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CASE REPORT

The tourniquet syndrome of the thumb due to dressing with a rubber band in a pediatric patient

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ABSTRACT

Ischemia of an appendage caused by dressing, tourniquet or hair is a rare, but devastating clinical entity. A six-year-old girl presented to the emergency department with necrosis of her right thumb caused by compressive dressing for four days. The patient was treated with an immediate surgical decompression and the thumb was saved. The patient had a full range of the thumb at 10 months of follow-up. In conclusion, instead of waiting for full demarcation, timely surgical interventions may protect the fingers from being amputated.

Keywords: Digital ischemia, healing, necrosis, rubber band, surgical treatment, tourniquet syndrome.

Tourniquet syndrome is the blockage of the vascular flow of the appendage by a tourniquet, bandage, or hair thread.[1,2] In the literature, the most commonly reported cause of tourniquet syndrome is hair thread.[3] The circumferential bandages have also been reported rarely causing tourniquet syndrome.[4] Circumferential bandage for the treatment of hand injuries is an effective treatment and is commonly used for wound dressing. However, the results of bandaging can be devastating in case of careless and tight application. The bandage can also cause a tourniquet effect, and block blood flow to the appendage with subsequent tissue ischemia and necrosis.[1-10] The pediatric patient may be more susceptible to this condition, due to being unable to explain their pain and remove the bandage.[5,10]

Timely detection and appropriate treatment are essential to save the appendage. Otherwise, amputation of the appendage is inevitable in the majority of cases.[6] In this article, we present a case of late-presented thumb ischemia caused by tight bandaging in a pediatric patient with management strategy and treatment outcomes.

CASE REPORT

A six-year-old girl presented to the emergency department with necrosis of her right thumb. She had bleeding on the tip of her right thumb tip after being cut with a glass piece, and her mother applied pressure with a compress to stop the bleeding and dressed the thumb with a piece of a sock, and put a rubber band circumferentially at home. Four days later, the teacher of the girl in the kindergarten noticed the dressing on the thumb and removed it. When the dressing was removed, the necrosis of the thumb was seen, and the parents were informed. The teacher and the parents took the girl to the emergency department of the state hospital. The patient was consulted by the orthopedic and plastic surgery departments. Both departments offered amputation of the thumb due to necrosis. However, the parents did not accept amputation and transferred the

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patient to the emergency department of a tertiary care hospital. On her physical examination, there was eschar formation circumferentially proximal to the interphalangeal joint, and the distal level of the thumb was necrotic (Figure 1a and b). There was no capillary refilling or bleeding with a pinprick. The sensorial and range of motion examination could not be done due to the patient's anxiety. A thorough examination of the patient was done to identify whether there was child abuse and no sign of child abuse was detected.

The parents were informed about the thumb's condition and the amputation was planned. The patient was operated under general anesthesia on a hand table. Two longitudinal incisions were performed from both the ulnar and radial sides of the thumb. The digital vessels and nerves were explored under loop magnification from proximal to distally from the level of the constrictive band. After releasing the constrictive band, a pulse was detected on both sides of digital arteries at the distal of the band. The vessels were washed with warm saline. Color changes of the skin and tissues at the proximal of the distal phalanx were observed (Figure 1c). There was a little bleeding in the incision line at the distal of the constrictive band. However, there was still no bleeding with a pinprick at distal of constricted area, although bleeding was observed on the nail bed when a piece of the nail was removed (Figure 1d). Therefore, we decided not to amputate the thumb.[11] The wounds were approximated with interrupted sutures. Sterile dressing was applied with antibiotic ointment.

Postoperatively, the patients were hospitalized for a week with daily wound care (Figure 2a). The heparin-soaked sponges were applied to the nail bed for venous bleeding to diminish congestion. Acetylsalicylic acid (80 mg/day) was prescribed for three weeks. The patient was scheduled for follow-up on a weekly basis in the outpatient setting.

FIGURE 1. (a, b) Preoperative view of thumb. **(c)** Intraoperative color change of the thumb after eschar release. **(d)** Bleeding of the nail bed after partial nail removal.

