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Original Research Article

Management of Traumatic Finger Avulsions Using the Chase Technique for Medialization of the Ring Finger: A Series of 07 Cases

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Abstract: Ring finger avulsion is a rare but severe hand injury, typically caused by a ring catching on a fixed object during a fall or sudden traction. This retrospective study analyzes seven cases treated at the Mohammed V Military Teaching Hospital between 2017 and 2021. All patients were male military personnel presenting with complete amputation of the left ring finger, classified as Urbaniak stage III. Each underwent surgical management with Chase amputation and medialization of the ring finger. Surgery was performed within an average of 12 hours post-injury. Early rehabilitation was initiated to optimize functional recovery. After a two-year follow-up, all patients achieved satisfactory functional and aesthetic outcomes. The Chase technique, which repositions the middle finger to replace the ring finger, offers a reliable solution when replantation is not possible. This study highlights the need for early intervention, proper rehabilitation, and increased awareness of preventive measures, especially in high-risk occupational settings.

Keywords: Ring finger avulsion, Urbaniak stage III, Chase technique, medialization, traumatic amputation, hand injury, rehabilitation, military trauma, ring safety.

INTRODUCTION

The ring finger avulsion, or "Ring-Finger," is the degloving or tearing off of a finger by a ring. The ring becomes engaged in a hook, door handle, or other object, partially or completely degloving the finger, or sometimes amputating it through traction [1]. It is among the most severe and challenging hand accidents to treat [1]. Chase amputation, which involves the removal of the base of the second metacarpal bone [1], is one of the surgical indications in cases of complete finger "amputation: classified as Urbaniak III [1] injuries. Amputation is a profound human experience, representing an act of creation rather than abandonment [2]; finger avulsions caused by a ring are severe both macroscopically and microscopically, posing a significant challenge for hand surgeons in terms of reconstruction [1, 2].

MATERIALS AND METHODS

The authors report a retrospective study comprising 07 cases of ring finger avulsion, or "Ring-Finger," collected at the Traumatology Orthopedics II Department of the Mohamed V Military Teaching Hospital in Rabat over a period of 5 years from January 2017 to December 2021, all treated by medialization of the ring finger through amputation according to the Chase technique.

RESULTS

The average age of our patients was 33.7 years with a range from 27 to 43 years. All our patients were male, active-duty military personnel, and all were traumatized on their left hand due to various etiologies: 6 patients experienced ring finger avulsion when their ring got caught during the descent from a military vehicle, and 1 patient experienced avulsion during the descent from a ladder in a workplace accident. The average post-traumatic delay was 4 hours; all patients were clinically stable, and they all presented with complete amputation of their left ring finger classified as stage III according to Urbaniak's classification. All patients underwent radiological assessment: standard X-rays of the traumatized hand. The average time to surgical intervention was 12 hours. Patients underwent surgery under local-regional anesthesia, and all benefited from Chase amputation with medialization of the ring finger. Passive rehabilitation began on the 3rd day, and active mobilization started at 3 weeks. After a follow-up period of 2 years, we obtained highly satisfactory functional and aesthetic results.

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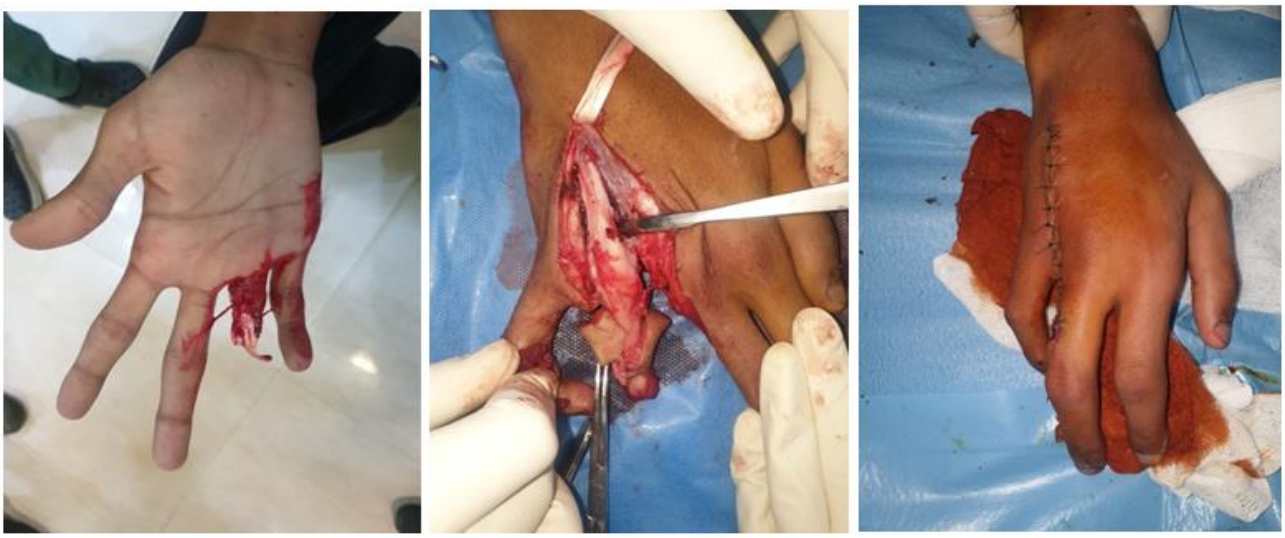

