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Comparative study of anterior and posterior approaches for sciatic nerve block for lower limb and foot surgery in diabetic patients

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Abstract
Background: Sciatic nerve block (SNB) is an established technique of anaesthesia for lower limb and foot surgeries. Although several approaches to SNB have been described not a single one is ideal in all respect. We aimed to compare commonly used two approaches to SNB to fin d out which one is better with regard to efficacy and patient satisfaction.
Methods: Consented 100 diabetic patients of ASA grade II, III posted for foot and /or lower limb surgery were randomly allocated to receive SNB by either anterior (n=50) or posterior (n=50) approach. Blocks were performed utilizing peripheral nerve stimulator (PNS), with 25 ml of local anaesthetic mixture (10 ml of 2% lignocaine with adrenaline and 15 ml of 0.5% bupivacaine). Time taken to perform block with number of attempts required, onset of sensory and motor block, duration of analgesia were record ed and compared. We also had compared comfort level of the patients.
Results: Time taken to perform anterior approach was significantly less ($p< 0.05$) when compared to posterior approach. Patients were comfortable with anterior approach than that of posterior. Faster onset of sensory and motor block, and more duration of analgesia was observed with the posterior group but the difference was not statistically significant.
Conclusion: Our study concluded that though efficacy of both the anterior and posterior approaches to block sciatic nerve was same, anterior approach is easier than posterior approach as it requires lesser time to perform and gives far better patient comfort

Keywords: diabetic, anterior, posterior

Introduction
To be widely accepted in clinical anesthesia practice, a peripheral nerve blocking technique must be technically simple, use easily identifiable landmarks, produce minimal patient discomfort, and provide prompt onset of surgical anesthesia. Sciatic nerve block is a well-recognized technique
for providing anaesthesia and post-operative analgesia for foot and ankle surgeries. Although several approaches to sciatic nerve block have been described, difficulty in identifying bony landmarks (particularly in overweight patients), substantial patient discomfort because most approaches require needle passage through dense gluteal or thigh musculature [1, 2].
The anterior approach to the sciatic nerve is performed with the patient remaining in the supine position and the need to position the patient in the sim's position for the posterior approach to sciatic nerve block, hence both approaches has advantages and disadvantages in patients with limited mobilization, morbid obesity, spine and hemodynamic instability [3].
Patients with long duration of diabetes are more prone for multi system disorders and compromised physiological state. Diabetic foot surgeries are mostly performed under regional nerve blockade, which does not interfere much with normal physiology [4].
Various factors affect the success rate and onset time of peripheral nerve blocks, including the concentration and volume of the injected anesthetic solution, type of approach used [5].
The purpose of this study was to evaluate the effects of different approaches (anterior and posterior) on the time required to perform, onset of anaesthesia, efficacy and duration of analgesia after sciatic nerve block performed with the same volume of local anaesthetic after a single-injection sciatic nerve block.

Materials and Methods
Source of Data
After ethical clearance from college committee, 100 diabetic patients undergoing lower leg and foot surgeries were selected for study
Study design- Prospective randomised single blind study
Sample size- 100 patients were selected based on inclusion criteria.
Inclusion criteria- Diabetic patients scheduled for lower limb (foot and ankle) surgeries belonging to ASA grade II and III and aged above 20 years.
Exclusion criteria -Patients refusal for study, coagulation abnormalities, skin infection at the site of needle entry and patients with chronic pain syndrome were excluded from the study.
Patients were shifted to sliding scale for sugar control, were advised to fast overnight and were given Tab Alprazolam 0.25 mg orally night before. All routine and if required specific lab investigations were done. Morning insulin was omitted, fasting sugar and electrolytes were checked and urine ketones were ruled out. Patients were explained about procedure and written consent for study was obtained. In the operation theatre patients were started on IV infusion according to fasting sugar levels. Goal was to keep sugar level in range of 150-200 mg% intraoperatively.

Multipara monitor was attached and baseline pulse, NIBP, Sao2, ECG were recorded. Oxygen was given via nasal prongs with 4 lit/min. Then patients received sciatic nerve block by either of approaches under all aseptic precautions with local infiltration at site of entry as described below.

Patients in whom medial aspect of lower leg was involved received additional saphenous nerve block at knee level.

Group A: Beck' s approach: With patient supine and lower extremity rotated externally a line was drawn between anterior superioriliac spine (ASIS) and pubic tubercle (PT). A second line was drawn parallel to first line passing through greater trochanter (GT). A perpendicular line was drawn from junction of medial 1/3rd and middle 1/3rd of the first line and this was extended to second line to define point of entry of the needle. A 15 cm long stimuplex needle was then passed at right angle to the skin till we get desired motor response of plantar flexion and inversion of foot at 5 mA current. Then the current was gradually reduced to 0.4mA and the motor response was confirmed. Sometimes manipulations like internal rotation of the leg to negotiate lessor trochanter were done. Desired motor response was obtained at the depth of 9-12 cm from the skin.

