ORIGINAL ARTICLE

Comparison of Ultrasound Guided Ankle Block versus Anatomical Landmark Guided Ankle Block in Minor Ankle and Foot Surgeries

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ABSTRACT

Background: Regional anesthesia has increasingly expanded its role in perioperative care of patients undergoing foot and ankle surgery. The use of regional anesthesia has been widely implemented among anesthesiologists and pain providers. Multiple approaches for sephanous nerve blockade have been used including nerve stimulation, anatomical landmarks and ultrasound. It has been observed in previous studies that USG ankle block is more successful as compared to conventional anatomical landmark guided nerve block; so this study was planned to get precise and reliable results regarding both techniques in our local population.

Objective: To compare the methods of surgical anesthesia of Ultrasound-guided ankle block versus conventional anatomic landmark-guided techniques in lower limb surgery under regional anesthesia.

Materials and methods: This randomized control was carried out at Department of Anesthesia Mayo Hospital Lahore. After meeting the inclusion and exclusion criteria 50 patients (25 in each group) were enrolled. Patients were randomly divided into two groups using lottery method. Group A patients underwent USG ankle block while group B patients underwent conventional anatomic landmark guided ankle block.

Results: Mean age of patients was 46.96±11.578 years; 40(80%) patients were male and 10(20%) patients were females. Successful anesthesia was achieved in 42 (84%) patients; in which in USG block group the successful anesthesia was achieved in 22(88%) patients and in ALG block group successful anesthesia was achieved in 20(80%) patients (p value =0.702)

Conclusion : Findings of this study conclude that both techniques have statistically insignificant difference in terms of success rate , however USG ankle block for surgical anesthesia showed higher success rate as compared to anatomic landmark guided technique in lower limb surgery under regional anesthesia.

Keywords: Ultrasound-guided Ankle Block, Anatomic Landmark-guided Ankle Block, Lower limb surgery.

INTRODUCTION

Foot surgery is usually painful postoperatively and is often undertaken in the day care setting; hence the delivery of appropriate analgesia is crucial for early discharge. Regional anaesthesia for foot surgery gives great anaesthetic and after surgical analgesia; which is perfect for day case surgeries [1]. Saphenous nerve is the final sensory branch of femoral nerve. It gives innervations to the skin overlying the medial, anteromedial and posteromedial portions of lower leg. This innervations stretches from the cephalad section of the knee to the level of medial malleolus. Blockade of sephanous nerve is necessary for procedures hat include the medial aspect of the foot or ankle where a regional method is favoured [2]. In past different approaches for sephanous nerve blocking have been explored which include nerve stimulation, landmarks and ultrasonography [3-5]. Recent ultrasound approaches have never been compared with routinely used nonultrasound treatments [6]. Suitable regional anaesthetic treatments include a spinal anaesthetic, popliteal sciatic blck, ankle block, metatarsal block or combination of these procedures; however; ankle blocks can give sustained postoperative analgesia and promote early mobilisation [1]. Traditionally ankle blocks have been performed by depending on landmark identification of nerves. The literature evaluating performance and efficacy of ankle block is inconsistent [7]. USG approach may improve block success compared with the standard technique, particularly in less-experienced hands [8]. It is difficult to demarcate the tiny nerves around the ankle on static photos. Real –time imaging makes their position and bounds easy to identify; since one can follow their course readily [1]. In a study; it was noted that good surgical anaesthesia was more frequent in the USG group (84 percent versus 66 percent p <0.001) as compared to ALG ankle block in lower limb surgery [8]. The conventional approach of ankle blocking for surgical anaesthetic has been found to be less effective than the USG ankle block, according to the literature. Due to a lack of local data and a lack of previous research showing that the USG ankle block is more effective, the conventional method is still in use. This study was therefore conducted in order to obtain precise and reliable results that can be implemented in local settings in the future, and the results obtained show that this is indeed the case.

MATERIALS AND METHODS

Study Design: Randomized controlled trial.

