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Comparative Study between Single Injection Parasacral and Popliteal Approaches for Sciatic Nerve Block

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ABSTRACT

Background: Sciatic nerve block is used for orthopedic procedure involving the lower limb. Parasacral approach for sciatic nerve block may be associated with complications, so single injection popliteal approach with insertion of the needle at the level of separation of tibial and common peroneal nerves was used.

Objective: The aim of the current study was to compare between single injection parasacral and popliteal block at neural bifurcation to block the sciatic nerve during below-knee surgeries using combined ultrasound-nerve stimulation as regards the beginning of a total sensory and motor block, the duration of the block and patient satisfaction.

Patients and methods: A randomized controlled clinical trial work was conducted at Zagazig University Hospitals on 100 patients of both sexes scheduled to undergo elective below knee surgery. Patients were divided randomly into two groups; Group I: Patients got a single injection to block the parasacral sciatic nerve while being guided by both nerve stimulation and ultrasonography and Group II: Individuals receiving popliteal sciatic block had a single injection in the common epineural sheath under guiding using both ultrasound and nerve stimulation. Patients were followed up for outcomes of usage of each of the blocking techniques.

Results: Performance time in popliteal sciatic block approach was significantly shorter than parasacral approach. Also the beginning of a popliteal sciatic block's complete sensory and motor block approaches was considerably shorter than parasacral approach. **Conclusion:** Combined ultrasound nerve stimulation during below-knee procedures, sciatic nerve block using parasacral and popliteal techniques proved a successful anesthetic strategy. The popliteal sciatic nerve block method, however, is superior to parasacral sciatic nerve blocking in terms of faster block performance and rapid complete sensory and motor block onset.

Keywords: Parasacral approach, Popliteal approach, Sciatic nerve blocks, Ultrasound-guided nerve block, Clinical trial, Zagazig University.

INTRODUCTION

Peripheral nerve blocks offer patients a number of benefits, such as better analgesia and a reduction in side effects from general anesthesia. However, for peripheral nerve block to be effective; there must be a quick onset and sufficient duration of complete sensory and motor block of action for both the surgical process and the ensuing postoperative analgesia. The method should also reduce the risk of complications in relation to block and the systemic absorption of local anesthetic [(1)].

For below-the-knee surgeries, a sciatic nerve block in conjunction with an appropriate femoral nerve block has been the preferred peripheral nerve block [(2)]. Any location along the sciatic nerve's path, from proximal to distal, might be anesthetized [(3)].

Parasacral route is a proximal approach that blocks the entire sacral plexus from emerging through the greater sciatic notch. Parasacral methods, as opposed to Winnie, sub-gluteal, or popliteal approaches, can affect the thigh's posterior cutaneous nerve. Moreover, when compared to other posterior methods, the greater sciatic foramen-based parasacral route exhibits a reduction in the nerves' depth at emergence [(4)].

Although particular complications related to the parasacral block procedure, such as hemorrhage, rectal perforation, and transitory sciatic neuralgia, may occur, it has been seen that they recover spontaneously after 48 hours [(4)].

During below knee procedures, the sciatic nerve in the popliteal fossa is frequently blocked in the distal lower extremities. Here, a subepineural injection was utilized to block the sciatic nerve at or just above its branching point into the tibial and common peroneal nerves, which produced a significant block and increased effectiveness [(5,6)].

Ultrasound nerve localization enables the safe and effective use of many peripheral nerve blocks that were previously difficult to perform with only landmark techniques. Viewing the needle, nerves, and surrounding structures as well as the spread of local anesthetic can also improve block efficacy, duration, and local anesthetic consumption while reducing the risk of complications [(7,8)].

To enhance sciatic nerve blockage and lower the incidence of morbidities, nerve stimulation and ultrasound guiding were coupled. Although the sciatic nerve may be a deeper structure, nerve stimulation is frequently utilized as a confirmation to ultrasound guidance sciatic nerve block [(9)]. When using specialized ultrasound guided procedures, nerve stimulation may be useful for avoiding nerves in the needle's path and serving as a safeguard against needle-nerve contact [(10)].

