Online Case Report

Toe-tourniquet syndrome: a diagnostic dilemma!

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Strangulation of digits, the 'toe-tourniquet' syndrome needs prompt intervention as failure to recognise the condition can lead to ischaemia and loss of the appendage. It is a common condition though relatively under reported.¹ Those who deal with children more frequently are aware of the condition but this is not the case for all medical practitioners and hence the diagnostic dilemma for accidental injury or child abuse arises.

We report this case to increase physician awareness of the syndrome, to highlight the importance of early release of the tourniquet and to avoid misinterpretation of the condition as child abuse.

Keywords: 'toe-tourniquet' syndrome, child abuse, diagnostic dilemma

Case history

A 6-week-old baby was brought to the accident and emergency department with redness and swelling in the third toe of the right foot. The child had been irritable overnight but there were no other symptoms. The toe had been noted to be normal prior to this event.

On examination, he had a deep, circumferential groove over the middle phalanx of the toe with the distal part of the toe severely swollen and red with a small blister on the dorsum (Fig. 1).

The child was taken to theatre within a few hours of arrival. We examined the toe under a general anaesthetic and found circumferential constriction of the toe at the middle phalangeal level. A single strand of hair had cut through the skin and was lying within the soft tissues, which was removed from the depths of the constriction. We were unable to find any more strands of hair even after a meticulous search. In order to decompress the toe further, a dorsal longitudinal incision was made across the constriction down to bone.

There was immediate restoration of circulation to the toe and by the following day it appeared normal (Fig. 2).

Figure 1 Foot on admission.

Examination a week later in the clinic showed good circulation in the toe and the wound was healing well.

Histology done on the strand later confirmed it to be hair.

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Figure 2 Foot 1 day after treatment.

Discussion

Quinn² first coined the term toe tourniquet syndrome after he described a series of 5 cases in 1971. Subsequently, other authors have described similar cases and have variously termed it hair thread tourniquet syndrome.

Relationship to telogen effluvium

Hair growth normally proceeds through three phases – anagen (growing phase), catagen (transitional phase) and telogen (resting phase). Hairs are shed in telogen phase and an average of 100 hairs are shed per day.³ Pregnancy results in an absolute increase in the ratio of anagen hairs to telogen hairs following a 'change in the endocrine constellation'.⁴ After childbirth, when the hormonal stimulation to the scalp ceases, the ratio of anagen hairs to telogen hairs decreases, gradually returning to normal over 4–6 months. Increased number of telogen hairs causes excessive shedding in the postpartum period.^{4,5} This phenomenon is termed telogen effluvium.

The most commonly involved parts are the fingers and toes. There have been instances where the penis and clitoris were involved.^{6–8} In a review of 66 cases from medical literature, 43% involved the toes, 24% involved fingers and 33% involved genitalia. The median age of infants with toe involvement was 4 months, coinciding with the time at which telogen effluvium peaks, while the median age of infants with finger involvement was 3 weeks.⁶ Most are irritable at presentation and often there is a delay of 3–4 days from the onset of symptoms to diagnosis. Several offending materials have been incriminated to cause constriction in the digits. In the toes, it is usually caused by human hair, while in fingers it is caused by fibres from clothing.⁶

Why the hair winds so tightly around the digit is unknown; hairs are thought to be more supple and

stretchable when moist, but when dried they shrink and cause constriction and strangulation of the encircled digit.⁹ The hair or fibre can cut through the oedematous skin and the surrounding skin may re-epithelialise and, therefore, the hair escapes detection. Treatment begins with recognition of the condition and appreciation of the seriousness of the problem. Attempts to remove the offending agent in the accident and emergency department might not be successful, with the risk of unrelieved strangulation. The safest option is to use a general anaesthetic that permits not only thorough exploration of the wound but also allows complete retrieval of the constricting agent and at the same time a longitudinal incision can be placed along the dorsum perpendicular to the constricting agent to decompress the digit further.

Because of the relative rarity of the condition, questions about child abuse frequently arise. In a survey of healthcare and child protective services in Miami, 83% of child welfare workers and 45% of public health nurses misinterpreted this as intentional injury.¹⁰ Most cases of involvement of the fingers and toes tend to be accidental while constriction around the genitals is frequently non-accidental in nature.¹¹ Postpartum mothers should be counselled about the possibility of excessive hair loss and that their infant should be carefully checked on a regular basis to make sure that there are no hairs entangled between the fingers and toes. If the infant is not bathed everyday, checking the extremities becomes even more important. Mittens and clothing that covers the fingers and toes should be turned inside out and watched for loose hair.¹²

Paediatric physicians and surgeons are well aware of acute constrictions of appendages with external ligatures; however, those who deal with children infrequently may not be aware of the potentially serious entity of the toe-tourniquet syndrome. Failure to recognise the condition could result in ischaemic gangrene and amputation of the appendage.

Conclusions

Physicians should look carefully for toe-tourniquet syndrome, consider early diagnosis and prompt release of the tourniquet and avoid misinterpretation of the condition as child abuse.

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