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Comparison of popliteal approach sciatic nerve block and tibial-common peroneal nerve block in patients undergoing unilateral foot and ankle surgery: a prospective randomized controlled clinical study

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ABSTRACT

Aims: The aim of this study is to compare the perioperative effects of tibial common peroneal nerve block (TCPNB) and sciatic nerve block (SNB) with popliteal approach in patients undergoing unilateral foot and ankle surgery.

Methods: This prospective, single-center study conducted between August 2021 and August 2022, 84 patients undergoing foot and ankle surgery were included and randomized. 12 patients were excluded for various reasons and the patients were divided into two groups, group tibial common peroneal nerve block (group T) (n=36) and group sciatic nerve block (group S) (n=36). For group T, the tibial and common peroneal nerves were visualized and blocked separately. For group S, the sciatic nerve in the popliteal fossa was visualized and blocked. Block imaging time, block procedure time, anesthesia onset time, block performance time, and number of needle insertions for the block were recorded. Postoperative (PO) Visual Analog Scale (VAS) scores, PO analgesic consumption and patient satisfaction were also recorded.

Results: Group T had statistically significantly longer block imaging and block procedure time ($p<0.01$) and statistically significantly shorter anesthesia onset time ($p<0.01$). Group T was statistically significantly longer ($p<0.01$) when block performance time and PO first analgesic requirement time were compared (19±2.4,13.8±3.2). When the PO VAS scores of the groups were analyzed, group T had statistically significantly lower VAS scores at 1, 6, 12 and 24 hours except for the post operative care unit (PACU) VAS score. The number of needle insertions was statistically significantly higher in group T ($p<0.001$). Block success, complications, postoperative nausea and vomiting and additional anesthetic requirement were similar in the groups.

Conclusion: Preferring TCPNB in foot and ankle surgery is not only successful in the time of anesthesia initiation; It also has positive effects in terms of block performance time, PO analgesic effectiveness and efficient use of resources.

Keywords: Foot and ankle surgery, peripheral nerve block, postoperative pain management, ultrasound guidance, tibial and common peroneal nerve block, sciatic nerve block

INTRODUCTION

Foot and ankle surgery is one of the frequently performed orthopedic surgical procedures.[1,2] Surgical procedures such as hallux valgus, hallux rigidus, hammer toe, and finger fractures are examples of foot and ankle surgery.[3] The biggest concern of patients undergoing foot and ankle surgery is the pain and mobility limitation they will experience. Post-surgical osteotome-induced pain can continue for up to 3 days; successful pain management is as important as the surgical procedure.[4] In these surgeries, general anesthesia, central regional methods and peripheral nerve blocks can be applied.

The safety and effectiveness of peripheral nerve blocks have been proven in patients for whom general anesthesia and central neuraxial blocks (epidural and spinal anesthesia) are risky and contraindicated.[5] In foot and ankle surgery; in peripheral nerve blocks with a popliteal approach, the block application point is very important. In this surgery, sciatic

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nerve block (SNB) can be applied before the sciatic bifurcation in the popliteal fossa, and tibial and common peroneal nerve block (TCPNB) can be applied after the bifurcation. When anesthetic and analgesic effectiveness are compared, distal blockade applications seem more advantageous compared to proximal blockade applications. Studies in this area date back many years and have not sufficiently demonstrated the differences between SNB and TCPNB for foot and ankle surgery.[6,7]

The primary aim of our study is; the aim is to compare the postoperative (PO) VAS scores of SNB and TCPNB in unilateral foot and ankle surgery, and the secondary objectives are to compare the anesthesia onset time and block performance time.

METHODS

This study was carried out in a tertiary level training and research hospital; it is a clinical, prospective and randomized study. Our work; it was approved by the Gülhane Training and Research Hospital Scientific Researches Ethics Committee (Date: 23.076.2021, Decision No: 2021/44) and was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Written informed consent was obtained from all patients participating in the study.

