

Orthopedic Surgeries of Lower Limb under Combined Femoral and Sciatic Nerve Block: A Comparative Study in RMCH & RC



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Introduction

The best option for life-saving operations is regional block anesthesia where both general and central neuraxial anesthesia are risky. It does not require fasting, special preparation, or preoperative optimization and can be given in emergency conditions.^[1] Also peripheral nerve blocks (PNBs) are preferred for lower limb surgeries and orthopaedic surgeries because of peripheral location of surgical site and the potential to block pain pathways at multiple levels.^[2] Furthermore, better cardio respiratory stability is observed with peripheral nerve blocks as central neuraxial blockade is having side effects such as hypotension, bradycardia, meningitis, postdural puncture headache, neurological deficit, etc.^[3] Advancement in the newer techniques such as peripheral nerve stimulator and ultrasound anesthesia has shifted from general anesthesia (GA) and central neuraxial blockade for isolated limb surgery to peripheral nerve blocks.^[4] But still there is no consensus on whether certain types of patients benefit more from a general, regional or mixture of the two types of anesthesia and anaesthesiologists have different priorities and preferences.^[5] The onset of action of a peripheral nerve block is longer than a spinal (subarachnoid block), and the success rate of a satisfactory block is generally lower than for neuraxial blocks. However the cardiovascular stability and postoperative pain relief these regional blocks provide make them worthwhile techniques to perform especially in the critically ill patients.

In orthopaedic emergency majority of the fractures occur in an elderly population, and patients with hip fractures frequently have various co-morbidities attributable to the normal process of ageing.^[6] Surgical repair is the method of choice for orthopaedic patients, and related pain both before and after surgery is usually reported as severe by most patients and patients have longer hospital stays and greater delays before mobilization.^[7]

The opiate drugs can be administered commonly for pain relief but they have complications such as central respiratory centres, drowsiness, hypotension, and mental confusion. Anti-inflammatory agents such as non-steroidal anti-inflammatory drugs (NSAIDs) may increase the risk of bleeding, gastrointestinal haemorrhage and

affect renal function. Thus in order to reduce pain regional nerve blocks can be given.^[6]

One of the most useful anesthetic techniques is the combination of sciatic and femoral nerve block for lower limb surgery.^[8] But precautions should be taken while using these blocks as large dose of drugs are required.^[9]

Materials and Methods

The present study was conducted in Dept. of Anaesthesia at Rama Medical College Hospital and Research Centre Hapur. In this prospective study 50 patients in the age group of 20 to 65 years of both sexes were included in the studies that were posted for the lower limb surgeries. Approval of the Institution's Ethical committee was taken. Patients having morbid obesity, pregnancy, and allergy to the study drug were excluded from the study. Informed written consent of patients was taken. Patients were randomly divided into two groups of 25 each. A technique procedure was explained to the patient and the procedure was done only if the patient agreed to it.

Sciatic block was given by the anterior approach as described by Chelly et al^[10] or through the posterior approach as described by Labat.^[11] To provide complete surgical anaesthesia combination of femoral and sciatic nerve was given to the selected cases. In Group A 20 ml of 0.5% ropivacaine for femoral nerve block and 20 ml of 0.5% ropivacaine for sciatic nerve block was given to the patients. In group B 20 ml of 0.5% ropivacaine plus 25 µg fentanyl for femoral nerve block and 20 ml of 0.5% ropivacaine plus fentanyl 25 µg for sciatic nerve block was given. The range of doses and concentration used depending on the weight of the patient and up to maximum safe dose. Detailed preanesthetic check-up was done before the surgery. Visual analog scale (VAS) with 0-10 cm line was used to see the level of anesthesia in the postoperative period and interpreted as "0" means "no pain" and mark "10" means "severe pain."

