



Combined Arthroscopy and Fluoroscopy Assisted Screw Fixation in Subtle Lisfranc Joint Complex Injuries

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We describe a 35-year-old woman who had a subtle left foot Lisfranc injury and whose diagnosis was delayed for 4 weeks. We treated this patient with combined arthroscopy and fluoroscopy assisted screw fixation, which has not been reported previously. The clinical function was evaluated by a AOFAS score (American Orthopaedic Foot and Ankle Society functional assessment score), and the clinical and radiographic outcome was satisfied after a 6 month follow-up.

Key words: lisfranc injury; tarsometatarsal joint dislocation, lisfranc joint fracture-dislocation

INTRODUCTION

Lisfranc joint complex injury is not common and is easily missed even by experienced doctors.¹ Missed injuries may lead to chronic disability.² Diagnosis of subtle Lisfranc joint complex injuries, defined as a diastasis of two to five millimeters between the bases of the first and second metatarsals on anteroposterior radiographs, is often delayed.³ Nunley and Vertullo classified low velocity Lisfranc injuries in three stages and suggested conservative treatment only in stage 1.⁴ Surgical treatment includes closed reduction and percutaneous pinning, open reduction and temporary screw fixation, primary arthrodesis and arthroscopic arthrodesis.^{5,6,7,8} We reported a case of missed subtle Lisfranc joint injuries treated with an arthroscopy and fluoroscopy assisted technique. The symptoms and function were evaluated after a 6 month follow-up.

CASE REPORT

A 35-year-old woman fell from a 1 meter high floor and injured her left foot. Initially she was treated with a

short leg cast and nonweightbearing of the left foot for 4 weeks and then partial weight bearing for another 4 weeks. She complained of persistent left foot pain when performing weight bearing actions after removal of the cast. Her AOFAS score was evaluated and the value was 65.

Weight bearing anteroposterior and lateral radiographs of the left foot demonstrate decrease of arch height and first to second intermetatarsal diastasis of about 4.3mm. (Fig.1A) CT film shows bony fragments in the region of the Lisfranc joint which arose from avulsed medial cuneiform (Fig. 2).

We localized the Lisfranc joint lesion under fluoroscopy with a needle guide which was inserted into the lesion. Two arthroscopic portals were made a 5mm distance away from the Lisfranc joint distally and proximally. One portal was reserved for the camera and pump system, and the other was reserved for the working system. Torn Lisfranc ligament and avulsed fragment from medial cuneiform were found under arthroscopy. The avulsed site of the medial cuneiform was curetted and debrided, but the avulsed fragment and Lisfranc ligament were preserved (Fig.3). The wide Lisfranc joint gap was reduced with a towel cramp and a cortical screw was inserted from medial cuneiform to the second metatarsal base under fluoroscopy (Fig.4).

Nonweightbearing of left foot with short leg cast protection was suggested for 6 weeks after the operation. Partial weight bearing was allowed after removal of the cast. The preoperative symptoms were cured except that the patient still felt mild soreness of the left midfoot when weight bearing. The screw was removed 6 months

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Fig. 1 (A) Weight bearing film of feet before surgery, they showed decreased arch height and diastasis of the base of first and second metatarsal base in left foot compared with the contralateral side. (B) Weight bearing film of feet after removal of the screw. Both AP and lateral view demonstrates significant improvement in diastasis and arch height, and in left foot Lisfranc joint was preserved without fusion.

after the surgery, and the AOFAS score was 90.

We compared the pre-operative and 6-month follow up x-rays of the foot after removal of the screw (weight bearing view, AP and true lateral) by calculating arch height (the distance between the base of the fifth metatarsal and medial cuneiform) and the diastasis between the base of the first and second metatarsals. The arch height of the right foot was 17.3 mm, the pre-operative and post-operative height of the injured left foot were 8.2mm and 15.3 mm. The diastasis distance between the 1st and 2nd metatarsal bones in the right foot was 1.3mm, while the pre-operative and post-operative left foot were 4.2mm and 1.4mm (Fig.1B).

DISCUSSION

Subtle Lisfranc joint complex injuries are easily missed in emergency rooms. Weight-bearing AP and lateral view is helpful in diagnosis. The diastasis between first and second metatarsal base and the flattening of the



Fig.2. CT of midfoot, note the avulsed fragment from medial cuneiform (arrow).



Fig.3. Upper: the arthroscopy position was checked under fluoroscopy. Lower left: the fluoroscopy image, the fine needle was used for confirming Lisfranc joint. Lower right: arthroscopy findings in Lisfranc joint, the avulsion fragment of Lisfranc ligament (big arrow) and medial cuneiform (small arrow).

longitudinal arch become markedly noticeable.^{4,9,10} However, pain and swelling make it difficult to get weight bearing film in ERs. The missed patients will come back later because of chronic pain and disability. Arthroscopic arthrodesis in chronic Lisfranc joint complex has been reported recently to reduce the risk of malunion and non-union, with clinical symptoms also subsiding.⁸

Weight bearing films are suggested in subtle Lisfranc



Fig.4. The Lisfranc joint was reduced and fixed with cannulated screw, which was inserted from medial cuneiform to second metatarsal base

joint injuries which show significant diastasis. We did both weight bearing X-ray and CT to evaluate the patient. "Flick sign" is supposed to be visible in AP radiography, but this is not always the case. An avulsed fragment was detected by CT, but this finding was masked in the x-ray. CT images may provide accurate diagnosis in hyperflexion injuries of the foot and should serve as the primary imaging technique.¹¹ In this case, we used an arthroscopy and fluoroscopy assisted technique to treat the subtle Lisfranc joint injury. There is only one study to perform arthroscopy assisted fusion in chronic, post-traumatic arthritis cases.¹⁰ Arthrodesis of the Lisfranc joint is usually indicated in the chronic stage with painful arthritis, persisting pain or deformity, or marked destruction of joint surfaces.¹² However, in acute and subacute cases, we still have a chance to preserve the Lisfranc ligament. In this case, we used arthroscopic debridement and fluoroscopic assisted screw fixation over the fracture site to increase union of the avulsed fragment. The fracture and injured condition of the Lisfranc joint can be observed clearly under arthroscopy allowing us to treat it precisely. The following X-ray revealed good reduction in diastasis of the Lisfranc joint and significant improvement in arch height.

In this study, the quality of reduction in Lisfranc joint injuries is emphasized, but not the timing of treat-

ment.¹³ We reported a new reliable method to treat acute-subacute subtle Lisfranc joint injuries and the clinical result is satisfied in this case, which means that if we treat Lisfranc joint injuries before they reach the chronic stage, we can achieve significant reduction and a good clinical outcome without fusion. According to this case, the timing of treatment is important and it should not be delayed.

Combining arthroscopy and fluoroscopy may be a good choice in treating acute and subacute subtle Lisfranc complex injury. However, we still need more cases and longterm follow-up.

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