

Case Report

Partially Embedded Metal Rings on the Right Middle Finger and Entrapment of Rings on the Right Index and Ring Fingers in a Psychiatric Patient: A Case Study

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Abstract

Rings are not only commonly worn as symbols of love and commitment, such as wedding rings, but they also serve as decorative pieces in various cultures. The finger rings are made up of materials of different grades (Soft or hard metals), influenced by availability and social customs. However, these accessories can sometimes become problematic when they get stuck on the fingers. This problem tends to occur more frequently in women and younger people. Most of patients present with distal digit swelling and pain, and sometimes present late with gangrene of the involved digits. In most cases, trapped rings do not cause any vascular or neurological damage, but timely removal is critical to prevent complications such as the tourniquet effect, where blood flow to the digit is compromised. The removal of rings is necessary under certain clinical conditions, especially in emergencies where swelling or trauma complicates the situation. Patients with psychological disorders or substance abuse problems may sometimes resist the removal of rings, making treatment more complicated. In this case report, we discuss the management of a psychiatric patient who presented with significant swelling in three digits due to embedded rings, highlighting the delayed treatment and the methods used for successful ring removal. In our case, we managed to remove entrapped and embedded finger rings by non-destructive and destructive methods with good outcomes.

Keywords

Psychiatric Patient, Entrapped Finger, Partially Embedded Metal Rings, Dental Drill, Ring Tourniquet Syndrome, Clinical Outcome

1. Introduction

The wearing of rings is widespread across different cultures and is deeply rooted in various traditions. Rings are often crafted from precious metals like gold, silver, and platinum, but recent trends have introduced materials like tungsten, titanium, and stainless steel, which have gained popularity for their durability and aesthetic appeal [1-4]. While rings may hold cultural, religious, or personal significance, they also

come with certain risks. A ring that fits snugly on the finger can easily become trapped, especially if the finger swells due to various factors [5, 6].

Common causes of finger swelling that may lead to ring entrapment include trauma (such as a fall or blow to the hand), infections, allergic reactions, insect bites, and fluid retention. In addition to these factors, certain medical conditions like

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arthritis, heart failure, and kidney disease can cause persistent swelling, increasing the risk of ring entrapment. The swelling reduces venous return and exacerbates the tightness of the ring, which can further restrict blood flow, potentially leading to ischemia, nerve damage, and even digital gangrene [7-9].

This condition, often referred to as "Ring Tourniquet Syndrome (RTS)," occurs when the constriction caused by the ring prevents proper blood circulation, resulting in swelling and pain. In severe cases, the patient may experience numbness or a loss of sensation in the finger, along with visible signs of tissue damage. Rapid intervention is necessary in such cases to prevent permanent damage to the digit. The rings can be removed through either destructive method (such as cutting the ring) or non-destructive techniques (which aim to preserve the ring by using various methods to ease its removal). Patients with psychiatric disorders or addictions may face unique challenges when it comes to seeking or accepting treatment for ring entrapment, as they may not be fully aware of the severity of the condition or may actively resist removal attempts [10].

In certain parts of the world, such as Nigeria, incidents of finger ring entrapment are relatively uncommon compared to other countries where wearing rings is more culturally ingrained [10, 11]. Nonetheless, the removal of stuck rings remains a critical skill for emergency department personnel, as delays in treatment can lead to more serious complications, including amputation in extreme cases.

2. Case Report

A 48-year-old man with a history of psychiatric illness presented to the emergency and trauma department after 10 days of experiencing increasing pain and swelling in his right middle finger. The symptoms began following an insect bite, which caused localized swelling. The patient had a ring on the affected finger, and as the swelling progressed, the ring became tightly embedded in the tissue [Figures 1, 3]. Despite several attempts by the patient and his family to remove the ring using various home remedies such as soap and lubricants, the ring remained firmly stuck [Figures 1, 3].

