Original Research Article

Ring finger: study of 30 cases and review of the literature

Abstract:

Introduction:

The “Ring finger” is the tearing off of a finger by a ring or similar mechanism. This accident, which has long gone unrecognized, is frequent.This accident is the mainly seen in young adult males, mainly affecting the left 4th finger. There are various therapeutic options.

Methods:

We’ve conducted a retrospective study of30 patients who presented with a ring finger between 2006 and 2016.

For each patient, we studied the epidemiological data, the stage of avulsion according to the Caroll Larrou classification and the surgical techniques used, as well as an analysis of the clinical and functional results and the psychological repercussions.

Results:

The majority of patients were classified as Stage IV. We used Coverage by a groin flap of Mac Gregor in most cases.

At an average follow-up of four years and ten months, there were no immediate complications.

Functional results were satisfactory at the last follow-up. Aesthetic results were not great. Nevertheless, the psychological impact was important.

Conclusion:

Ring finger is a serious lesion, the poor prognosis despite advances in microsurgery, and the need to promote preventive measures. An urgent, multidisciplinary management is the only way to improve functional prognosis.

Keywords: Finger; Flap; Microsurgery; Post-traumatic stress; Ring

Introduction:

The “Ring finger” is the tearing off of a finger by a ring or similar mechanism. This accident, which has long gone unrecognized, is frequent. In Europe and the United States of America, it is estimated that there is a digital amputation every day; ring finger accounts for 13-15% of these digital amputations (1). The finger is torn off by the ring, which is accidentally held in place by a fixed point while the subject is dragged along by the weight of his or her body. This accident is the mainly seen in young adult males, mainly affecting the left 4th finger. There are various therapeutic options.The management can be difficult with bad aesthetic results that can lead to bad results.

The aim of this studywas to describe management options and evaluate the results of the ring finger lesions.

Methods:

We’ve conducted a retrospective study of30 patients who presented with a ring finger between 2006 and 2016.

For each patient, we studied the epidemiological data, the stage of avulsion according to the Caroll Larrou classification and the surgical techniques used, as well as an analysis of the clinical and functional results and the psychological repercussions.

All our patients were male. The mean age was 32.5 years, with extremes ranging from 27 to 40 years. The mechanism of injury was various: the finger was torn off by the ring. In all cases, it was a work-related accident.

The affected finger was always the ring finger (24 left and 6 right).

There were 9 stages II and 21 stages IV (Figure 1). For the latter, bone lesions included distal trans-interphalangeal amputation in 12 cases, trans P2 amputation in 3 cases, trans P2 neck amputation in 3 cases, and loss of fingertip in 3other cases.

Figure 1: Stage IV ring finger

Management was immediate in 27 cases and secondary in 3 cases with an average delay of 5 days (of which only one was stage IV).

27 patients benefited from skin coverage after bone regularization: 24 by a Mac Gregor flap (Figure 2), two by a flag flap (stage II seen secondarily after 6 days) and one by an intermetacarpal flap (stage

II seen after 5 days). The other three cases (stage II seen immediately) had local care and a secondary nerve graft.

