Masani et al
Brunei International Medical Journal
2025; 21:201-204

Brunei International

Case Report

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A Rare Case of Tourniquet Syndrome with Constriction of the Wrist by a Cable Tie

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Abstract

Constriction syndrome caused by a non-elastic structure like a strand of hair wrapping around a toe presents acutely with swelling and ischaemic pain. Meanwhile, constriction caused by an elastic structure such a rubber band presents more gradually with tissue oedema, skin necrosis, sprout of granulation tissue, and with the rubber band burrowing under the skin. We report a 9-year-old girl with a delayed presentation of constriction by a non-elastic cable tie on the wrist that was burrowed by soft tissue, which was complicated with soft tissue infection and osteomyelitis. She was treated with a surgical release, dressing, and antibiotics.

Keywords: Tourniquet; Constriction; Osteomyelitis

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INTRODUCTION

Neglected constriction of appendages by a rubber band or a strand of hair is known to cause significant problems. Constriction with rubber band syndrome may present with gradual swelling and cases where the rubber band is buried under the skin via skin necrosis and covered with healing granulation tissue can present later with infection.[1] Tourniquet syndrome caused by nonelastic material such as a hair strand presents more acutely with ischemic pain, swelling, and discolouration.[2] To the best of our knowledge, there has been only one cable tie syndrome reported, which occurred on a big toe of an adult patient with dementia.[3] We report a case of a 9-year-old child who had a neglected cable tie in the wrist with delayed presentation mimicking rubber band syndrome. Constriction by cable tie is very rare as the size of the tie is easily visible and allows for early detection by parents.

CASE REPORT

A 9-year-old girl was brought by her parents to the emergency department with a complaint of pain associated with swelling, discharge around the right wrist, and an inability to extend the right wrist for one week. From the history, it appeared that the girl had applied a cable tie, which she had found at her home, over her right wrist one month earlier. Initially, she tried to remove the tie but ended up further tightening it. Because she was afraid of being scolded by her parents, she covered her right wrist under a hand sock. With time, her right wrist became gradually swollen and painful, and the cable tie later burrowed under the skin and affected her wrist extension. Further inquiry revealed that the patient was the second of three siblings, all of whom lived with their parents. Their family appeared to have no crisis. Her academic performance was average.

Examinations showed a linear circumferential wound at the right wrist with a cable tie knot on the volar side. All portions of the cable tie were covered with granulation tissue, except at the knot. The surrounding skin was inflamed, seropurulent discharge was noted around the knot, and the area was foul-smelling. The right wrist was kept in flexion. She could not extend the right wrist but could extend all fingers and perform a clenched fist **(Figure 1**). Radial and ulnar pulses were reduced compared with the left side. The capillary refilling time of all fingers was less than 2 seconds. Neurology was intact. General body inspection revealed no abnormal scar or limb deformity suggesting nonaccidental injury. She was comfortable throughout our assessment, and her body temperature was normal.

The haematologic investigation was within normal range, except for a slight increment of the total white cell count. The right radius-ulna radiograph showed soft tissue constriction around the wrist with periosteal elevation noted at the distal part of the bones (**Figure 2**).

The wound was debrided, and the cable tie was explored from the dorsal side. The cable tie was situated superficially in the subcutaneous tissue, and no deep structure was involved. The tie was then cut and removed slowly.

After the operation, the patient was able to extend her right wrist up to 45° (**Figure 3**). Radial and ulna pulses were comparable on both sides, and neurology was intact. She was given intravenous cefuroxime for 1 week and switched to oral administration for another 5 weeks. Upon follow-up at 6 weeks, the bone was well consolidated without new osteomyelitis changes, while C-reactive protein and erythrocyte sediment rate were within a normal range. At our final follow-up 1-year post-surgery, the patient fully recovered without residual symptoms.

DISCUSSION

A cable tie is a type of nylon fastener with a flexible tape section with teeth that engage with a pawl in the head to form a ratchet to allow movement in one direction. Because it is nonelastic and cannot be released once the tape section is pulled, cable ties can be very dangerous when applied to the limbs, especially in children. As children struggle to remove the tie, it can tighten further on the affected limb, causing increased constriction.