Upon examination, it was evident that the swelling had worsened significantly, and there was clear venous congestion in the finger [1, 4, 5]. Attempts were made to remove the ring using standard methods employed in emergency settings, including string wrapping techniques, suture materials, and even specialized ring-cutting devices. However, due to the extent of the swelling and the thickness of the ring, these techniques were unsuccessful. Local anaesthesia (LA) was administered to manage the patient's pain, but the failure to remove the ring led to increased concern about the potential for ischemic damage.

At this point, a dental surgery team was called to assist, bringing with them a high-speed dental handpiece equipped with a diamond burr. The handpiece allowed for precise cutting of the ring without causing additional trauma to the

swollen tissue. Over a period of 15 minutes, the ring was carefully cut in two places and removed without any complications except deep laceration [Figures 2-5]. After the procedure, the patient was closely monitored for signs of digital ischemia.

The treatment plan included daily wound care, antibiotics (ceftriaxone 1g twice daily for three days), and anti-inflammatory medications to manage the swelling and pain. The patient responded well to treatment and was discharged on the third postoperative day (POD). He continued to attend follow-up appointments at the outpatient clinic, where he showed no signs of further complications [6, 7].



Figure 1. Embedded two rings right middle Finger & entrapped rings on right ring and Index finger.



Figure 2. Laceration on volar aspect of proximal phalanx of right middle finger.



Figure 3. Entrapped ring on right ring finger with laceration on right proximal phalanx.



Figure 4. Showing laceration over right proximal Phalanx volar aspect after removal of ring.



Figure 5. Impressions after rings removal from right index, middle and ring finger.

3. Discussion

Finger ring entrapment is a common issue that affects both children and adults. However, it is more frequently observed in women, with a reported female-to-male ratio of 5: 1 [11]. The most common presentation is swelling and pain in the affected finger, which may occur gradually or suddenly depending on the cause of the entrapment. Entrapped rings are most commonly found on the left hand, particularly on the ring finger, which is the digit most often associated with wearing symbolic jewelry, such as wedding or engagement rings.

Children, due to their natural curiosity and tendency to explore their surroundings, often get their fingers stuck not only in rings but also in other constricting objects like door handles, keyholes, and household appliances [12-15]. The shape of the finger, combined with the soft, malleable tissue, allows for easy insertion into tight spaces [16], but this same tissue becomes compressed and swollen when subjected to prolonged constriction, leading to entrapment [Figures 1, 3].

Swelling and pain are common clinical symptoms in patients with trapped finger rings [2]. The swelling can range from mild to severe [4, 7]. The presence of vascular or neurological complications in affected fingers can vary, and these cases may also involve lacerations (in about 12% of instances) [17] and restricted movement in the proximal and interphalangeal joints. Once the ring is removed and swelling subsides, normal movement often returns. Studies have shown limited mobility in the proximal and distal interphalangeal joints, particularly when the ring is embedded [18] and the meta-

carpophalangeal joint may also be affected [19]. However, in some cases, joint mobility remains normal, even with embedded rings.

The time that rings are worn before becoming trapped can vary significantly, from days to years. Bleibleh et al. found that the rings were typically worn for several years before entrapment, although no specific duration was provided [4]. Hove and Odland reported a case where the ring had been worn for 31 years before entrapment [20]. The literature reports a wide range of entrapment durations, from as short as six hours [2] to several months or even years, particularly when the rings are embedded [20]. In our case, the ring had been embedded for two months on the right middle finger, resulting in a deep laceration on the volar aspect [Figures 2-5], while the rings on the right index and right ring fingers were removed mechanically with lubrication [Figures 1, 3].

The number of rings worn can also vary. Rings may be worn on one or both hands, and individuals may wear multiple rings on multiple digits. There is a case report involving 17 rings worn on four digits [18]. In our case, a maximum of four rings were worn on the fingers of the right hand. Entrapped rings are most frequently found on the left ring finger. Richard C. et al. noted that ring entrapment most commonly occurs on the left ring finger (68%) [21].

