CLINICAL RESEARCH / KLİNİK ÇALIŞMA

EFFECTIVENESS OF POPLITEAL NEVRE BLOCK AND ANKLE NEVRE BLOCK IN HALLUX VALGUS SURGERY

HALLUKS VALGUS AMELİYATINDA POPLİTEAL SİYATİK SİNİR BLOĞU İLE AYAK BİLEĞİ SİNİR BLOĞUNUN ETKİNLİĞİ

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ABSTRACT

Objective: *Regional anesthesia methods have been widely used in hallux valgus (HV) surgery in recent years. General anesthesia, spinal anesthesia and peripheral nerve blocks are frequently applied. The aim of this study was to investigate the effectiveness of ultrasound-guided popliteal sciatic nerve block (UPSNB) and ultrasound-guided ankle nerve block (UANB) in HV surgery.*

Method: *This study was conducted with 40 patients with ASA I-II physical conditioning after having obtained the ethics committee approval from Gaziantep University ethics committee (No:2016/186). Patients were divided into two equal groups; UPSNB was applied with 20 mL of 0.5% bupivacaine in Group S (n=20). In Group P (n=20), UANB (5 mL to the posterior tibial nerve, 5 mL to the superficial peroneal nerve, 4 mL to the deep peroneal nerve, 3 mL to the saphenous nerve, 3 mL to the sural nerve) was applied with 20 mL of 0.5% bupivacaine. The tourniquet time, time of onset of motor block and duration of motor block, time of onset of sensory block and duration of sensory block were recorded for each patient. The time when the visual analogue scale (VAS) was 4 was recorded for each group.*

Results: *The sensory block onset time was shorter in Group P (21.85± 1.53; 9.4± 1.31 min) (p<0.001). The duration of sensory block was also shorter in Group P (14.65± 1.46; 7.35± 0.93 hr) (p<0.001). The motor block onset time was shorter in Group P (25.2± 2.45; 11.8± 2.33 min) (p<0.001). The duration of motor block was also shorter in Group P (12.15± 1.18; 5.5± 0.68 hr) (p<0.001). The time to VAS 4 was shorter in Group P (16.2±1.41; 9.25± 0.44 hr) (p<0.001).*

Conclusion: *While UANB yielded earlier sensory and motor block in HV surgery, the block effect terminated in a shorter time. The post-operative pain onset time was also observed to be shorter in UANB. UANB may be suggested as an alternative to UPSNB in HV surgery.*

KEYWORDS: *Hallux valgus, Popliteal block, Ankle block*

ÖZ

Amaç: *Son yıllarda halluks valgus (HV) operasyonlarında rejyonel anestezi yöntemleri sıkça kullanılmaktadır. Genel anestezi, spinal anestezi ve periferik sinir blokları sıkça kullanılmaktadır. Bu çalışmanın amacı HV cerrahinde ultrasound eşliğinde popliteal siyatik sinir bloğu (UPSNB) ile ultrasound eşliğinde ayak bilek sinir bloğunun (UABSB) etkinliğini gözlemlemektir.*

Yöntem: *Çalışmamız yerel etik kurul onayı (Gaziantep Üniversitesi Etik kurulu No: 2016/ 186) ile ASA I-II fiziksel durumda olan toplam 40 hasta ile yapıldı. Çalışmamızda iki eşit gruba ayrılan hastalarımızda grup S de (n=20) 20 mL %0.5 lik bupivakain ile UPSNB uygulandı. grup P de (n=20) toplam 20 mL %0.5 lik bupivakain ile UABSB (5 mL posterior tibial sinir, 5 mL yüzeyel peroneal sinir, 4 mL derin peroneal sinir, 3 mL safen sinir, 3 mL sural sinir blokları) uygulandı. Hastalarımızın turnike süresi, motor blok başlama zamanı ve süresi ile sensoryal blok başlama zamanı ve süresi kayda alındı. Ayrıca her iki grup için vizüel analog skalanın (VAS) 4 olduğu zaman kayda alındı.*

Bulgular: *Sensoryal blok başlama zamanı grup P'de daha kısa idi (21.85± 1.53; 9,4± 1.31 dk) (p<0.001). Sensoryal blok süresi grup P'de daha kısa idi (14.65± 1.46; 7.35± 0.93 saat) (p<0.001). Motor blok başlama zamanı grup P'de daha kısa idi (25.2± 2.45; 11.8± 2.33 dk) (p<0.001). Motor blok süresi grup P' de daha kısa idi (12.15± 1.18; 5.5± 0.68 saat) (p<0.001). VAS 4 olma süresi grup P'de daha kısa idi (16.2±1.41; 9.25± 0.44 saat) (p<0.001).*

