

The Ishiguro Technique for the Treatment of Adolescent Mallet Thumb Fracture

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Abstract

Introduction: Mallet thumb is the avulsion of the extensor pollicis longus tendon from the base of the distal phalanx with or without bony fragment. Abruption injuries of the extensor tendon are rare in adolescents and in most of the cases complete healing and functional restoration can be achieved by conservative treatment. However, when the disruption is extensive (i.e., it affects more than one third part of the articular surface) and the extent of the dislocation is more than 1.5 mm, then surgical intervention is necessary.

Aim: To present the feasibility of the Ishiguro's method which is more beneficial than open surgery in the treatment of mallet thumb fracture.

Case report: A 16-year-old male patient presented tenderness and swelling around the interphalangeal joint of the right thumb. X-ray imaging showed fracture at the base of the distal phalanx including one third of the articular surface. Under digital nerve block anesthesia we performed closed reduction and extension block pinning. The right thumb was immobilized with Bennet splint for 3 weeks. The wires were removed 6 weeks after the primary intervention. Two month after the surgery, the patient acquired full extension and five degree flexion deficit in the interphalangeal joint. He was satisfied with function and cosmetics.

Summary: Ishiguro technique is an effective, safe, and easily applicable procedure for the treatment of mallet thumb fracture in the adolescent age group. In our reported case we were able to achieve good functional results without open surgery.

Keywords: Case; Mallet finger; Extensor tendon abruption; Children

Objective

To present the feasibility of the Ishiguro method in the treatment of mallet thumb fracture.

Introduction

Mallet thumb is the avulsion of the extensor pollicis longus tendon from the base of the distal phalanx with or without bony fragment. It occurs because of the hyperflexion or axial loading of the interphalangeal joint, most often due to bicycle injuries and ball games. Injuries of the abruption extensor tendon in adolescents are extremely rare. During the last 30 years 2 cases have been published in English [1].

Treatment options for mallet thumb fracture are primary conservative such as splint or cast. Splints or casts immobilize musculoskeletal injuries while alleviating pain and promoting healing. However, these interventions differ in their technique, indications, benefits, and risks.

Operative treatment is indicated in case of fractures involving more than one third of the articular surface and/or volar subluxation of the interphalangeal joint as well as open fractures and when conservative treatment is not successful [2]. Internal fixation and reposition is required in the case of instable phalanx fractures and fractures with extensive destruction. These methods include: wire, intraosseous wire sutures, extra- and intraosseous compression pin fixation, and mini screw fixation.

Case Report

A 16-year-old male patient presented tenderness and swelling around the interphalangeal joint of the right thumb after falling off his bicycle. Physical examination revealed the loss of function of the interphalangeal joint of the right thumb. X-ray imaging showed fracture at the base of the distal phalanx including one third of the articular surface (Figure 1).

Under digital nerve block anesthesia we performed closed reduction and extension block pinning. For extension block and temporary fixation we used 1 mm diameter K-wires. The right thumb was immobilized with Bennet splint for 3 weeks (Figure 2).

The wires were removed 6 weeks after the primary intervention (Figure 3). Two month after the operation, the patient had full extension and five degree flexion deficit in the interphalangeal joint. We achieved excellent results according to the Crawford's evaluation criteria (Figure 4) [3].

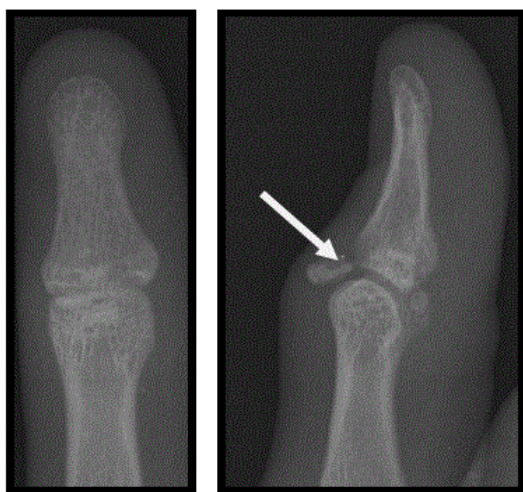


Figure 1: Mallet fracture of the right thumb.

