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## Original Research Article

# Combined popliteal and saphenous nerve block vs NSAIDS for post operative analgesia in below knee surgery patients: A cross-sectional study

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## ABSTRACT

**Introduction:** Peripheral nerve blocks are becoming increasingly popular to control postoperative pain in orthopaedic limb surgeries. An outstanding feature of nerve block is its lack of adverse effects, reduced requirement of analgesics and better patient satisfaction.

**Aim:** To compare the efficacy of combined popliteal and saphenous nerve block with NSAIDS for postoperative pain relief in below knee surgery patients.

**Materials and Methods:** We performed a prospective randomized study involving seventy patients. All patients underwent an elective orthopaedic procedure below knee under spinal anaesthesia. Thirty five patients had received a combined popliteal and saphenous nerve block and the rest thirty-five received intravenous NSAIDS at the end of surgical procedure. Post operative VAS Score, time for first rescue analgesia, total diclofenac requirement, total anti-emetic requirement and complications if any were noted.

**Statistical Analysis:** The statistical power of sample was 80% and type I error ( $\alpha$ ) of 0.05. The distribution of the data was evaluated using the Shapiro-Wilk test. For data with a non-normal distribution, the Mann-Whitney U test was used in intergroup comparisons. The data were expressed as the median, minimum and maximum (min-max). For comparison of postoperative analgesic use, the chi-square test was used, and complication rates were compared using a cross-ratio test. P-values less than 0.05 were considered to be statistically significant in all the analyses.

**Results:** Patients with a combined popliteal and saphenous nerve block had significantly less pain at six hours, twelve hours and twenty four hours (p value <0.001) postoperatively. Time for request of rescue analgesia was prolonged. Total diclofenac and anti emetic requirement was also reduced. Also higher level of satisfaction was achieved among this group of patients.

**Conclusion:** A combined popliteal and saphenous nerve block provides significantly better postoperative pain relief than NSAIDS in patients who underwent below knee surgeries.

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## 1. Introduction

The sciatic nerve is a nerve bundle consisting of two separate nerve trunks, the tibial and common peroneal nerves. This division of the sciatic nerve occurs usually

between 50 and 120 mm proximal to the popliteal fossa crease. The popliteal block is a block of the sciatic nerve at the level of the popliteal fossa. Some common indications include corrective foot surgery, foot debridement, amputation of toes, filleting of toes and Achilles tendon repair.

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Popliteal blockade results in anesthesia<sup>1</sup> of the entire distal two thirds of the lower extremity, with the exception of the medial aspect of the leg. Cutaneous innervations of the medial leg below the knee is provided by the saphenous nerve, a superficial terminal extension of the femoral nerve. Depending on the level of surgery, the addition of a saphenous nerve block may be required for surgery.<sup>2</sup>

The saphenous nerve originates from the L3-L4 nerve roots and is a terminal branch of the femoral nerve. This purely sensory nerve innervates the medial, anteromedial, and posteromedial lower leg, ankle, and foot.<sup>3</sup>

After the saphenous nerve leaves the adductor canal, it pierces the fascia lata between the tendons of the gracilis and sartorius muscles to become subcutaneous. During this course, the nerve divides into the infrapatellar branch and the sartorial branch before dividing into multiple small subcutaneous branches. It travels laterally to the great saphenous vein as it descends the medial aspect of the lower leg, dividing into multiple small subcutaneous branches that provide sensory innervation to the medial aspect of the lower leg, ankle, and forefoot.<sup>4-7</sup>

### 1.1. Non steroidal anti inflammatory drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a well-established class of drugs that have long been used for the blockage of pain and inflammation in both acute and chronic pain. They can maintain a constant level of prostaglandin inhibition over the course of a prolonged surgery and during the postoperative period. They have no risk of abuse; therefore, postoperative use of NSAIDs helps reduce growing concerns of opioid abuse and the potential over-prescription of opiate.<sup>8</sup>

NSAIDs have been shown to be effective in orthopedic surgery; they decrease pain and inflammation, therefore allowing patients to have an increased knee range of motion, leading to a shorter period of physical therapy.

