CHAPTER 10

LISFRANC'S JOINT ARTHRODESIS
A Twenty-Five Case Study

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The purpose of this study is to analyze the long-term results and prognostic factors for patients who had disruption of the tarsometatarsal joints. This disruption was secondary to trauma or Charcot arthropathy, and had been treated by fusion of all or part of the tarsometatarsal joints with and without the AME pulsed electromagnetic bone stimulator (Orthofix, Richardson, Texas).

APPROACH

Twenty-five patients with tarsometatarsal disruption secondary to trauma (14 patients) and Charcot and spina bifida arthropathy (11 patients) were analyzed over five-years. Of the 14 acute fractures, 3 were from direct injuries, 5 were falls from heights, and 6 were secondary to motor vehicle accidents. The 11 remaining patients exhibited arthropathy induced disruption, of which 10 were due to Charcot arthropathy and 1 was secondary to spina bifida with associated posterior tibial tendon collapse with pathological equinus.

Fractures and dislocations for fresh trauma were categorized using the radiographic classification system of Hardcastle et al. This classification system is based on radiological interpretation of the incongruity associated with the tarsometatarsal joint.

Type A is categorized by total incongruity of the entire tarsometatarsal joint. The displacement can occur in the sagittal or transverse planes. Type B is categorized by partial incongruity of the joint complex in either the sagittal plane, transverse plane or both. Partial injuries may exist and are of two types: Type 1- medial displacement affects the first metatarsal either in isolation or combined with displacement of one or more of the second, third or fourth metatarsals; Type 2 - lateral displacement involves one or more of the lesser metatarsals while the 1st metatarsal is unaffected. Type C - divergent, there may be partial or total incongruity of the joint, the first metatarsal is displaced medially in any combination of the lateral four metatarsals in either the sagittal or transverse planes, or both.

CLINICAL AND RADIOLOGICAL EVALUATION

Three of the fractures were totally incongruent, type A. Five of the fractures were partially incongruent. Four were categorized as type B2 and one being B1. The remaining six were divergent or partially divergent, five being C1 and one being C2.

Typical histories from the Charcot study, (11 patients), revealed slow-to-acute collapse of the medial arch over a period of 12 to 15 months. Soft-tissue ulcerations occurred in some of these patients, but the data were not collected.

All 25 patients in the study underwent surgical fusions of LisFranc's joint, with 14 out of 14 patients in the acute traumatic study undergoing primary cast and percutaneous fixation with Kirschner wires or transcrew non-fusion fixation prior to their surgical fusions.

RESULTS

Excellent results were defined as patients who had complete radiological fusion in 4 to 6 months, with an absence of pain and significant swelling. Good results were defined as patients who had radiological fusion in 6 to 8 months with at least 90% fusion of all sites, and minimal pain and swelling. Fair results were expressed as patients who had partial fusion (70-85%) in 6 to 8 months with moderate pain and swelling. Poor results were defined as patients who had 50% fusion or less in 6 to 12 months with moderate pain and swelling.

Five patients had excellent results. Nine patient's results were expressed as good, six patients were fair, and five patients were poor.

Results were significantly better in younger patients under 30 years of age, as compared to the 50 to 76-year-old age group.

Charcot arthropathies, (10 patients) and spina bifida (1 patient): Two excellent, five good, two fair, two poor. Charcot and spina bifida patients had less complaints of pain secondary to neuropathy, but have been observed by the authors as having continued swelling and enlargement with exocallus formation at the arthrodesis sites.

Patients, 18 of 25 utilizing AME pulsed electromagnetic (EMF) bone stimulation showed earlier results of bone fusion, especially in post-traumatic versus Charcot and spina bifida groups.

The efficacy of AME bone stimulator was demonstrated as follows. Eighteen of the 25 patients utilizing the AME PME stimulator showed earlier results of bone fusion, especially in post-traumatic versus the charcot and spina bifida group. The bone stimulator was used in all cases within two weeks of the surgical fusion. It was not used during the initial conservative or percutaneous fixation in trauma patients. The patients were instructed to use the AME bone stimulator for a minimum period of 10 to 12 hours per day.

Of the five excellent results, all used the bone stimulator post fusion for 10 to 12 hours per day. Good results occurred in nine patients (7 out of nine utilizing the bone stimulator). Fair results occurred in 6 patients (5 out of 6 used the bone stimulator). Poor results occurred in 5 patients, (1 out of 5 used the bone stimulator).

In conclusion, 17 out of 25 patients had excellent results (5), good (7), fair (5), utilizing AME bone stimulation and only 1 of the patients receiving poor results used the bone stimulator. There were no failures in the study, as overall improvement of foot position was accomplished in all cases.