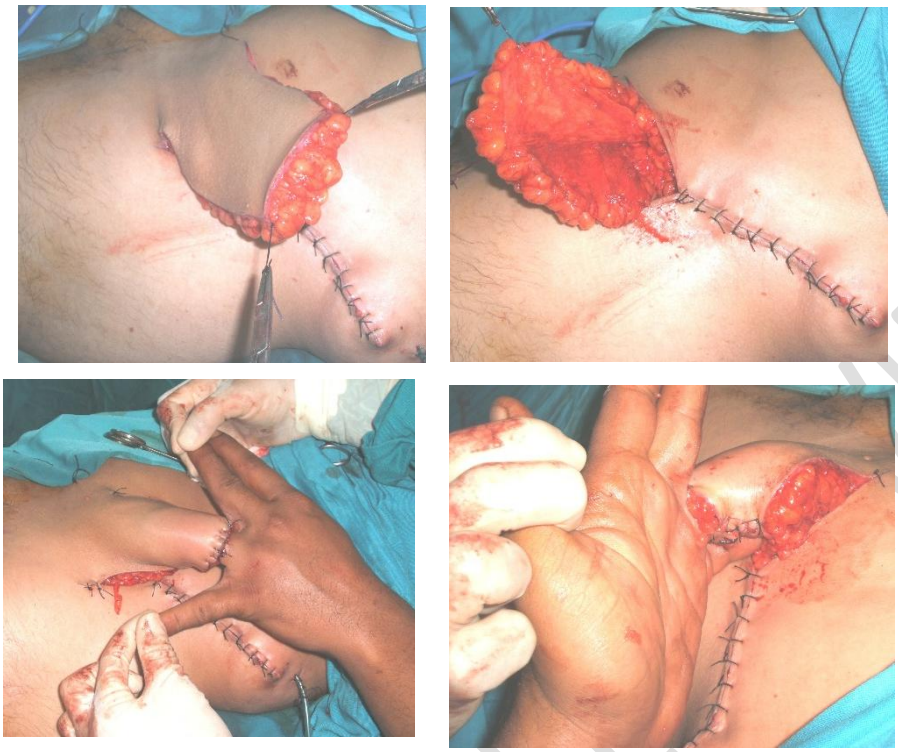

Figure 2: Mac Gregor flap

Results:

At an average follow-up of four years and ten months, there were no immediate complications.

Early complications were osteoarthritis of the IPD in one case, disunion of the Mac Gregor flap due to sepsis in one case, and distal ischemia after weaning of the Mac Gregor flap in another.

Late complications included PPI stiffness in 7 patients (6 stage IV and one stage II) and pain when cold in 4 patients.

1. Functional examination

Results were analyzed:

Functionally, we assessed the active and passive mobility of the various joints and the sensitivity of the affected finger. We studied the mobility of each joint separately, and the overall active and passive mobility of the finger in terms of Total Active Motion (TAM) and Total Passive Motion (TPM). In most of our patients, the study included the metacarpophalangeal and proximal interphalangeal joints only, with a mean TAM of 131.4° with extremes ranging from 90° to 180°, and a mean TPM of

145° with extremes ranging from 110° to 180°. For the patients who retained their distal interphalangeal joint, the mean TAM was 202.5° and the mean TPM was 240°.

Recovery of metacarpophalangeal mobility after rehabilitation was satisfactory in 27 cases (90° active and passive).

Only one patient (who had a proximal trans-interphalangeal amputation) had a mobility of 0/70° active and 0/80° passive.

Proximal interphalangeal mobility was variable. Active mobility averaged 41°, with extremes ranging from 0 to 90°, and passive mobility was 53.5°, with extremes ranging from 20 to 90°.

Overall sensitivity was satisfactory in all cases, with protective sensitivity rated at S2 (according to the British Medical Reseach Council classification) at the flap level.

2. Aesthetic examination:

Aesthetic results were average, mainly due to the hyperpigmented appearance of the Mac Gregor flap. Only one patient regained a perfectly normal appearance of his finger (Figure 3)

Figure 3: Aestheticresults

3. Psychological examination:

Psychologically, all our patients were left with sequelae of body damage, with varying degrees of reviviscence and avoidance. We noted 22 stabilizations and 8 evolutions towards adjustment disorders with depressive mood.

4. Recovery:

In terms of work, we noted a long absence from work (12 months on average). 15 patients required professional reclassification to an administrative position. 6 patients returned to their former administrative post. 9 other patients, who were active military personnel, were able to return to their posts with exemptions from carrying weapons.

Discussion:

The mechanism of injury is often unambiguous. It may be a work accident, a sports accident or a domestic accident. In our series, it was exclusively a work-related accident.

