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Case report

Revision with suture-tape augmentation after failed collateral ligament reconstruction for chronic interphalangeal instability of the hallux

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ABSTRACT

Chronic varus instability or recurrent subluxation following isolated interphalangeal dislocation of the hallux is a rare injury. No consensus has been reached regarding the best joint-salvage procedure for patients with the failed collateral ligament reconstruction using tendon graft. We report a case who achieved satisfactory clinical outcome through a modified surgical procedure (revision collateral ligament reconstruction augmented with suture-tape).

1. Introduction

Isolated interphalangeal dislocation of the toe is an uncommon injury, more usually occurring in association with other foot injuries [1]. The hallux is the most commonly affected by hyperextension or adduction force [1,2]. Reduction is commonly accomplished with manual traction under digital block anesthesia. Although most interphalangeal dislocations are usually stable after closed reduction, some patients progress to the recurrent interphalangeal subluxation and chronic instability [3]. Chronic interphalangeal instability of the hallux can be treated by collateral ligament repair, plantar plate repair, collateral ligament reconstruction using tendon graft [4,5], and arthrodesis [6]. For chronic interphalangeal instability with insufficient or irrepairable ligament tissue, collateral ligament reconstruction using tendon graft is a generally accepted procedure [4,5]. However, no consensus has been reached regarding the best joint-salvage procedure for patients with the failed ligament reconstruction. The surgical procedures for chronic interphalangeal instability have been reported in the literature as fragmentary case reports. No study have reported the clinical outcomes of revision using joint-salvage procedures in comparison to arthrodesis of the interphalangeal joint.

A suture-tape used for revision ligament reconstruction in this study have a function as an artificial collateral ligament. This procedure was originated from the ligament augmentation technique for chronic lateral ankle instability [7]. We report a case who achieved satisfactory clinical outcome through a modified surgical procedure (revision collateral ligament reconstruction augmented with suture-tape).

2. Case report

A 21-year-old male was playing soccer when he was kicked in the right foot by other player while attempting to kick the ball. On examination in the emergency room, the distal phalanx of the hallux was dislocated dorsomedially. He underwent manual reduction under local anesthesia and recovered with splint immobilization for 1 month. However, he sustained a direct injury to door at 6 months later from initial injury, resulting in redislocation of the interphalangeal joint of the hallux. He underwent open reduction (under spinal anesthesia) and collateral ligament reconstruction using peroneus longus tendon auto-graft in another hospital (Fig. 1). Medical record of intraoperative findings showed that his injured lateral collateral ligament was insufficient and irrepairable. At 4 weeks postoperatively, he complained a sudden hallux pain with a crepitus occurred in toe motion exercise. Then, the hallux gradually became swollen, painful, and unstable. The interphalangeal joint of the hallux was

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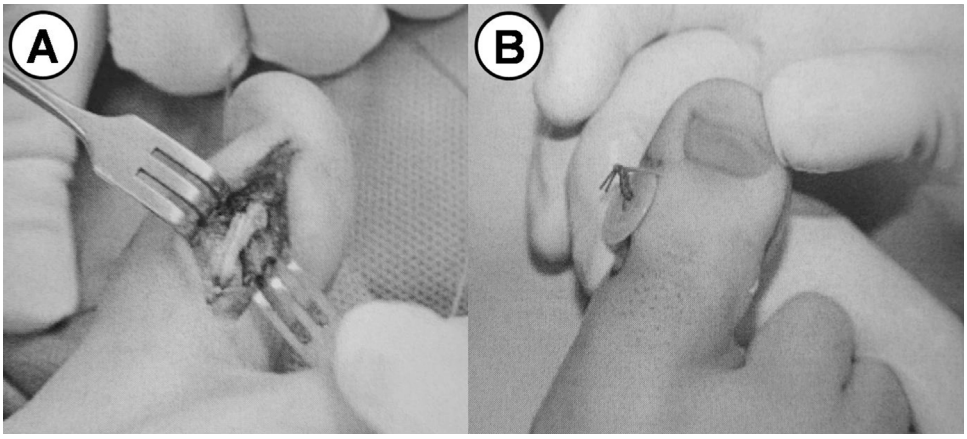

Fig. 1. (A,B) Intraoperative photographs in initial surgery show the collateral ligament reconstruction using the peroneus tendon auto-graft for chronic interphalangeal instability of the hallux.