Ring entrapment can result from trauma, infection, fluid retention, allergic reactions, animal or insect bites, burns, or skin conditions, all of which cause finger swelling. This swelling leads to venous outflow obstruction due to the tightness of the rings, which can cause further swelling, ischemia, nerve damage, and gangrene. This condition is referred to as "Ring Tourniquet Syndrome (RTS)" [5-8]. Quick ring removal is crucial to saving the affected fingers, either by cutting the rings or using preservation techniques. Ring entrapment has also been reported in patients with psychiatric illnesses, as seen in various case studies [5, 20, 22]. Psychiatric patients may refuse ring removal or fail to seek medical help. This also happened in our case, the patient initially refused to have the embedded ring removed, but after proper counselling, we successfully removed the rings.

Rings can be removed using either destructive or non-destructive techniques. Non-destructive methods include winding, compression, string wrapping, twin threads, caterpillar, elastic pull, and glove techniques. Materials such as soap and water, oil, petroleum jelly, strings, sutures, umbilical tape, nylon ribbon tape, rubber bands, compression bandages, Penrose drains, surgical gloves, paper clips, and arterial tourniquets are used in these methods [6, 8, 9, 23]. In our case, a destructive method was employed using a high-speed dental handpiece with a diamond burr on the right middle finger. Non-destructive techniques, including soap and water and manual pulling, were used to remove the rings on the right index and right ring fingers [Figures 1, 3].

The time required to remove a trapped ring depends on the method used. Exner's string method took a few minutes [24], while Gardiner et al. reported a mean removal time of 135.4

seconds (range 94-164 seconds). Manca used the string technique, taking half an hour, while Kates used a rubber tourniquet method, which took over 10 minutes [25]. Cresap needed four sessions, each lasting 10-15 minutes, to remove a ring using a combination of compression and string techniques [26]. Kingston et al. used a two-rubber-band method, with a mean removal time of 10.7 seconds (range 2-60 seconds) [9]. In our case, it took 15 minutes to remove the ring using a high-speed dental handpiece with a diamond burr. The duration of removal using destructive techniques depends on the device and the ring's thickness and hardness. Powered machines, such as electric ring cutters, can cut even the strongest alloys in under 10 seconds [27], while dental drills and saws may take 15-20 minutes.

Most patients with trapped rings are discharged after a short period of observation, typically within 24 hours [3, 26]. However, some may require longer hospital stays [5, 10]. In this case, our patient with a laceration was admitted for three days [Figures 2-5] and discharged after ensuring the fingers were functioning normally and laceration was healed [Figures 6, 7].



Figure 6. 5th postoperative day.



Figure 7. 8th postoperative day.

4. Conclusion

Entrapped finger rings are a common problem affecting both children and adults. Females and younger individuals are more likely to be affected, and in most cases, the left ring finger is the most commonly involved digit. While many cases present with only mild swelling and discomfort, more severe cases can lead to ischemia, nerve damage, and digital gangrene if not promptly treated. The successful removal of entrapped rings is critical in preventing long-term damage to the finger, and medical professionals must be skilled in both non-destructive and destructive techniques for ring removal. Psychiatric patients may pose additional challenges due to their reluctance to seek or accept treatment, making a compassionate, patient-centered approach (PCA) essential in these cases.

Abbreviations

RTS	Ring Tourniquet Syndrome
LA	Local Anaesthesia
POD	Post-Operative Day
PCA	Patient Centred Approach

Consent

Informed written consent was obtained from patient for publication of case report.

Author Contributions

Kumar Raj Ranjan is the sole author. The author read and approved the final manuscript.

Approval of Ethical Committee

Exempted by our institution.

Conflicts of Interest

The authors declare no conflicts of interest.

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Research Fields

Kumar Raj Ranjan: Medical, Surgery, Comparative Study, Retrospective Study, Prospective Study