**Case study:** Lisfranc stabilization - Fixos 2 and Anchorage plating

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**Patient history:**
This patient is a 35 year old avid marathon runner who was involved in a motor vehicle accident with her right foot suddenly forced back on the brake pedal. She noticed immediate pain in the right midfoot. She was able to progressively bear more weight on her foot but with continued pain. She waited, thinking it was a sprain, and presented it to the clinic about three weeks after the injury. She had not had any treatment for it apart from some pain relieving medications.

**Assessment:**
On evaluation she appeared to be in good general health and had swelling over the midfoot and bruising under the midfoot in the region of the arch of the foot along with point tenderness over midfoot in the region of the first and second metatarso-cuneiform joints. She had good dorsalis pedis and posterior tibial pulse and intact sensation. Weight bearing radiographs of both feet were obtained to evaluate for Lisfranc ligament injury. The radiographs showed diastasis between the base of the second metatarsal and the middle cuneiform bone along with a small fleck of bone in the interval between these bones. A diagnosis of Lisfranc ligament and tarso-metatarsal subluxation of the right foot was confirmed by these findings.

Surgical intervention to stabilize the unstable joints and reduce the diastasis at the Lisfranc joint was planned.

**Procedure/treatment:**
Under anesthesia, the foot was stressed and fluroscopy to determine which joints in the midfoot needed stabilization. There was abnormal opening at the first metatarso-cuneiform joint on abduction stress in addition to worsening of the diastasis at the second metatarso-cuneiform joint. A dorsal open approach was used to approach the articulation of the first metatarso-cuneiform joint. The capsule was found to be disrupted and the joint unstable. This joint was reduced and temporarily held with 0.62 Kirschner wire. A locking titanium four hole plate (Anchorage, Stryker) was positioned over the joint and after confirming appropriate positioning, fixed with two locking screws on either side of the joint.

A percutaneous approach one centimeter long, was made to the lateral wall of the base of the second metatarsal using a 'nick and spread'. A bone holding clamp was then applied to compress and reduce the diastasis between the base of the second metatarsal and the medial cuneiform bone. Then a guide wire for a 5.0 mm diameter, titanium threaded head partial threaded screw was inserted from the base of the second metatarsal into the medial cuneiform bone. Over this guide wire an appropriate length screw was inserted to stabilize the Lisfranc joint.

**Discussion:**
This patient is an avid marathon runner and wishes to be able to continue to participate in races in the future. She presented three weeks after the injury. At this stage the surgical options that can be considered were either arthrodesis or internal fixation. On the radiographs obtained there was a fleck or small fragment off the base of the second metatarsal, which makes this case not purely ligamentous. A purely ligamentous injury may have a poorer prognosis resulting in non-healing of the Lisfranc ligament if the option of open reduction and internal fixation is selected initially. Failure of fixation or failure of healing may then require arthrodesis in the future.
Although there is current literature comparing transarticular internal fixation with arthrodesis performed as a primary procedure in such cases, there are no studies that compare internal fixation with bridging techniques to arthrodesis.

In this case extra-articular fixation was used to preserve the joints. A rigid stabilization was obtained with use of a locking plate. The Lisfranc joint itself was reduced and stabilized with a threaded head screw which can potentially increase compression, provide stability and be less prominent when compared to a smooth headed screw. Metal artifact distortion is less with the titanium if evaluation with MRI scan becomes necessary in the future.

**Post-operative clinical outcome:**

The patient was immobilized in a splint and evaluated for first post operative visit in 10 days and the splint was changed to a cast. Patient remained non-weight bearing for a total period of six weeks. The cast was removed and patient started bearing weight protected in a removable boot and attended physical therapy for rehabilitation.

She was given a molded arch support with a carbon plate insert to be used after three months from surgery for about 12 months. The follow up radiographs show that the hardware is intact and there is no diastasis at the site of Lisfranc ligament. The soft tissue swelling has completely abated, indicating again resolution and healing of injury.

**Follow-up:**

At four months following fixation, the patient started to run and mentioned some initial discomfort which resolved and she returned to her previous level of activity.

**Conclusion:**

This patient, despite late presentation, appears to have healed her Lisfranc injury. Anatomic reduction and rigid extra-articular stabilization of the unstable tarsometatarsal articulations following a Lisfranc injury can restore function after such an injury.