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The aim of the current study was to compare between single injection parasacral and popliteal block at neural bifurcation to block the sciatic nerve during below-knee surgeries using combined ultrasound-nerve stimulation as regards the beginning of a total sensory and motor block, the duration of the block and patient satisfaction.

PATIENT AND METHODS

A randomized controlled clinical trial work was conducted at Zagazig University Hospitals, from January 1, 2021 to 31 July 31, 2022, on 100 patients of both sexes scheduled to undergo elective below knee surgery. Patients were divided randomly into two groups

- Group I (n=50): Under combined ultrasound (US) and nerve stimulation (NS) guidance, Patients only need one injection to block the parasacral sciatic nerve.
- Group II (n=50): Under combined US and NS patients received direction a single-injection in the common epineural sheath for popliteal sciatic block.

As the thigh tourniquet was used, the femoral nerve block was done in both groups.

Inclusion criteria: Patient acceptance. Age: 21-65 years. Sex: both males and females. American Society of Anesthesiologists Physical Status (ASA –PS) I–II patients. Body mass index (BMI) ≥20 and ≤35 kg/m^2. Scheduled to undergo below knee surgery.

Exclusion criteria: Preexisting neuropathy. Coagulopathy. Patients with advanced hepatic, renal and cardiac disease. Allergy to local anesthetic (LA). Pregnancy. Prior surgery in the spine or in the popliteal fossa.

Preparation of the Local Anesthetic Used in the Study: On arrival the patient to the post-anesthesia care unit (PACU) room, an intravenous catheter of 18 or 20 gauge was placed, and lactated ringer 8-10 ml /kg was started to be infused for replacement of overnight fasting. The same amounts of 0.5% bupivacaine (Sunny Pharmaceutical, Egypt) and 2% lidocaine (Sunny Pharmaceutical, Egypt) each of both had 1:200 000 epinephrine, so after mixing the concentration was 0.25% bupivacaine, 1% lidocaine and 1:200 000 epinephrine. Premedication with IV midazolam 0.02 mg/kg (Sunny Pharmaceutical, Egypt) and fentanyl 0.5 ug/kg (Sunny Pharmaceutical, Egypt) was given to every patient. Oxygen administration (nasal cannulas at 4L/min) and standard monitors (pulse oximetry, non-invasive blood pressure (NIBP), ECG were attached to the patients, and baseline vital signs were assessed and recorded before and after premedication.

Technical Procedure for Parasacral Sciatic Nerve Block: In Sim's position, the patients were placed laterally with the operated side uppermost and the dependent side straightened while both the hips and knees flexed. Draw a line using the anatomical landmarks posterior superior iliac spine (PSIS) with ischial tuberosity (IT).connecting these two points dividing into thirds [11]. After skin sterilization, we use low frequency (2-5 MHZ) curved transducer (Sonosite M Turbo, Bothell, USA) placed perpendicularly to the drawn line a distance of one-third the distance from PSIS. The sciatic nerve appears as a hyperechoic structure on ultrasonography medial to the posterior border of the ischium (PBI). Injection of 3ml lidocaine 1% at the site of needle entry then insulated needle (Stimuplex D B Braun) placed in-plane was introduced using a neural stimulator (B Braun Germany). Whenever the needle comes into contact with the sciatic nerve, the foot will either plantar flex, dorsiflex, or evert at 0.5 mA current indicating correct placement of the needle. Following negative blood aspiration, 20 ml of a prepared local anesthetic was incrementally administered (5 ml) keeping an eye out for parasthesia, reflex movement, injection resistance, and the distribution of local anesthetic in the vicinity of the sciatic nerve.

