Operative Findings of Lateral Ankle Instability Compared with MRI Results: A Retrospective Case Series

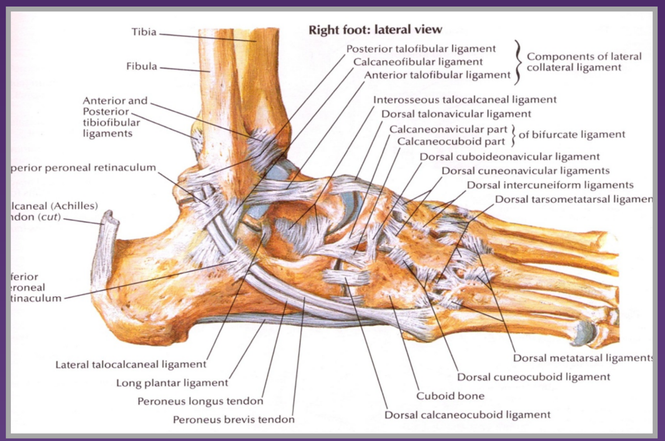
Michael Huchital DPM*, Michael Subik DPM, FACFAS#$, Rick Delmonte DPM, FACFAS^
*Fellow- North Jersey Reconstructive Foot and Ankle Fellowship
Director - North Jersey Reconstructive Foot and Ankle Fellowship $ Director - St. Marys General Hospital PMSR-RRA Residency
^ Chief, Division of Podiatric Surgery, Department of Orthopedic Surgery, NYU Langone Medical Center

PURPOSE

To examine a series of cases retrospectively in which the operative findings of lateral ankle pathology were compared to MRI results.

INTRODUCTION

- The etiology of chronic lateral ankle instability is often multifactorial.
- Peroneal tendon pathology is an underestimated source of lateral hind-foot and ankle pain (Davda et al 2017).
- Dombek et al (2003) found that only 60% peroneal tendon disorders were correctly diagnosed clinically.
- The etiology of peroneal tendon disease is often unclear on physical exam and can often be confused with lateral ankle ligament pathology (Davda et al 2011).
- Etiologies include but are not limited to accessory muscle (peroneus quartus/ quinti), low riding muscle belly, peroneal tendonosis, peroneal tendon subluxation, and superior peroneal retinaculum pathology.
- Physicians often turn to advanced imaging (MRI, ultrasound) in order to determine the cause of lateral leg and ankle pathology. However, the final diagnosis is often made intraoperatively.
- Our Case Series examines operative findings of chronic lateral ankle instability compared with preoperative MRI results.



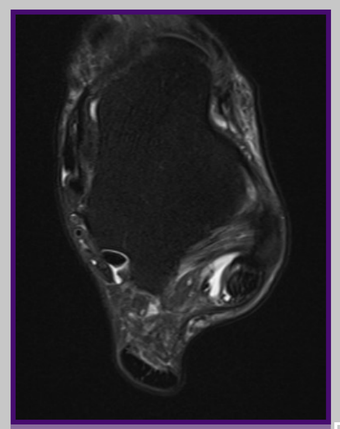
Methodology

74 individuals (54 M/ 20 F) who underwent surgical intervention of lateral ankle pathology were examined retrospectively in comparison to preoperative MRI findings between 2013 and 2017. The age range was 29-61 years (average 49). The average length of conservative treatment prior to surgical intervention was 8 months. All operative treatment was performed by one surgeon (RJD). Follow up ranged from 14-61 months with an average of 38 months. Patients with rheumatological disease were excluded from the study. Following literature review, data and consent for publication was obtained and analyzed in accordance with NYU Langone Medical Center's research policy and the North Jersey Reconstructive Foot and Ankle Fellowship.

Data on MRI Evaluation of Lateral Ankle Pathology

Pathology Examined	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Anterior Talofibular Ligament Pathology	0.95	1.0	1.0	0.70
Peroneal Tendon Tenosynovitis	0.71	1.0	1.0	0.51
Peroneus Brevis Tear	0.485	1.0	1.0	0.146
Low Riding Peroneus Brevis Muscle Belly	0.118	1.0	1.0	0.792
Accessory Muscle	0.0	1.0	1.0	0.23
Superior Peroneal Retinaculum Pathology	0.20	1.0	1.0	0.972

Figures



A

Figure A: MRI of the Ankle Demonstrating Peroneal Tenosynovitis

B

Figure B: Intraoperative finding of peroneus braves tear with low riding muscle belly

C

Figure 3: Repair of peroneal tendon tear with resection of low riding muscle belly

