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Original article

The new digit tourniquet ForgetMeNot®

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ABSTRACT

Background: Digit tourniquets are widely used in the operating room and even more often in the emergency department to allow the exploration of injuries. A rolled surgical glove finger or silicone catheter placed at the base of the digit is a common method. However, rolled glove tourniquets are easily forgotten under the dressing and may then cause ischemia, which may require amputation. Silicone catheters are expensive single-use devices that may fail to provide effective exsanguination and must be removed by cutting, which may result in skin lesions. The ForgetMeNot® digit tourniquet (Arex, Palaiseau, France) was designed to overcome these drawbacks. The objective of this study was to assess the use of ForgetMeNot® in our clinical practice.

Hypothesis: The ForgetMeNot® digit tourniquet is easy to position and remove, effective, and difficult to accidentally leave in place.

Material and methods: ForgetMeNot® is composed of two solid cylindrical silicone strands emerging from a central crosspiece bearing two holes through which the ends of the strands can be threaded until stopped by beads on each strand. The device can be sterilised and re-used. It is easy to put in place and to remove. Threading the ends through the holes in the crosspiece forms two loops, which are passed around the tip of the finger. The device is then rolled down to the base of the digit, wrapping around itself and thus tightening gradually. At the end of the surgical procedure, pulling on the flat central crosspiece releases the device. ForgetMeNot® was tested by junior and senior surgeons in 86 patients. The following were assessed: pain, tourniquet time, effectiveness of exsanguination, complications, and the learning curve.

Results: Positioning the device caused no pain. No patient reported paraesthesia. Remembering to remove the device was made easy by its bright blue or yellow colour. The pressure applied ensured effective exsanguination of the digit. In no case was cutting the device required for removal. Each device was sterilised and re-used several times.

Discussion: The new digit tourniquet ForgetMeNot® is unlikely to be forgotten, effective, easy to use, re-usable, and associated with a low risk of skin lesions upon removal.

Level of evidence: III, retrospective uncontrolled study.

1. Introduction

Tourniquets are widely used daily in hand surgery, particularly to explore finger injuries or to perform simple suturing. In the emergency room, advantages of digit tourniquets over pneumatic tourniquets include faster exsanguination and absence of pain due to the device being positioned at the locally-anaesthetised site. Nevertheless, controversy continues to surround the use of digit tourniquets, [1] as these are often improvised from devices intended for other uses and have been associated with serious complications [2]. Biomedical devices used off-label as digit tourniquets [3] include surgical gloves, [4] silicone catheters, [5] Penrose drains, [6–8] and urethral catheters [9]. In addition to the legal issues raised by the off-label use of biomaterials, a piece of surgical glove finger rolled at the base of the patient's digit is easily overlooked and may then cause necrosis [10,11] or even amputation of the digit. Although rare, this complication is catastrophic [12,13]. The risk of leaving the tourniquet in the dressing is well-known and extensively described [12] yet cannot be fully eliminated. Further drawbacks of catheters or drains tightened around the base of the

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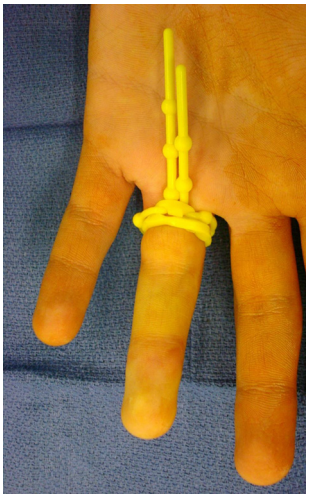

Fig. 1. The new digit tourniquet ForgetMeNot®.

finger include high cost, difficulty in adjusting the applied pressure, limited effectiveness, and risk of skin lesions during removal.

To overcome the drawbacks of improved digit tourniquets, an innovative system, ForgetMeNot®, was designed and is now marketed by Arex (Palaiseau, France). We conducted a clinical evaluation of this device in 86 patients.

2. Material and methods

2.1. Patients and device

A clinical study of the ForgetMeNot® device was conducted over a 13-month period in our department. The device was used by junior physicians (interns and residents) and senior physicians (fellows and hospital physicians). The study included 86 patients who presented to our hand trauma emergency department. ForgetMeNot® was used in all patients meeting standard criteria for emergency placement of a digit tourniquet. The device was put in place either in the emergency room to allow exploration under local anaesthesia (Fig. 1) or in the operating room under local or regional anaesthesia.

