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Original research article

COMPARISON OF ULTRASOUND-GUIDED ANKLE BLOCK VERSUS ANATOMICAL LANDMARK-GUIDED ANKLE BLOCK IN ANKLE AND FOOT SURGERY UNDER REGIONAL ANESTHESIA

NAZ U[1], SULAIMAN[2], HAROON M[3*], HAQ IU[4], SULTAN A[5], FARID K[5]

[1]*Department of Anesthesia, Khyber Teaching Hospital, Pakistan*
[2]*Department of Anaesthetist, Cardiac Rehabilitation Center, HMC,Peshawar, Pakistan*
[3]*Department of Medicine/medical ICU Khyber Teaching Hospital Peshawar, Pakistan*
[4]*Department of anesthesia, and in charge SICU KTH, Pakistan*
[5]*Department of Anaesthesia, Peshawar General Hospital, Pakistan*
**Correspondence author email address:* imranulhaq5@yahoo.com

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Abstract: *As more patients undergo foot and ankle surgery, regional anesthesia's significance in postoperative treatment has grown. Anesthesiologists and pain specialists have adopted regional anesthesia in large numbers. Numerous techniques, such as nerve stimulation, anatomical markers, and ultrasonography, have blocked the saphenous nerve.* ***Objective:*** *The present study aimed to assess the traditional anatomic landmark-guided approaches in lower limb surgery performed under regional anesthesia with ultrasound-guided ankle blocks in surgical anesthetic methods.* ***Method:*** *This randomized control study is carried out at the hospital. A total of 60 participants with scheduled foot and ankle surgery were randomly divided into two study groups (each n=30): Ultrasound-guided ankle block (USG) and anatomical landmark-guided ankle block (ALG).* ***Results:*** *Recruited participants had a mean age of 50.2± 14.02, with 39 (65%) male and 21 (35%) female. A total of 49 patients (82%) were able to undergo anesthesia successfully, with 26 (86.60%) of those patients belonging to the USG block group and 23 (76.60%) of those patients belonging to the ALG block group undergoing anesthesia successfully (p-value = >0.999).* ***Conclusion:*** *The results of this research indicate that the success rates of the two procedures are statistically insignificantly different; however, the USG ankle block for surgical anesthesia performed under regional anesthetic had a greater success rate than the anatomic landmark-guided technique.*

Keywords: Ankle Block, Anesthesia, Regional, Foot Surgery, Nerve Block, Ultrasonography.

Introduction

Proper analgesia is essential for early discharge since foot surgery typically results in postoperative pain and is frequently performed in the daycare environment.

Day-case procedures benefit significantly from regional anesthesia because they provide excellent analgesia following surgery (1). The saphenous nerve is the femoral nerve's last sensory branch. It provides innervations to the skin that cover the lower leg's medial, anteromedial, and posteromedial regions. This innervation runs from the medial malleolus level to the cephalad portion of the knee. When a regional approach is preferred, saphenous nerve blockade is required for operations involving the medial side of the foot or ankle. (2) Ultrasonography, nerve stimulation, landmarks, and other techniques have all been investigated as potential saphenous nerve-blocking methods (3).

Recent ultrasound methods have never been contrasted with commonly employed non-ultrasound therapies. Ankle blocks can provide persistent postoperative analgesia and encourage early mobilization, although popliteal sciatic blocks, metatarsal blocks, ankle blocks, and combinations of these techniques are also acceptable regional anesthetic therapies. Historically, nerve landmark identification has been used for ankle blocks (4). Inconsistencies exist in the research examining the effectiveness and performance of ankle blocks. Comparing the USG approach to the traditional strategy may increase block success, especially in the hands of less experienced surgeons. In still photographs, it is challenging to distinguish the small nerves that surround the ankle. Since one can easily follow their progress thanks to real-time imagery, one can quickly determine their location and boundaries (5). The research discovered that in lower limb surgery, excellent surgical anesthesia occurred more frequently in the USG group (84 percent versus 66 percent, p 0.001) than in the ALG ankle block group. According to the research, the USG ankle block has been proven to be more successful than the traditional method of ankle blocking for surgical anesthesia (6). The conventional approach is still used since there is a shortage of local data and prior studies demonstrating that the USG ankle block is more efficient (7). The present study aimed to assess the traditional anatomic landmark-guided approaches in lower limb surgery performed under regional anesthesia with ultrasound-guided ankle blocks in surgical anesthetic methods.

Methodology

This randomized control study was conducted after the hospital's ethical committee's approval. Sixty patients scheduled for foot and ankle surgery were recruited for the present study after the duly filled informed consent. The recruited participants between ages 25-75 years and of both genders were randomly divided into two groups: Ultrasound-guided (USG) ankle block (n=30) and Anatomical landmark-guided (ALG) ankle block (n=30). Participants with neurological disorders and chronic

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diseases like hypertension, diabetes, and heart problems were excluded from the study.