Unlike the cutting of a finger by a sharp object, the pulling of a ring on a finger causes avulsion (or tearing) of the tissue.

Several classifications have been proposed. We have adopted Carroll Larrou's classification.

There are many different therapeutic approaches.

Cutaneous coverage is essential to preserve noble tissues from necrosis. Several flaps have been described in the literature. They may be local or distant. In our series, remote flaps were used predominantly, although current trends are towards local and regional pedicled flaps. The Mac Gregor inguinal flap was the flap of choice in our serie, offering the advantages of vascular reliability, simplicity of harvesting, rapid realization, skin surface area and the possibility of covering large losses of substance.

Among digital flaps, we used the flag flap. An intermetacarpal flap was also used.

Our preference for remote flaps can be explained by the fact that most of our patients had significant distal lesions, classified as stage IV, and that local flaps could not provide coverage for such lesions.

In addition, the pedicled inguinal flap is of great interest as it enables emergency skin coverage of underlying noble elements.

It enables immediate repair of underlying bone, tendon, vascular and nerve lesions, as it provides a good skin cover and protection for the noble elements of the hand, which, if exposed, would be doomed to desiccation, infection and necrosis, necessitating amputation.

In our series, there was no need for microsurgical vascular repair. For arterial lesions, bypass surgery can be performed. For venous lesions, a simple suture may be sufficient, but if the lesions are more extensive, the use of a "flag" or "cross-finger" type vein flap is preferred.

For nerve lesions, direct suturing or a primary nerve graft may be proposed.

With the advent of microsurgery, several teams have attempted ring-finger reimplantation (2-5). It can be attempted when the amputation is distal to the insertion of the flexor digitorum superficialis and the proximal interphalangeal is intact. Reimplantation should always be attempted in the case of the thumb, whatever the stage of injury. Survival in cases with advanced lesions does not exceed 50-60%(4). Function of the replanted finger is never normal.

Amputation is sometimes the preferred option when the lesion is at an advanced stage, mainly for aesthetic and psychological reasons. This avoids the need for multiple operations, which are not always successful, or the retention of an unsightly stump.

The complications of ring fingers described in the literature were pain when cold(2, 6,7), and joint stiffness that improved more or less with rehabilitation. Rare cases of infection (7) have been described, with PPI arthritis, osteomyelitis, disunion due to sepsis or malunion.

Schoofs et al (8), in a series of 30 cases, were able to study mobility in 11 cases, with an average TAM of 178° and extremes of 90 to 230°. In our series, for the patients who retained their IPD, the mean TAM was 202.5° and the mean TPM was 240°.

Gaston et al (6), in a study of 33 cases, found that for stages I and II, the arc of mobility of the interphalangeal joints was 175°, whereas it was 93° for stages III and IV, according to the Michon et Merle classification, which corresponds, with a few differences, to the Caroll Larrou classification.

Sensitivity assessment was always based on the British Medical Reseach Council scoring.

Injuries to the hand have significant psychological repercussions, due to the trauma itself, the resulting loss of function and changes in self-image. Most articles studying this phenomenon have not addressed its psychological impact. K. Grunert (9) has highlighted the importance of reviviscence phenomena in hand trauma, as part of post-traumatic stress disorder. The latter was found in all our patients to varying degrees. We feel it is important to underline the absence of immediate psychological care in such traumas. An early treatment technique known as "debriefing" can be proposed(9). It is designed to enable victims to verbalize their emotional experience, to inform them of the risks of psychological or psychiatric manifestations in the aftermath of the event, and to offer them help they can call upon. It also aims to screen particularly at-risk subjects for possible subsequent treatment.

Conclusion:

Based on our series and the literature, we emphasize the seriousness of the lesions, the poor prognosis despite advances in microsurgery, and the need to promote preventive measures. We also stress the importance of urgent, multidisciplinary management to improve functional prognosis and limit subsequent psychological repercussions.

Consent and ethical approval

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors.

All authors declare that 'written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review.

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