Technical procedure for popliteal block: The patients were lying on their backs. Skin sterilization is followed by high frequency (7-12 MHZ) linear transducer placed over popliteal crease. Then we trace proximally to identify the exact point of tibial nerve (TN) and common peroneal nerve (CPN) start separation from Sciatic nerve but still in common epineural sheath and appear as hyperechoic structure. Injection of 3ml lidocaine 1% was done at the site of needle entry. Insulated needle was introduced through in-plane technique attached to nerve stimulator. Once the needle seen in contact with the site of bifurcation between T N and CPN, eliciting planter flexion, foot eversion or dorsiflexion at current of 0.5 mA indicate the needle's position is correct. Following a negative blood aspiration, 20 ml of prepared local anesthetic solution was injected incrementally (5 ml) with special focus on the distribution of local anesthetic surrounding the sciatic nerve, the existence of parasthesia, reflex movement, and injection resistance.

Technical procedure for femoral nerve block for the both groups: The patients were lying on their backs. After skin sterilization, we use high frequency (7-12 MHZ) linear transducer placed at inguinal crease parallel to inguinal ligament which is extending to from the anterior superior iliac spine (ASIS) to the pubic tubercle. In contrast to the femoral artery, the femoral nerve is seen as a hyperechoic structure. Injection of 3ml of 1% lidocaine was done at the needle site entry. Insulated needle was introduced through in-plane technique attached to nerve stimulator. Once the femoral nerve was contacted by the needle, eliciting of adequate motor response by quadriceps contraction patellar snap (dance sign) at current of 0.5 mA indicate correct placement of the needle.

Following negative blood aspiration, 10 ml of a prepared local anesthetic solution was incrementally administered (5 ml) paying close attention to local anesthetic distribution around the femoral nerve, the existence of parasthesia, reflex movement, and injection resistance.

Following local anesthetic injection, every five minutes, the sensory and motor blockage of the operated limb will be checked until full block or the 45-min had ended. In 3 nerve areas, the sensory block's distribution was evaluated: TN (sole of foot), superficial peroneal nerve (dorsum of foot) and deep peroneal nerve (skin space between the first and second toes). The evaluation was conducted using the pinprick method and a 4-point scale: (3) typical sensation, (2) dull sensation, (1) scarcely noticeable and (0) no sensation On a 4-point scale, motor block of the TN (toes and plantar flexion of foot) and CPN (toes and dorsiflexion of foot) was rated: (3) full strength, (2) weak resistance response, (1) a barely discernible response in the absence of opposition, and (0) paralysis [12]. Score 0 was assigned on each scale, to a complete sensory and motor block.

The following parameters were detected and recorded in each group

1. **Demographic data** including age (year), weight (kg), height (cm), BMI (kg/m2), ASA PS classification, sex, types of operations, operation duration (minute) calculated from surgical incision until adhesive application to the wound and tourniquet duration (minute) calculated from start of tourniquet inflation to the end of tourniquet deflation.
2. **Procedure time** is the time from the beginning of nerve detection till the completion of drug injection.
3. **Onset time of complete sensory block** is determined as the interval between the end of injection and sensory blockade of the whole sciatic nerve distribution, or the period at which the block stopped progressing.
4. **Onset time of complete motor block** is calculated as the period between the end of the injection and the moment when the block stopped advancing or until complete motor blockage of the whole sciatic nerve distribution.
5. **Duration of sensory block** is the length of time (in minutes) between the start of the sensory block and the full recovery of sensation in the anaesthetized limb (assessed by pinprick).
6. **Duration of motor block** is the length of time (in minutes) from the onset of a motor block until the patient was able to perform plantar or dorsal flexion of either their ankle joint or their toes on the anaesthetized leg. All patients received paracetamol 1gm IV infusion every 6 h as a standard analgesia (maximum dose 4gm/day) postoperatively when the patient to request analgesia (VAS ≥3).
7. **Heart rate, systolic blood pressure and diastolic blood pressure captured prior to** beginning the block (as baseline), just after tourniquet inflation, 10, 30 and 60 minutes after tourniquet inflation, 5 minutes after tourniquet release, and 15 minutes after tourniquet release.
8. **Incidence of the associated complications** as sciatic nerve damage, vascular puncture, hematoma formation at the needle's insertion site, LA toxicity, respiratory and cardiovascular depressions, nausea, and vomiting. The integrity of the sciatic nerve was assessed daily prior to hospital release and by telephone one week and one month after surgery.
9. **Patient satisfaction** at the end of 24 hours postoperatively, patient satisfaction with the quality of the anesthesia created by US-NS guided sciatic nerve block was evaluated as the following: 0= poor, 1= fair , 2= good and 3= excellent [13].