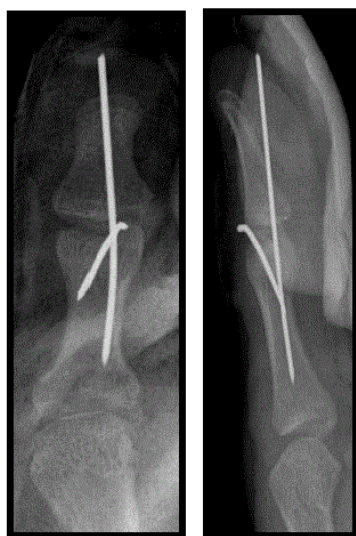


Figure 2: Post operative x-ray shows the antero-posterior and lateral view.

Discussion

There are various options to treat the mallet finger fracture. Brook splint keeps the finger in an extended position that promotes healing in the case of extensor tendon injuries. The application of wires is a simple, easy, fast, and minimally invasive surgical technique. Because of its insufficient stability external fixation is needed as well. The intraosseous wire sutures and compression-hooks are dynamic, stabilizing fixation techniques. Their advantage is that they are minimally invasive, thus the perfusion of the bone and the surrounding tissues are spared.

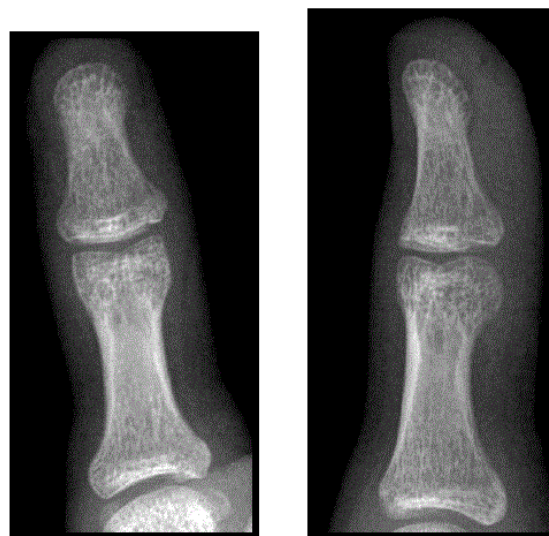


Figure 3: X-ray image after K-wire removal. It shows consolidated fracture 6 weeks after the injury.

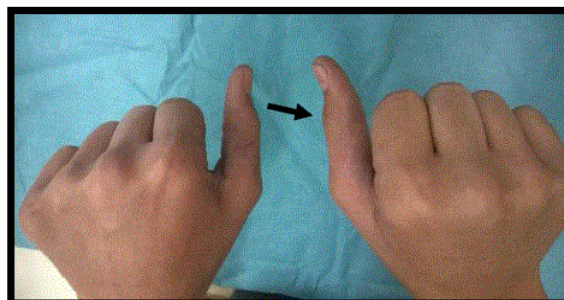


Figure 4: Functional examination shows full extension of the interphalangeal joint of the right thumb.

The mini screws enable internal fixation allowing stable movement, after which early active movement can be started [4].

Ishiguro technique is an extension block technique using Kirschner wires [5]. It is performed under digital or metacarpal nerve block anesthesia with image intensifier control. During the first step of this procedure the distal phalanx is in maximal flexion. In order to support the fracture fragment 0.9 mm diameter Kirschner wire is inserted percutaneously through the terminal extensor tendon into the proximal phalanx. The wire is inserted dorsally. Then, after extending the joint, another 1 mm Kirschner wire is inserted in order to keep the interphalangeal joint in extension.

Ishiguro's method is easier than open surgery and the closed manipulation reduces the possibility of the fragment becoming comminuted.

We have found that the extension block technique is an effective and minimally invasive technique and it does not disrupt the remaining

extensor mechanism. It is also relatively easy to achieve an adequate reduction and a good fixation with image intensification. It is also quicker than most of the open surgical procedures. It allows an earlier mobilization of the involved joint (as soon as the wires are removed), making it a more suitable procedure for patients who require early use of the hand (e.g., youngsters).

The damage of the articular cartilage may lead to secondary osteoarthritis, as a result, infections and nail deformities may adversely affect the outcome. After repeated insertion of the dorsal pin due to methodological issues dorsal scarring may occur [6,7].

Conclusion

Ishiguro technique is an effective, safe, and easily applicable procedure for the treatment of mallet thumb fracture in the adolescent age group. In the currently reported case we could achieve good functional results without open surgery.

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