subluxated several times for 5 months after the first operation. He was transferred to our hospital with diagnosis of chronic interphalangeal instability of the hallux. On physical examination, gross appearance of the hallux was normal. However, the interphalangeal joint was very unstable to varus stress. The interphalangeal joint was stable to flexion–extension, and the range of motion was normal. The plane radiographs showed normal alignment and congruity of the interphalangeal (IP) and metatarsophalangeal (MTP) joints. The fluoroscopic stress radiographs demonstrated a severe varus instability and subluxation of the interphalangeal joint without any avulsion fragment (Fig. 2). Revision surgery was performed under local anesthesia (digital block) with rubber band tourniquet. The interphalangeal joint was accessed via a previous incision scar on lateral aspect of the hallux. We found a severe attenuated tendon graft and disrupted suture materials out of bone tunnels. After removal of useless graft tissues, there was no repairable remnant of the lateral collateral ligament. We checked the position and width of previous bone tunnels, and then performed 2.7 mm overdrilling for suture-tape passage. A 2.0 mm-wide suture-tape was passed through two bone tunnels with suture passer (Fig. 3). While maintaining the interphalangeal joint on a 10° prebended aluminium splint, two 3.0 mm bio-tenodesis screws were inserted at proximal and distal phalanges, respectively. With a congruent reduction confirmed under fluoroscopy, the interphalangeal joint was additionally stabilized by longitudinal k-wire insertion (Fig. 4A). Stability to be checked after k-wire removal at 2 weeks postoperatively was competent against varus stress. He was encouraged the motion exercises of the hallux without additional immobilization splint. He was able to return to the work and to walk without discomfort after 6 weeks postoperatively. Five years after revision surgery, he showed good clinical and functional results without the recurrence of interphalangeal instability. Active dorsiflexion of the first MTP and IP joints were 40°, 0° and plantarflexion were 30°, 30°, respectively. Plane radiographs demonstrated a normal joint congruity and no signs of posttraumatic arthritis (Fig. 4B).

3. Discussion

The injury mechanism causing interphalangeal dislocation of the toe is known to be an axial loading and extreme hyperextension [6]. Yang et al. [8] reported that interphalangeal dislocation of the toe, if recognized early and treated by a proper manipulation technique, can have excellent clinical and radiological results. Redislocation in transverse plane following manual reduction results from the laxity of collateral ligaments. In addition, instability of the interphalangeal joint can be more aggravated by rupture of the joint capsule and fibrocartilagenous plantar plate [6,8]. Miki et al. [6] reported that there could be no dislocation of the interphalangeal joint without disruption of the plantar plate. In

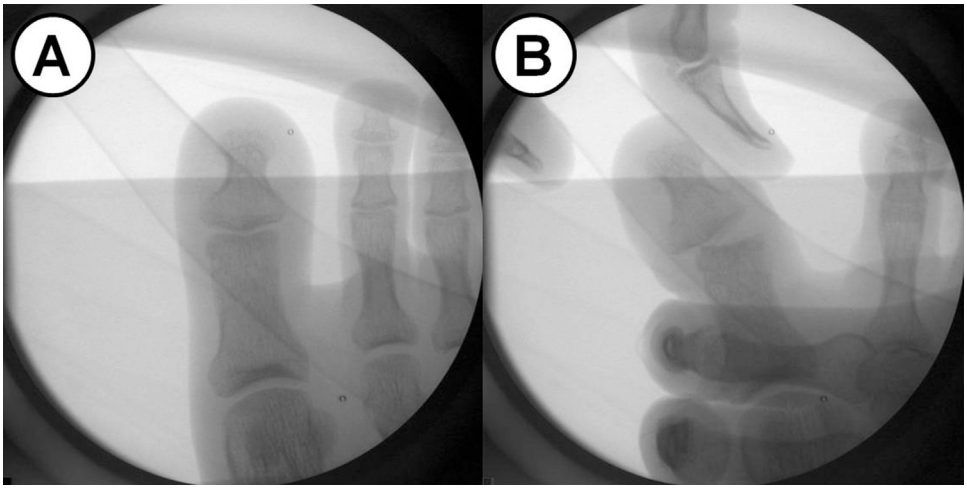

Fig. 2. Intraoperative fluoroscopic radiographs demonstrate (A) the normal alignment of the hallux following manual reduction, and (B) the reducible but unstable interphalangeal joint of the hallux.

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