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Case Report

Finger trapped in door latch removed using an electric saw. A new technique and review of other techniques

Anurag Tiwari MS, DNB^{a,*}, Nishit Bhatnagar MS^a, Ankit Thora MS^a,
Amit Sharma MS^a, Hari Kishan MBBS^b, Saikat Jena MBBS^b

^a Senior Resident, Department of Orthopaedics, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi 110002, India

^b Post Graduate, Department of Orthopaedics, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi 110002, India

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ABSTRACT

Trapping of fingers in metallic bands is a commonly encountered situation. The children, elderly people, and psychiatric patients are the usual victims. The constricting object in the digit causes obstruction to lymphatic and venous drainage leading to oedema distal to the constriction, which leads to further neurovascular compromise and presents as a surgical emergency. A 7-year-old boy presented to us with his right middle finger being stuck in a steel door latch. Multiple attempts were made to remove the trapped finger with conventional methods, and subsequently, it was removed by electric-driven metal cutting saw, which was not previously described in medical literature to the best of our knowledge.

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1. Introduction

A finger getting trapped in a metallic band is a commonly seen condition in a child. Various reports have described conditions in which fingers have been trapped in metallic rings. Most of these are usually associated with trauma to the hand or finger, leading to oedema of the finger distal to the ring. 'Trapped fingers' have also been described in psychiatric patients^{1,2} and in the geriatric age group.³ There are also descriptions of fingers getting stuck in plugholes of kitchen sink⁴ and hardened metal

auto parts.⁵ When there is a delay in presentation of these patients to the health care system, serious complications may proceed, including finger ischaemia, infection, tendon attrition or ultimately the need for surgical amputation. Various techniques and methods of rescue of such trapped digits are described in the literature. Here, we describe a case of a child's finger stuck in a door latch and its subsequent removal using an electric saw and the review of other techniques. The difficulties faced by the orthopaedic surgeons in emergency department in such a condition and techniques for removal of metallic constricting band are discussed.

* Corresponding author. Tel.: +91 9013211215.

E-mail address: dranurag.tiwari@gmail.com (A. Tiwari).

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2. Case report

A 7-year-old boy presented to emergency department with his right middle finger being stuck in a steel door latch for an hour. The finger got stuck in the latch while the child was playing, and the child himself had made several forceful attempts to remove it. Further unsuccessful attempts to remove the trapped finger were made by his mother by applying soap as a lubricant to the finger and then trying to forcefully pull the finger out. The latch was subsequently removed from the door and the child with the finger still trapped in the latch was then brought to us (Fig. 1).

On presentation, the finger distal to the entrapment appeared swollen and congested. Capillary refill was, however, normal and patient was responsive to sensory stimulation. Removal was first attempted by lubrication of the finger with diluted Savlon solution. However, the attempt was unsuccessful. The next attempt was made by trying to cut through the steel latch using a jumbo cutter. The jumbo cutter was able to make a dent in the latch, but was unable to cut through it. The *Hacksaw blade* was then used to cut through the door latch but could not get success. An electric cutting saw (Fig. 2) was then arranged from the Public Works Department of the hospital. A preliminary trial to cut the metallic latch far from the finger was made to test the saw. But due to the loud sound created by the saw, the child became uncooperative. The

Fig. 1 – Clinical photograph of child's hand showing finger trapped in the door latch.

Fig. 2 – Photograph of electric-driven saw.

Fig. 3 – Clinical photograph of hand after removal of finger from the door latch.

patient had to be taken to the operation theatre and general anaesthesia was administered. The blade of a forceps was inserted through the latch over the finger to protect it from blade of the electric saw. To prevent thermal injury to the finger, cutting was done in a stop-start fashion, two seconds cutting followed by five seconds rest. Continuous irrigation with normal saline was maintained to minimise debris and heat production. Within 20 min, the finger was freed without any iatrogenic trauma (Fig. 3). The swelling and congestion resolved and the patient was allowed home the same day. On 6 months follow-up, there have been no residual sequelae or complications.