Many case reports of hair strand constriction have been found to cause tourniquet syndrome affecting the toes of small children and the appendages of mentally challenged persons.[2] Unlike cable ties, hair strand constriction occurs more frequently because it goes

Figure 1: Wound with granulation tissue around the right wrist with the patient attempting to extend her right wrist. The arrow showing the end of the cable tie.

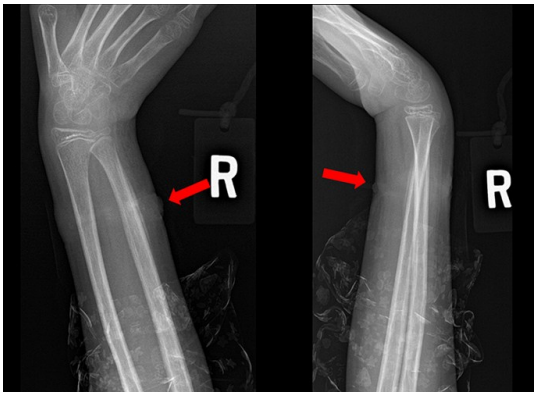

Figure 2: Right wrist x-ray showed soft tissue constriction and periosteal reaction (red arrows).

unnoticed by the caregiver because of its small size. However, early attention can occur in the presence of ischaemic pain.

There have been a number of cases of neglected rubber band constriction reported with complications. This constriction is also associated with the practice of certain parents of applying a rubber band on their children's limbs for decorative purposes.[4] A rubber band that stays hidden in the crease of the wrist may gradually result in skin necrosis and skin penetration. Rapid soft-tissue growth in young patients followed by the epithelisation of the skin eventually buries the rubber band, resulting in a delay in diagnosis.[3] A forgotten rubber band can be left neglected in children for up to seven months, presenting with soft-tissue infection or osteomyelitis.[3]

Unlike tourniquet syndrome, which is caused by a nonexpendable hair strand, a peculiar feature about the patient in this report was that the constriction over the wrist caused by the nonelastic cable tie presented more than two weeks later buried under soft tissue, similar to that caused by an elastic rubber band. Radiologic changes indicated the skin infection had propagated to the bone and led to osteomyelitis, and this might have been present for more than two weeks. We did not think that the child had developed compartment syndrome because she was not experiencing severe pain. The cable tie was not tight enough to constrict the nerves or vessels. Instead, it caused only pressure necrosis to the skin, and subcutaneous tissue resulted in ulceration. Swollen and relatively good blood supply provided good tissue healing through the formation of granulation tissue, which slowly buried the cable tie into the skin.

Figure 3: Post operation patient able to extend the wrist.

The reason for the delayed presentation, in this case, was that the child tried to hide the situation until the infection had set in and produced a foul, smelly discharge that made it obvious to her parents. If this condition had not been treated early, she might have ended up with severe soft-tissue and bone infection and, in the worst-case scenario, compartment syndrome and gangrene distal to the cable tie as the swelling worsened secondary to infection.

Because the patient revealed the history of the incident and the knot of the cable tie was still visible, the diagnosis was not so difficult in this patient. The operative procedure was also not complicated because the cable tie was not buried deep enough and was limited to only the subcutaneous tissue. Similar to cases of forgotten rubber band syndrome, this patient recovered well after the removal of the cable tie, wound debridement, and antibiotic administration.

CONCLUSIONS

A neglected cable tie constriction may gradually bury under the skin and present late with soft-tissue infection or osteomyelitis. Although the treatment was relatively straightforward in this case, prevention is the goal through good communication between the child and caregiver.

Take Home Message

- Cable ties pose a serious risk to children when applied to limbs due to their nonelastic, non-releasable nature, which can lead to progressive constriction, pressure necrosis, and potential deep tissue injury.
- Thorough clinical evaluation and a high index of suspicion are essential in paediatric patients with limb swelling or infection, as physical signs may be subtle, and radiologic findings may be the first clue to a hidden constricting object.

- Early identification and intervention are crucial to prevent complications such as skin necrosis, soft tissue infection, osteomyelitis, or even compartment syndrome and limb-threatening ischaemia.

- Constrictive injuries from non-metallic objects (e.g., hair strands, rubber bands, cable ties) should be considered in any unexplained limb swelling, ulceration, or localised infection in children.

Declarations

Patient Consent

Patient consent has been obtained.

Disclosure and Conflict of Interest

The authors declare that they have no conflicts of interest and no financial disclosures relevant to this case report.

Acknowledgments

None.

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