Group P: Winnie's approach: Patient was positioned laterally with the limb to be blocked uppermost, the lower leg was extended straight and the upper leg was maximally flexed at hip and was bend at right angle at knee. A line was drawn from GT to posterior superioriliac spine (PSIS). A second line was drawn from GT to sacral hiatus (SH). A perpendicular was drawn bisecting the first line and that was extended to second line to define the point of the needle entry. A 15 cm long stimuplex needle was passed perpendicular to the skin searching for desired motor response of palnter flexion and inversion of foot at 5mA current. Then the current was gradually reducd to 0.4 mA to conform the needle position. Desired motor response was obtained at the depth of 8-10 cm from the skin. Plexygon nerve stimulator was used, in itial setting was kept at 5mA, desired response was of posterior tibial nerve (plantar flexion and inversion at 0.4mA was taken as end point) 10 and 25 ml of local anaesthetic mixture (10 ml of 2% lignocaine with adrenaline 1: 2,00,000 and 15 ml of 0.5% bupivacaine) was injected in aliquots after negative aspiration for blood. Saphenous nerve block: Patient was placed in supine position. Subcutaneous infiltration of lignocaine 2% with adrenaline (5-7) ml was made in anterior and posterior direction at level 3-4 cm distal to medial condyl.

Results

Table 1: Demographic data

Variable	Group-A	Group-P	p-value
Age	52.23 + 10.24	53.12 + 11.24	>0.05
Sex (M: F)	42:8	43:7	>0.05
Weight in Kg	62.24 + 8.32	63.12 + 9.65	>0.05
ASA (II: III)	26:24	25:25	>0.05

Demographic distribution shows there are no significant differences in two groups regarding age, weight and sex and ASA grade.

Table 2: Comparison of study variables

Variable	Group-A	Group-P	p-value
Time to perform block	5.83 + 1.17	6.44 + 1.14	<0.05
Time to perform procedure	13.1 + 4.12	18.23 + 5.23	<0.05
Number of attempt	3.87 + 0.90	2.81 + 0.90	>0.05
Sensory block onset (min)	12.7 + 7.12	10.52 + 8.21	>0.05
Motor block onset (min)	20.64 + 7.41	19.24 + 5.98	>0.05
Duration of analgesia (hrs)	9.35 + 5.12	9.56 + 5.24	>0.05
Comfort of patien	30(60.00%)	10(20.00%)	<0.05

Time taken to perform the block is significantly less in group A than in group P ($p< 0.05*$). Time taken to complete the procedure is significantly more in group P than in group A ($p < 0.05*$). Statistically there is no significant difference observed in both the groups with regard to number of attempts required for placement of the block (p= 3.95). Sensory onset time is early in group P than in group A but the difference is not statistically significant (p>0.05). Onset of motor block in both the groups is comparable (p>0.05). We can see duration of analgesia in group A and in group P is almost similar. We can observe from the table that there is statistically significant difference in Comfort level of the patients ($p < 0.005*$) 60% of group A while only 20% of group P patient appear to be comfortable about the procedure.

Discussion

Peripheral nerve block is an extremely effective and useful technique for lower limb and foot surgeries [6]. In high risk patients with unstable haemodynamics central neuroaxial blockade which causes bilateral blockade with extensive sympathectomy should be avoided. As peripheral nerve block can be confined to regional area without affecting patients sympathetic nervous system it gives better haemodynamic stability so is a suitable technique [7] Unilateral spinal or graded epidural anaesthesia are other methods todeal with such patients under regional anaesthesia but are not free from their own side effects or complications [8, 10]. While General anaesthesia is an acceptable alternative it comes with its own complications. [11]. With the use of USG machine peripheral nerve blocks are being used widely and precisely for almost all of the surgeries either intraoperatively or for postoperative analgesia.

In Rajasthan state due to strict law of PCPNDT, it is not easy to get USG machine at operation theatre, our institute lack this facility so here we are using our gold standard PNS guided technique. For lower leg and foot surgeries. In literature various approaches to block SN are described and most of the time posterior approach of Labat is used [6, 12].

In posterior approach patient needs to be in lateral position which is cumbersome to the patient, and sometimes it is not safe for obese or unstable patient. Also, there are some difficulties in monitoring and handling of patients airway in lateral position. These drawbacks are taken very well taken care in supine position with Beck's anterior approach. In

observations we found time taken to perform block and total procedural time was more in posterior approach and the difference was statistically significant than that of anterior one. This might be due to time taken to give lateral position and to identify multiple bony landmarks.

Conclusion

Through our study we have come to the conclusion that though efficacy of both the approaches to block sciatic nerve is same, anterior approach is easier than posterior and requires lesser time to perform with better patient comfort and satisfaction.

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