

Chronic Ring Tourniquet Syndrome: A Rare Case Report with A Viable Digit

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ABSTRACT

Ring Tourniquet Syndrome (RTS) is an acute condition in which a circumferential object (jewellery or a metal nut) is impacted over the base of a digit causing a constriction effect over the neurovascular pedicles. If left untreated, the resultant edema and constriction will lead on to ischemia and necrosis of the affected digit, resulting in amputation. Removing the ring requires utmost gentleness in order to avoid injury to the surrounding tissues and applying force just over the metal ring to either slide it through by threading technique or by cutting it. We report a rare case of 40-year-old female presented with pain and swelling in the right index finger due to metal ring impaction after trivial trauma for over a week. Poor pain tolerance and poor compliance required intravenous sedation for removal. Intraoperatively, the ring was loosely lodged just above the extensor apparatus, allowing partial mobility preserving the vascular pedicles. It was successfully removed using a bone cutter. The patient was discharged the next day with antibiotics, and follow-up showed complete healing and functional recovery.

INTRODUCTION

Ring tourniquet syndrome is an acute digit threatening condition which, if left untreated may lead to amputation of the affected digit. In adults, jewellery-related constriction can cause vascular and neural compromise. A timely early intervention is required in order to save the affected digit. Surgical interventions may be necessary in severe cases, including staged reconstruction to restore function and address complications like infection¹. Here we are presenting a rare instance of a chronic ring tourniquet syndrome with a salvageable finger where the impacted ring was left in place for a week.

CASE REPORT

A 40-year-old female presented to the plastic surgery outpatient department with complaints of pain and swelling in the right index finger due to a metal ring impaction for the past eight days. The swelling developed gradually following a trivial trauma, where her ring was crushed between railings. She had no predisposing conditions and was clinically stable.

On examination, the right index finger was edematous from the proximal phalanx to the fingertip. A 2 × 0.25 cm ulceration was noted dorsally at the base of the proximal phalanx, with no visible ring dorsally, suggesting it had cut through the soft tissue, which was confirmed on X-ray. The ring was visible on the volar aspect from the bilateral neutral lines. No discharge was present. The range of motion was restricted due to pain, and palpation revealed tenderness but no warmth or discharge. Capillary refill time was less than two seconds.

Due to a very low pain threshold and poor cooperation for clinical examination, an attempt to remove the ring under local anesthesia in the outpatient setting was abandoned. After obtaining emergency anesthetic clearance, the patient was taken to the operating room, and ring removal was performed under intravenous sedation.

Intraoperatively, the ring was found to have cut through the dorsal soft tissue, lying just above the extensor apparatus. The resulting space allowed some mobility of the ring, sparing the vascular pedicles. The lodged ring, measuring less than 0.25 cm in thickness, was cut using a bone cutter and removed. A thorough wound wash was performed, and the extensor apparatus was found to be intact.

The patient was discharged the following day with a course of antibiotics. On follow-up, the wound showed good healing, and finger function recovered fully.



Figure 1: Ring cut through dorsal tissues and completely not visible on the dorsal side.