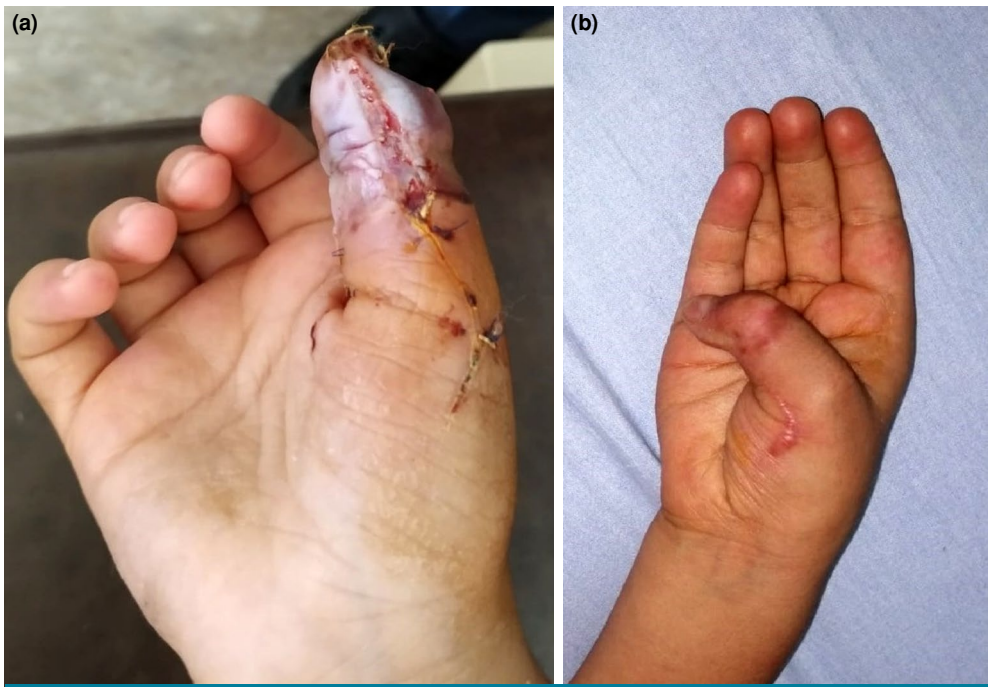

FIGURE 2. (a) Early postoperative image of the thumb. **(b)** Full range of motion and completely healed wound at two months postoperatively.

The incision was completely healed at six weeks of follow-up. The patient had a good capillary refill and full range of the thumb at 10 months of follow-up (Figure 2b).

DISCUSSION

Finger or thumb ischemia due to circumferential dressing with tubular gauze or self-adherent wrap, hair, or a forgotten tourniquet is rarely reported clinical phenomenon, but may cause devastating consequences.[1-10] Recommended treatments are the removal of the dressing, observation, debridement of necrotic tissues and amputation, if necessary.[3]

Circumferential wound dressing has been commonly used in lower and upper extremity injuries, particularly for fingers and toes. The tightness of the bandage should be fine-tuned to prevent tissue ischemia and necrosis whether it is applied at the hospital by medical professionals or at home by patients or relatives.[1-10,12] In our case, wound dressing was applied by the mother of the girl with a sock piece and rubber band.

Increasing pain after wound dressing may be an indicator of finger ischemia. However, in the pediatric population, pain may not be described by the child.[5,10] Pediatric patients may even refuse the removal of the dressing.[5,10] In our case, the patient did not report discomfort during dressing on.[11] The teacher recognized necrosis after removing the wound dressing in the kindergarten. Parents, caregivers, and physicians should be more careful about pediatric patients to avoid devastating circumstances.

In our case, we did surgical decompression to scar tissue to give a chance to appendage before amputation and we were able to achieve blood flow to the distal of scar tissue. To the best of our knowledge, there is only one patient (an 18-year-old girl) treated with surgical decompression in the literature.[12] The patient was treated in the hospital for partial tip amputation of the long finger on the right-hand and circumferential wound dressing was applied. Three days later, a constriction band and ischemia were noted after dressing removal and she was treated with surgical decompression through a dorsal incision. In our case, there was necrosis, and construction band was scarred (Figure 1a and b). We used two longitudinal incisions on the ulnar and radial side of the thumb to directly explore the digital arteries. Also, we believe that these incisions are more cosmetic than dorsal incisions.

In conclusion, we recommend immediate surgical decompression of the appendage with longitudinal incisions from both radial and ulnar sides for

ischemic or necrotic appendages caused by bandage or tourniquet, instead of watch-and-see policy. This can save the thumb as in our case, if can be done in a timely manner.

Patient Consent for Publication: A written informed consent was obtained from the parents of the patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea, supervision, critical review: O.A., K.E.; Design, data collection, literature review, writng the article: O.A., Y.O.

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