Adult patients who are aged 18-81, American Society of Anesthesiologists (ASA) 1-3, fully oriented and cooperative, who underwent unilateral foot and ankle surgery at our center between August 1, 2021 and August 1, 2022, were included in the study. Exclusion criteria from the study were; patients with bleeding diathesis, spinal and neurological damage, infection at the needle entry site, pregnancy and breastfeeding, local anesthetic allergy, general anesthesia, those who want to withdraw from the study voluntarily, and those with advanced liver, heart or kidney failure. In the operating room, 84 patients were randomized using the closed envelope drawing method, 12 patients were excluded from the study for various reasons and divided into two groups; group T, those who underwent TCPNB and group S, those who underwent SNB (Figure 1). In both groups, sedation was provided with 0.04 mg/kg intravenous (IV) midazolam after standard ASA monitoring. All patients were treated preoperatively with a posterior approach in the prone position, using high-frequency linear 13-5 MHz Sonosite (FUJIFILM SonoSite, Inc., Bothell, WA) USG and a 21 Gauch 100 mm Braun Stimuplex (B. Braun Medical, Bethlehem, PA) block needle. A total of 20 ml of local anesthetic was used in both groups, with 14 ml of 0.5% bupivacaine and 6 ml of 2% lidocaine.

Tibial-Common Peroneal Nerve Block and Sciatic Nerve Block

The USG probe was placed transversely into the popliteal fossa and the popliteal artery, popliteal vein and biceps femoris were identified. Sciatic nerve bifurcation was detected with the guidance of the popliteal artery. For sciatic nerve blockade, the USG probe was directed from the bifurcation towards the cephalad, targeting 2 cm proximal to the bifurcation (Figure 2). For the blockade of the tibial and common peroneal nerves, the USG probe was directed caudally to visualize the relevant nerves separately. After the optimal image, the block needle was continuously visualized and directed to the relevant nerve with an in-plane short axis approach (Figure 3). As it was observed that no blood was seen with negative