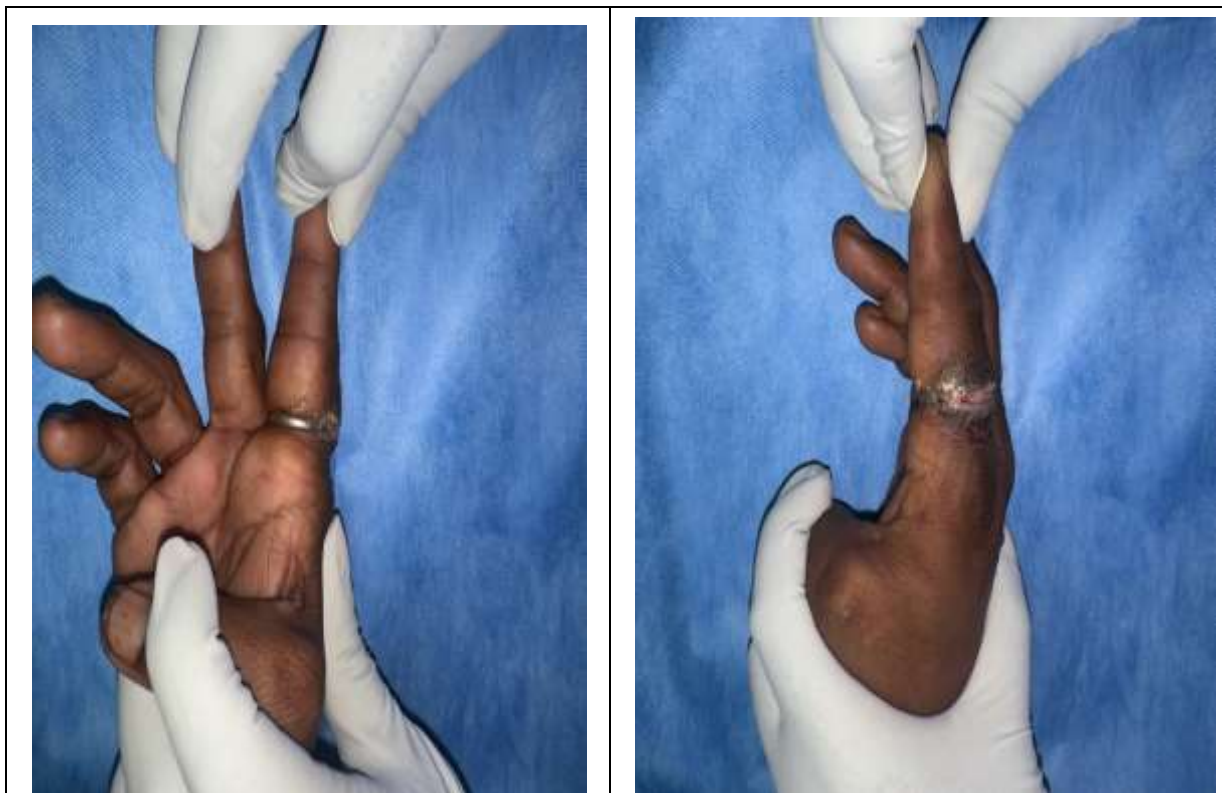


Figure 2 & 3: Volar and Lateral views. The ring is visible on the volar aspect till the neutral lines on either sides.