Ethical Approval:

This study was ethically approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 26.0 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test, Fisher's exact test and Monte Carlo test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and standard deviation (SD), and independent sample t-test and Paired t test were used for comparison between groups. P value ≤0.05 was considered to be statistically significant.

RESULTS

Patients' characteristics: age, weight (kg), height (cm) BMI, sex and ASA PS, type of surgery, surgery duration and tourniquet duration were comparable between the two studied groups (**Table 1**).

Table (1): Baseline data in the two studied groups.

Variable		Group I (n=50)	Group II (n=50)	T test	P-value
Age (years) Mean ± SD		48.18 ± 9.25	46.92 ± 10.27	0.645	0.521
Height (cm) Mean ± SD		167.58 ± 3.79	166.8 ± 3.43	1.079	0.283
Weight (kg) Mean ± SD		83.16 ± 7.79	80.72 ± 7.54	1.591	0.115
BMI (kg/m^2) Mean ± SD		29.66 ± 3.12	29.05 ± 3.04	0.986	0.326
Qualitative Variable				**X^2**	**P-value**
Sex	**Male / Female (n)**	35/ 15	32/18	0.407	0.523
ASA PS I /II (n)		29/21	27/23	0.162	0.687
Type of surgery	**Tendo achiles repair (n)**	19	20	0.659	0.883
	Ankle arthrodesis (n)	6	4		
	Pott's fracture fixation (n)	21	23		
	Calcaneus fracture fixation (n)	4	3		
Variable				**T test**	**P-value**
Surgery duration (min), Mean ± SD		65.5 ± 10.41	63.8 ± 10.07	0.342	0.733
Tourniquet duration (min), Mean ± SD		70.6 ± 9.3	68.7 ± 9.04	0.210	0.71

(t) Independent student t test. Chi-square test: (x^2). P≤0.05 considered significant difference. P>0.05 considered non-significant.

There was highly statistically significant decrease in performance time in Group II than in group I. Also there was highly statistically significant rapid onset of complete sensory and motor block in group II than in group I. While the duration of sensory and motor block were comparable between the two studied groups (**Table 2**).

Table (2): Performance time, Onset of complete sensory and motor block and duration of sensory and motor block in the two studied groups.

Variable	Group I (n=50)	Group II (n=50)	T test	P-value
Performance time (Mean ± SD)	15.24 ± 0.89	10.1 ± 0.65	32.95	<0.001*
Onset of complete sensory block (min) Mean ± SD	18.68 ± 1.19	9.78 ± 0.88	42.496	<0.001*
Onset of complete motor block (min) Mean ± SD	25.22 ± 1.18	13.86 ± 2.23	31.803	<0.001*
Duration of sensory block (hrs)	7.4 ± 0.89	7.7 ± 0.99	1.59	0.114
Duration of motor block (hrs)	6.2 ± 0.9	6.6 ± 0.92	1.74	0.084

n= Patient number. (t) Independent student t test. P≤0.05 considered significant difference. P>0.05 considered non-significant.

Table (3): Surgical pain and tourniquet pain severity (VAS), and intraoperative fentanyl needed.

Variable	Group I (n=50)	Group II (n=50)	T test	P-value
Surgical pain severity score Mean ± SD	2.14 ± 0.53	1.64 ± 0.48	4.897	<0.001*
Tourniquet pain severity score Mean ± SD	2.26 ± 0.49	1.56 ± 0.50	7.081	<0.001*
Qualitative Variable			**X^2**	**P-value**
Intraoperative fentanyl needed (n)	12	3	6.353	0.012*

n= patient number. (t) Independent student t test. Chi-square test (x^2). P≤0.05 considered significant difference. P>0.05 considered non-significant

Systolic and diastolic blood pressures were comparable between the studied groups at different measurements. In our study, within each group regarding systolic and diastolic blood pressure, there was statistically significant decrease in systolic blood pressure after premedication compared with before premedication reading. During the duration of tourniquet inflation there was statistically significant increase in systolic and diastolic blood pressure at 30 and 60 minutes when compared after premedication reading, and there was statistically significant decrease in systolic and diastolic blood pressure at 5 minutes after tourniquet deflation when compared with the reading after tourniquet inflation (**Table 4**).