Patients aged 18 years or older were included if they required exploration of a finger wound in the emergency room, simple suturing of a finger wound, felon drainage, foreign body extraction, or other procedures. Exclusion criteria were as follows: emergency room exploration of multiple finger wounds; emergency room suturing of a wound located at the base of the first phalanx or extending to the web space; or suspected flexor tendon injury, or injury to both neurovascular pedicles.

The digit tourniquet used for the study was ForgetMeNot® (Arex, Palaiseau, France), which is composed of platinum-cured 40 Shore A (40ShA) silicone, an inert elastomer whose biomechanical properties remain unchanged over a temperature range of −60 °C to +200 °C. The ForgetMeNot® device is composed of two solid cylindrical strands of silicone emerging from a flat central crosspiece bearing two holes (Fig. 2). Total length is 121 mm. Each strand carries five evenly-spaced, round beads that serve to tighten the device when both strands are looped around the finger. ForgetMeNot® is currently available in bright blue and bright yellow.

2.2. Methods

The physicians participating in the study learned how to use the ForgetMeNot® tourniquet by reading a poster placed in the emergency room. The tourniquet is available as a linear device in a sterile package (Fig. 2a). First, the end of each strand must be introduced into one of the holes in the central crosspiece to produce two loops (Fig. 2b). After local anaesthesia of the digit, the loops are positioned around the tip of the finger (Fig. 2c). Traction is then applied to the two strands to tighten the device around the finger (Fig. 2d). Finally, the device is rolled down to the base of the digit, thus producing complete exsanguination (Fig. 2e). At the end of the surgical

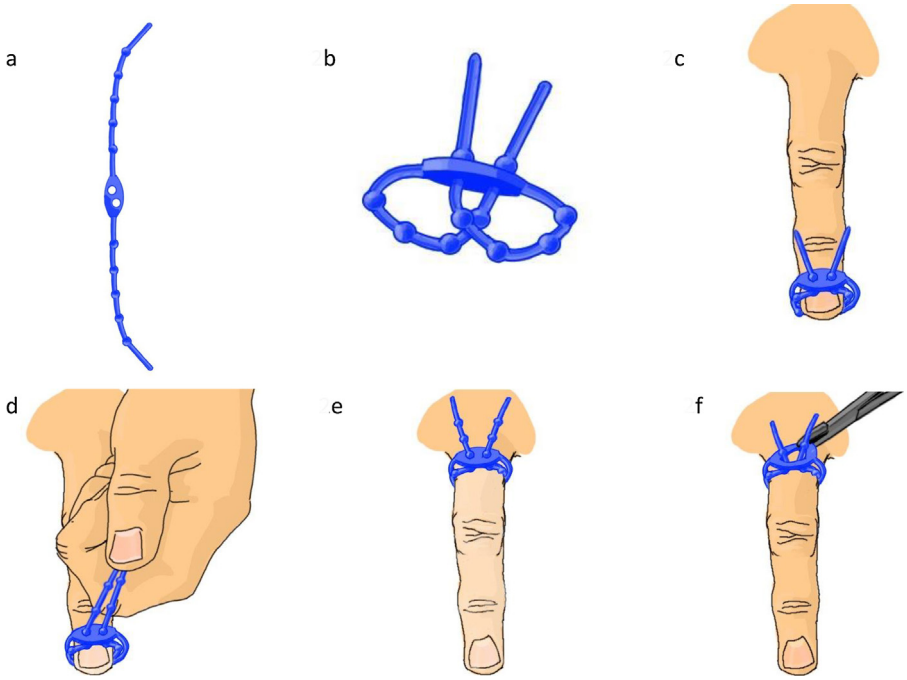

Fig. 2. a: the ForgetMeNot® device as supplied; b: the ForgetMeNot® device after formation of the two loops; c: the ForgetMeNot® device placed on a fingertip; d: the two strands are pulled until the device is sufficiently tight; e: the device is rolled to the base of the finger to ensure complete exsanguination; f: using forceps to pull on the flat central crosspiece releases the device.

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