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Surgical Management of Acute Tendinous Mallet Finger: Our Experience

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Abstract

Introduction: Mallet finger often occurs often a traumatic event that causes the lesion of the extensor tendon with its rupture at the base of the distal phalanx in the so called zone I. It is important to treat the lesion after the acute injury in order to avoid chronic deformities.

Aim: The aim of our study was to demonstrate the effectiveness of surgical treatment in treatment of acute tendinous mallet finger.

Materials and Methods: In our study, we evaluated a series of 51 patients aged 30 to 65 admitted for acute tendinous mallet finger after sport trauma or manual activities. They all underwent open surgery with an internal absorbable tendon suture and temporary DIPJ arthrodesis with Kirschner wire removed after for 6 weeks.

Results: We showed excellent results for 30 patients (60%) and good results for 21 patients (40%). No pain, no recurrence of deformity or stiffness was detected is 84% of patients. There was an high satisfaction rate of treated patients.

Conclusion: In our experience, our surgical technique for the treatment of acute tendinous mallet finger is a safe and effective method that provides positive functional results with a good restoration of tendon strength with very few postoperative complications.

Keywords: Mallet Finger; Tendinous Lesion; Extensor Lesion

Introduction

Mallet finger often occurs often a traumatic event that causes the lesion of the extensor tendon with its rupture at the base of the distal phalanx in the so called zone I. It can be associated with bony avulsion at the base of the distal phalanx, without any lesion of the skin [1,2]. Tendinous mallet finger was firstly investigated by Shoening in 1887 [3]; after some conservative approaches, the first surgical treatment was performed in 1930 by Mason [4]. Mallet finger occurs when an axial load is strongly applied to the tip of a straight finger. This leads to a massive passive hyperextension or hyperflexion of the distal interphalangeal joint (DIPJ) [5]. When the finger undergoes hyperflexion, tendon avulsion usually causes bony lesions with a fracture at the base of the distal phalanx. If the injuring mechanism is the hyperextension, exclusive tendon lesions occur. According to the literature, considering all tendinous lesions in the hand and wrist the incidence of mallet finger is about 5.6% [6]. It is frequent in young males who play high-energy ball sports such as basketball, volley, rugby or soccer. Manual workers o housewives can also incur this type of trauma during their daily activities. The heterogeneity of this type of trauma makes these injuries easy to encounter in the everyday clinical practice. The third, fourth and fifth finger are the most affected sites, expecially in the dominant side. The clinical examination is usually sufficient to formulate the diagnosis. In fact, affected patients are clearly unable to complete

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and active extension of the DIPJ with a flexion deformity of the last phalanx (Figure 1 and 2). During the clinical exam it is important to isolate the DIPJ in order to test the inability to straighten or extend the DIPJ during active range of motion testing, tenderness and swelling near DIPJ [7]. If the rupture of the extensor tendon is only a suspicion, imaging is useful to confirm the diagnosis.

Figure 1 and 2: Tendinous mallet finger: clinical examination with DIPJ unable to active extension.

In particular, X- rays in lateral and anteroposterior projections should be provided to look for a bony articular fragment if bone avulsion is suspected. Ultrasound or magnetic resonance can be useful to detect partial tendon lesions. Considering different therapeutic options, it is important to remind that the healing process follows different phases [8]. In pure tendinous lesion, an inflammatory response occurs in the first 2 weeks. Then phagocytosis starts, followed by tenocytes proliferation. In this phase, only type III collagen is synthesized. At six weeks consolidation proceeds until type III collagen transforms into type I mature collagen. After ten weeks the maturation process begins.

When a bony lesions occurs healing time is always conditioned by bone metabolism. These bone lesions are often associated to a partial tendon lesion because the distal portion of the tendon usually remains attached to the dorsal DIPJ capsule and it allows a more rapid healing of these type of injuries.