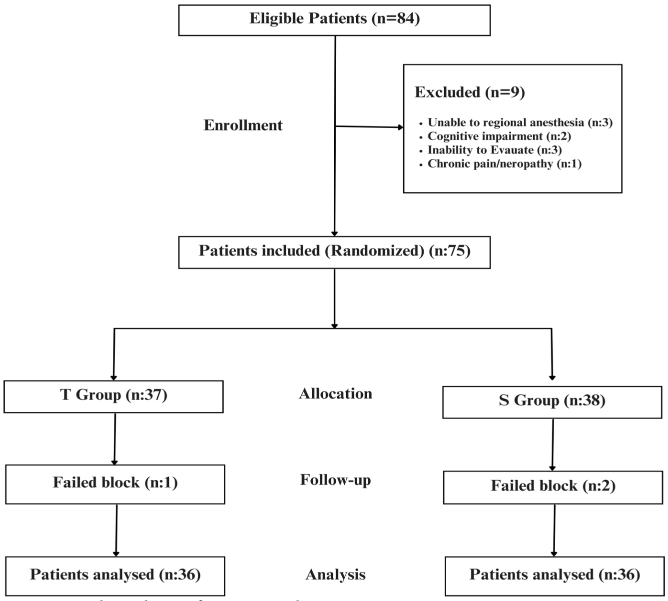

Figure 1. Flow chart of patients selection

T: Tibial common peroneal, S: Sciatic, n: Number

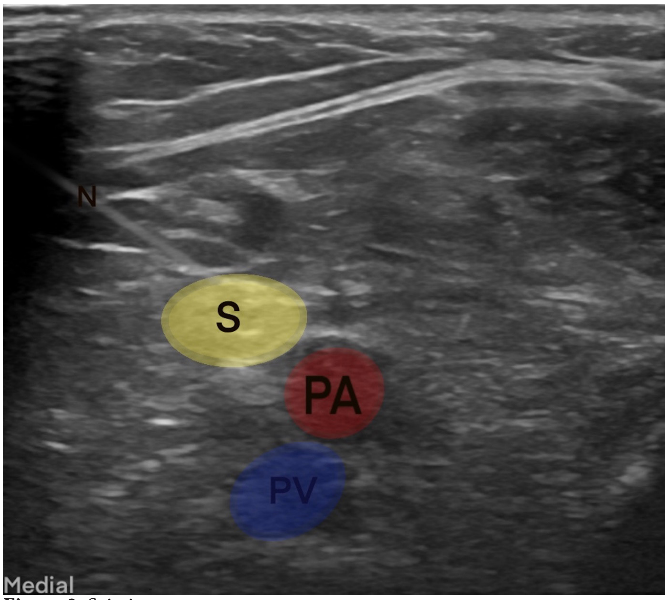

Figure 2. Sciatic nerve anatomy

N: Needle, S: Sciatic nerve, PA: Popliteal artery, PV: Popliteal vein

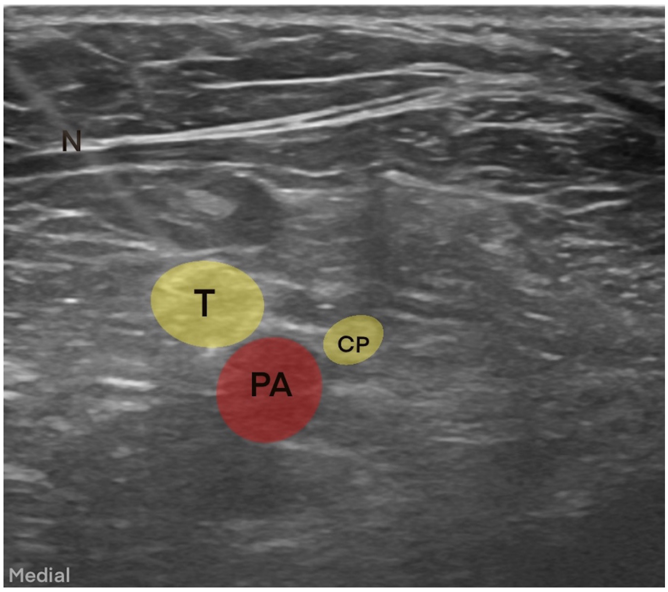

Figure 3. Tibial-common peroneal nerve anatomy

N: Needle, T: Tibial nerve, CP: Common peroneal nerve, PA: Popliteal artery pressure aspiration, block was applied with divided doses of 5 ml, intermittent aspiration and multiinjection techniques. A total of 20 ml of local anesthetic, 10 ml each, was applied to the tibial and common peroneal nerves, and a total of 20 ml of local anesthetic was applied to the sciatic nerve. During the block, circumferential spread at the needle tip was achieved with multiple injections, and the needle tip was repositioned in case of unexpected resistance in the syringe. When necessary for optimal image, anesthesia and block quality, the block needle was removed from the skin and re-entered through the skin.

Demographic data of the patients were recorded. Tourniquet was not used in any of the patients included in the study and the types of surgery included calcaneus fracture, hallux rigitus, hallux valgus, mass excision, ingrown nail, finger amputation, arthrodesis and foreign body excision. Preoperative USG imaging time, block procedure time, number of needlings and anesthesia start time were recorded. The time between when the USG probe touched the skin and the block needle entered the skin was recorded as the block imaging time (min), and the time between the time the block needle entered the skin and the time it left the skin after the procedure was recorded as the block application time (min). The number of times the needle passed through the skin during the procedure was recorded. During the intraoperative period, the surgical time and the amount of additional anesthetic used were recorded. Peripheral blocks and follow-ups of the patients were performed by the same research assistant. In both groups, during the PO period, when VAS was >5, 1 g paracetamol and 50 mg IV tramadol were administered for analgesia. The amounts of analgesics used were recorded.

All patients were monitored in the postoperative care unit (PACU), and VAS scores at 1, 6, 12 and 24 hours and the presence of postoperative nausea and vomiting (PONV) were recorded. The block performance time (h) (time for sensory block to begin to resolve), the time when the patients experienced pain for the first time (VAS>3) and the patient satisfaction for the block at the 24th hour of PO were evaluated with a Likert Scale and recorded.