For the anterior approach a 150mm needle was used to the sciatic nerve and a 100mm needle was used for the posterior approach. A 100mm or 150mm needle was used for the psoas compartment

lumbar plexus block. Before and during the procedure; ECG, pulse oximetry & blood pressure were monitored. Resuscitation drugs and equipment were kept available.

Tablet alprazolam 0.25 mg was given on the night before surgery. Intravenous line was secured with 18-gauge intra cath also patients were preloaded with Ringer lactate solution over 15-20 min.

Patient was kept in supine position, with leg extended and the table flattened for femoral nerve block for maximum access to the inguinal region. Under all aseptic precautions, the femoral block was given by inserting 22-gauge needle 1.5-2 cm lateral to the femoral artery and 1-2 cm distal to an inguinal ligament in a cephalic direction at 30-45° angle using nerve stimulator

For sciatic nerve block, the patient was kept in lateral decubitus position with the normal leg kept straight and the hip joint of the upper leg in the 40° of flexion, 20-30° of adduction and neutral as to rotation. The knee of the extremity to be blocked was flexed at a 90° angle.

Monitoring and assessment of block was carried from the time of the completion of the anesthetic injection. Sensory block was assessed as loss of pinprick sensation to a 22-gauge needle for both

Table 1: Demographic data of the patients in group A and B

	Group A (n=25)	Group B (n=25)
Age (in years)	41.78± 15.23	37.34± 13.24
Male	22	20
Female	3	5
Duration of Surgery (min)	84.22±14.44	91.67±12.03

In group a mean age of the patients was 41.78± 15.23 and in group B it was 37.34± 13.24. Out of total 25 patients operated in group A 22 were male and 3 female, while in group B male and female were 20 and 5 respectively.

Table 2: Sensory and motor block in both groups after induction of anesthesia

Onset/ duration in minutes/ hours	Group A (n=25)	Group B (n=25)	P value
Mean onset of sensory block (Minutes)	12.54 ± 3.25	13.12 ± 2.54	NS
Mean onset of motor block (Minutes)	18.22 ± 2.45	18.78± 3.44	NS
Total duration of sensory block (hours)	14.56 ± 0.22	13.95 ± 1.23	NS
Total duration of sensory block (hours)	12.88 ± 1.28	13.05 ± 1.88	NS

Discussion

Anesthesia should be administered to meet the demands of the surgery, patient's willingness and anaesthesiologist's experience. Regional anesthesia was first described by the Karl Kollar, use of cocaine in ophthalmological procedures. After that in Dec 1884 William Halsted and Richard Hall described sensory nerve block and then virtually every peripheral somatic nerve and the plexuses were blocked.^[13]

A Road traffic accident is the greatest killer and lead to increased morbidity and mortality and is responsible for maximum loss of productive man-hours. General anesthesia (GA) was preferred earlier for the trauma surgeries but it was having disadvantages as it disrupts the sympathoadrenal compensatory reflexes and physiological balance. Also in some emergency cases patients have to wait as nil by mouth is required for the general anesthesia. The issue of GA versus RBA has been much discussed and debated over the years so regional anesthesia is the safest option to provide anesthesia to the orthopaedic patients. Regional anesthesia are gaining popularity because of it has advantages of cardiovascular stability and postoperative rehabilitation. The issue of general and

femoral and sciatic distributions every 5 min for the first 30 min then every 10 min till complete surgical anesthesia.

Motor blockade was evaluated based on modified Bromage scale.^[12] Pain score was assessed every 30 min during surgery. If pain is experienced during surgery injection ketamine 0.5 mg/kg intravenously. Postoperatively patient's sensory, motor block and VAS score was assessed half hourly for 1 hour then hourly for 8 hours then 2 hourly for 12 hours then 3 hourly for 24 hours. Injection diclofenac sodium dose 75 mg intramuscular or injection tramadol 50 mg intravenous was given as rescue analgesia.