Despite proven efficacy in postoperative pain management, there are still growing concerns of NSAID adverse events (AEs) which limit their use particularly with high-risk patients, such as the elderly or patients with preexisting renal insufficiency. NSAIDs are well known to be associated with gastrointestinal, renal, and cardiovascular side effects.

## 2. Aims and Objectives

### 2.1. Aim

To determine comparative efficacy of combined popliteal and saphenous nerve block with NSAIDs for post operative pain relief in knee and below knee surgery patients.

### 2.2. Objectives

1. Time for first requirement of rescue of analgesia

2. Total Dose of analgesia required in 24 hrs after surgery.
3. Time of ambulation
4. Patient Satisfaction

## 3. Materials and Methods

With the approval of Hospital research ethical committee and informed and written consent, this study was conducted in cross-sectional way at Department of Anaesthesia and Critical Care of S.N. Medical College, Agra (November 2018 – April 2020). The subjects belonged mainly to the catchment area of this government district hospital.

### 3.1. Inclusion criteria

1. Patients Scheduled for knee and below knee surgeries.
2. Age >18 years. ASA I and II
3. Patients giving informed written consent.

### 3.2. Exclusion criteria

1. Allergy towards non-steroidal anti-inflammatory drugs, paracetamol, morphine or local anaesthetics.
2. Body weight <52 kg to avoid toxic doses of local anaesthetics.
3. Contraindications for SA.
4. Cognitive or psychiatric dysfunction or alcohol/narcotic substance abuse causing expected inability to comply with study protocol.
5. Infection at anaesthesia injection site.
6. Bleeding diathesis.
7. Additional exclusion criteria were patients with coagulopathy and significant cardiovascular, respiratory, renal, hepatic or metabolic disease.

### 3.3. Sample size calculation

Based on previous studies we presume that combined block will reduce 24 hr post-operative analgesic by 30 % (type I error 0.05 & power of 0.8). On this basis 70 patients were taken into account.

Randomization was achieved with sealed envelopes containing randomization numbers (simple randomization using a randomization table from a statistic book).

After obtaining written informed consent from the patients, they were Randomized into two groups, GROUP C and Group N.

Patients of both the groups were cannulated in the procedure room with a wide bore intravenous (IV) catheter (18G) and infusion with lactated Ringer's solution (RL) was started. A multichannel monitor was attached. Patients were given spinal anaesthesia for below knee surgeries at L4-L5 and at the end of surgery, for postoperative analgesia, Group C received 12ml of bupivacaine plain 0.5% for popliteal nerve block and 8ml of bupivacaine plain 0.5%

for saphenous nerve block. Group N received 1000mg of intravenous paracetamol.

### 3.4. Popliteal nerve block using lateral approach

Under all aseptic precautions and with the patient in a supine position, a point is marked 7.0 cm cephalad to the lateral femoral condyle in the groove between biceps femoris and vastus lateralis muscles. The needle was advanced until the shaft of the femur was contacted. After withdrawing the needle, it was redirected posteriorly at an angle of 30 degree with the horizontal plane. Then after negative aspiration for blood to exclude vascular puncture and confirmation of the position of the needle 12ml of 0.5% bupivacaine plain was injected.

### 3.5. Saphenous nerve block at medial femoral condyle

With the patient in supine position, the medial condyle of the femur of the operated site is palpated. After taking all the aseptic precautions, 8ml of 0.5% of bupivacaine plain was injected in a fan-wise direction between the skin and the periosteum of the medial surface of the condyle.

Mean arterial pressures (MAP) and heart rate (HR) were recorded before starting the procedure and just after the blockade was confirmed. The heart rate, non-invasive blood pressure, SpO<sub>2</sub> and VAS values were recorded during the pre-operative period and then at 15 min intervals after the induction of spinal anaesthesia. When the mean arterial pressure dropped below 65 mm Hg, 5-10 mg IV ephedrine was injected.

After the block the patients were shifted to PACU for observation.

