Salvage arthrodesis for fracture-dislocation of the cuneonavicular and calcaneocuboid joints: a case report

GC Kang, IS Rikhraj
Department of Orthopaedic Surgery, Singapore General Hospital, Singapore

ABSTRACT

We present a 22-year-old man with dislocation of both the calcaneocuboid and cuneonavicular joints and fractures of the calcaneum and navicular of the right foot. The joints were reduced with percutaneous Kirschner wires, but the disrupted dorsal cuneonavicular ligaments were left unrepaired. Reduction was suboptimal and the joints were subluxed resulting in disabling arthralgia. Six months later, he underwent salvage arthrodesis of the subluxed calcaneocuboid and cuneonavicular joints. At 24-month follow-up, the patient had returned to work and remained pain-free when walking, with good fusion of both joints. Early anatomic reduction, stable fixation, and ligament reconstruction are essential for a good outcome. Arthrodesis is indicated when subluxation and posttraumatic arthritis are present. Primary arthrodesis is a viable option for severe midfoot fracture-dislocations, because it facilitates rehabilitation and functional recovery, and obviates the need for a secondary arthrodesis should arthritis arise.

Key words: arthrodesis; dislocation; fracture fixation, internal; fractures, bone; tarsal bones

INTRODUCTION

Midfoot fractures and dislocations are uncommon because of the intrinsic stability of the tarsal structure. Fracture-dislocation of the Chopart and Lisfranc joints have been reported, but concomitant fracture-dislocation of the calcaneocuboid and cuneonavicular joints is rare. We report a patient with dislocation of both the calcaneocuboid and cuneonavicular joints and fractures of the calcaneum and navicular bones in his right foot.

CASE REPORT

In January 2006, a 22-year-old man presented to
another hospital with pain in both legs and inability to bear weight after both his feet were ran over by a slow-moving forklift. The left foot was normal except for abrasions on the dorsum. The right foot was deformed and swollen with no neurovascular deficit. Radiographs revealed dislocation of the calcaneocuboid joint and plantar-lateral dislocation of the cuneiforms from the navicular, associated with fractures of the medial navicular and lateral-anterior calcaneum (Fig. 1). Closed reduction was attempted but unsuccessful. A below-knee back slab was applied.

The patient was placed supine on a radiolucent table under general anaesthesia. The calcaneocuboid joint was reduced closed under fluoroscopic guidance and fixed with 2 percutaneous Kirschner wires. The cuneonavicular fracture-dislocation was reduced openly and fixed with 2 percutaneous Kirschner wires in a retrograde manner, leaving the disrupted dorsal cuneonavicular ligaments unrepaired. Joint congruence was considered satisfactory with no displacement on stability testing, but in retrospect, both calcaneocuboid and cuneonavicular joints seem to have remained subluxed and the calcaneal fragment remained displaced (Fig. 2).

The foot was put in a cast and kept non-weight bearing for 6 weeks. The patient was able to bear full weight by 4 months but had pain and tenderness after long-distance walking. The midfoot pain (visual analogue score, 3) persisted, and the patient presented to our hospital for a second opinion. Radiographs revealed subluxation of both calcaneocuboid and cuneonavicular joints (Fig. 3).

Six months after the primary surgery, the patient underwent salvage arthrodesis of both joints via dorsal incisions. The malunited anterior calcaneum was excised and the calcaneocuboid joint was fused in situ with tricortical bone grafts harvested from the iliac crest using an H-plate. The cuneonavicular joint surfaces were excised and fused in situ with cancellous bone grafts using 2 interfragmentary screws placed through the middle and medial cuneiforms into the navicular.
The foot was put in a cast and kept non–weight bearing for 6 weeks, with range-of-movement exercises of the knee and hip allowed. At the 24-month follow-up, the patient had returned to work and remained pain-free when walking, with good fusion of both joints (Fig. 4).

DISCUSSION

Dislocations of the midfoot are uncommon because of the constrained configuration of multiple articular surfaces augmented by capsular attachments, strong ligaments and tendons. These injuries are usually secondary to high-energy trauma and involve any or a combination of the Chopart joints, tarsal navicular, cuboid, cuneiforms, and Lisfranc joint.

In our patient, both medial and lateral columns of the foot were disrupted. The injury mechanism was an acute valgus and dorsiflexion stress, similar to that described in previous reports of midtarsal joint subluxation involving navicular tuberosity avulsion and anterior calcaneal fracture. Foot trauma of this severity can result in articular incongruities, complex derangement of the arc geometry, ligamentous instability, and, eventually, long-term disability secondary to joint subluxation and posttraumatic arthritis. High-energy midfoot injuries may be complicated by severe soft-tissue damage, resulting in a compartment syndrome.

In our patient, the surgical management was based on the principles for treatment of Chopart joint fracture-dislocations. Radiographs obtained in 3 standard projections (exact lateral, dorsoplantar, and 45° oblique) and computed tomography (if necessary) are essential for making the correct diagnosis.

The goals of treatment are realignment of both medial and lateral columns of the foot, restoration of joint congruity, alignment of the foot axes, temporary fixation, and ligament reconstruction to ensure proper ligament healing (in cases with ligamentous instability). Realignment of the axes and columns is paramount in midfoot fracture-dislocations because loss of length of a foot column or shift of the foot axis in the horizontal or vertical direction substantially affects gait quality.

In our patient, reduction at the first surgery was suboptimal; the joints were subluxed, resulting in disabling arthralgia. Early anatomic reduction, stable fixation, and ligament reconstruction could have achieved a better outcome. Closed reduction yields good results only in cases of pure dislocation.
when anatomic restoration is possible. Arthrodesis is indicated when subluxation and posttraumatic arthritis are present. Mini-plates are biomechanically superior to screws in joint arthrodesis, despite both modalities being effective for double arthrodesis. Primary arthrodesis is a viable option for severe midfoot fracture-dislocations, because it facilitates rehabilitation and functional recovery, and obviates the need for a secondary arthrodesis should arthritis arise.

REFERENCES