According to the literature, there is a lack of consensus about the best treatment for acute tendinous mallet finger. The timing of the intervention is very important because it is well known that if acute lesions (within 4 weeks of injury [9]) remain untreated they present an high risk of evolving in chronic deformities with several associated complications (DIPJ extension deficits, swan-neck deformities and DIPJ osteoarthritis). According to some authors, conservative treatment performed by immobilization with an hyperextended splint provides a good functional outcome [10].

The timing of the immobilization is different depending on the type of injury because tendon healing takes longer (10 weeks) that bone healing (6 - 8 weeks) [11]. If a surgical approach is preferred, it can be performed by open or percutaneous approach [12-14].

In this paper, we present our surgical experience in treating acute tendinous mallet finger by internal absorbable suture associated with Kirschner wire temporary arthrodesis of the DIPJ.

Materials and Methods

We included 52 patients that came to our attention for acute tendinous mallet finger after sport trauma or manual activities from January 2013 to December 2019. They were 38 males (75%) and 13 females (25%) with an average age of 47 years (min. 30, max. 65). All the patients were treated with an internal absorbable tendon suture and temporary DIPJ arthrodesis with Kirschner wire removed after for 6 weeks.

All patients were clinically evaluated before and after the surgical procedure. They all underwent examination using Crawford's criteria [15] (excellent: no pain and no limitation of the range of motion at the DIP joint; good: less than 10-degree of extension deficit; fair: no pain, 10 - 25 degrees of extension deficit; poor: much pain, more than 25 degrees of extension deficit).

Our mean follow-up was 12 months.

Surgical technique

In our surgical procedure, we make a transverse "H" shaped incision at the DIPJ and we expose the extensor apparatus (Figure 3). An absorbable simple interrupted suture is performed at the level of tendinous lesion. We suggest using absorbable suture to reduce the risk for superficial granulomas around the DIP joint. The tendon suture is then protected by temporary transarticular DIPJ arthrodesis using a Kirschner wire fixation in hyperextension (Figure 4 and 5). The surgical procedure is performed using local anesthesia. Considering the arthrodesis, we do not apply any support or splint after the procedure. After 6 weeks, the Kirschner wire is removed (Figure 6).

Figure 3: Open surgical approach: tendon absorbable suture with K wire temporary arthrodesis of the DIPJ.

Figure 4 and 5: X-rays showing K wire temporary arthrodesis of the DIPJ.

Figure 6: Correction of the deformity after K wire removal.

Results

After our surgical procedure, we clinically evaluated the patients using the Crawford clinical criteria. and we recorded excellent results for 30 patients (60%) and good results for 21 patients (40%).

Forty-one patients (84%) reported no deformities, no pain and a complete restoration of the extension of the DIPJ at 12 months follow-up after surgery. Some limitations were recorded in extension (7 patients, 14%) and in flexion (4 patients, 9%) for joint stiffness that was resolved after an accurate physiotherapy program with active and passive mobilization of the DIPJ.

Discussion

Different therapeutic options have been proposed for the treatment of acute tendinous mallet finger and at this time there is no consensus about the indications for surgical intervention. In our experience, we focused on a surgical technique that allows a good correction of the flexion deformity and a fast recovery of the involved finger.

The advantage of our surgical technique is the real possibility of directly inspectioning the tendon lesion and of retensioning the tendon with a direct primary suture. K wire fixation protects the suture and allows the tendon to completely heal in six weeks.

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We did not report infections neither tendon re-rupture or skin breakdown. Complications related to the initial limitation of the range of motion due to joint stiffness after arthrodesis removal were resolved after a specific rehabilitation program. We obtained positive outcomes with an high rate of "excellent"/"good" results according to the Crawford criteria.

On the contrary, nonsurgical treatment seems to lead to persistent DIP joint extension deficit as an outcome measure.

Conclusion

Acute tendinous mallet finger is a common clinical condition that, if untreated, leads to a chronic flexion deformity of the DIPJ with loss of strength in active extension causing an important functional impairment of the affected finger.

We reported that internal absorbable suture associated with temporary Kirschner wire arthrodesis for 6 weeks represents a safe and effective technique for this acute lesions with poor risks for the patients and an high rate of satisfaction.

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