Table (4): Systolic and diastolic blood pressure at different intervals within and between the two studied groups.

Variable	Group I (n=50)	Group II (n=50)	T test	P-value
Systolic BP				
Systolic BP before premedication Mean ± SD	127.20 ± 5.53	128.1 ± 5.08	-0.848	0.399
Systolic BP after premedication Mean ± SD	114.8 ± 7.64*	114.9 ± 6,8*	1.383	0.170
Systolic BP at inflation of tourniquet Mean ± SD	118.3 ± 7.85	117 ± 9.4	0,411	0.682
Systolic BP 10 min after inflation of tourniquet Mean ± SD	120.4 ± 5.9*	121.5 ± 6.3*	1.224	0.221
Systolic BP 30 min after inflation of tourniquet Mean ± SD	121.3 ± 9.74*	120 ± 9.04*	1.222	0.224
Systolic BP 60 min after inflation of tourniquet Mean ± SD	125.6 ± 10.44*	126 ± 10.05*	-0.781	0.437
Systolic BP 5 min after deflation of tourniquet Mean ± SD	114.3 ± 6.08*	113.9 ± 5.2*	1.226	0.223
Systolic BP 15 min after deflation of tourniquet Mean ± SD	124.8 ± 8.43	125.7 ± 9.03	-1.224	0.221
Paired t test	*P* <0.05*	*P* <0.05*	-------------	
Diastolic BP				
Diastolic BP before premedication Mean ± SD	76.6 ± 4.24	74.2 ± 3.85	0.740	0.461
Diastolic BP after premedication Mean ± SD	62.7 ± 6.56*	64.4 ± 6.11*	-1.340	0.183
Diastolic BP at inflation of tourniquet Mean ± SD	65.5 ± 5.18	65.1 ± 5.52	0.247	0.576
Diastolic BP 10 min after inflation of tourniquet Mean ± SD	62.3 ± 6.1	63.6 ± 6.03	-0.561	0.805
Diastolic BP 30 min after inflation of tourniquet Mean ± SD	74.4 ± 5.96*	75.6 ± 6.83*	0.250	0.803
Diastolic BP 60 min after inflation of tourniquet Mean ± SD	75.6 ± 3.88*	76.3 ± 4.9*	0.240	0.801
Diastolic BP 5 min after deflation of tourniquet Mean ± SD	65.3 ± 6.1*	65.7 ± 5.89*	-0.334	0.739
Diastolic BP 15 min after deflation of tourniquet Mean ± SD	73.52 ± 6.26	71.81 ± 7.11	1.61	0.79
Paired t test	*P* <0.05*	*P* <0.05*	----------------	

n= Patient number. (t) Independent student t test. Paired t test. *P≤0.05 considered significant. P≥0.05 considered non-significant.

Heart rate was comparable between the studied groups at different measurements. Within each group there was statistically significant decrease in heart rate after premedication compared with before premedication reading. There was statistically significant increase in heart rate at 30 and 60 minute after tourniquet inflation when compared after premedication reading, also there was statistically significant increase in heart rate at 5 minutes after tourniquet deflation when compared with after premedication reading. While heart rate at 15 minutes after tourniquet deflation was comparable with before premedication reading (**Table 5**).

Table (5): Heart rate changes at different intervals within and between the studied groups.

