Frost Technique H versus Technique V in Anesthetic Block of the First Toe: A Comparative Study.

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Keywords: Technique V, Technique H, Anesthesia, Ingrown toenail.

Posted Date: August 19th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-61786/v1

Abstract

Blackground

This study aims to compare 2 methods of anesthetic block in the first toe in patients with onychocryptosis.

Methods

A total of 70 ingrown toenails of the first toe in 59 patients underwent a digital anesthetic block using the V technique, while 70 ingrown toenails of the first toe in 57 patients underwent a digital anesthetic block using the H technique. As study variables, the effectiveness of the anesthetic block of the first toe was evaluated at 10 and 20 minutes after each of the techniques.

Results

An anesthetic block efficacy of 58.6% was observed at 10 minutes and 85.7% at 20 minutes in group V technique, while technique H observed efficacy at 10 minutes. 51.4% and 72.9% and at 20 minutes.

Conclusions

Technique V appears to be superior to technique H by 7.2% at 10 minutes and 12.8% at 20 minutes after anesthetic block.

Trial registrations

Ethical approval was obtained from the ethical committee of the University of Barcelona with the registration number IRB00003099 and the Ethical Committee for Research with Medicines from the Hospital Clínico de Barcelona with the number HCB / 2019/0051. All patients signed informed consents.

Introduction

Onychiptostosis, or ingrown toenails, appear when the lateral edges of the nail penetrate the skin and cause inflammation and pain. If left untreated, they can become infected [1]. The most frequent cause is a bad nail cut, hereditary factors, biomechanical or structural alterations of the foot, hyperhidrosis and the inappropriate use of footwear [2].

In most cases, surgery is the most effective treatment, and there are different techniques [3, 4], the phenol-alcohol technique being the most specific and studied [5, 6].

These surgeries are performed under local anesthesia. Among the local anesthetic techniques, the trunk techniques are the most frequently used on the first toe. This is innervated by four nerves that are located on both sides of the proximal phalanx and are distributed longitudinally: two nerves in the dorsal area

(superficial peroneal nerve and deep peroneal nerve), and two nerves in the plantar area, which are future. of the common plantar nerve [7].

The most commonly used trunk technique in the first toe is the digital ring block or H-technique described by Frost in 1952 that requires two punctures [8] on each side of the proximal phalanx (Figure 1). In some occasions, there are technical failures, which can cause an insufficient anesthetic effect and the possibility of rescue injections. This situation forces the clinician to multiple punctures controlled postoperative pain in the puncture area and an increase in the doses of injected anesthetic solution.

For this reason, it is necessary to know and manage other alternative techniques of anesthetic block of the first finger.

One of the alternatives to technique H is technique V, described and published for the first time in 2017. It is a little-known technique, which requires a greater learning curve, but allows anesthetic blockage of the first toe with a single puncture. on the back of the first toe and two lateralizations in the medial and lateral area of the metatarsophalangeal joint [9].

Materials And Methods

An experimental, multicenter, prospective, randomized study was carried out to compare the two anesthetic techniques, where the efficacy of the anesthetic block of the first toe was evaluated 10 and 20 minutes after performing technique V and technique H.

The study procedures were performed at the SS Podiatry Clinic and at the Barcelona Hospital Clinic on 140 ingrown toenails on the first toe (72 on the right foot and 68 on the left foot) in 115 patients of average age 40, 93 years (range 12-90 years).

The first participant registered in February 2018 and the last one in February 2020.

Patients with a history of sensitivity or allergy to local anesthetics in the amide, pregnancy or lactation group, neuropathy, cognitive deficit, and Raynaud's syndrome were excluded from the study.

The variables were age; Sex; Laterality; Infection; Efficacy of the technique at 10 and 20 minutes and number of reinforcements.

A total of 70 onychocryptosis surgeries on the nails of the first toe in 59 patients (33 men and 37 women) underwent the V technique, while 70 ingrown toenails of the first toe in 56 patients (19 men and 51 women).) underwent technique H.

The allocation of patients in each group was done randomly, depending on the number of medical records.

