Prediction of Midfoot Instability in the Subtle Lisfranc Injury: Comparison of MRI with Intraoperative Findings

Presenting:

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Summary:
21 patients with clinically suggestive Lisfranc ligament complex injury and equivocal radiographic studies underwent MRI evaluation and subsequent stress radiographs under anesthesia. 17 patients were confirmed to have an unstable midfoot requiring surgical stabilization. Involvement of the plantar medial cuneiform to 2/3rd metatarsal base (pC1-M2M3) was the strongest predictor of instability with a positive predictive value of 94%. 90% of cases were correctly classified on MRI potentially eliminating the need for stress radiographs and anesthesia in many patients.

Background:
The objective of this study was to assess the utility of magnetic resonance imaging (MRI) in the diagnosis of injury to the Lisfranc and adjacent ligaments, and to determine whether conventional MRI is a reliable diagnostic tool, using manual stress radiographic evaluation under anesthesia and surgical findings as a reference standard.

Materials:
Magnetic resonance images of 21 feet (10 female and 10 male, 1 bilateral; mean age 33.6 years, range 20-51) were evaluated for integrity of the dorsal and plantar bundles of the Lisfranc ligament, the plantar tarsal-metatarsal ligaments and the medial-middle cuneiforms ligament. Furthermore, the presence of fluid along the first metatarsal base and the presence of fractures were also evaluated. Radiographic observations were compared with intraoperative findings (stable versus unstable Lisfranc joint) using logistic regression to find the best predictors of Lisfranc joint instability.

Results:
Intraoperatively, 17 unstable and 4 stable Lisfranc joints were identified. The strongest predictor for instability was disruption of the plantar ligament between the first cuneiform and the bases of the second and third metatarsals (the pC1-M2M3 ligament), with a sensitivity, specificity and positive predictive value of 94%, 75% and 94% respectively. Nineteen of 21 cases (90%) were correctly classified on MRI: one case of intraoperative stable Lisfranc ligaments was interpreted as unstable on MRI; one case of intraoperative unstable Lisfranc ligaments was interpreted as stable on MRI. The majority of our cases (18/21) demonstrated a disruption of the second plantar tarsal-metatarsal ligament, which had little clinical correlation with instability.

Conclusion:
Magnetic resonance imaging is accurate for detecting traumatic injury to the Lisfranc ligaments and to predict Lisfranc joint complex instability when using the plantar Lisfranc ligament bundle as a predictor. Rupture or grade 2 sprain of the pC1-M2M3 ligament is highly suggestive of an unstable midfoot for which surgical stabilization has been recommended. The appearance of a normal ligament is suggestive of a stable midfoot documentation of its integrity may obviate the need for a manual stress radiographic evaluation under anesthesia in a patient with equivocal clinical and radiographic examinations.