Variable	Group I (n=50)	Group II (n=50)	T test	P-value
Heart rate before premedication Mean ± SD	74.10 ± 8.08	75.4 ± 8.38	-0.101	0.716
Heart rate after premedication Mean ± SD	65.1 ± 4.55*	66.13 ± 3.99*	-0.332	0.456
Heart rate at inflation of tourniquet Mean ± SD	68.90 ± 6.90	67.6 ± 6.49	1.033	0.304
Heart rate 10 min after inflation of tourniquet Mean ± SD	65.30 ± 6.10	65.7 ± 5.89	-0.334	0.739
Heart rate 30 min after inflation of tourniquet Mean ± SD	7250 ± 5.65*	73.1 ± 6.23*	1.177	0.242
Heart rate 60 min after inflation of tourniquet Mean ± SD	75.2 ± 4.3*	75.9 ± 5.3*	1.715	0.089
Heart rate 5 min after deflation of tourniquet Mean ± SD	76.90 ± 9.92*	77.10 ± 9.7*	0.250	0.803
Heart rate 15 min after deflation of tourniquet Mean ± SD	73.90 ± 9.92	72.10 ± 9.87	0.250	0.920
Paired t test	*P* <0.05*	*P* <0.05*	--------------	

n= Patient number. (t) Independent student t test. Paired t test. * $P \leq 0.05$ considered significant difference.
$P > 0.05$ considered non-significant

Patient satisfaction was comparable between the two studied groups with high increase in incidence of excellent degree in both groups (**Table 6**).

Table (6): Patient satisfaction in the two studied groups.

Variable		Group I (n=50)	Group II (n=50)	X^2	P-value
Satisfaction	**Poor (n)**	4	1	0.543	0.461
	Fair (n)	1	2		
	Good (n)	6	7		
	Excellent (n)	39	40		

DISCUSSION

In the current study, the detected sciatic nerve performance time was 15.24 (SD 0.89) and 10.1 (SD 0.65) in parasacral and popliteal methods respectively. According to findings, performance time in popliteal sciatic block approach was significantly shorter than parasacral approach. This was due to less number of attempts and easy nerve localization due to superficial nature of the popliteal fossa nerve while the parasacral approach is the opposite as the sciatic nerve is deep.

In agreement with our study is the work of **Van Geffen *et al.*** [14] who according to reports, the popliteal block took 6 minutes to accomplish using the posterior technique. **Tran *et al.*** [6] reported that the popliteal block's performance duration was 9.6 minutes. **Ripart *et al.*** [15] reported that parasacral block performance time was 7 minutes.In contrast to our study is the work of **Fournier R *et al*.** [16] who reported that performance time in lateral popliteal sciatic block (4.5 ± 4 minutes) was significantly longer than posterior sciatic block (2.5 ± 2 minutes). The discrepancy between the duration of performance time in the current study and the findings given by the other worker may be caused by the varied nerve localizing technique and the various needle position correction attempts.

The identified onset time for total sensory and motor block in our study was 18.68 minutes and 25.22 minutes, respectively in parasacral sciatic nerve block, 9.78 minutes and 13.86 minutes, respectively in popliteal sciatic nerve block. The onset of complete sensory and motor popliteal sciatic block was noticed in the current study to be significantly shorter than parasacral approach. This was due to trapping of local anesthetic to the popliteal fossa underneath the common epineural sheath.

In agreement with our study is the work of **Cuvillan *et al.*** [17] who reported that with Winnie two injections, the total onset time of the sensory and motor block was 15 min and significantly shorter than parasacral approach 25 minutes. In contrast to the current study, **Taboada *et al.*** [18] reported that in popliteal SN block through posterior route, total sensory and motor block onset time was 30 minutes. Due to the use of various types and concentrations of the local anesthetic, there was a disparity between the detected start of total sensory and motor block.

In the current study, sensory and motor blockade lasted for 7.4 hours and 6.2 hours, respectively in parasacral sciatic nerve block, 7.7 hours and 6.6 hours respectively in popliteal sciatic nerve block without a discernible difference.

In agreement with the present study, **Gary *et al.*** [12] reported duration of 6.1 hours for parasacral SN block. **Benedetto *et al.*** [19] reported comparable popliteal and subgluteal techniques for long-lasting sciatic nerve block during postoperative analgesia.

In contrast with the current study, **Fournier *et al.*** [16] reported that popliteal sciatic nerve block approach had statistically a longer duration than parasacral approach due to cephald and caudal distribution of local anesthetic with higher systemic uptake and short duration in parasacral than in the popliteal region.