1. All patients were monitored according to the PACU protocol regarding vital parameters.
2. Verbal analogue score (on 0-10 cm scale, where 0 is no pain and 10 is worst possible pain) was noted on arrival in PACU 2, 6, 12 and 24 hours at rest and on direct pressure on the surgical wound.
3. Time of first demand for analgesic was noted and patient was administered diclofenac 75mg.
4. Total rescue analgesic consumption during first 24 hours was recorded.
5. Time of voiding of urine, first oral feed and ambulation was noted.
6. Any side effect related to the block was also recorded.
7. After 24 hours patient was enquired about satisfaction regarding analgesia.

Residents of the recovery room who were not involved in the study and were blinded about the anaesthetic technique due to identical dressings, recorded the data. During follow-up their blood pressure, heart rates and VAS values were recorded at arrival in PACU, 30 mins. and 45 mins. and at 1, 2, 6, 12 and 24 hr. After the regain

of proprioception of great toe, ability to dorsiflex the foot and return of perianal sensation, observer encouraged the patient to ambulate under supervision. When the patient succeeded in ambulation, the time to ambulation was noted. Postoperative pain was assessed with the verbal analogue scale (VAS) score of 0 - 10 (0 = no pain and 10 = worst catheter of appropriate size, maintaining strict asepsis. Other postoperative adverse events were recorded.

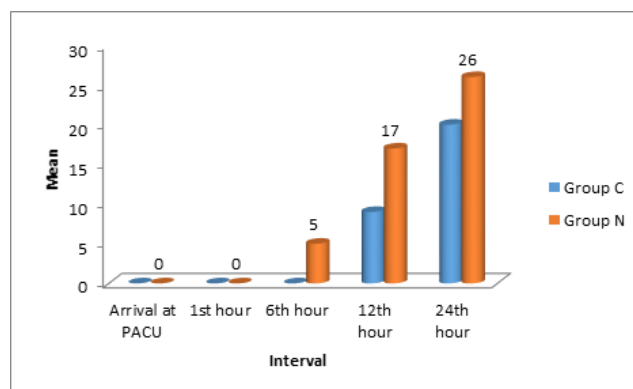
### 3.6. Statistical analysis

The statistical power of sample was 80% and type I error ( $\alpha$ ) of 0.05. The distribution of the data was evaluated using the Shapiro-Wilk test. For data with a non-normal distribution, the Mann-Whitney U test was used in intergroup comparisons. The data were expressed as the median, minimum and maximum (min-max). For comparison of postoperative analgesic use, the chi-square test was used, and complication rates were compared using a cross-ratio test. P-values less than 0.05 were considered to be statistically significant in all the analyses.

## 4. Results

Patient's characteristics were comparable among the two groups in the demographic data.(Table 1).

Pain scores at rest were 0 in PACU and at 1st hour in both the groups (may be due to effect of spinal anaesthesia). Reduced pain scores were seen in block group as compared to NSAIDS group from 6th to 24 hours.(Figure 1)



**Fig. 1:** Pain at surgical site at rest

Time for first request for analgesia was quite prolonged in block group in comparison to NSAIDs group. Also VAS score was significantly higher in NSAIDs group as compared to BLOCK group (Table 2).

Total Diclofenac consumption was almost reduced by approximately 40% in group C as compared to group N (Figure 2).

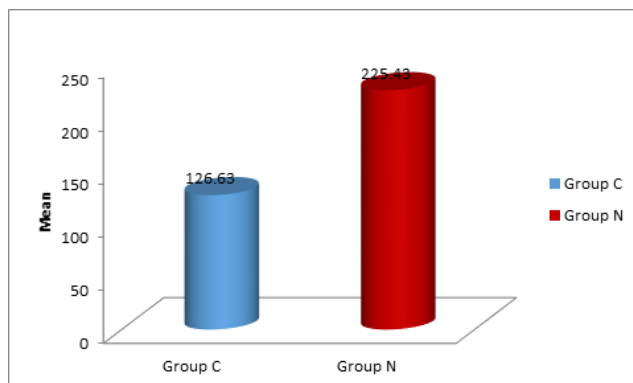
Reduced post-operative nausea and vomiting were noticed in block group as compared to NSAIDs group during 6th hour, 12th and 24th hour postoperatively. At