Settings: Department of Anesthesia, Mayo Hospital Lahore.

Sample size: Sample size of 50 cases; 25 cases in each group is calculated with 80% power of test; 5% level of significance and taking expected percentage of successful surgical anesthesiai-e 66% conventional ALG method versus 84% with USG ankle block in patients undergoing lower limb surgery.

Sampling technique: Non probability consecutive sampling.

Sample selection: Inclusion criteria: Patients of age 20-80 yrs of either gender with plan to undergo elective surgeries of lower limb

Exclusion criteria: Patients having any neurological or musculoskeletal disease (clinical examination), Patients with systemic diseases like Diabetes mellitus(BSR > 200mg/dl) or hypertension (BP >140/90mmHg),asthma or COPD, or cardiac problem(abnormal ECG)

Machine and Technique: Ultrasound machine with linear transducer (8-18 MHz) is used. The needle tip is placed immediately adjacent to each of five nerves (superficial peroneal nerve, deep peroneal nerve,saphenous nerve, sural nerve and tibial nerve) and deposit local anesthetic until the spread around each nerve is accomplished.

Data collection procedure: After taking approval from institutional review board, 50 patients fulfilling selection criteria were enrolled in the study from operation theater of Department of Surgery ,Mayo Hospital Lahore.Informed consent was taken. Demographic information like age,sex was also noted. Then patients were randomly divided into two groups using lottery method. Group A patients underwent USG guided ankle block while group B patients underwent ALG ankle block. Then patients were followed up for 15 minutes for successful implication of anesthesia at site of surgery by researcher himself. Pin pricking method was used to assrss the sensation of body at surgical site.If there was no sensation at surgical site, then successful surgical anesthesia was labeled.

Data Analysis: All data analysis was performed by using SPSS version 21. Quantitative data like age and BMI was presented as mean and standard deviation and qualitative data like gender ;successful.

RESULTS

Surgical anesthesia was presented as frequency and percentage, chi-square test was applied. P value ≤ 0.05 was considered as significant.
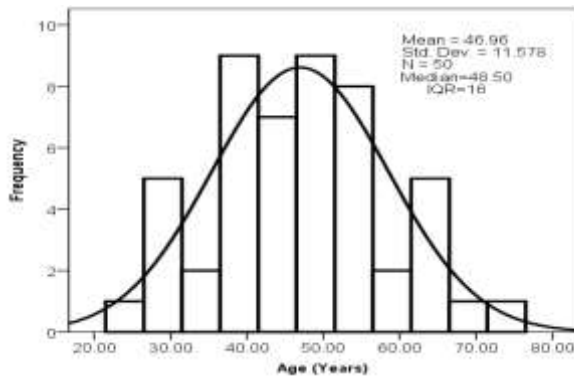

Fig 1: Summary statistics of age (years)

In this study total 50 patients were participated. By applying KS test we came to know that the age was normally distributed. According to this study the mean age of the patients was 46.96±11.578 years with minimum and maximum ages of 24 & 74 years respectively.

As data of age was not normal, so in USG block group the median age of the patients was 49(25.75) years and in ALG block group the median age of the patients was 45(25.25) years. This difference was statistically insignificant. i.e. p-value=0.229.

Table 1: Comparison of age between study groups

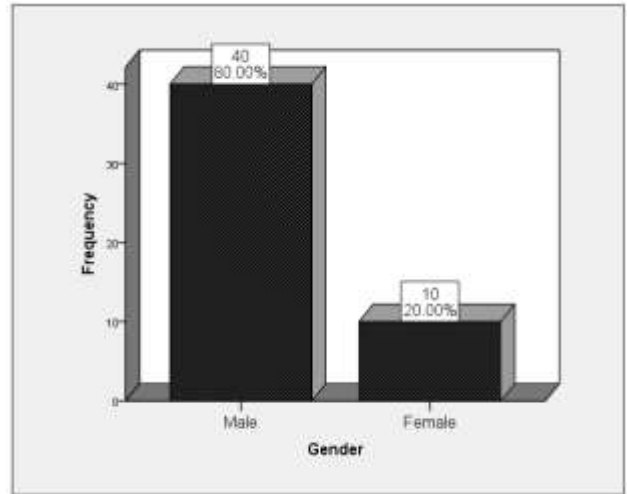|		Study Groups		p-value
		USG block	ALG block	
Age (Years)	n	25	25	0.829
	Mean	46.60	47.32	
	Standard Deviation	10.90	12.43	