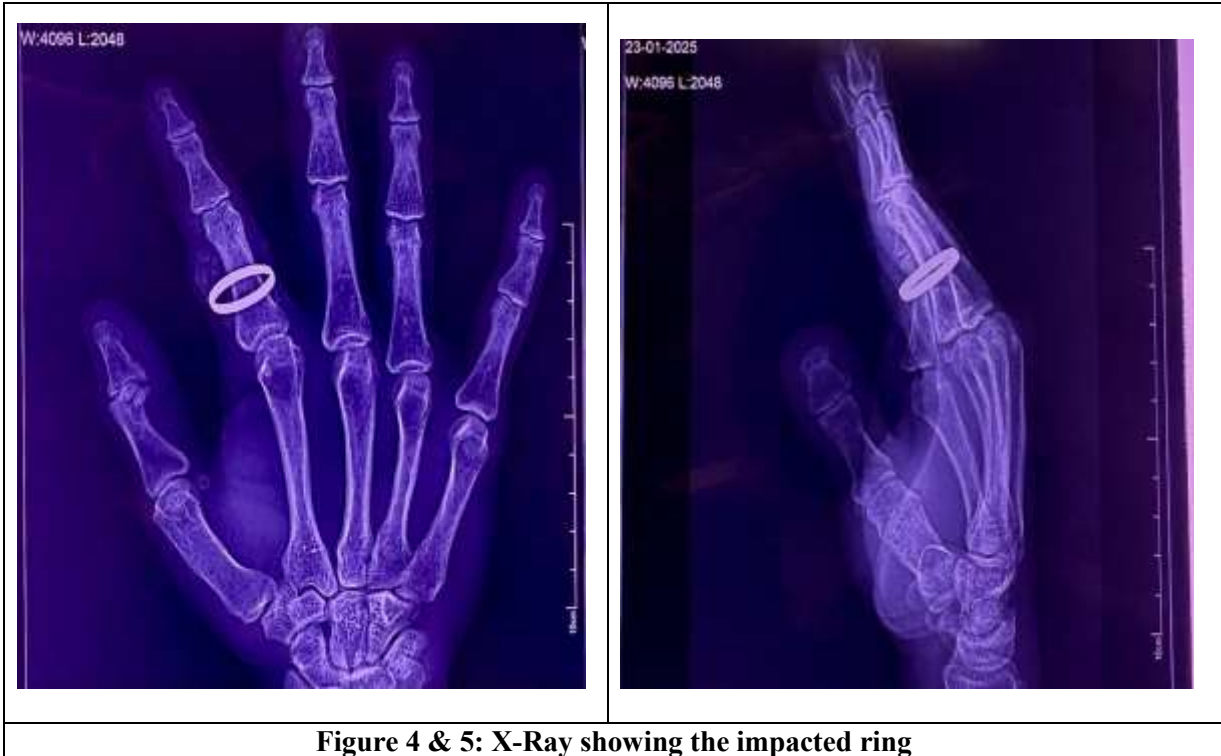


Figure 4 & 5: X-Ray showing the impacted ring

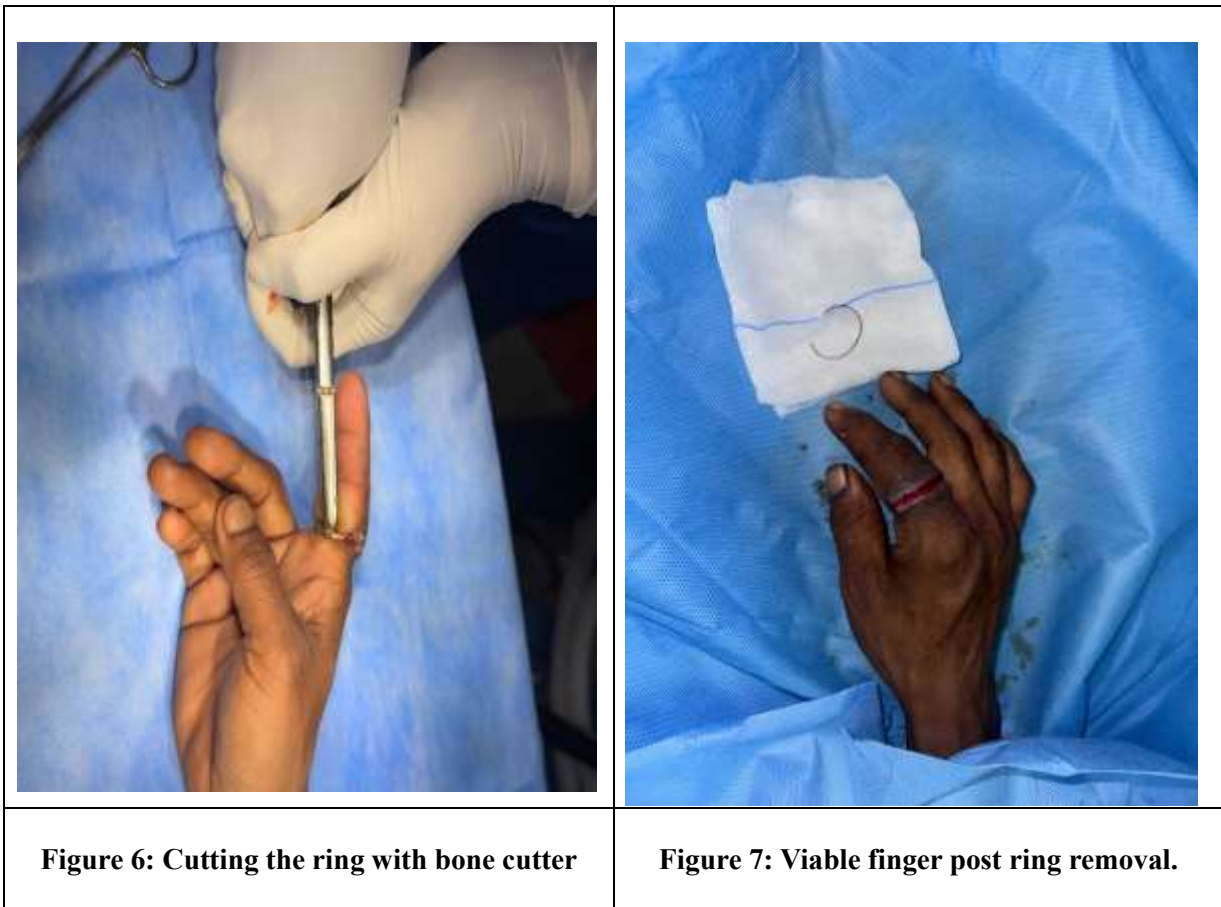


Figure 6: Cutting the ring with bone cutter

Figure 7: Viable finger post ring removal.

DISCUSSION

Ring tourniquet syndrome is a constriction injury caused by jewellery or metal rings becoming impacted on fingers or toes¹. Impaction may result from applying a ring that is too small, trivial trauma that crushes the ring, or swelling around a previously well-fitted ring. This impaction leads to a strangulation effect, causing

constriction of the neurovascular pedicles, which can result in edema, ischemia, and, ultimately, necrosis of the affected digit²⁻⁴. Delayed treatment may lead to irreversible damage and potential amputation⁵.

Patients with an impacted ring typically present to the emergency department early, whereas delayed presentations are often associated with a nonviable digit. The stringing technique, a common non-destructive method, involves using dental floss or a nylon suture thread to create an artificial passage for the ring to slide through. This technique can be painful and may require local anesthesia⁶. Destructive techniques include cutting the ring using K-wire cutters or bolt cutters, though these methods often require repeated attempts and their success depends on the metal composition and thickness of the ring. In cases where conventional methods fail, high-speed rotary tools such as a Dremel may be used, but caution is required to prevent thermal injury to adjacent tissues⁷.

Most cases present early to the emergency department, and delayed presentations often result in digit loss. However, in this case, despite the late presentation, the finger was salvaged due to the relatively thin ring cutting through the soft tissue, creating space for it to lodge loosely and relieving constriction around the neurovascular pedicle.

CONCLUSION

Ring tourniquet syndrome is a potentially limb-threatening condition that can lead to digit amputation if not promptly managed. Timely intervention is crucial to preserving the affected digit. Immediate removal of the constricting ring, either by destructive or non-destructive methods, is essential upon diagnosis. A fundamental understanding of the ring's metal composition and the appropriate removal techniques is necessary to ensure effective decompression. Not all cases present with a viable digit after prolonged impaction; thus, early recognition and appropriate management are critical to preventing irreversible ischemic damage.

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