

Extension Block K-Wire Technique in the Management of Mallet Finger



Medical Science

KEYWORDS :

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ABSTRACT

Objective: To assess the clinical and radiological outcome in patients with mallet finger treated by extension block k-wire technique

Methods and Material: Patients diagnosed with mallet finger [Doyle's type IV B] were treated using extension block k-wire technique. The Patients were put on mallet finger splint post operatively, the dorsal k wire was removed at 4 weeks and the trans-osseous k-wire at 8 weeks. Splint was continued for 4 months. The clinical results were assessed using the Crawford evaluation criteria and radiologically.

Results: According to the Crawford rating system there were 77% excellent and 33% fair results. Two of the patients had some restriction of flexion on follow up. All the patients had full extension and were able to return to their usual daily living activities and jobs with no functional limitation.

Conclusions: Extension block K-wire technique is a simple technique which gives excellent outcome in patients with Mallet finger [Doyle's type IV B].

INTRODUCTION:

The disruption of the terminal extensor tendon with or without intra-articular fracture of dorsal lip of distal phalanx results in the distal interphalangeal joint extension lag, this is known as Mallet finger deformity. It is usually caused due to forceful blow to the tip of the finger causing sudden flexion, but can also be caused by hyperextension with fracture of the dorsal lip of distal phalanx.¹ Mallet finger treatment ranges from simple splinting to surgical management based on the type of mallet finger. There are studies that consider that restoration of the joint surface by accurate reduction is important, in order to prevent secondary osteoarthritis, loss of movement, and a poor cosmetic outcome. They advocate operative treatment, especially where the fracture involves more than 30% of the articular surface or there is volar subluxation. Extension block pinning, which consists of a dorsal extension block Kirschner (K)-wire and a second volar wire to hold the distal interphalangeal joint in extension, was first described by Ishiguro et al in 1988.² In this article, we use the extension block Kirschner wire method that originated from Ishiguro et al to treat mallet fracture and evaluate its efficiency.

METHOD AND MATERIAL:

Between February 2014 and August 2015, 18 patients with a mallet finger [Doyle's type IV B] were treated using extension block K-wire technique [Figure 1]. Patients included 12 men and 6 women. The patients underwent the procedure under digital block anaesthesia or short general anaesthesia.

With the distal and proximal interphalangeal joints held in maximum flexion, a K-wire is introduced just behind the fragment and driven proximally into the head of the middle phalanx at an angle of 30° to its long axis. Closed reduction is achieved by extension of the distal phalanx. A second trans-osseous K-wire is inserted from the volar side across the distal interphalangeal (DIP) joint to maintain extension and reduction [Figure 2 and 3]. The wires are cut short and a mallet finger splint is applied to protect them

and prevent movement of the DIP joint. Regular dressings and pin care was done.²



FIGURE 1: Pre-op Xray showing Doyle's type IV B mallet finger



Figure 2: Intra-operative picture showing placement of the K-wires done under radiographic guidance



Figure 3: Post-op x-ray showing reduction of the fracture
The Patients were put on mallet finger splint post operatively which was continued for a total period of 4 months [Figure 4]. The dorsal k-wire was removed at 4 weeks followed by the trans-osseous k- wire at 8 weeks. The patients were followed up post operatively at after an interval of 4 weeks, 6 weeks and 4 months. The clinical results were assessed using the Crawford evaluation criteria and radiologically.³



Figure 4: Mallet finger splint given for a total of 4 months

RESULTS

The patients were followed up and at 4 months post surgery they were assessed. According to the Crawford rating system there were 77% excellent and 33% fair results. Two of the patients had some flexion restriction on follow up. All the patients had full extension and were able to return to their usual daily living activities and jobs with no functional limitations. There were no infections of pin tracks or skin necrosis around the dorsal K-wire. The fracture had well united in all the patients on follow-up check radiograph. Osteoarthritis of the distal interphalangeal joint was not seen in any case at follow-up.

Three patients were followed up on longer durations of 8 months and were found to have a long term excellent results with no limitation of their daily activities.

DISCUSSION

An untreated mallet finger can result in a painful finger, deformity and degenerative arthritis. Therefore it is advisable that a mallet finger be treated conservatively or surgically.⁴

Different procedures have been described in the management of mallet finger.⁵ These include percutaneous and open reduction and internal fixation techniques. The percutaneous techniques with pinning of the fragment usually

carry a high risk of comminution. However, open reduction is sometimes hazardous because of the small size of the fragment and the difficulty in visualizing the articular congruity. Surgical complications including infection, nail deformities and failure of the device have also been reported.

Surgically the extension block technique described by Ishiguro is minimally invasive and easier. It also gives an adequate reduction & fixation. It allows earlier mobilization of the joint, thereby making it suitable for patients looking for an easier recovery.^{1,2}

The complications of the technique are mainly related to use of improper method such as multiple attempts in inserting the k-wires and inaccurate reduction. It can lead to secondary osteoarthritis, dorsal scarring, delayed union and re-dislocation. Also, infection at the pin track site, marginal skin necrosis and deformity of the nail may adversely affect the outcome as reported by Bischoff et al in their study.⁶

Prats et al., in their study concluded that all the fractures united, with an average healing time of 5.6 weeks. At a mean follow-up of 25 months majority of them had an excellent or good result. One patient had a fair result with a lag to extension of 20 °.⁷

There have been numerous studies on the same in the past. A large section of these studies have shown promising results with this method of management of mallet finger. We believe that this technique when properly applied produces satisfactory results.

CONCLUSION:

Extension block K-wire technique is a simple technique which gives excellent outcome in patients with Mallet finger [Doyle's type IV B]. It is a reliable closed procedure that permits an indirect anatomical reduction of the fracture. We believe that this technique when properly applied produces satisfactory results.

BIBLIOGRAPHY:

1. Uzun, M., Bulbul, M., Ozturk, K., Ayanoğlu, S., Adanir, O., & Gürbüz, H. (2012). Surgical treatment of mallet fractures with the extension block kirschner wire technique. *Acta ortopedica brasileira*, 20(5), 297-299.
2. Ishiguro, T. (1988). A new Method of closed reduction for mallet fracture using extension-block Kirschner wire. *Cent Jpn J Orthop Trauma Surg*, 6, 413-415.
3. Crawford, G. P. (1984). The molded polythene splint for mallet finger deformities. *The Journal of hand surgery*, 9(2), 231-237.
4. Orhun, H., Dursun, M., Orhun, E., Gürkan, V., & Altun, G. (2008). [Open reduction and K-wire fixation of mallet finger injuries: mid-term results]. *Acta orthopaedica et traumatologica turcica*, 43(5), 395-399.
5. Auchincloss, J. M. (1982). Mallet-finger injuries: a prospective, controlled trial of internal and external splintage. *The Hand*, (2), 168-173.
6. Bischoff, R., Buechler, U., De Roche, R., & Jupiter, J. (1994). Clinical results of tension band fixation of avulsion fractures of the hand. *The Journal of hand surgery*, 19(6), 1019-1026.
7. Darder-Prats, A., Fernandez-Garcia, E., Fernandez-Gabarda, R., & Darder-Garcia, A. (1998). Treatment of mallet finger fractures by the extension-block K-wire technique. *Journal of Hand Surgery (British and European Volume)*, 23(6), 802-805.