Sample Size and Statistical Analysis

The number of patients was determined as a minimum of 60 people in the G-power program, aiming for a 5% margin of error and a minimum of 80% study power. For standard deviation, studies in the literature are taken as basis. Statistical package for social sciences (SPSS), version 22.0 for Windows (SPSS Inc. Chicago, USA) computer package program was used for statistical analysis of the research data. In the descriptive statistics section, categorical variables are presented as numbers and percentages, and continuous variables are presented as mean±standard deviation and median (minimum-maximum value). The conformity of continuous variables to normal distribution was evaluated using visual (histogram and probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). In data that did not comply with normal distribution, the Mann-Whitney U test was used for comparison analyzes between two independent groups, and in normally distributed data, T test was used between two independent groups. Chi-square test was used in the comparison analysis for categorical variables between independent groups. In the study, the statistical significance level was accepted as p<0.05.

RESULTS

In our study, data of 72 patients were analyzed. 36 patients were assigned to group T and 36 patients to group S. The demographic data and surgical procedure times of the groups were similar (**Table 1**).

Block imaging and block procedure time were statistically significantly longer in group T (6.5±1.8 vs 4.4±1.8; 7.2±1.6 vs 5.1±1.6 p<0.01), while anesthesia onset time was statistically significantly shorter (8.1±1.1 vs 13.7±2.3 p<0.01). When the patients' block performance time and PO first analgesic requirement time were compared, group T was statistically significantly longer (18±2.8 vs 12.5±2.4/19±2.4 vs 13.8±3.2 p<0.01). When the PO VAS scores of the groups were compared, group T was statistically significantly lower in the 1st, 6th, 12th and 24th hour VAS scores, except the PACU VAS score (**Table 2**).

Table 1. Demographics and preoperative data

	Group T (n=36)		Group S (n=36)		
	Mean±SD, median (min-max)		Mean±SD, median (min-max)		p-value
Age (years)	58.8±13.9, 61 (30-80)		52.8±15.5, 53 (21-80)		0.085[1]
Height (cm)	168.3±9.6, 168 (152-196)		168.5±11.6, 170 (150-203)		0.903[1]
Weigt (kg)	76.8±12.5, 76.5 (55-107)		83.5±18.1, 84 (50-130)		0.071[1]
BMI (kg/m^2)	27.1±3.7, 28.0 (19.0-34.2)		29.1±5.6, 28.5 (17.8-47.1)		0.078[1]
	n	**%***	**n**	**%***	
Gender					
Female	14	38.9	12	36.1	0. 806[2]
Male	22	61.1	24	63.9	
ASA					
1	1	2.8	4	11.1	
2	15	41.7	19	52.8	0.153[3]
3	20	55.6	13	36.1	

*Column percentage, Independent sample T test, Contunity correction chi-square, Pearson chi-square, T: Tibial common peroneal, S: Sciatic, Min: Minimum, Max: Maximum, SD: Standard deviation, BMI: Body-mass index, ASA: American Society of Anesthesiologists classification, n: Number

Table 2. Comparison of data regarding surgery, peripheral nerve block, and postoperative follow-up between groups			
	Group T (n=36)	**Group S (n=36)**	
	Mean±SD, median (min-max)	**Mean±SD, median (min-max)**	**p-value**
Surgical procedure time (min)	85.2±37.5, 75 (35-190)	79.8±40.2, 74.5 (30-215)	0.463[1]
Viewing time (min)	6.5±1.8, 6.5 (4-12)	4.4±1.8, 4.2 (2.2-11)	<0.001[1]
Block processing time (min)	7.2±1.6, 7.0 (5-11)	5.1±1.6, 5 (3-10.5)	<0.001[2]
Anesthesia start time (min)	8.1±1.1, 8.2 (5-10.5)	13.7±2.3, 13 (10.5-20)	<0.001[2]
Block performance time (hour)	18.0±2.8, 18.0 (12-25)	12.5±2.4, 13 (6-18)	<0.001[2]
Time to first PO analgesic requirement (hour)	19.0±2.4, 20 (14-24)	13.8±3.2, 14 (6-20)	<0.001[2]
PACU VAS	0.03±0.17, 0 (0-1)	0.19±0.58, 0 (0-3)	0.088[1]
PO1 VAS	0.03±0.16, 0 (0-1)	0.31±0.75, 0 (0-3)	0.044[1]
PO6 VAS	0.33±0.71, 0 (0-3)	0.91±1.34 0 (0-5)	0.022[1]
PO12 VAS	1.11±1.24, 1 (0-5)	1.75±1.46, 1 (0-5)	0.035[1]
PO24 VAS	2.69±1.47, 2.5 (1-7)	3.39±1.32, 3 (0-7)	0.021[1]

