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Case Report

Orthopaedics Section

# A Case Report of Ring Tourniquet Syndrome: A Paradigm of Danger

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## ABSTRACT

Ring Tourniquet Syndrome (RTS) is a rare but potentially serious condition that occurs when a small, tight object such as a hair, thread, or string becomes wrapped around a finger, toe, or other body part, creating a tourniquet-like effect. This can lead to tissue damage, swelling, a bluish colour of the finger, and in severe cases, loss of the affected digit or limb. Here, we present a case of an 11-year-old female patient who was diagnosed with RTS due to a metallic latch on the left index finger. The patient was managed with the removal of the latch under local anaesthesia in the operating theatre and regained full range of motion without any signs of ischaemia on a 2-week follow-up. This case report highlights the successful salvage of a finger affected by RTS through prompt recognition and appropriate intervention.

**Keywords:** Cyanosis, Ischaemia, Necrosis

## CASE REPORT

An 11-year-old female presented to the orthopaedic casualty with complaints of pain and bluish discolouration of the left index finger due to a metallic latch of a door striking her left index finger for the past two hours. The pain was excruciating and moderate in intensity. The patient and relatives gave a history of girl playing with the door latch. Subsequently, her index finger got stuck in the door latch. Multiple attempts were made to remove it at home, resulting in the latch getting embedded deep in the dorsal aspect of the finger. The pain increased in intensity, and bluish discolouration of the finger started after the attempts. After multiple failed attempts, relatives brought the patient to the casualty after two hours of the injury.

On examination, the metallic door latch was seen stuck deeply on the dorsal aspect of the metacarpophalangeal joint. There was diffuse swelling, cyanosis, and decreased sensation on the affected finger without any purulent discharge [Table/Fig-1]. The range of motion was painful and not possible at the metacarpophalangeal joint of the affected finger. The vitals were within normal limits, and the finger's temperature was raised. Oxygen saturation was not recordable in the affected finger. Capillary refilling was checked by pressing the nail bed of the affected finger and was found to be delayed.

**[Table/Fig-1]:** Showing deeply embedded metallic latch on the left index finger.

Complete blood count and postoperative plain X-ray showed no remarkable changes. Blood investigations were within normal limits. Colour Doppler of the index finger showed biphasic forward flow in the affected finger.

A diagnosis of RTS with impending gangrene was made. The patient was given tetanus prophylaxis and immediately taken into the operating room. A jumbo cutter was used to make a window in the latch. The window was widened using the plier and later elevated using the osteotome and periosteum elevator. The latch was removed, and the wound was examined, which showed no tendon injury [Table/Fig-2,3].


**[Table/Fig-2]:** Instruments used for the removal of latch a) Jumbo Cutter; b) Osteotome; c) Periosteum elevator; d) Plier.

**[Table/Fig-3]:** Postoperative wound after removal of metallic latch.

A single dose of injectable broad-spectrum antibiotic was given. Oxygen saturation was 98% recordable immediately after the removal of the metallic latch. A plain X-ray of the hand was done, and a fracture was ruled out due to the tightly embedded latch [Table/Fig-4].

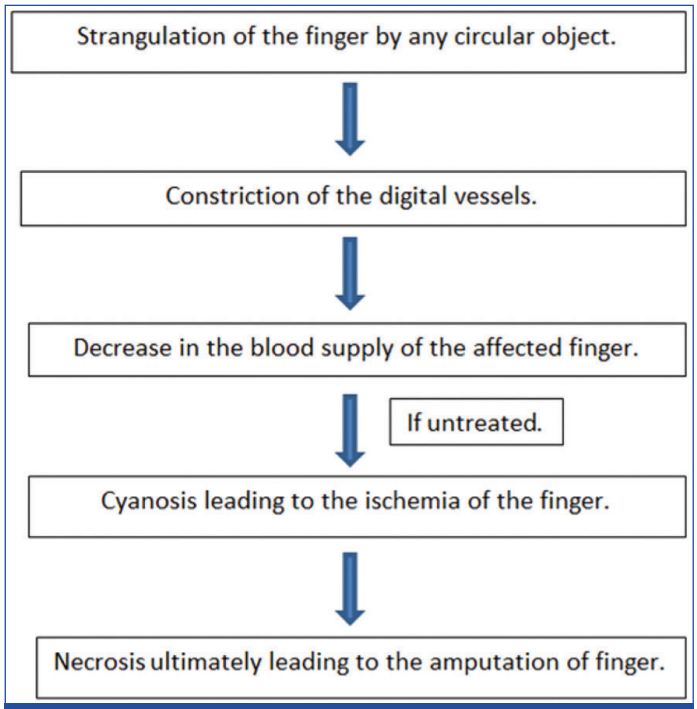
The patient was discharged the next day with oral antibiotics and analgesics prescribed for three days. Daily dressing was done on