Fig 2: Frequency distribution of gender

The study results showed that 40(80%) patients were male and 10(20%) patients were females. male to female ratio of the patients was 4:1.

In this study in USG block group 21(84%) patients were male and in ALG block group 19(76%) patients were male. Similarly in USG block 4(16%) patients were females and in ALG block group 6(24%) patients were females. This difference was statistically insignificant.

Table 2: Comparison of gender between study groups

		Study Groups		Total
		USG block	ALG block	
Gender	Male	21	19	40
		84.0%	76.0%	80.0%
	Female	4	6	10
		16.0%	24.0%	20.0%
Total		25	25	50
		100.0%	100.0%	100.0%

By applying KS test we came to know that the BMI was not normally distributed. So the median BMI of the patients was 22(1.25) kg/m^2 with minimum and maximum BMI of 20 & 24 kg/m^2 respectively. Table 3

Table 3: Summary statistics of BMI (kg/m^2)

	n	50
BMI (kg/m^2)	Mean	22.20
	Standard Deviation	1.01
	Median	22
	IQR	1.25
	Minimum	20.00
	Maximum	24.00

In USG block group the median BMI of the patients was 22(1.50) kg/m2 and in ALG block group the median BMI of the patients 22(1.50) kg/m2. This difference was statistically insignificant. i.e. p-value=0.783. Table 4

Table 4: Comparison of BMI (kg/m²) between study groups

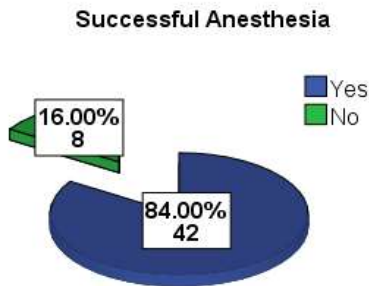|		Study Groups		p-value
		USG block	ALG block	
BMI (Kg/m²)	n	25	25	
	Mean	22.24	22.16	
	Standard Deviation	1.05	0.98	0.783
	Median	22	22	
	IQR	1.50	1.50	

Fig 2: Frequency distribution of successful anesthesia

The study results showed that the successful anesthesia was achieved in 42(84%) patients and unsuccessful anesthesia was noted in 8(16%) patients.

The study results showed that in USG block group the successful anesthesia was achieved in 22(88%) patients and in ALG block group the successful anesthesia was achieved in 20(80%) patients. This difference was statistically insignificant. i.e. p-value=0.702.

Table 5: Comparison of successful anesthesia between study groups

		Study Groups		Total	p-value
		USG block	ALG block		
Successful Anesthesia	Yes	22	20	42	
		88.0%	80.0%	84.0%	
	No	3	5	8	0.702
		12.0%	20.0%	16.0%	
Total		25	25	50	
		100.0%	100.0%	100.0%	

In patients having age ≤ 50 years: In USG block group the successful anesthesia was achieved in 14(87.50%) patients whereas in ALG block group the successful anesthesia was achieved in 11(68.8%) patients. Similarly in patients having age >50 years: In USG block group the successful anesthesia was achieved in 8(88.9%) patients whereas in ALG block group the successful anesthesia was achieved in 09(100%) patients.

In male patients: In USG block group the successful anesthesia was achieved in 19(90.5%) patients whereas in ALG block group the successful anesthesia was achieved

in 14(73.7%) patients. Similarly in female patients: In USG block group the successful anesthesia was achieved in 3(75%) patients whereas in ALG block group the successful anesthesia was achieved in 6(100%) patients.