The data from the study was collected, compiled and statistically analyzed. Data was expressed as a mean and standard deviation, number, and percentages

Results

50 patients were selected for the study purpose and were divided into two groups of 25 each in to A and B both groups were posted for the lower limb surgeries in the orthopaedic department. Demographic data of the patients was collected as shown in the table 1

regional block anesthesia has been much discussed and debated over the years.^[14]

A success rate of 85% was observed in a study done by Regnier et al who evaluated spinal and nerve block anaesthesia in an emergency trauma cases.^[15] We did not have mortality in our study and all cases were operated successfully without general anesthesia.

Fears of serious permanent nerve damage are rarely seen as demonstrated in a study from France.^[16] Inaccurate needle placement often results in unsatisfactory block due to minimal drug spread; this may prolong the onset of block but the dense quality and duration of analgesia. The knowledge of anatomy is the most important prerequisite for giving nerve blocks.^[4] Advances in regional block are one of the safest modalities in surgical anaesthesia and pain management and enhance the potential for success, rapid postoperative recovery and patient safety.^[17] Since no starving or special preparation is required regional block is preferred in trauma procedures as in emergency settings patient is generally full stomach.^[18]

Various studies were conducted to look for the safety of combined femoral and sciatic nerve block over general and central neuraxial blocks for lower limb surgeries. Aksoy et al. compared continuous spinal and peripheral nerve block in hip replacement surgery.^[19] Mehroutra S. compared 3 in 1 femoral with sciatic nerve block over GA.^[20]

Patients with cardiovascular instability and anticoagulant therapy can undergo lower extremity surgery under combined femoral and sciatic nerve block safely. In our study one patient in group A was having low cardiac output and safely operated without any complications with combined block. Tantry et al. conducted a study of patient with severe valvular disease under combined femoral and sciatic nerve block without any complications.^[21]

Combined femoral and sciatic nerve block provides longer duration of postoperative analgesia of about 12–13 hours as compared to a central neuraxial block of about 4–5 hours, so low doses or less doses of analgesics are required. In our study duration of postoperative analgesia was around 13 hours which is in concordance with results by Papper et al.^[22]

Among various local anesthetics, the use of ropivacaine improves the quality of block; provide prolonged duration of sensory block and postoperative analgesia

Mean onset time of sensory and motor block, mean duration of sensory and motor block and postoperative analgesia in our study shows similar results that with the study of Tang et al.^[23]

In our study fentanyl was used but it had no benefit in onset and duration of anesthesia.

Conclusion

Combined femoral-sciatic nerve block is one of the most useful anesthetic procedures and can be used for lower limb orthopaedic surgeries without any major adverse effects and complications. Also it can be used in critically ill patients with comorbid conditions like valvular heart diseases. Significant difference was not seen by adding fentanyl, but this technique can be used for prolonged analgesia.