**[Table/Fig-4]:** Anteroposterior: (a) and Lateral view; (b) X-ray after the removal of latch.

an outpatient basis. On follow-up of two weeks, the wound was healed, and the patient regained painless full range of motion of the affected finger with no signs of ischaemia or necrosis.

## DISCUSSION

The RTS is a constriction injury caused by any jewellery or metals. Rings getting caught on fingers are a regular complaint made to the emergency room, but fingers stuck in other circumferential metal objects are rare. Patients may have sores from prior ring removal efforts, as well as finger pain, oedema, ischaemia, and wounds. Ring imprisonment may be caused by applying a ring that is too small or by swelling around a ring that was once properly fitted. There have been previous reports of injuries to the hand or wrist, oedema, deforming arthritis, and other disorders [1,2]. Constriction of digital vessels worsens the oedema by reducing the venous and lymphatic drainage, and ultimately, arterial supply is hampered. This may lead to cyanosis and ischaemia of the affected finger if left untreated. Necrosis is the next consequence of the untreated constriction, which may lead to the amputation of the finger [Table/Fig-5].




**[Table/Fig-5]:** Schematic representation showing constricting injury leading to necrosis of the finger.

If left untreated for a long time, it can lead to finger ischaemia and necrosis, leading to the only option of amputation [3]. Based on the intensity and acuteness of the afflicted tissue, as well as the characteristics of the band, emergency management should be considered. More aggressive techniques must be used if conservative ones fail. A tight band can be appendage-threatening, though rarely life-threatening. First-line therapy may involve more invasive procedures rather than more conservative ones when there is deformation of the damaged tissues or loss of function [4]. In order to prevent irreversible injury to the limb and prevent amputation, it is crucial to have a high clinical suspicion, especially in vulnerable patients with psychiatric disorders. One such case of tourniquet syndrome of the lower limb has been reported in a psychiatric patient, which led to the neurovascular complications of the affected limb [5]. Another case of acquired constriction ring syndrome reported in a child led to severe oedema and the imminent danger of gangrene, which required complete decompression in the operation theatre [6].

Ring constriction syndrome is a rare but potentially limb-threatening condition that requires prompt recognition and intervention. Delayed treatment can lead to irreversible damage, requiring more extensive surgical procedures such as digit amputation. Similarly, a report by Mohan A et al., showed ring entrapment leading to ischaemia, an oedematous finger which was treated by amputation [7]. Also, Mengesha MG and Lambiso B showed similar management due to delay and timely management [8]. Pahwa HS et al. noted a case of penile constriction syndrome leading to partial amputation of the penis in a child [9].

Losing a finger for an 11-year-old is a physically as well as mentally disabling condition. Especially for females, it is very disturbing for the patient as well as relatives from a cosmetic point of view, and keeping in mind the future endeavours. Here, immediate operative intervention led to finger salvage, there were no signs of ischaemia or necrosis postoperatively, and a full range of motion was regained. It resulted in an excellent outcome. Hence, the present case report highlights the extravagant outcome with prompt decision and quick interventions.

Non invasive measures should be attempted initially to remove the constricting object, such as the two rubber band technique [10]. However, in cases where the condition rapidly progresses or causes significant pain and oedema and where signs of cyanosis and ischaemia have already started to set in, early surgical intervention becomes necessary to prevent tissue necrosis and preserve the affected digit.

## CONCLUSION(S)

Successful salvage of a finger affected by RTS could be achieved through prompt recognition and appropriate intervention. Timely diagnosis, immediate removal of the constricting object, and meticulous wound care are essential for preventing irreversible damage and preserving the affected digit. The present case serves as a reminder to healthcare providers of the importance of vigilance in identifying RTS and initiating timely treatment to optimise patient outcomes.

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