Mann-Whitney U test, Independent sample T test, T: Common peroneal, S: Sciatic, PACU: Postanesthetic care unit, Min: Minimum, Max: Maximum, SD: Standard deviation, VAS: Visual Analog Scale, PO: Postoperative, PO1: Postoperative 1th hour, PO6: Postoperative 6th hour, PO12: Postoperative 12th hour, PO24: 24 postoperative, Min: Minute, n: Number

The patients' block success, complications, PONV, and need for additional anesthetics were similar. In group S, a single needle insertion was required for the block in 75% of cases. In group T, a single attempt was successful in 13.9% of cases, while two or more attempts were necessary in 86.1%. Specifically, three attempts were required in 7 patients (19.4%) within group T. The number of needle insertions in group T was statistically significantly higher (p<0.001) (**Table 3**).

Table 3. Comparison of some variables between groups					
	Group T (n=36)		**Group S (n=36)**		**p-value**
	n	**%***	**n**	**%***	
Block success (n: 75)					
Successful	36	97.3	36	94.7	1.000[1]
Not successful	1	2.7	2	5.3	
The number of attempts for nerve block (7 patients: 3)					
1	5	13.9	27	75.0	<0.001[2]
2-3	31	86.1	9	25.0	
Need for additional anesthetic					
None	31	86.1	25	69.4	
Yes	5	13.9	11	30.4	
Complication					
Yes	0	0	0	0	
None	36	100	36	100	
PONV					
None	31	86.1	34	94.4	0.429[1]
Yes	5	13.9	2	5.6	

*Column percentage, Fisher chi-square, Contunity correction chi-square, T: Tibial common peroneal, S: Sciatic, PONV: Postoperative nausea and vomiting, n: Number

38.9% of group T and 58.3% of group S consumed PO 1 g paracetamol and 50 mg tramadol. Although the percentage of analgesic use in the group T was numerically low, no statistically significant difference was detected between the groups in terms of analgesic consumption (p>0.05). When PO 24th hour satisfaction scores were compared; 80.5% of group T participants and 97.2% of group S participants answered that they were satisfied or very satisfied.

DISCUSSION

This study reveals that TCPNB has lower VAS scores than SNB in unilateral foot and ankle surgery. It also shows significantly better results in anesthesia onset time and block performance time.

In foot and ankle surgery, peripheral nerve blocks are also used as an alternative to general anesthesia and central neuraxial blocks.[8] Peripheral nerve blocks can be used safely and effectively, especially in patients for whom general anesthesia and central neuraxial blocks are risky. In addition, peripheral nerve blocks have advantages such as low side effect profile, high patient satisfaction, early mobilization, early discharge and low cost.[9] For these reasons, SNB is widely used in foot and ankle surgery.[10] Many techniques have been described for SNB in foot and ankle surgery, such as parasacral, posterior, anterior, subgluteal and popliteal approaches.[11] The popliteal approach is the most frequently applied technique.[12] In this technique, the sciatic nerve can be blocked at any level in the popliteal fossa. Since there is no optimal decision regarding the application site of popliteal blocks; while SNB can be performed with a single needle insertion, TCPNB can also be performed closer to the surgical area with one or more attempts after bifurcation. Although the effectiveness and reliability of SNB have been proven; studies have shown that as the distance to the surgical field decreases and the nerve diameter decreases, the duration of block formation shortens and the effectiveness of the block increases.[13,14] In our study, we found the start time of group T anesthesia to be statistically significantly shorter and obtained similar results with the literature.[15,16]

In a study by Hamid et al.[16] sciatic and tibial-common peroneal nerve block was performed in 52 patients under USG guidance. Using 30 ml of block fluid, the results of this study showed that the block procedure time and imaging time were similar between the groups. In our study, block procedure time and block imaging time were found to be higher in the T group using a total of 20 ml of block medium. This result may be due to the difference in method and approach between the practitioners.