In the current study, parasacral sciatic nerve block and popliteal sciatic nerve block were equivalent between the two groups regarding hemodynamic measures, including heart rate, systolic blood pressure, and diastolic blood pressure.

In agreement with the present study, **Bansal *et al.*** [20] reported that lower limb operations with a combination femoral and sciatic nerve block produce stable hemodynamics. **Davarci *et al.*** [21] and **Arjun *et al.*** [22] reported that hemodynamic stability was achieved after popliteal sciatic and adductor canal blocks guided by ultrasonography during below-knee procedures.

In our study, within each group regarding systolic and diastolic blood pressure, there was statistically significant decrease in Systolic blood pressure after premedication compared with before premedication reading.

During the duration of tourniquet inflation both the systolic and diastolic blood pressure increased in a statistically meaningful way at 30 and 60 minutes when compared after premedication reading, and compared to the result taken after the tourniquet was inflated, there was a statistically significant decrease in both systolic and diastolic blood pressure 5-minute after tourniquet release.

We discovered that the tourniquet effect is caused by elevated sympathetic tone because when the tourniquet is placed, patients may have signs including heart palpitations and high blood pressure as a result of ischemia discomfort in the leg and concurrent patient danger. After the tourniquet was removed, undesirable effects occurred as decreased blood pressure as a result of post-ischemic reactive vasodilatation, the blood was distributed to the periphery, and metabolites were released from the ischemic area into the systemic circulation.

According to the current study, **Di Jin *et al.*** [23] reported that when compared within the femoral block group, mean arterial pressure increases as tourniquet time progresses and decreases once the tourniquet is removed.

In contrast with the current study, **Li *et al.*** [24] found that mean arterial pressure measurements within sciatic-femoral block group during tourniquet application were comparable at different intervals and sciatic-femoral block can maintain hemodynamic stability by preventing the tourniquet reaction.

In the present study within each group heart rate reduced by a statistically significant amount after premedication compared with before premedication reading.

There was statistically significant increase in heart rate at 30 and 60 minutes after tourniquet inflation when compared after premedication reading, also there heart rate increased in a statistically meaningful way at 5 minutes after tourniquet deflation when compared with after premedication reading.

In contrast with the current study, **Di Jin *et al.*** [23] reported that HR measurements within femoral block group during tourniquet application were comparable, with the progression of tourniquet time.

In the present study, in parasacral and popliteal methods there was no correlation to complications like hematoma, vascular injury, sciatic nerve injury, local anesthetic general toxicity, respiratory depression or nausea and vomiting. One patient in the parasacral sciatic nerve block group developed parathesia and that was attributed to tourniquet application that lasted for 105 minutes.

In agreement with the present study is the work of **Van Geffen *et al.*** [14] and **Volka *et al.*** [25] who reported that the posterior route popliteal SN block did not have any complications.

The low incidence of the associated complications was due to ultrasound visualization of the needle, the sciatic nerve, and any nearby vascular structure which leaded to decrease the chance of nerve injury, inadvertent puncture of a blood vessel and local anesthetic general toxicity.

In the two groups, the patients' satisfaction levels with the quality of the produced anesthesia by sciatic nerve block were good and excellent in 6 and 39 patients respectively in parasacral approach, 7 and 40 patients respectively in popliteal approach with no significant difference.

In agreement with the present study is the work of **Taboada *et al.*** [18] who found that 92% and 96% of patients were satisfied in posterior and popliteal SN block approaches respectively and the satisfaction level with the block via posterior and popliteal approaches were comparable. **Davarci *et al.*** [21] reported that all patients showed they would prefer the same anesthetic method in the future.

CONCLUSION

Combined ultrasound nerve stimulation sciatic nerve block through parasacral and popliteal approaches was effective anesthetic technique for below knee surgeries and leaded to decrease incidence of adverse effects and well tolerated surgical and tourniquet pain. However, popliteal sciatic nerve block is superior to parasacral sciatic nerve block approach as regards shorter block performance time and rapid onset of complete sensory and motor block.

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