Table 6: Comparison of successful anesthesia between study groups stratified by age groups

Age Groups	Successful anesthesia	Study Groups		Total
		USG block	ALG block	
≤ 50	Yes	14	11	25
		87.5%	68.8%	78.1%
	No	2	5	7
		12.5%	31.2%	21.9%
>50	Yes	8	9	17
		88.9%	100.0%	94.4%
	No	1	0	1
		11.1%	0.0%	5.6%

Table 7: Comparison of successful anesthesia between study groups stratified by gender

Gender	Successful anesthesia	Study Groups		Total
		USG block	ALG block	
Male	Yes	19	14	33
		90.5%	73.7%	82.5%
	No	2	5	7
		9.5%	26.3%	17.5%
Female	Yes	3	6	9
		75.0%	100.0%	90.0%
	No	1	0	1
		25.0%	0.0%	10.0%

There is statistically insignificant difference was found between was found between the study groups and successful anesthesia of the patients stratified by BMI.

Table 8: Comparison of successful anesthesia between study groups stratified by BMI

BMI	Successful anesthesia	Study Groups		Total
		USG block	ALG block	
20	Yes	1	1	2
		100.0%	100.0%	100.0%
21	Yes	5	5	10
		100.0%	100.0%	100.0%
22	Yes	7	8	15
		77.8%	80.0%	78.9%
	No	2	2	4
		22.2%	20.0%	21.1%
23	Yes	7	5	12
		100.0%	71.4%	85.7%
	No	0	2	2
		0.0%	28.6%	14.3%
24	Yes	2	1	3
		66.7%	50.0%	60.0%
	No	1	1	2
		33.3%	50.0%	40.0%

DISCUSSION

USG guided ankle block versus traditional anatomic landmark guided ankle block in lower limb surgery under regional anaesthesia were compared in a randomised control trial at Mayo Hospital Lahore's department of Radiology.

Nerve blocks are commonly used for analgesia before and after surgery. To ensure a safer perioperative experience, pain management and reduced post-surgical

opiod use, this type of regional anaesthetic is recommended. If you're having surgery on your foot, you'll need both anaesthetic and analgesia, and ankle blocks can give all three. Successful anaesthesia was attained in 22 (88%) of the patients in the USG-guided block group and 20 (80%) of the patients in the ALG-guided block group (p value = 0.702). The following are some of the findings from several studies:

According to Fredrickson et al., a modest volume (mean of 16 mL) USG-guided ankle block was found to be inferior in analgesia in the first 24 hours postoperatively, despite block success being identical (89 percent vs 80 percent for USG vs ALG). As a result, it's possible that traditional USG ankle block volumes of 5-8 mL/nerve can be used indefinitely. A number of prior studies have shown that intraoperative block success between the USG and ALG groups did not translate into significant variations both in PACU admission and discharge pain levels, as well as the overall number of patients receiving any opiod analgesia in the PACU. Several studies have shown that utilising USG to place a nerve block has therapeutic advantages [10]. A number of studies have shown that this method reduces patient problems and provides enough pain management without the need for strong medications. Anatomical landmark approach, despite great success rates (89-100%), has been viewed as difficult to use and unreliable [11]. Migues et al. conducted a randomised control experiment to determine the effectiveness of their treatment. An analysis of surgical anaesthetic quality in foot surgery patients found no significant differences in block efficacy or complications, as the author had hoped to find when comparing individuals.

Eighty-eight percent of patients in the USG group and eighty percent of those in the ALG group had effective anaesthesia in our study. The ALG approach, on the other hand, has a stated success rate of 95%. When it comes to success and failure, there are a number of aspects that come into play. Surgical anaesthetic induced just by the ankle block may be overstated if the method is applied incorrectly, resulting in some blocks. It's also important to note that if the block technique isn't standardised in both groups, the results will be inconsistent [12]. Given that anaesthetist experience is critical to the efficacy of both procedures, future investigations should be conducted in a multicenter setting in order to minimise bias in this study's findings.

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