One of the problems that patients will encounter during the PO period in foot and ankle surgery is pain.[17] While effective pain management increases patient comfort; it also helps early mobilization, early discharge and low cost.[4] In the pain management in foot and ankle surgery; We can list IV analgesics (paracetamol, NSAIDs, opioids, etc.), local anesthetic infiltration in the incision site, and peripheral nerve block techniques (such as TCPNB, SNB). In addition to providing effective pain control, peripheral nerve blocks also significantly reduce the amount of IV analgesics consumed, thus avoiding IV medications such as opioids that have serious side effects. In our study, we compared the effectiveness of TCPNB, one of the current peripheral nerve blocks, with SNB, which has been used for a long time, in patients undergoing foot and ankle surgery. In our study, we showed that TCPNB provides lower VAS scores and the block performance time is longer compared to SNB. In addition, TCPNB's PO first analgesic requirement time was longer and IV analgesic consumption was proportionally better.

After the sciatic nerve is separated by a special septa called 'Compton Cruveilhier' at the bifurcation level, it extends distally in the form of the tibial and common peroneal nerves.[18,19] In a study conducted in 2011, SNB with a popliteal approach was applied at this specialized septa level and better results were reported.[20] Since we anticipated that this particular septa would alter the spread of local anesthetic, block success, and needling number, we had two peripheral block groups applied from the proximal (SNB) and distal (TCPNB) parts of the septa in our study. We did not have a third group at the septa level. When proximal and distal blocks were compared, we found the number of group T needlings to be higher due to correct needle positioning, blocking of more than one nerve and the need for multi injection. Multi injection technique has been recommended in the literature to increase block success, and this technique increases the number of needlings.[9] For TCPNB, where we used the multi injection technique, our needling numbers were similar to the literature.[15] This increase in the number of needling may negatively affect patient satisfaction. Although no difference was found in terms of procedure-related discomfort and patient satisfaction in the study by Prasad et al.[15] in our study, we think that the 17% patient satisfaction difference between the groups (80.5% vs 97.2%) was due to the difference in the number of needling between the blocks. We believe that the difference in satisfaction between the blocks will decrease with an increase in the dose of sedoanalgesia to be administered before peripheral nerve block.

Limitations

There were some limitations in our study. First, owing to the practitioner's skill and patient diversity, it was difficult to achieve objectively similar rates of blockage in all patients using the current methods. Secondly, since all patients received a block, there is no third group as a control group. In addition, comparison of PO effectiveness between groups was limited to 24 hours, and long-term effects and complications could not be evaluated. There is a need for new studies with a larger sample size, covering all 3 groups, and evaluating long-term effects and complications.

CONCLUSION

In conclusion; although imaging time, block processing time and number of needling are seen as disadvantages for TCPNB; it has significant advantages in terms of anesthesia onset time, block performance time, PO analgesic effectiveness and amount of analgesic consumed. In our study which includes comparing two different block application points; We showed that TCPNB is the peripheral nerve block that should be preferred in foot and ankle surgery for effective use of resources.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Gülhane Training and Research Hospital Scientific Researches Ethics Committee (Date: 23.076.2021, Decision No: 2021/44).