Images depicting a stage III Urbaniak amputation of the ring finger treated by Chase amputation

Images depicting a seconde case of a stage III Urbaniak amputation of the ring finger treated by Chase amputation

DISCUSSION

Ring finger avulsion, defined as the tearing off of a finger by a ring, is a common accident. The finger is forcibly removed by the ring, which becomes accidentally caught on a fixed point while the individual is pulled by the weight of their body [1, 3]. Skin coverage is essential to prevent tissue necrosis. Several flap techniques have been described in the literature. With the advent of microsurgery, various teams have attempted ring finger reattachment. However, amputation is sometimes preferred when the injury is advanced, primarily for aesthetic and psychological reasons [3]. Any hand trauma, given its importance, will result in disability, whether temporary or permanent. Most of

these traumas are reversible, which is not the case with amputations [1, 3, 4].

Traumatic digital amputation remains a significant physical and psychological assault on the patient. Without clear explanations and regular clinical follow-up, the injured individual will gradually "mourn" the amputated parts and eliminate them from their body schema. Thus, any decision for such a radical procedure must be carefully planned and considered to minimize the consequences on a functional and social level, as well as aesthetic aspects [4, 5].

The two most common clinical presentations are either degloving of the finger (involving all skin and subcutaneous tissues and the neurovascular system) or amputation of one or more phalanges. Various classifications have been proposed based on the number and severity of tissues involved. According to the literature, the Urbaniak classification [1, 6] modified by Weil [1, 7] is noteworthy: • Stage I: no vascular injury, but there are soft tissue injuries. • Stage II: vascular injuries exist: - Stage IIA: isolated arterial injury, with intact venous and nervous systems and no bone or tendon involvement. - Stage IIB: associated bone, tendon, and/or nerve injuries. - Stage IIC: isolated venous injury. • Stage III: complete avulsion or amputation.

All our patients were classified as stage III, warranting amputation. The preferred amputation for the ring finger is the Chase amputation, which involves removing the 4th ray from the base of the 4th metacarpal, known since 1946 [4, 8]. The middle finger then takes the place of the 4th finger, a procedure known as medialization of the ring finger. This approach minimizes functional impairment and preserves hand strength, while also respecting aesthetic aspects [1, 4, 5].

Early rehabilitation is crucial to optimize functional outcomes [9, 10]. Currently, attempts are made for digital replantation. The success of revascularization in reattaching complete ring finger avulsions has encouraged surgeons to push the boundaries of their recommendations for replantation [11-14]. In their systematic review of replantations of finger avulsion injuries, Sears and Chung [15] reported a vascular success rate of 66%. However, this review did not specify the surgical technique used in each case. Sanmartin *et al*., [16] reported a survival rate of 68% in patients where only one artery was repaired using a graft; Foucher *et al*., [17] noted the advantages of a long graft for revascularization of complete ring finger avulsions, while avoiding extensive skin incisions, which have precarious vascularization.

The therapeutic challenge of this severe accident underscores the importance of prevention, which involves public education and awareness of the risks involved, refraining from wearing rings or other jewelry in certain high-risk professions, strengthening rings with appropriate materials or weak points, or creating a slot in the ring [1, 5].

Several devices designed to weaken rings and other jewelry to make them less traumatic have been described [18, 19]. Efforts are being made by healthcare professionals and consumer safety commissions to raise awareness among ring wearers and manufacturers [20]. However, weakening the ring does not eliminate the risk of injury when the finger is caught in an obstacle: Matheron *et al*., [21] reported injuries induced by pre-weakened rings similar to those caused by iron fences. Prevention should not be limited to awareness but also to supervision and adherence to manufacturing standards.

CONCLUSION

The issue of digital amputations caused by rings presents significant challenges for hand surgeons. Our study provides valuable insights into this reality and highlights the characteristics and outcomes of ring finger medialization through amputation using the Chase technique.

The results obtained are encouraging. However, the discussion underscores the complexity of managing these traumas, emphasizing the importance of skin coverage to prevent tissue necrosis and the various therapeutic options available, including replantation and amputation.

The importance of prevention is also emphasized, with suggestions aimed at raising public awareness of the risks associated with wearing rings, as well as strengthening manufacturing standards to minimize such incidents.

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