Poor results did not necessarily indicate patient dissatisfaction, but were radiological evaluations observed by the authors at the conclusion of the study. Poor results evaluated by the authors included continued malposition, delayed union (greater than 12 months post-fusion), and persistent swelling and pain. Male and females evaluated showed no difference in healing results from complications.

INVESTIGATOR'S OBSERVATIONS

Lisfranc's joint injury is a common sequelae of the Charcot foot. Its diagnosis and treatment produced more fair and poor results than post-traumatic Lisfranc's joint injury treated by the fusion techniques and AME bone stimulation utilized at the Northlake Regional Medical Center. Percutaneous fixation and casting were attempted in 11 patients prior to Lisfranc's joint fusion, by either the authors or other surgeons. These initial injuries were significantly disruptive to the tarsometatarsal joint, and although treated by proper conservative casting and attempted open reduction, apparently proved to have significant patient and surgeon dissatisfaction, necessitating the need for arthrodesing procedures of the Lisfranc's joint.

CASE PRESENTATION

A 19-year-old white female presented to the emergency room after falling eight feet off a ladder at work, and twisting her left foot. The patient sustained a Lisfranc's joint fracture/dislocation which was openly reduced and pinned with 0.062 K-wires. Non-weight-bearing status was maintained for 3 months, at which time the internal fixation was removed, and the patient progressed to full weight-bearing status. Pain progressively increased throughout the weight-bearing period, and 13 months following the original injury Lisfranc's joint arthrodesis was performed. An AME bone stimulator was used during the postoperative period. The patient has currently been followed for 8 months with fusion achieved radiographically and clinically. The patient is ambulating with a good result and decreased pain (Figs. 1-6).

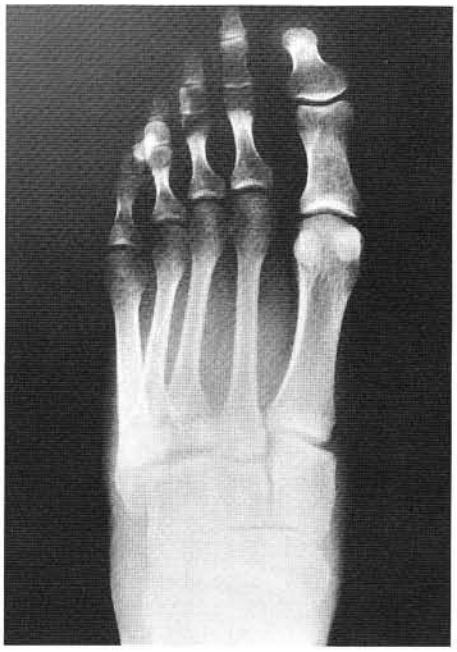

Figure 1A. Prereduction dorsoplantar radiograph of type B partial lateral Lisfranc's joint dislocation/fracture