Sonuç: *HV cerrahisinde UABSB daha erken sensoryal ve motor blok oluşumu gözlenirken, blok etkisinin daha kısa sürede sonlandığı gözlenmiştir. Postoperatif ağrı oluşum süreside UABSB da daha kısa olarak gözlenmiştir. HV cerrahisinde daha erken derlenme istenen vakalarda ABSB PSNB' ye alternatif olarak düşünülebilir.*

ANAHTAR KELIMELER: *Halluks valgus, Popliteal blok, Ayak bileği bloğu*

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INTRODUCTION

Hallux valgus (HV) is defined as a 15 degrees or more deviation of the toe from metatarsal joint to the lateral and is among the most common foot deformities. This condition leads to pain, difficulty in walking and wearing shoes (1). More than 150 methods have been described for treatment of HV, for which outpatient surgery has been recommended (2). Many post-operative complications including scarring, infection, pain, recurrence, neuro-vascular surgery, deep venous thrombosis, and malunion of osteotomy have been described (3).

Different anesthesia methods including general anesthesia, neuro-axial anesthesia and peripheral nerve blocks (sciatic, femoral, ankle) may be carried out for treatment of HV (4). The anesthesia method is important for early recovery and also post-operative pain control (5,6). Regional anesthesia methods (peripheral nerve blocks and neuro-axial anesthesia) are preferred to general anesthesia due to providing faster post-operative recovery, shorter duration of hospital stay and better pain control (6,7).

Popliteal nerve block has been performed for many foot surgeries (4,5,7). This method may be applied as it provides anesthesia in regions innervated by the sciatic nerve and its branches or for post-operative analgesia purposes concurrently with general anesthesia (4,5). In ultrasound-guided popliteal sciatic nerve block (UPSNB), the sciatic nerve is fixed at the outlet point in the hamstring muscles and this improves the success of the method through enabling monitoring of the local anesthetic drug and also reduces the side effects such as intra-neural application or overdose (7).

Ankle block has also been used for foot surgery (8,9). The method is based on locally blocking the nerves that innervates the ankle. Failure or drop foot may be seen in this method. However, the prevalence of these side effects has decreased through ultrasound-guided ankle nerve block (UANB). The aim of this study was to compare the sensory and motor block onset time and the duration of effect, time to post-operative pain development and patient satisfaction between UANB and UPSNB groups.

Use of UANB and UPSNB for HV surgery has reported in the literature (7-11). However, we could not encounter a study reporting HV surgery using peripheral nerve blocks without general anesthesia and comparing both methods. We aimed to reveal the effects of both regional anesthesia methods applied when the patients were awakened.

MATERIAL AND METHOD

The present study was conducted with a total of 40 patients aged between 20-60 years, in ASA I-II physical conditioning, for whom elective HV surgery had been planned at the Dr. Ersin Arslan Training and Research Hospital between January 1 and March 1, 2017, after having obtained the local ethics committee approval from Gaziantep University ethics committee (No:2016/186). Patients with diabetes mellitus, allergy to local anesthetics, chronic pain syndrome, coagulation disorder, infection and those who did not agree to participate, were excluded from the study.

All patients were taken to the operating room; an 18 G venous catheter was placed into the left arm and fluid support was provided during the procedure. Non-invasive blood pressure, heart rate, electrocardiography, saturation monitoring with pulse-oxymetry were recorded during the procedure. The regional anesthesia field was disinfected with betadine.

Patients were divided to two equal groups. The patients in Group S (n=20) were placed in the prone position and UPSNB was applied with 20 mL of 0.5% bupivacaine (Bustesin“, İstanbul, Turkey) using 21G 120 mm peripheral block needle (Sonoplex Stim Cannula, Pajunk, Geisingen, Germany) and linear probe of the ultrasound (Mindray M5“, Shenzhen, China). Patients in Group P (n=20) were applied UANB (5 mL to the posterior tibial nerve, 5 mL to the superficial peroneal nerve, 4 mL to the deep peroneal nerve, 3 mL to the saphenous nerve, 3 mL to the sural nerve) with 20 mL of 0.5% bupivacaine (Bustesin“, İstanbul , Turkey) using 21G 120 mm peripheral block needle (Sonoplex Stim Cannula, Pajunk“, Geisingen, Germany) and linear probe of the ultrasound (Mindray M5“, Shenzhen, China). Low-pressure tourniquet (200 mmHg) was applied to the supra malleolar region at the beginning of the operation and recorded by the anesthesia nurse blinded to the study.