The effect of the anesthetic block was evaluated at 10 and 20 minutes after performing one of the two techniques. The times to control the anesthetic effect were calculated based on the latency time of

lidocaine, with 10 minutes to start the first symptoms and 20 minutes to start the latency for complete anesthesia.

To verify the effect of the anesthetic block, the side of the finger pad was pressed with tweezers and the patient was asked if the finger felt anesthetized, lacked sensitivity, or had a lost pain sensation.

In patients who, 20 minutes after performing one of the techniques, did not have a sufficient degree of anesthesia, the technique was reinforced with new punctures, as rescue.

In both techniques, a 5 ml dose of 2% lidocaine without epinephrine was administered with a conventional syringe and a 0.6 x 25 mm needle.

All the data were recorded in a table specially prepared for the present study.

Results

The final sample of the study consisted of 140 onychocryptosis surgeries of 115 patients (52 men and 88 women) with a mean age of 40.93 years and a range of 12-90 years.

In 72 subjects, the ingrown toenail was found on the right foot, and in 68 subjects, the left foot.

At 10 minutes after performing technique V, 58.6% of the patients presented a complete anesthetic block and at 20 minutes it was 85.7% (p-value = 0.3957)

New injections were made as rescue in 14%.

In technique H, 51.4% presented anesthetic block after 10 minutes and 72.9% (p value = 0.5688) within 20 minutes after performing technique V.

In 27%

new rescue injections were required from the patients.

In patients with infection, 10 minutes after performing technique V, it was 39% effective, while it was 28% in technique H. The 20 minutes in technique V, the effectiveness was 70%, and technique H was 50%.

Discussion

In a patient requiring surgery to treat the ingrown toenail, an anesthetic blocking technique should be performed correctly so that the patient does not report pain during surgery [8,9,14].

In this study, 115 patients of both sexes had onychocryptosis and required an anesthetic block to partially or completely remove the nail from the first toe.

Lidocaine is a local anesthetic agent with an amide structure, developed in 1943 by Swiss Nils Lofgren and his colleague Bengt Lundqvist [15]. Currently, it is the most widely used nesting type local anesthetic and is a benchmark for comparative studies with other anesthetics in the same group [10].

Lidocaine is characterized by a rapid onset, around 10 minutes, and a moderate duration of action of 1.5 hours [16,17]. It is metabolized mainly by the CYP3A4 enzyme in the liver into pharmacologically active metabolites [16] and is a suitable drug for infiltration, regional and superficial anesthesia [18].

Latency times vary according to the anesthetic technique to be used, this would be explained by the distance that the anesthetic solution must travel from the deposit site to reach the nerve trunk [18].

In this study, the allocation of one of the two techniques (technique V and technique H) was performed randomly according to the number of medical records.

Regarding the results, we can highlight that, although the two techniques did not prove to be significantly different, the V technique was effective in 85.7% of the patients at 20 minutes compared to 72.9% of the H technique in it. period of time This means that the V technique is better by 12.9%.

This study also seems to suggest that in infected onychocryptosis, technique V is 20% more effective than technique H.

This could occur due to the location where the anesthetic is deposited in technique V, which, being further from the focus of infection [7], facilitates the action of the anesthetic drug [19].

One of the limitations of this study is the number of subjects. A sample size calculation (95% confidence level) was performed, in which a total of 126 subjects in each group are needed to obtain more conclusive results.

Conclusion

In conclusion, we can affirm that both methods of anesthetic block in the first toe are safe and that the V-technique, with a single puncture, has a slightly higher effectiveness.

Declarations

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the ethical committee of the University of Barcelona with the registration number IRB00003099 and the Ethical Committee for Research with Medicines from the Hospital Clínico de Barcelona with the number HCB / 2019/0051. All patients signed informed consents.

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

Not applicable

COMPETING INTERESTS

The authors declare that they have no competing interests

FUNDING

The authors declare that there is no source of financing.

AUTHOR'S CONTRIBUTIONS

All authors read and approved the final manuscript.

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Figures

Frost technique for anesthetic block of the first toe with two puncture sites.

Technique V for the anesthetic block of the first toe with a single puncture.

Figure 1

Frost technique for anesthetic block of the first toe with two puncture sites. Technique V for the anesthetic block of the first toe with a single puncture