3. Discussion

Trapping of fingers in metallic bands has solutions ranging from simple home remedies to specialised sophisticated cutting instruments. The constriction can lead to obstruction of lymphatic and venous drainage leading to swelling and hence exacerbating the constriction. Usually patients present after having multiple attempts at removal of the object by using force or lubrication using soap, oil or ointment. Such attempts tend to further increase the swelling of the digit and make removal more difficult. Persistent swelling can even compromise the capillary and arterial circulation leading to ischaemia of the digit, which can lead to further swelling and neurovascular compromise. A prolonged compromise of circulation in a 'trapped finger' can lead to gangrenous changes and might require amputation. Therefore, early referral from primary care clinics is essential to prevent such consequences.

Several techniques of rescue-trapped fingers have been described over the years. Broadly, these techniques are categorised into 'Non-cutting' and 'Cutting' methods.⁶ Choice of technique depends on the age and cooperation of the patient, the nature of the injury and the physical characteristics of the constricting material.

Non-cutting techniques involve removal of the object without disturbing its integrity. These are suited for small, lightweight objects like rings. The patients sometimes attach emotional feelings to these rings and want them to be removed without damaging the ring. Such methods start with home remedies like lubrication of the finger using soap, oil,

ointments, ice, etc. When such basic home remedies fail, then other non-cutting techniques can be used. One of the first steps to be taken should be elevation of the hand and application of ice while arrangements for removal are made. Adequate analgesia should be provided, and if required, a digital nerve block may be given.⁷ Kates³ described the use of a rubber elastic bandage to exsanguinate the finger to decrease the swelling. This facilitates removal of ring without cutting. Venters⁸ described a similar technique of exsanguination using a penrose drain and Esmarch elastic bandage to decrease the swelling. He used a blood pressure cuff as a tourniquet to prevent influx of blood. Cresap⁹ also described the use of elastic bandage for exsanguination and blood pressure cuff as a tourniquet, but he repeated the process of exsanguinations four times for 10–15 min each time to eliminate the swelling. Hiew,¹⁰ Mizrahi¹¹ and Thilagarajah¹² in their separate reports described a 'string wrap technique' in which the proximal end of nylon tape is passed under the object, and the digit is tightly wrapped from proximal to distal. Pulling on the proximal end of the tape moves the constricting object distally onto the tape overlying the compressed tissue and finally off the finger. McElfrish¹³ described an 'elastic pull technique' in which an elastic band is slid beneath the constricting object and on lubrication, both ends of the elastic are pulled circumferentially and distally. Inoue¹⁴ et al. described another simple method using the finger of a surgical glove, which is cut at both ends to get a cylinder-shaped piece of latex. This latex piece is pulled under the object using forceps. The proximal end is then grasped and pulled toward the distal end of the finger in a twisting motion.

Cutting techniques are more suited for heavier, bulkier objects. These require either manual cutters or powered cutting devices. Ricks¹⁵ and Sazwan¹⁶ et al. in separate reports described the removal of hardened metal ring by a diamond-tipped dental burr. Taylor and Boyd⁴ also describe the use of dental volvere for removal of a hard metal auto part stuck on an injured finger. Hajivassiliou⁵ and Woodburn¹⁷ have also shared their separate experiences in removal of constricting objects using a hand-held inexpensive 'hobbydrill'.

Our case, a 7-year-old child with a finger trapped in a door latch presents an uncommon manifestation of a commonly encountered problem solved by an innovative and unconventional method. Emergency departments have to commonly deal with cases of trapped fingers; however, a case of a finger getting stuck in a door latch has not been reported in medical literature. The use of a crude electric powered cutting blade to

free the trapped finger is also not previously described in medical literature to the best of our knowledge.

Conflicts of interest

The authors have none to declare.

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