

## Closed Reduction of Mallet Fractures using Extension Black Kirshner Wire

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### = Abstract =

Operative repair of mallet fracture is a technically difficult operation because fracture of fragment and the difficulty in visualizing the articular congruity. The problems with these methods include soft tissue scar formation and subsequent joint stiffness. From January 1993 to April 1994, eight cases of mallet fingers with displaced large fracture fragment and/or subluxed distal phalanx were treated by closed reduction using extension-block Kirschner wire. The follow-up evaluation took place after a mean of 6 months.

The results according to Crawford's criteria were four excellent, two good and two fair. This technique is simple, and easier than other techniques for reduction of mallet fractures, and is associated with a low morbidity.

**Key Words :** Mallet fracture, Large fragment, Closed reduction, Extension block.

### INTRODUCTION

There is general agreement that acute mallet fingers with tendon rupture or with small fracture fragment involving less than one third of the articular surface of the distal phalanx should be treated nonoperatively with one of the various available

splints<sup>1,4,5</sup>. Operative treatment has been recommended for patients with a dislocated large fracture fragment involving greater than one third of the articular surface and/or a subluxated distal phalanx to prevent joint deformity with secondary arthritis<sup>2,4,5</sup>. However, operative repair of mallet fractures is a technically difficult because of the small size of the fragment and the difficulty in visualizing the articular congruity. In 1988, Ishiguro et al.<sup>3</sup>) described a new technique for closed reduction of mallet fractures using exten-

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sion-block kirschner (K) wire.

This article reports our experience of Ishiguro's method for treatment of nail fractures.

## TECHNIQUE

### Rationale

The rationale for this technique is based on the fact that the displaced fracture fragment follows the distal phalanx volarly by flexing the distal interphalangeal (DIP) joint due to periosteal continuity between the fragment and the distal phalanx. When the fragment lies in its proper position by flexing the DIP joint, a 0.035- or 0.045-inch K wire is inserted into the head of the middle pha-

lanx along the dorsal edge of the fragment. The distal phalanx is then extended passively so that the fracture fragment can be reduced because the K wire acts as a counterpressure against the fragment (Fig. 1A-D).

### Procedure

Under digital block anesthesia, the distal phalanx is flexed and maintained that position. A 0.035- or 0.045-inch K wire is introduced longitudinally into the head of the middle phalanx along the dorsal edge of the fragment under image intensifier control. Closed reduction is obtained by extending the DIP joint, and applying distal traction of the finger and dorsally directed pressure on

**Fig. 1.** Serial radiographs demonstrate a technique of the fracture reduction using extension-block kirschner (K) wire.

A : The displaced fracture fragment follows the distal phalanx volarly when flexing the distal phalanx.

B : A K-wire is drilled into the head of the middle phalanx along the dorsal corner of the fragment.

C : The distal phalanx is extended, applying distal traction of the finger and dorsal pressure on the base of the distal phalanx. The K-wire provides a counterpressure against the fragment, and the fracture fragment is reduced.

D : The distal interphalangeal joint is transfixed with a K-wire

the base of the distal phalanx. A second transfixing longitudinal K wire is then driven across the joint into the middle phalanx. A radiograph must be obtained to verify congruity of the articular surface and reduction of the subluxation of the distal phalanx(Fig. 1C). No further immobilization is necessary and active motion of the proximal interphalangeal joint and metacarpophalangeal joint is encouraged immediately after operation. At postoperative 4 weeks, the extension block k wire is removed. A transfixed longitudinal K wire is left in place for 5-6 weeks postoperatively until union is demonstrated by radiograph. The patient can return to work immediately after operation without heavy labor.

## MATERIALS AND RESULTS

During the 1 year from January 1993 to April 1994, 9 patients with a mallet finger with and intraarticular fracture involving greater than one third of the articular surface of the distal phalanx were treated by this method. There were four patients with a dislocated fragment without subluxation of the distal phalanx(fig. 2) and four with a subluxated distal phalanx. There were five men and three women, with an average age of 28

years(range, 13-59). The duration of injury to treatment ranged from 2 to 7 days, with an average of 4 days.

The criterial of Crawford<sup>1)</sup> were used to assess the results : excellent, full DIP joint extension and flexion with no pain; good, 0-10° of extension deficit with full flexion and no pain; fair, 10-25° of extension deficit, any flexion loss, and no pain; and poor, more than 25° of extension deficit. Any patient with persistent pain at follow-up observation was classified as having a poor result.

The final outcome was excellent in four, good in two, fair in two. There were no cases of pseudoarthrosis. No pin tract infections were encountered.

## DISCUSSION

An accurate reduction is advocated in the treatment of mallet finger with a displaced large fracture fragment and/or a subluxated distal phalanx. However anatomical reduction is technically demanding due to the difficulty of direct visualization of the articular congruity. Stark et al.<sup>5)</sup> advised a dorsal approach with division of the ulnar collateral ligament and Hamas et al.<sup>2)</sup> described a dorsal approach with division of the extensor tendon as

**Fig. 2.** A : Preoperative radiograph.  
B : Postoperative radiograph shows excellent reduction of the fracture fragment.

an aid in reduction and visualization. The problems with these methods include soft tissue scar formation and subsequent joint stiffness.

The technique of Ishiguro et al. is simple than other techniques for the reduction of mallet finger fractures and is associated with a low morbidity. This simple technique for closed reduction of mallet finger using an extension-block K wire is of benefit in patients with a displaced large fracture fragment and/or a subluxated distal phalanx.

### SUMMARY

1. Acute mallet finger deformity with a significant intraarticular fracture with joint incongruity and anterior subluxation up to 3-4 weeks may be satisfactorily treated by this technique.

2. Should the patient be seen with tendon disruption, tendon avulsion with small fleck of bone or seen later with a chronic mallet deformity,

splinting or surgery may be indicated.

### REFERENCE

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= 국문 초록 =

### 골성추지의 치료

— 신전제한 K-강선을 이용한 도수정복법 —

경북대학교 의과대학 정형외과학교실

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골성추지의 관절적 정복은 골절편이 작아서 관절면의 조화를 육안적으로 보기가 어렵고 연부조직 반흔형성 및 관절강직 등의 합병증을 초래하는 기술적으로 어렵고 위험성이 있는 수술로서 본 교실에서는 1993년 1월부터 1994년 4월까지 전위된 큰 골절편이 있거나 원위지골이 아탈구 되었던 8명의 골성추지 환자를 Ishiguro씨의 신전제한 K-강선을 이용한 도수정복법으로 치료하여, 3개월에서 12개월간 평균 6개월 이상 추시관찰 가능하였던례를 분석하여 만족할만한 결과를 얻었기에 문헌고찰과 함께 보고하는 바이다.