For both groups, sensory and motor block were evaluated at every 3 min after block application and at every 30 min in the post-operative period by an anesthetist blinded to the study, and the results were recorded. Sensory block was evaluated with the pin-prick test (2= complete sensory loss, 1= sensory loss, 0= no sensory loss), and the onset time and termination time of sensory block were recorded. Motor block was evaluated as follows: 2= complete motor loss, 1= partial motor loss, 0= no motor loss. The tourniquet time was recorded for each patient by a nurse blinded to the study. The onset time of post-operative severe pain was also recorded by

a nurse blinded to the study. The time to VAS 4 (VAS= no pain, VAS= most severe pain) was taken as the onset time of severe pain and recorded by a nurse blinded to the study.

Intravenous ibuprofen (Itrafen", Gen İlaç, İstanbul; Turkey) was administered when the post-operative VAS was ≥4 and the amount of the analgesic used was recorded. Post-operative patient satisfaction was evaluated at the 24th hour (1= I am not satisfied, 2= I am somewhat satisfied, 3= I am quite satisfied, 4= I am very satisfied).

Statistical analyses were performed using the SPSS 13.0 program. The data were compared using the unpaired student's t-test, and repeated measures were compared using the variance analysis test. A p level of ≤0.05 was accepted as statistically significant.

RESULTS

No statistically significant difference was found between the groups with regard to age, gender, body mass index and the tourniquet time (Table I).

Table I. Comparison of demographic data of groups

	Group S	Group P	p
Age(years)	52.95	54.1	0.1
Male/Female	6/14	7/13	0.8
BMI(Body Mass Index)	29.78	29.11	0.2
Duration of tourniquet (minutes)	41.1	40.4	0.2

The sensory block onset time was shorter in Group P (21.85±1.53; 9.4±1.31 min) (p<0.001). The duration of sensory block was also shorter in Group P (14.65±1.46; 7.35±0.93 hr) (p<0.001). The motor block onset time was shorter in Group P (25.2±2.45; 11.8±2.33 min) (p<0.001). The duration of motor block was also shorter in Group P (12.15±1.18; 5.5±0.68 hr) (p<0.001). The time to VAS 4 was shorter in Group P (16.2±1.41; 9.25± 0.44 hr) (p<0.001). (Table II). No statistically significant difference was determined between the groups with regard to patient satisfaction (p=0.15) (Table II). No statistically significant difference was found between the groups with regard to analgesic consumption (2360±709.6; 2680±59612 mg) (p=0.13) (Table II).

DISCUSSION

The present study has revealed that the time of onset of block was shorter in patients undergoing UANB compared to the patients undergoing UPSNB. However, the time to VAS 4 was determined to be longer in patients undergoing UPSNB.

Popliteal sciatic nerve block was first described by Labet in 1923; however, it was not used frequently due to the side effects (dysesthesia and termination of block, and returning to normal activity). In recent years, the number of side effects and the number of unsuccessful blocks were found to decrease through ultrasound use in peripheral nerve blocks, and furthermore, longer duration of effects could be obtained with lower drug doses (10-12). The block onset time and the duration of motor and sensory block are shorter in ankle block (13). While ankle block is usually used for control of post-operative pain in patients undergoing general anesthesia, its use has been reported for awake-surgery and post-operative pain control (8,9,13,14).

Schipper et al. (9) applied UPSNB and UANB for post-operative pain control in patients undergoing foot surgery. The authors observed better post-operative pain control in patients undergoing UPSNB in the study that used peripheral block methods for post-operative pain control under general anesthesia. Karaarslan et al. (7) evaluated patient satisfaction and the effects of popliteal sciatic nerve block and spinal anesthesia methods in HV surgery. While patient satisfaction was found to be better in popliteal sciatic nerve block, the VAS score was found to be lower.

The finding of sensory and motor block onset time and the duration of block to be statistically significantly shorter in patients undergoing UANB is a finding that supports the literature data (9). Although the time to VAS score of 4 was statistically significantly shorter in

Table II. Comparison of the data of the groups

	GROUP S	GROUP P	p
The initial time of motor block (min)	25.2±2.45	11.8±2.33	*<0.001
The duration of motor block (hr)	12.15±1.18	5.5±0.68	*<0.001
The initial time of sensory block (min)	21.85±1.53	9.4±1.31	<0.001
The duration of sensory block (hr)	14.65±1.46	7.35±0.93	<0.001
The initial time of VAS 4 (hr)	16.2±1.41	9.25±0.44	<0.001
The satisfaction score of patients	3.6	3.2	0.15
Total analgesic consumption of (mg)	2360±709.6	2680± 596.12	0.13

p<0.5

the UANB group, no significant difference was observed in patient satisfaction, which was evaluated at the 24th hour and the analgesic consumption.

Early recovery and effective pain control are important after operations like HV, which are evaluated as outpatient surgery (15). We have observed earlier recovery and effective pain control in HV surgery performed with UANB compared to UPSNB.

CONCLUSION

We suggest that applying UANB without general anesthesia could enable early recovery and effective post-operative pain control in HV surgery, which is evaluated as outpatient surgery.

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