**Table 1:** Demographic data

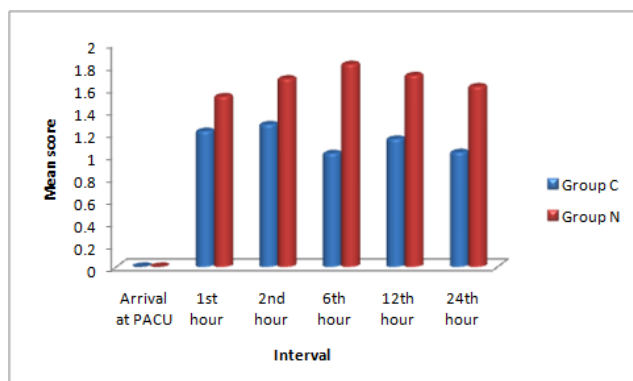
Demographic features	Group C		Group N		p-value
	Mean	D	Mean	D	
Age (yrs.)	42.15	8.33	44.25	9.04	0.396
Weight (kg)	56.88	11.67	55.68	7.69	0.664
Duration of surgery(mi)	61.24	8.164	58.23	8.96	0.712
Height (cm)	163.3	8.1	162.3	6.7	0.036
Sex (M/F)	25/10		27/8		0.452
SA Grade (I/II/III)	1	1-3	1	1-3	0.932

**Table 2:** 1<sup>st</sup> time analgesia requirement

	Group C		Group N		p-value
	Mean	SD	Mean	SD	
Analgesic requirement for the first time (mins.)	733.00	306.21	290.50	83.23	<0.001
VAS at time of first analgesic requirement	4.24	1.25	6.69	1.85	0.0021

**Fig. 2:** Total consumption of diclofenac in mg within 24 hours duration after surgery

other points of time, both the groups were comparable to each other and no statistically significant difference was found. (Figure 3)

**Fig. 3:** Post-operative score for nausea and vomiting

Overall 95% of the patients were satisfied with their analgesic regimen among Block group as compared to 65% among group N (Table 3).

**Table 3:** Patient satisfaction (%)

	Group C	Group N
Excellent	70.00	30.22
Good	25.00	34.78
Unsatisfied	5.00	35.00

## 5. Discussion

In this study we sought to determine the effectiveness of combined popliteal and saphenous nerve block with NSAIDs.

Main outcome of our study is that patients with combined block has lower NRS scores. Also the first request of analgesia and total analgesic requirement is significantly lower in combined block group as compared to NSAIDs group. Several studies supported our outcome. In a study done by Hassan A. et al<sup>9</sup> in 2017-18 found that eight (80%) and six (60%) patients with combined popliteal and saphenous nerve blocks, experienced no pain in day zero and day one, respectively. Another study done by Xu J, Chen XM, Ma CK, Wang XR<sup>10</sup> in 2014 found that compared with systemic analgesia alone, peripheral nerve blocks adjunctive to systemic analgesia resulted in a significantly lower pain intensity score at rest, using a 100 mm visual analogue scale, at all time periods within 72 hours postoperatively.

The mean time for first analgesic requirement in group C was 731 min, as compared to Group N where it was 289.6 min ( $p < 0.001$ ). Also VAS score was significantly higher in NSAIDs group as compared to BLOCK group at the time of demand of rescue analgesia.

In our study the demographic data of the patients including age, weight, and height and ASA grade were

comparable in Group C and Group N and was statistically insignificant. The duration of surgery was also comparable in both the groups and was statistically insignificant.

Incidence of post-operative nausea and vomiting was also less in Group C as compared to Group N.

When we enquired about patient satisfaction, overall 95% of the patients in block group (Group C) were satisfied with their analgesic regimen as compared to 65% among the NSAIDs group. Also, there was no significant difference in discharge of patients from PACU and Hospital in both the groups.

## 6. Source of Funding

None.

## 7. Conflict of Interest

The authors declare no conflict of interest.

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