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Finger Tourniquet Method with Sterile Surgical Gloves

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Abstract

Hemostasis is important in hand surgery, and especially in surgical procedures on the fingers. A clean and blood-free surgical site ensures a faster and more reliable surgical procedure. As a simple, reliable and affordable tourniquet method that can be used in surgical procedures involving the fingers in hand surgery, we use a sterile glove as an Esmarch bandage, and administer local anesthesia.

Keywords: Hand Surgery; Tourniquet; Hemostasis

Introduction

Hemostasis is important in hand surgery, and especially in surgical procedures on the fingers. [1] A clean and blood-free surgical site ensures a faster and more reliable surgical procedure. Hemostasis can be achieved by applying pressure to both sides of the finger during the surgical procedure, and there have been several tourniquet methods described for this purpose. [2,3,4] As common methods, a Penrose drain can be cut into a flat strip and wrapped around the proximal phalanx; a finger from a surgical glove can be cut and applied to the finger as a tourniquet; or pneumatic or digital tourniquets can be used. Ischemic necrosis can occur if such tourniquets are forgotten [5] and left in place at the end of the operation. We have developed a modified method to create finger tourniquets that can help the surgeon to avoid such accidents. In our clinic, we use sterile surgical gloves and apply a tourniquet and regional anesthesia to the fingers, along with venous discharge during finger surgeries. As a simple, reliable and affordable tourniquet method that can be used in surgical procedures involving the fingers in hand surgery, we use a sterile glove as an Esmarch bandage, and administer local anesthesia.

Materials and Methods

Surgical Technique

During surgical procedures on fingers, a left or a right sterile surgical glove is prepared the hand to be operated upon. Before digital block to the finger, 10% povidone-iodine solution and 75% alcohol are applied to the whole hand, wrist, and distal half of forearm for sterilization and allowed to dry for 3 minutes. The hand is then further cleaned with 75% alcohol and dried with sterile towel or gauze. Then, an intact, sterile latex surgical glove is put on the patient's hand. The patient or an assistant surgeon is asked to elevate the forearm and hand to avoid contamination during the subsequent draping of surgical sheets. This completes the preparation. A 3-6 mm elliptical section is then cut from the tip of the glove on finger to be surgically operated. The size of the removed glove part is adjusted to suit the size of the finger. By folding the glove tip over the part of the glove that was cut, the cut part is rolled proximally. Thus, the arterial and venous circulation of the finger is discharged backward (Figure 1). Then, an anesthetic agent is applied to both sides of the proximal phalanx of the finger, and thereby, both tourniquet and regional anesthesia are achieved. After the surgical procedure, the glove is cut and the tourniquet is removed.