Results

Our Study found that preoperatively on MRI 67 (90%) of the subjects had some form of Anterior Talofibular Ligament (ATFL) pathology, 41 (55%) tenosynovitis of the peroneal tendons, 33 (45%) longitudinal tear of the peroneus brevis tendon, 2 (2.7%) low riding peroneus brevis muscle belly, 0 peroneus quartus accessory muscle and 1 (1.3%) had peroneal retinaculum tear. Operatively 71 (95%) of the subjects had some form of Anterior Talofibular Ligament (ATFL) pathology, 57 (77%) tenosynovitis of the peroneal tendons, 68 (91%) longitudinal tear of the peroneus brevis tendon, 11 (14.8%) low riding peroneus brevis muscle belly, 17 (23%) peroneus quartus accessory muscle and 5 peroneal retinaculum tears (6.8%). For ATFL pathology sensitivity and specificity was 0.95 and 1.0 respectively. Positive predictive value (PPV) and negative predictive value (NPV) was 1.0 and 0.70 respectively. Sensitivity and specificity for peroneal tendon tenosynovitis was 0.71 and 1.0 respectively. PPV and NPV was 1.0 and 0.51 respectively. For peroneal brevis tear sensitivity and specificity were 0.485 and 1.0 respectively. PPV and NPV were 1.0 and 0.146 respectively. Sensitivity and specificity for low riding peroneus braves muscle belly were 0.118 and 1.0 respectively. PPV and NPV were 1.0 and 0.792 respectively. For accessory muscles sensitivity and specificity were 0.0 and 1.0, PPV and NPV were 1.0 and 0.23. Sensitivity and specificity for superior peroneal retinaculm tears was 0.20 and 1.0. PPV and NPV were 1.0 and 0.972.

Discussion/ Literature Review

- **MRI is a useful tool for the clinician to evaluate the lateral soft tissue stabilizers of the ankle joint.**
- **The exact etiology of the patient's symptoms may vary.**
- **Park et al (2010) examined the reliability of MRI in detecting peroneal tendon pathology specifically in patients with chronic lateral ankle instability. Sensitivity and specificity of were 83.9% and 74.5% respectively. Positive and negative predictive values were 66.7% and 88.4% respectively.**
- **Park also published on the sensitivity and specificity of MRI regarding the ligamentous complex of the lateral ankle. They concluded that "the diagnosis of a complete tear of the ATFL on MRI is more sensitive than the diagnosis of a complete tear of the CFL. MRI findings of CFL injury are diagnostically specific but are not sensitive."**
- **False negatives were highest in the case of peroneus braves tears, low riding muscle bellies, and accessory muscles and appear to be the most difficult to assess on MRI.**
- **Our advanced imaging was read by several different radiologists which may have contributed to the lack of false positives possibly skewing our results.**
- **In regards to our study sample, size could have been larger. We also could expand our study by examining talar dome lesions which are often associated with chronic inversion injuries of the ankle.**
- **Our study did not examine calcaneofibular ligament injuries.**
- **Foot type and rear foot attitude was not measured in our study and would be an interesting corroborating factor.**
- **More data is needed to determine if MRI is a reliable imaging modality when diagnosing the full spectrum of pathology present in chronic lateral ankle stability.**

Conclusions

Our study demonstrates that operative findings of chronic lateral ankle instability will often differ from radiographic results found on MRI. We found increased discrepancy in regard to anatomic variants of the lateral muscle group, retinaculum pathology, and peroneus braves tears. Anterior talofibular ligament pathology did not have as much variation.

References

1. Davda K, Malhotra K, O'Donnell P, Singh D, Cullen N. Peroneal tendon disorders. *EFORT Open Rev.* 2017;2(6):281-292. doi: 10.1302/2058-5241.2.160047 [doi].

2. Gatti MM, Protzman NM, Mandelker EM, Malhotra AD, Schwartz E, Brigido SA. An examination of anatomic variants and incidental peroneal tendon pathologic features: A comprehensive MRI review of asymptomatic lateral ankles. *J Foot Ankle Surg.* 2015;54(2):164-172. doi: 10.1053/j.jfas.2014.11.005 [doi].

3. Hobashy A, Cook B, Sumarriva G, Treuting R. Peroneus quartus muscle. *Am J Orthop (Belle Mead NJ).* 2017;46(6):E419-E422.

4. Park HJ, Cha SD, Kim HS, et al. Reliability of MRI findings of peroneal tendinopathy in patients with lateral chronic ankle instability. *Clin Orthop Surg.* 2010;2(4):237-243. doi: 10.4055/cios.2010.2.4.237 [doi].

5. Yammine K. The accessory peroneal (fibular) muscles: Peroneus quartus and peroneus digiti quinti. A systematic review and meta-analysis. *Surg Radiol Anat.* 2015;37(6):617-627. doi: 10.1007/s00276-015-1438-3 [doi]

Michael Huchital, DPM
mhuchital.dpm@gmail.com