A new definition of ankle sprain: a prospective MRI study

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My disclosure is in the Final AOFAS Mobile App.
I have no potential conflicts with this presentation.
While the ankle ligamentous injuries are fairly well investigated, the subtalar ligamentous injuries have long been overlooked.

The purpose of this study was to investigate inversion ankle sprain with magnetic resonance imaging (MRI) to detect the pathoanatomy of the ligamentous injuries of the ankle and subtalar joint.
Patients who had an inversion ankle sprain within a week and were not able to stand with the injured leg were enrolled in this study.

**Materials & Methods**

The ligamentous injuries of the ankle and subtalar joint were evaluated by MRI.

**Exclusion criteria**
- fractures
- syndesmotic injury
- Lisfranc injury
- symptomatic accessory navicular
MRI examinations were performed in a 1.5-T scanner with a circumferential 16-channel extremity coil, using T1 weighted image (WI), T2 WI and short tau inversion-recovery in each planes.

The MRI scans were read retrospectively and independently by 2 orthopaedic surgeons (JS and HM), with 12 and 26 years of experience. The MRI scans were reviewed blinded for referral and clinical reports. Discordant findings were arbitrated to consensus.
The following ligaments were assessed: (1) anterior talofibular ligament (ATFL), (2) calcaneofibular ligament (CFL), (3) interosseous talocalcaneal ligament (IOTCL), (4) anterior capsular ligament (ACL) of the posterior subtalar joint, (5) posterior tibiotalar part of the deltoid ligament (DL).

The diagnostic criteria for determining a ligament injury were as follows: (1) discontinuity, (2) a wavy or curved contour, and (3) increased signal intensity within the ligament. The diagnosis of ligament injuries was made upon the fulfillment of any one of those criteria.

What is ACL?
ACL is an intraarticular ligament that is located just lateral to the IOTCL\textsuperscript{1-3}).

It is a thick flat capsular ligament that vertically links anterior borders of the posterior talocalcaneal facet\textsuperscript{1-3}).
ICC evaluation of ACL

ACL can be seen on sagittal plane of T2 WI.

intact ACL

injured ACL

effusion
Results

87 patients were included.
11-68(avg. 24) yo, 53 m & 34 f

- CFL injury: 61 patients (70%)
- ATFL injury: 86 patients (99%)
- DL injury: 48 patients (55%)
- ACL injury: 71 patients (82%)
- IOTCL injury: 17 patients (20%)
All of the 17 patients who had IOTCL injury had ACL injury. And there are 48 patients who had DL injury and 47 patients of them (98%) had CFL and/or ACL injury. So we considered IOTCL and DL would be injured after CFL and/or ACL injury.

Roemer et al.\textsuperscript{4} reported that talar contusions were commonly seen with ankle sprain. In this study, there were 47 patients (54%) for the bone bruise of medial talus and no patients with complete rupture of DL. So we considered the mechanism of DL injury with ankle inversion sprain is not rupture but impingement and/or torsion.
The mechanism of ligamentous injuries with ankle inversion sprain

| 1st  | ATFL       |
| 2nd  | CFL and/or ACL |
| 3rd  | IOTCL and/or DL |

impingement and/or torsion
Among 87 cases of severe inversion ankle sprain, there were 86 patients (99%) for ATFL injury, 61 patients (70%) for CFL injury, 71 patients (82%) for ACL injury, 17 patients (20%) for IOTCL injury and 48 patients (55%) for DL injury, respectively.

As the force of ankle sprain become larger, ATFL would be injured at first, then CFL and/or ACL injured next, and continuing to the injury of IOTCL and/or DL.
References