Informed Consent

All patients signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version

REFERANCES

1. Ma HH, Chou TA, Tsai SW, Chen CF, Wu PK, Chen WM. The efficacy and safety of continuous versus single-injection popliteal sciatic nerve block in outpatient foot and ankle surgery: a systematic review and meta-analysis. *BMC Musculoskelet Disord.* 2019;20(1):441. doi:10.1186/s12891-019-2822-7
2. Gupta A, Kumar K, Roberts MM, et al. Pain management after outpatient foot and ankle surgery. *Foot Ankle Int.* 2018;39(2):149-154. doi:10.1177/1071100717738495
3. Sidon E, Rogero R, McDonald E, et al. Prevalence of neuropathic pain symptoms in foot and ankle patients. *Foot Ankle Int.* 2019;40(6):629-633. doi:10.1177/1071100719838302
4. Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery-a prospective study. *Can J Anaesth.* 1998;45(7):612-619. doi:10.1007/BF03012088
5. Myerson MS, Ruland CM, Allon SM. Regional anesthesia for foot and ankle surgery. *Foot Ankle.* 1992;13(5):282-288. doi:10.1177/107110079201300510
6. Beverly A, Kaye AD, Ljungqvist O, Urman RD. Essential elements of multimodal analgesia in enhanced recovery after surgery (ERAS) guidelines. *Anesthesiol Clin.* 2017;35(2):e115-e143. doi:10.1016/j.anclin.2017.01.018
7. Palmisani S, Ronconi P, De Blasi RA, Arcioni R. Lateral or posterior popliteal approach for sciatic nerve block: difference is related to the anatomy. *Anesth Analg.* 2007;105(1):286-287. doi:10.1213/01.ane.0000263033.92266.f1
8. Karaarslan S, Tekgül ZT, Şimşek E, et al. Comparison between ultrasonography-guided popliteal sciatic nerve block and spinal anesthesia for hallux valgus repair. *Foot Ankle Int.* 2016;37(1):85-89. doi:10.1177/1071100715600285
9. Sagherian BH, Kile TA, Seamans DP, Misra L, Claridge RJ. Lateral popliteal block in foot and ankle surgery: comparing ultrasound guidance to nerve stimulation. A prospective randomized trial. *Foot Ankle Surg.* 2021;27(2):175-180. doi:10.1016/j.fas.2020.03.011
10. Rodziewicz TL, Stevens JB, Ajib FA, Tunnell DJ. Sciatic Nerve Block. In: StatPearls. Treasure Island (FL): StatPearls Publishing; June 5, 2023.

11. Barbosa FT, Barbosa TR, da Cunha RM, Rodrigues AK, Ramos FW, de Sousa-Rodrigues CF. Anatomical basis for sciatic nerve block at the knee level. *Braz J Anesthesiol.* 2015;65(3):177-179. doi:10.1016/j.bjane.2014.03.010

12. Karmakar MK, Reina MA, Sivakumar RK, Areeruk P, Pakpirom J, Sala-Blanch X. Ultrasound-guided subparaneural popliteal sciatic nerve block: there is more to it than meets the eyes. *Reg Anesth Pain Med.* 2021;46(3):268-275. doi:10.1136/rapm-2020-101709

13. Dejong RH, Wagman IH. Physiological mechanisms of peripheral nerve block by local anesthetics. *Anesthesiology.* 1963;24:684-727. doi:10.1097/00000542-196309000-00019

14. Danelli G, Fanelli A, Ghisi D, et al. Ultrasound vs nerve stimulation multiple injection technique for posterior popliteal sciatic nerve block. *Anaesthesia.* 2009;64(6):638-642. doi:10.1111/j.1365-2044.2009.05915.x

15. Prasad A, Perlas A, Ramlogan R, Brull R, Chan V. Ultrasound-guided popliteal block distal to sciatic nerve bifurcation shortens onset time: a prospective randomized double-blind study. *Reg Anesth Pain Med.* 2010;35(3):267-271. doi:10.1097/AAP.0b013e3181df2527

16. Faiz SHR, Imani F, Rahimzadeh P, Alebouyeh MR, Entezary SR, Shafeinia A. Which ultrasound-guided sciatic nerve block strategy works faster? Prebifurcation or separate tibial-peroneal nerve block? A randomized clinical trial. *Anesth Pain Med.* 2017;7(4):e57804. doi:10.5812/aapm.57804

17. Willis WD, Westlund KN. Neuroanatomy of the pain system and of the pathways that modulate pain. *J Clin Neurophysiol.* 1997;14(1):2-31. doi:10.1097/00004691-199701000-00002

18. Hodler J, Kubik-Huch RA, von Schulthess GK, eds. Diseases of the brain, head and neck, spine 2020-2023: diagnostic imaging. Cham (CH): Springer; 2020.

19. Tran DQ, Salinas FV, Benzon HT, Neal JM. Lower extremity regional anesthesia: essentials of our current understanding. *Reg Anesth Pain Med*. 2019. doi:10.1136/rapm-2018-000019

20. Tran DQ, Dugani S, Pham K, Al-Shaafi A, Finlayson RJ. A randomized comparison between subepineural and conventional ultrasound-guided popliteal sciatic nerve block. *Reg Anesth Pain Med.* 2011;36(6):548-552. doi:10.1097/AAP.0b013e318235f566