Int J Clin Exp Med 2019;12(6):7874-7877
www.ijcem.com /ISSN:1940-5901/IJCEM0091605

Case Report

"Rubber band syndrome" in children: a case report and literature review

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Received January 21, 2019; Accepted May 8, 2019; Epub June 15, 2019; Published June 30, 2019

Abstract: Background: "Rubber band syndrome" is rare which often occurs in young children because of forgotten elastic band wrapping in different body parts. This study aimed to report a case and make a literature review on "rubber band syndrome". Methods: A four-year-old boy was referred to our department because of swelling and restriction movement of forearm for two months. The child presented with a linear circumferential scar around the forearm. Plain x-ray showed a distinctive ulnar notch with circling hyperostosis. Ultrasonography indicated a high echo of proximal ring in the forearm. A surgical exploration was taken. Results: After surgical exploration of circumferential scar, the band was seen and then removed. The patient had a favorable outcome in the follow-up investigations. Conclusion: Forearm linear constricting scar in young children accompanied with swelling and pain should alert the clinician to suspect the diagnosis of rubber band syndrome. Plain x-ray and ultrasound are helpful in leading to diagnosis. Early recognition of the syndrome can avert catastrophe.

Keywords: Rubber band, constriction, forearm, neurovascular

Introduction

Rubber band syndrome occurs rarely in young children because of forgotten elastic band wrapped in different body parts [1]. A rubber band is worn around the limb for decoration or playing in developing countries frequently. However, when the elastic band is forgotten by the guardian for a long time, it will penetrate gradually into skin and subcutaneous tissue, even bone, leading to distal swelling, limitation of movements, and neurovascular compression terminally [2]. As the history of band tied on the body is always neglected by parents, rubber band syndrome is easy to be misdiagnosed as atopic dermatitis, cellulitis or tubercular osteomyelitis, etc. Early recognition of the syndrome is vital for preventing further damage of neurovascular structures. Herein, we report a case of rubber band syndrome in the forearm of a 4-year-old child, including the clinical manifestation, imaging findings and surgical exploration.

Case presentations

A 4-year-old boy was referred to our hospital because of pain and edema in the right proximal forearm, wrist and hand for two months. A linear circumferential scar was found around the forearm (**Figure 1**). Physical examination revealed carpoptosis and limitation of the forearm. The child had recurrent fever and he had been misdiagnosed as atopic dermatitis, infection, osteomyelitis orcellulitis in other hospitals. He received intermittent antibiotics for two months, however with exacerbation of symptoms. Plain X-ray showed a distinctive ulnar notch with circling hyperostosis (**Figure 2**). Ultrasound indicated a high echo of proximal ring in the forearm (**Figure 3**). An exploratory surgery was performed, and a rubber band was found lying in bone deep with positive obstruction sign. Neurovascular structures were constricted with macroscopic damage. After surgical debridement of the circumferential scar, the rubber band and neighboring necrotic tissues

Figure 1. Linear circumferential scar on the dorsum and volar aspect of the proximal forearm.

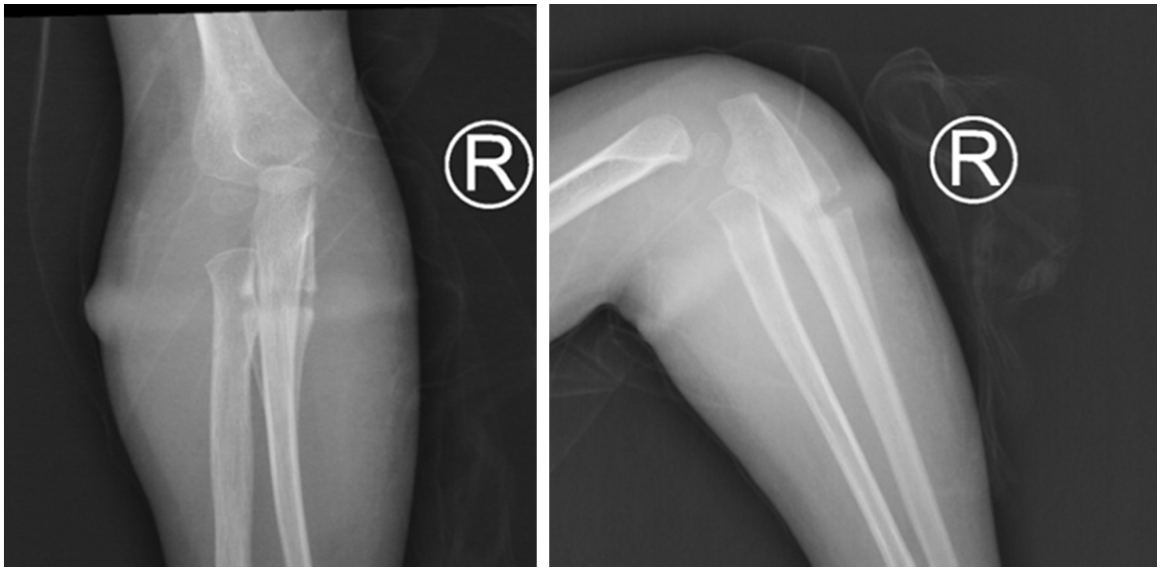

Figure 2. Plain radiographs in AP and lateral views showing a distinctive ulnar notch with circling hyperostosis.

were removed (**Figure 4**). The wound recovered after a three-week antibiotics therapy. Forearm, wrist and hand movements recovered gradually. The child had good movement and sensations of limb at the last follow-up one year after surgery.

