity may reflect residual spinal anaesthesia and immediate postoperative analgesic effects. By 6 hours, a significant difference emerged ($p < 0.001$). All Group B patients remained pain-free, whereas only 28.6% of Group D were pain-free; 48.6% reported mild, 8.6% moderate, and 14.3% severe pain. At 12 hours, severe pain occurred in 28.6% of Group B compared with 60.0% of Group D ($p < 0.001$). At 24 hours, severe pain remained significantly less frequent in Group B (48.6% versus 77.1%; $p = 0.005$). These findings agree with Li et al., who reported significantly lower VAS scores at 4–16 hours following ultrasound-guided popliteal sciatic nerve block [19]. Xu et al. also reported improved postoperative analgesia and comfort with combined popliteal sciatic and saphenous blockade [17]. Morau et al., Germain et al., and Choquet et al. emphasised the importance of appropriate local anaesthetic spread and ultrasound-guided technique for successful sensory blockade [23]. The superior NRS profile therefore supports comprehensive regional analgesia, although substantial severe pain at later assessments indicates that additional postoperative analgesia remained necessary.

Complications and Patient Satisfaction: The reported complication profile significantly favoured Group B ($p = 0.002$). No complications occurred in 94.3% of Group B, with nausea reported in 5.7%. In Group D, 60.0% had no complications, while nausea and epigastric discomfort were each reported by 20.0%. Greater systemic NSAID exposure may have contributed to epigastric discomfort in Group D, where 62.9% received 225 mg and 37.1% received 150 mg diclofenac during the observation period. Patient satisfaction was significantly higher in Group B ($p < 0.001$). Excellent and good satisfaction were reported by 42.9% and 57.1%, respectively, with no dissatisfied patients. In Group D, 14.3% reported excellent and 31.4% good satisfaction, while 54.3% were dissatisfied. Satisfaction reflects the combined effects of pain severity, duration of relief, rescue medication requirements, comfort, and adverse effects. The agreement between satisfaction and analgesic outcomes strengthens the clinical relevance of the observed differences. These results correspond with Bendtsen et al., who reported increased satisfaction with ultrasound-guided popliteal sciatic blockade [22]. Li et al. similarly demonstrated greater satisfaction compared with systemic analgesia [19]. Xu et al. reported improved comfort without significant adverse effects following combined blockade [17], while Kamel et al. demonstrated effective analgesia and

patient satisfaction with ultrasound-guided sciatic and saphenous blocks [18]. The present findings suggest better tolerability during the observed postoperative period, without establishing the absence of uncommon block-related complications.

The stable haemodynamic findings in both groups also suggest that the differences in pain and satisfaction were not accompanied by clinically important cardiovascular or respiratory instability during the postoperative observation period.

Interpretation in Relation to Previous Studies:

Previous studies support the contribution of ultrasound guidance and precise local anaesthetic deposition to successful sciatic blockade. Buys et al. reported faster onset of complete sensory block with ultrasound-guided tibial-peroneal injection than proximal sciatic injection (19.2 versus 26.1 minutes; $p = 0.006$) [24]. Morau et al. demonstrated improved complete sensory blockade with circumferential spread around the nerve (73% versus 43%; $p = 0.035$) [23]. Bendtsen et al. reported higher success with ultrasound-guided continuous popliteal blockade than nerve stimulation (94% versus 79%; $p = 0.03$), alongside lower morphine consumption and greater satisfaction [22]. Perlas et al. reported a 30% reduction in onset time and fewer needle passes with common paraneural sheath injection [25]. Cappelleri et al. reported faster onset with intraneural injection and no clinical neurological consequences at six months in their study [26].

These reports illustrate the importance of injection technique, although they do not directly compare combined blockade with intramuscular diclofenac. The present findings most closely correspond with Li et al., who reported lower pain scores, delayed analgesic requests, reduced rescue requirements, and greater satisfaction following ultrasound-guided popliteal blockade [19]. Maagaard et al. and Wu et al. also demonstrated prolonged analgesia with combined popliteal and saphenous blocks [20,21]. Differences in reported duration should be interpreted in relation to the local anaesthetic regimen, adjuncts, technique, and outcome definitions rather than assuming equivalence across studies. Overall, combined popliteal and saphenous blockade provided longer pain relief, reduced diclofenac requirements, improved pain scores and satisfaction, and fewer reported complications than diclofenac alone. Baseline comparability and haemodynamic stability support this interpretation, although they do not exclude every potential influence on postoperative outcomes. The technique represents a useful component of multimodal postoperative analgesia for below-knee surgery, with continued assessment and rescue treatment required as its effects diminish.

Conclusion

The current study estimated that, in below-knee surgery, USG-directed combined popliteal/saphenous nerve blocks are more effective in reducing postoperative pain than intramuscular diclofenac. Block group patients experienced longer analgesia, delayed rescue analgesia, reduced overall diclofenac, improved pain scores and reduced complications and greater satisfaction.

At the start, both groups were similar; therefore, the improved results in Group B can be explained by the success of the composite nerve block.

Thus, combined popliteal and saphenous nerve block under USG guidance is an efficient and safe technique that can be employed to provide postoperative pain relief in below-knee orthopedic surgery.

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