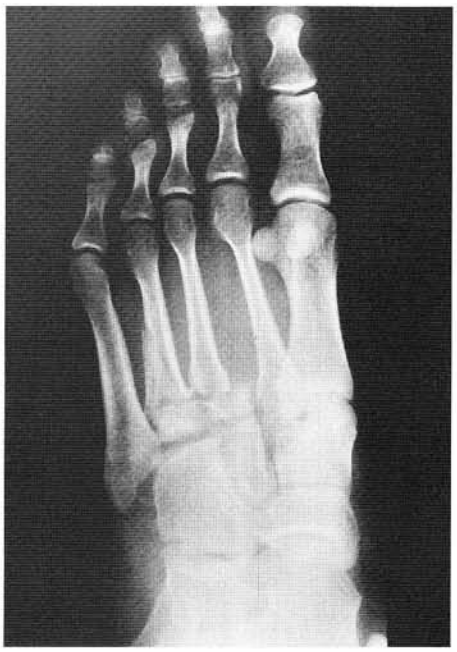

Figure 1B. Prereduction lateral oblique radiograph

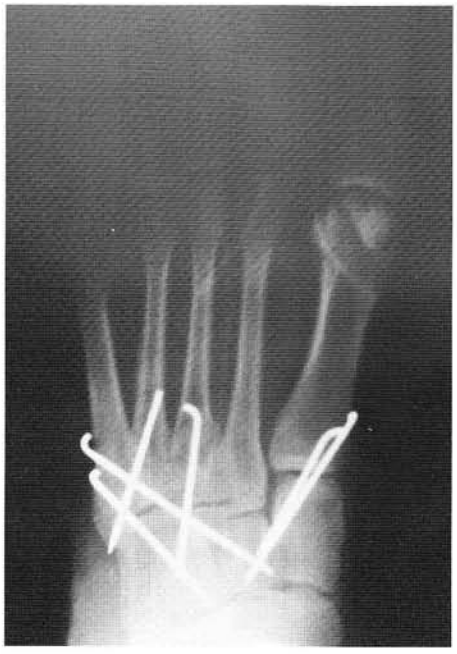

Figure 2. Postreduction dorsoplantar radiograph

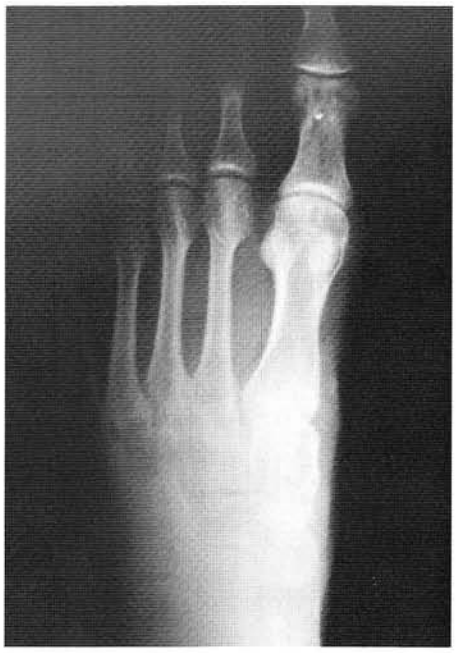

Figure 3. Post-traumatic arthritis 13 months after original injury

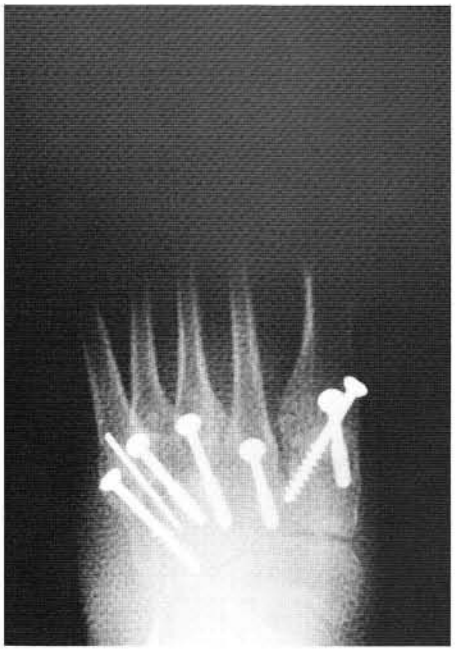

Figure 4. Lisfranc's joint arthrodesis post-operative dorsoplantar radiograph

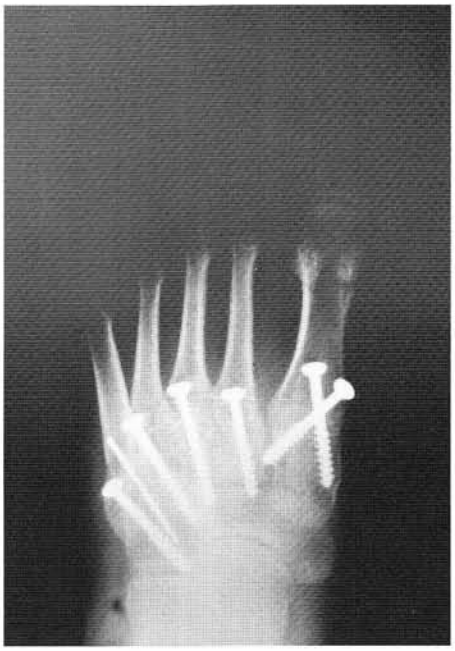

Figure 5. 2 months status post Lisfranc's joint arthrodesis

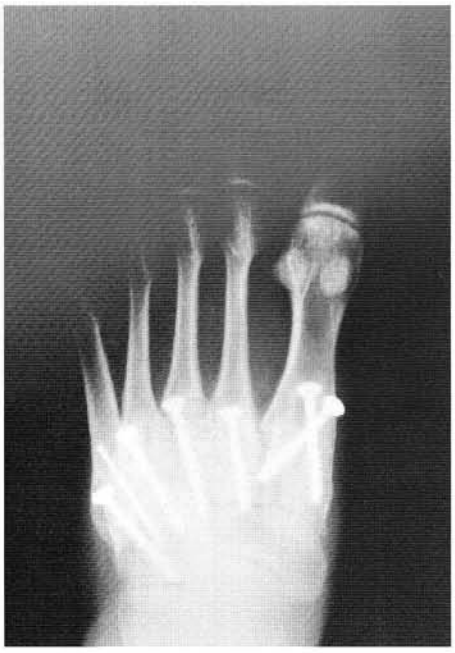

Figure 6. 8 months status post Lisfranc's joint arthrodesis

BIBLIOGRAPHY

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