Discussion

Rubber band syndrome is a rare injury [3]. In developing countries, a rubber band is easy to be acquired for decoration or playing by children who are naughty and lacking safety awareness. To our knowledge, very few cases have been reported by previous literature [4-8]. Hogeboom et al [4] reported the syndrome for the first time in 1961. Kumar et al [5] described a case of constriction in the thigh secondary to a rubber band. Kumaraswamy et al [6] presented a case of rubber band constriction of the arm. The constriction of band in most reported cases locates in the wrist crease, which is very hidden and easily ignored by parents [7, 8].

Rubber band poses variable constrictive effects on the limb and produces inherent heat on stretching and coolness on relaxing. Because of rapid increase of limb circumference, the rubber band cuts through the soft tissue. The slowly progressive process is painless

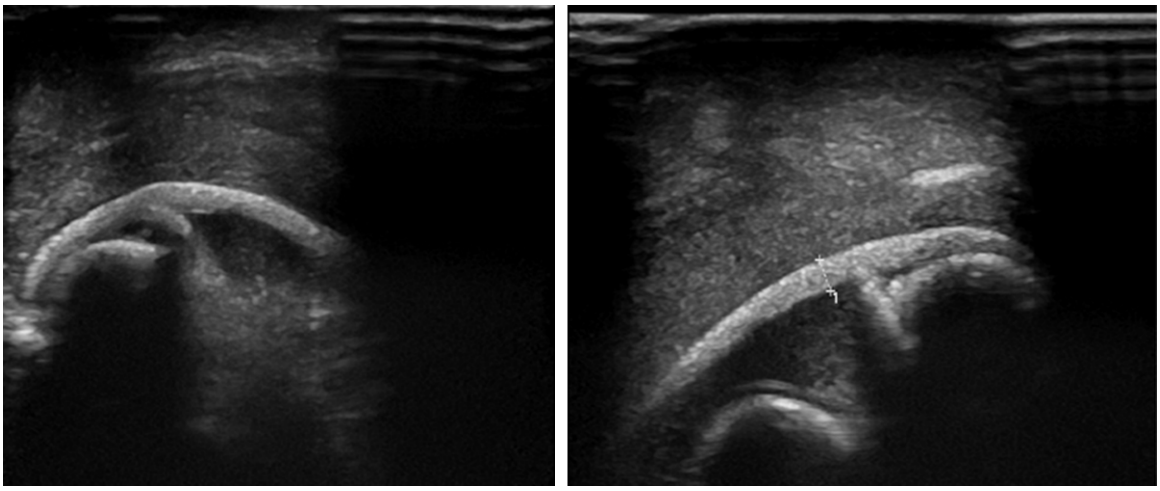

Figure 3. B-ultrasound showing a high echo of proximal ring in the forearm.

Figure 4. Surgical exploration showing a rubber burrowed in to the bone and wound debridement was done.

and without early neurovascular symptoms [9]. The band becomes invisible due to rapid epithelialization. The linear circumferential scar is formed along the foreign body with long-term stimulation. The hidden band continues to penetrate the fascia, tendons, neurovascular structures and even bone, which leads to corresponding injury and recurrent infection.

Unusual symptoms and vague medical history contribute to the misdiagnosis of rubber band syndrome. It is difficult for a clinician to relate this rare but typical condition to the syndrome [10]. In our case, accurate diagnosis cannot be reached until we found the band during operation. Constriction or bony indentation on radiographs may be conducive to assist in the diagnosis but usually at late stage. Ultrasonography is valuable to localize the band [11]. Our case showed a high echo of ring under the ultrasonographic examination. Magnetic resonance imaging scan also can be effective to establish diagnosis.

Management of rubber band syndrome is prompt surgical exploration. Several precautions must be taken to achieve satisfactory outcomes. These include debridement of circumferential fibrous tissue, removal of the rubber band and repair of the injured structures. As for nerve injury, primary surgery is not recommended in our study because this injury in children is usually incomplete and scar tissue around nerves will obscure the normal anatom-

ic structure. Our patient had a favorable recovery of nerves with close observation. If the damage of nerves does not heal within six months, neurolysis is an effective method in the treatment of such injuries.

In conclusion, diagnosis and management of rubber band syndrome pose challenge. Forearm linear constricting scar in young children accompanied with swelling and pain should alert the clinicians to suspect this syndrome. X-ray or ultrasound may serve as a method for accessory examination to make diagnosis. Early recognition of this syndrome can effectively avoid catastrophic consequences.

Acknowledgements

We thank the assistance of Lili Yang (The Children's Hospital, Zhejiang University School of Medicine) for her help with language and grammar.

Disclosure of conflict of interest

None.

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