A linear transducer ultrasound machine (8–18 MHz) was utilized. The deep peroneal nerve, superficial peroneal nerve, tibial nerve, sural nerve, and saphenous nerve were the five nerves to which the needle tip was positioned, and it deposits local anesthetic until the spread around each nerve was completed. Age- and gender-related demographic data were collected through the questionnaire. Participants in the USG group received an ultrasound-guided ankle block, whereas the ALG group received an anatomical landmark-guided ankle block. Then, the participants were monitored for 15 minutes to ensure the anesthetic was successfully injected at the operation site. The body's feeling at the surgery site was evaluated using the pin pricking. The term "successful surgical anesthesia" was used if there was no feeling at the operative site.

SPSS version 26 was used to compare the results between USG and ALG study groups. P-value ≤0.005 was considered significant. Demographic data of the recruited participants were presented as Mean±S.D using Microsoft Excel (2016).

Results

The demographic characteristics of the present study's recruited participants are shown in Table 1. The present study comprises 39 out of 60 male participants, whereas 21 were female, with a mean age of 50.2 years and a mean BMI of 22.55. Table 2 shows the demographic characteristics of the randomly distributed USG and ALG study group participants. The age Mean±S.D of the participants in USG and ALG was 51.46±14.93 and 48.93±13.17, respectively. The BMI Mean±S.D of the participants in USG and ALG was 22.59±1.89and 22.51±1.64, respectively. Figures 1 and 2 show no significant variation between the age and BMI of the participants between the USG and ALG study groups. According to the study's findings (Figure 3), adequate anesthesia was experienced in 49 participants (82%), while failed anesthesia was reported in 11 participants (18%). The study's findings indicated (Table 3) that both 23 (76.60%) participants in the ALG block group and 26 (86.60%) participants in the USG block group had adequate anesthesia.

Statistics showed that this difference was not significant. That is, p-value=>0.9999. Participants under 50 (Table 4): In the USG group, 14 patients (100%) were successful in their anesthesia, compared to 13 (72.20%) in the ALG block group. Similar results were seen in participants above 50: In the USG block group, 12 participants (75%) had adequate anesthesia, while in the ALG block group, 10 participants (83.30%) underwent successful anesthesia. Male participants (Table 5): In the USG group, adequate anesthesia was obtained in 16 (88.88%) participants, while in the ALG group, successful anesthesia was achieved in 17 (81%) participants. Similar results were shown in female participants: In the USG group, 10 (83.3%) patients achieved adequate anesthesia, and in the ALG block group, 6 (66.7%) achieved successful anesthesia. The study groups and the proper anesthesia of the patients, stratified by BMI, were shown to vary statistically insignificantly (Table 6).

Table 1: demographic characteristics of study participants

Gender	
Male	39(65%)
Female	21(35%)
Age	
Mean	50.2
S. D	14.02
Median	48.5
Min	27
Max	75
BMI	
Mean	22.55167
S. D	1.76121
Median	23
Min	18.5
Max	25

Table 2: Demographic characteristics of the participants in study groups

USG Group											
Gender		Age					BMI				
Male	Female	Mea n	S. D	Media n	Mi n	Ma x	Mean	S. D	Media n	Min	Max
18(60%)	12(40%)	51.46	14.9 3	56	27	75	22.59	1.89	23	18. 5	25
ALG group											

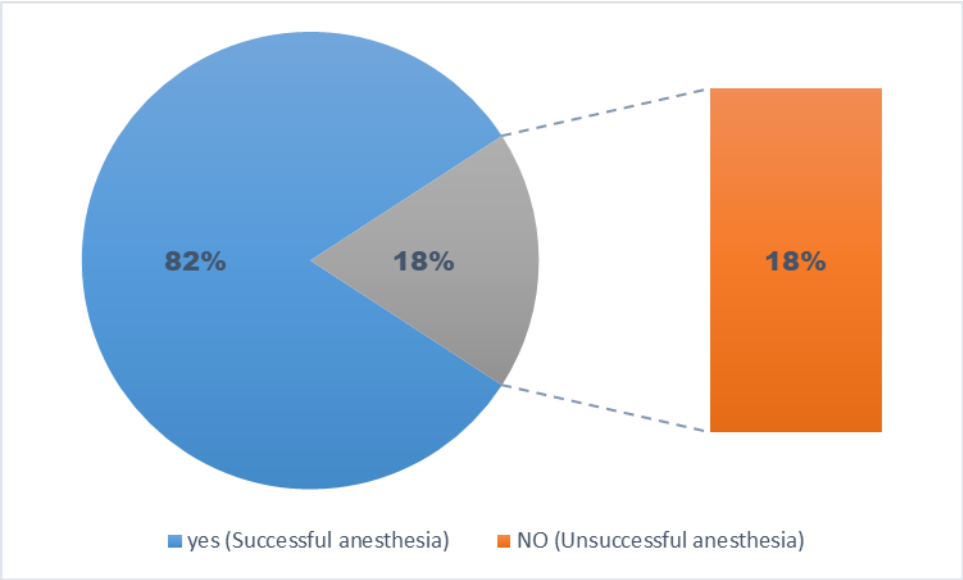

Figure 1: Percentage of the participants with successful anesthesia and unsuccessful anesthesia

