Newly developed anatomical and functional ligament reconstruction for Lisfranc joint injuries

Takaaki Hirano,  Hisateru Niki,  Hirokazu Okada  
Yui Akiyama,  Katsuhiro Yamashita,  Moroe Beppu  

Department of Orthopaedics Surgery  
St. Marianna Univ. School of Medicine  
Kanagawa, Japan 

My disclosure is in the Final AOFAS Program Book.  
I have no potential conflicts with this presentation.
Background

Lisfranc Joint Injuries

Injury to this ligament results in pain and deformity of the foot

To avoid developing deformities and residual pain

(Kuo RS, JBJS-Am., 2000)

✓ The anatomical reduction
✓ The screw fixation

have been recommended.
Limitations of screw fixation

1. Scar healing (re-dislocation)

2. Screw breakage
Purpose

To find a new way of reconstructing Lisfranc joint injuries based on anatomical and biomechanical characteristics, and then to describe our clinical experiences.

Materials and Methods

We created an anatomical reconstruction route from

✓ Anatomical data: 78 legs (Ave.84.5 y.o.)
✓ Biomechanical study data: 5 legs (Ave.88.2 y.o.)
✓ Anatomical data:

Cartilage between small joints (C1-M2) was identified in 95% (74 examples) (Hirano T, JOS, 2013 in press)

✓ Biomechanical study data

After the Lisfranc ligament reconstruction, pulling out strength was $279.3 \pm 94.0$ N
Methods of anatomical reconstruction of Lisfranc ligament

1. Take and measure gratilis tendon

2. Make burr-hole in the second metatarsal (M2) at a position 6 mm distally from the second cuneiform

1. Make horizontal burr-hole from the medial surface of the first cuneiform (C1) towards the M2 for the Lisfranc ligament.

2. The gratilis tendon was secured in the M2 with the interference screws (TJ Large Screw®, The Meira Inc. Japan). Then, manual max tension was applied and the ends of the gracilis tendon were secured in the base and dorsal side of C1.
Case 1

15 y.o., Male, Lt. foot pain

- Lisfranc fracture dislocation  Myerson Classification Type B2
- Transverse instability (Kaar et al.)
- Post-op 1 year: JSSF midfoot score 100, the patient now currently play volleyball again
Discussion

Lisfranc Joint Injuries

Pain and deformity of TMT Joint

Instability of Lisfranc Joint

The reconstruction of the Lisfranc ligament complex is beneficial to maintain an anatomical reduction, to obtain physiological stabilization, and also to shorten postoperative treatment simultaneously.
Conclusion

Our newly developed ligament reconstruction for the Lisfranc joint injuries is based on anatomical and biomechanical characteristics is not only able to acquire the dynamic stabilization of the Lisfranc joint but also to preserve the joint’s function.