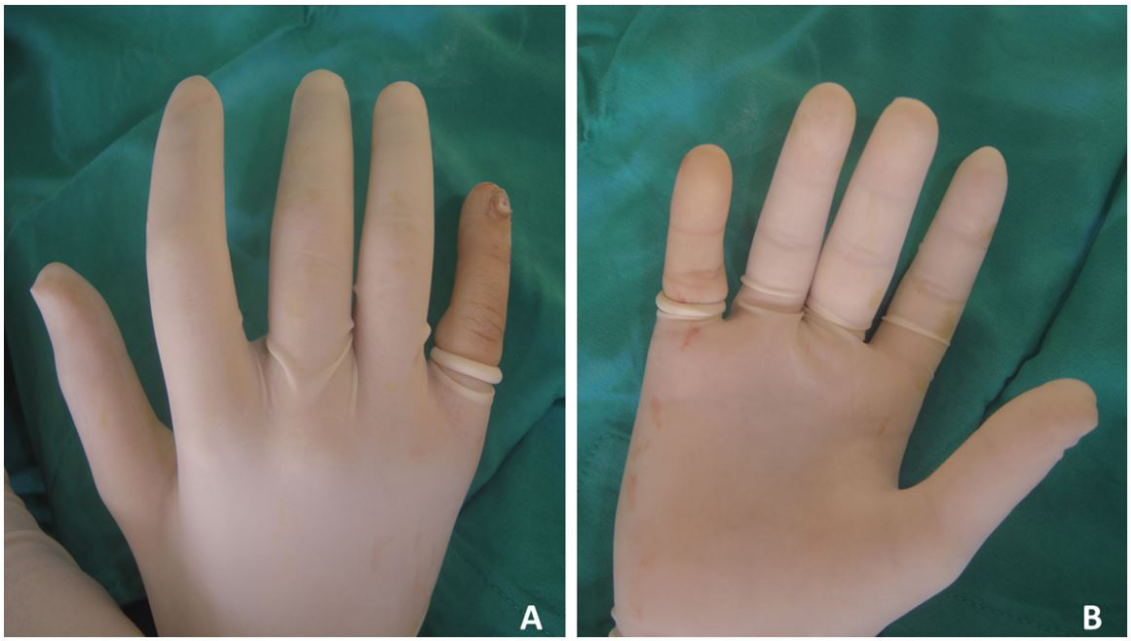

Figure 1: (A, B): Use of sterile surgical gloves on the little finger of the hand as an esmach bandage and tourniquet

Results

From 2014 to 2020, approximately 67 patients underwent digital surgical procedures with our safe finger tourniquet. All the patients had their lesions located distal to the mid portion of the proximal phalange of fingers or thumbs. There was no venous oozing from the surgical wound, and the operation field was clean and free from bleeding during every operation in this series. Notably, the latex in the glove tends to relax over time, and venous oozing may commence after approximately 40 to 50 minutes, so we strove to keep ischemia time less than 40 minutes. All the digits had blood flow returned immediately after the tourniquets had been released. None of the tourniquets was forgotten or left in place after the surgery. Postoperative follow-up 6 weeks after the surgery revealed no infections or skin necrosis over the digits. One patient reported hypesthesia over the operated finger. The sensation of that finger restored about 1 week later.

Discussion

Using a finger tourniquet for surgeries limited to fingers is usually preferred to an arm tourniquet, as it prevents any unnecessary tissue ischemia. Surgical procedures are performed under digital nerve block alone, leading to prolonged tolerance by the patient. There are commercially available finger tourniquets, [2,4] although they cost more, and so many surgeons perform surgical procedures using a tourniquet method using Penrose drains or glove fingers, which are readily available in operating rooms.

An ideal digital tourniquet should provide a consistently safe and effective pressure. The pressure should be high enough to arrest digital circulation and not too high to cause neural or vascular injury. [6] Our digital tourniquet method is a modification of glove roll-on tourniquets and produces the pressure approximately like the others'. Lahham et al measured such pressure to be between 196 and 268 mmHg. Such pressure is not harmful to digital nerves, [6] especially in short duration operations. So we believe that the transient hypesthesia of our patient is due to neuropraxia after minor injury to the digital nerve caused by digital block and is not related to the short-term tourniquet application.

In the technique we have adopted, first, the surgical site is cleaned and the tourniquet is applied by gradually strangling the finger using the glove, followed by anesthetic agent application. Thereby, hemostasis is achieved as desired. The procedure is made more comfortable for both the patient and the surgeon through regional anesthesia. The superior hemostasis management and the option to partially release the tourniquet when required make this technique superior to other finger tourniquet methods. Furthermore, it is more cost effective than pneumatic and Penrose drains. Using the entire glove as the tourniquet rather than using the fingertip cut from the glove also makes it less likely the tourniquet will be forgotten on the finger, resulting in the avoidance of ischemia and necrosis.

Declarations

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Competing Interests

Both authors declare that they have no competing interests.

Author's contributions

FD made substantial contributions to operation and writing, FNT made substantial contributions to data interpretation and writing. Both authors read and approved the final manuscript.

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The patient was informed about the procedures. Informed consent form was obtained from the patients and their relatives.

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