References

- [1] White PF, Kehlet H, Neal JM, Schricker T, Carr DB, Carli F. The role of the anesthesiologist in fast-track surgery: from multimodal analgesia to perioperative medical care. *Fast-Track Surgery Study Group. Anesth Analg.* 2007 Jun; 104(6):1380-96, table of contents.
- [2] Chug F, Mezei G. What are the factors causing prolonged stay after ambulatory? *Anesthesiology* 1998;89:A3
- [3] Mansour A. Femoral nerve block versus spinal anesthesia for lower limb peripheral vascular surgery. *AJAIC.* 2006;9:1.
- [4] Malik S, Krishna D, Malik S. Combined psoas compartment and sciatic nerve block for lower limb surgery: An alternative anesthetic option in high-risk geriatric patients. *Karnataka Anaesth J.* 2015;1:85–8.
- [5] Mc Conachie I, McGeachie J. Regional anaesthesia techniques. In: Healy Thomas EJ, Cohen PJ, editors. Wylie and Churchill Davidson's A Practice of Anaesthesia. 6th ed. Edward Arnold; 1995. pp. 792–795.
- [6] Parker MJ, Handoll HH, Griffiths R. Anaesthesia for hip fracture surgery in adults. *Cochrane Database Syst Rev.* 2004 Oct 18; (4):CD000521.
- [7] Morrison RS, Magaziner J, McLaughlin MA, Orosz G, Silberzweig SB, Koval KJ, Siu AL. The impact of post-operative pain on outcomes following hip fracture. *Pain.* 2003 Jun; 103(3):303-11.
- [8] MOORE DC. Sciatic and femoral nerve block. *J Am Med Assoc.* 1952 Oct 11; 150(6):550-4.
- [9] Baddoo H. A preliminary report on the use of peripheral nerve blocks for lower limb amputations. *Ghana Med J.* 2009 Mar; 43(1):24-8.
- [10] Chelly JE, Delaunay LA. A new anterior approach to the sciatic nerve block. *Anesthesiology.* 1999 Dec; 91(6):1655-60.
- [11] Casati A. Multiple-Stimulation Technique to block the Sciatic nerve. In: Chelly JE, editor. *Peripheral Nerve Blocks.* 2nd Edn. Philadelphia: Lippincott Williams and Wilkins; 2004. pp. 121–122.
- [12] Lipsy Bansal, Joginder Pal Attri, and Pawan Verma. Lower limb surgeries under combined femoral and sciatic nerve block. *Anesth Essays Res.* 2016 Sep-Dec; 10(3): 432–436
- [13] Arora MK. Scope of regional anaesthesia editorial. *J Anaesth Clin Pharmacol.* 1999; 15(4):359–360.
- [14] Inbasegaran K. Are outcomes better with regional anaesthesia rather than general anaesthesia. In: Dureja GP, Madan R, Kaul HL, editors. *Regional General Anaesthesia and Pain Management. Current perspectives.* 1st ed. BI Churchill Livingstone Pvt Ltd; New Delhi: 2000. pp. 6–19.
- [15] Regnier JM, Rossignol B, Genco G, Picart F, EgretEAU JP. Evaluation of locoregional anaesthesia in an emergency -traumatology operating room. *Cah Anesthesiol.* 1994; 42(4):545–548.
- [16] Aural Y, Narchi P, Messiah A. Serious complications related to regional anaesthesia: results of prospective survey in France. *Anesthesiology.* 1997; 87:479.
- [17] Chan V. Advances in regional anaesthesia and pain management. *Can J Anaesth.* 1998; 45:5.
- [18] Rouhalomin E, Harris D. Axillary block anaesthesia in acute and elective hand surgery: A report on 300 procedures. *Ann R Coll Surg Engl.* 1990; 72(2):90–93.
- [19] Aksoy M, Dostbil A, Ince I, Ahiskalioglu A, Alici HA, Aydin A, Kilinc OO. Continuous spinal anaesthesia versus ultrasound-guided combined psoas compartment-sciatic nerve block for hip replacement surgery in elderly high-risk patients: a prospective randomised study. *BMC Anesthesiol.* 2014; 14:99.
- [20] Mehrotra S, Mehrotra M. Regional Block Anaesthesia - How Effective is it for Extremity Trauma? *Med J Armed Forces India.* 2002 Jul; 58(3):205-
- [21] Tantry TP, Kadam D, Shetty P, Bhandary S. Combined femoral and sciatic nerve blocks for lower limb anaesthesia in anticoagulated patients with severe cardiac valvular lesions. *Indian J Anaesth.* 2010;54:235–8

- [22] PAPPER EM, BRODIE BB, ROVENSTINE EA.
Postoperative pain; its use in the comparative evaluation
of analgesics. *Surgery*. 1952 Jul; 32(1):107-9.
- [23] Tang S, Hong X, Huang Y, Ren H, Ye T, Luo A.
Sufentanil does not enhance the efficacy of ropivacaine
in combined lumbar plexus and sciatic block: A
controlled randomized clinical trial. *Acute Pain*. 2007;9:
59-63.