Table 3: Successful anesthesia achieved by the participants in study groups

		Study groups			P value
		USG Group	ALG Group	Total	
Successful anesthesia	yes	26	23	49	>0.999
		86.60%	76.60%	81.6%	
	No	4	7	11	
		13.40%	23.40%	18.4%	

Table 4: Successful anesthesia in the study group participants via age-wise distribution

Age	Successful anesthesia	USG	ALG	Total
<50	Yes	14	13	27
		100%	72.20%	84.30%
	No	0	5	5
		0%	27.80%	15.60%
>50	Yes	12	10	22
		75%	83.30%	78.60%
	NO	4	2	6
		25%	16.70%	21.40%

Table 5: Successful anesthesia in the study group participants via gender-wise distribution

Gender	Successful anesthesia	USG Group	ALG Group	Total
Male	Yes	16	17	33
		88.88%	81%	84.6%
	No	2	4	6
		11.11%	19%	15.4%
Female	Yes	10	6	16
		83.3%	66.7%	76.1%
	No	2	3	5
		16.7%	33.3%	23.9%

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Table 6: Successful anesthesia in the study group participants via BMI-wise distribution

BMI	Successful anesthesia	USG Group	ALG Group	Total
18	Yes	1	0	1
		100%	0	100%
	No	0	0	0
		0	0	0
19	Yes	2	1	3
		100%	100%	100%
	No	0	0	0
		0%	0%	0%
20	Yes	2	1	3
		100%	33.3%	60%
	No	0	2	2
		0%	66.7%	40%
21	Yes	1	5	6
		33.3%	83.3	66.7%
	No	2	1	3
		66.7%	16.7%	33.3%
22	Yes	4	4	8
		80%	80%	80%
	No	1	1	2
		20%	20%	80%
23	Yes	5	4	9
		100%	80%	90%
	No	0	1	1
		0%	80%	10%
24	Yes	6	6	12
		100%	85.6%	92.3%
	No	0	1	1
		0%	14.4%	7.7%
25	Yes	4	1	5
		80%	50%	71.4%
	NO	1	1	2
		20%	50%	28.6%

Discussion

Nerve blocks are often used to reduce pain before and after surgery. This kind of regional anesthesia is advised to provide a safer perioperative experience, pain control, and decreased postoperative opiate consumption (8, 9). An ankle block may provide anesthesia and analgesia necessary for foot surgery. In the USG-guided block group, 26 patients (86.60%) and the ALG group, 23 patients (76.6%), both had successful anesthesia (p-value = >0.9999).

A small volume (mean of 16 mL) USG-guided ankle block was reported to be inferior in analgesia in the first 24 hours postoperatively by Shah et al., despite block success being equal (89% vs. 80% for USG vs. ALG). Traditional USG ankle blocks, which employ amounts of 5-8 mL/nerve, may be safe to administer forever as a consequence (10). The number of patients requiring any opioid analgesia in the PACU and patients whose pain was manageable at admission and upon discharge has not been shown to differ significantly between the USG and ALG groups, as has been established in several previous studies. There are therapeutic benefits to using USG to place a nerve block, as documented in several trials (11). Multiple studies have shown the efficacy of this approach in reducing patient complications and providing adequate pain control without resorting to narcotics. Despite its high success rate (89-100%), the anatomical landmark strategy has a poor reputation due to its complexity and lack of trustworthiness (12). Migues et al. used a randomized control trial to test how well their therapy worked. The author of a study on the quality of surgical anesthetics used in foot surgery patients was disappointed to discover no significant variations in

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block effectiveness or complications when comparing individuals (13).

In the present research, 86% of patients who received USG anesthesia and 76% who received ALG anesthesia experienced successful sedation. However, the ALG method's success rate is 95%. Numerous factors influence whether an endeavor succeeds or fails. If the ankle block is misused, the anesthetic effect during surgery might be overestimated. It's also worth noting that the outcomes will vary widely unless the block approach is standardized across both groups.

Conclusion

In conclusion, the present study observed successful anesthesia in 26 USG groups and 23 participants of the ALG group. A significant variation in the percentage of adequate anesthesia was observed in the study group, but the results were not significantly different (P=>0.999). Future studies should be carried out in a multicenter environment to reduce bias in this study's results since anesthetic expertise is essential to the effectiveness of both procedures.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

It is approved by the department concerned. (IRBEC-TCSHU-9384/22)

Consent for publication

Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

UMBRIN NAZ (Assistant professor)
Data Analysis
SULAIMAN (Assistant)
Revisiting Critically
MOHAMMAD HAROON (Assistant professor)
Final Approval of version
IMRAN UL HAQ (Assistant professor)
Drafting
AMINA SULTAN (Junior consultant) & KHAYYAM FARID (Registrar)
Concept & Design of Study

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