Stress radiographs under anesthesia for painful chronic lateral ankle instability

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My disclosure is in the Final AOFAS Mobile App. I have no potential conflicts with this presentation.
Stress radiographs for lateral ankle instability

**Anterior drawer test**

With plantar flexion 10°
- Absolute value of over 10mm
- 5mm greater than contralateral

**Varus stress test**

- Absolute value of over 9°
- 3° greater than contralateral
- Absolute value of over 15°

Louwerens JWK et al. *Foot Ankle Int.* 1995
Coughlin MJ et al. *Surgery of foot and ankle*
Muscle guarding

Following injury, the muscle that surrounds the injured area contract, in effect, splint that area, thus minimizing pain by limiting movement.

Muscle guarding in chronic medial elbow instability

Instability may be difficult to elicit in an awake patient on examination due to muscle guarding

Purpose of this study

To evaluate the accuracy and efficacy of stress radiographs at outpatient clinic for painful chronic lateral ankle instability

- Hypothesis
  Muscle guarding would interfere the accurate stress radiographs performed at outpatient clinic

Lannotti JP et al. The Netter collection of Medical Illustrations
Materials & Method

- From Jan, 2014 ~ Jun, 2016
- Patients underwent Modified Broström operation for painful chronic lateral ankle instability
  (pain/instability duration $> 3$ months from initial injury)

- Exclusion criteria
  (1) Bilateral injury  (2) General laxity

- Manual anterior / varus stress radiographs
  1. Pre-operative at outpatient clinic &
  2. Intra-operative under spinal anesthesia

The mean of the results of two, trained, blinded radiographic technicians
Materials & Method

- **96 cases in 96 patients**
  - Mean age: 29.63±12.04 (15~76); Right 59, Left 37; Male 65, Female 31

- **Concomitant operation**
  - **Ankle arthroscope**: 42
    1. Anterior impingement sx. 41
    2. OLT 21 (medial 15, lateral 6)
  - **Os subfibulare excision**: 20
  - Supramalleolar osteotomy: 1
  - Tarsal tunnel release: 1

- **MRI grade of ATFL injury**

  Lee KM et al. *Skeletal Radiol.* 2013
# Results (Anterior drawer test)

## [Affected limb]

<table>
<thead>
<tr>
<th></th>
<th>At clinic</th>
<th>Under anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (96)</td>
<td>6.08 mm</td>
<td>8.64 mm</td>
</tr>
<tr>
<td>Complete (39)</td>
<td>6.13 mm</td>
<td>8.80 mm</td>
</tr>
<tr>
<td>Partial (46)</td>
<td>6.15 mm</td>
<td>8.60 mm</td>
</tr>
<tr>
<td>Without rupture (11)</td>
<td>5.62 mm</td>
<td>8.30 mm</td>
</tr>
</tbody>
</table>

## [Changes via anesthesia]

<table>
<thead>
<tr>
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<th>Complete (39)</th>
<th>Partial (46)</th>
<th>Without rupture (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected limb</td>
<td>2.57 mm</td>
<td>2.68 mm</td>
<td>2.45 mm</td>
<td>2.68 mm</td>
</tr>
<tr>
<td>Contralateral limb</td>
<td>0.09 mm</td>
<td>0.003 mm</td>
<td>0.16 mm</td>
<td>0.09 mm</td>
</tr>
</tbody>
</table>

## [Affected limb – Contralateral limb]

<table>
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<tr>
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<th>Without rupture (11)</th>
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</thead>
<tbody>
<tr>
<td>At Clinic</td>
<td>0.37 mm</td>
<td>0.3 mm</td>
<td>0.46 mm</td>
<td>0.24 mm</td>
</tr>
<tr>
<td>Under Anesthesia</td>
<td>2.84 mm</td>
<td>2.97 mm</td>
<td>2.75 mm</td>
<td>2.83 mm</td>
</tr>
</tbody>
</table>
### Results (Varus stress test)

#### [Affected limb]

<table>
<thead>
<tr>
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<th>Partial (46)</th>
<th>Without rupture (11)</th>
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</thead>
<tbody>
<tr>
<td>At clinic</td>
<td>10.40°</td>
<td>12.56°</td>
<td>8.98°</td>
<td>8.48°</td>
</tr>
</tbody>
</table>

#### [Changes via anesthesia]

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<th>Partial (46)</th>
<th>Without rupture (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected limb</td>
<td>2.01°</td>
<td>2.04°</td>
<td>2.09°</td>
<td>1.51°</td>
</tr>
<tr>
<td>Contralateral limb</td>
<td>0.68°</td>
<td>0.89°</td>
<td>0.58°</td>
<td>0.28°</td>
</tr>
</tbody>
</table>

#### [Affected limb – Contralateral limb]

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<th>Without rupture (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Clinic</td>
<td>3.51°</td>
<td>4.7°</td>
<td>2.59°</td>
<td>3.00°</td>
</tr>
<tr>
<td>Under Anesthesia</td>
<td>4.83°</td>
<td>5.84°</td>
<td>4.11°</td>
<td>4.23°</td>
</tr>
</tbody>
</table>
Discussion

• **Lee KM et al (Skeletal Radiol, 2013)**

  ATFL injury and PTFL injury on MRI significantly affected tibiotalar tilt angle and anterior drawer on stress radiographs

• **Becker HP et al (Foot Ankle, 1993)**

  Need for anesthesia to obtain more reliable results from stress diagnostic tests in the acutely sprained ankle

• **Anterior drawer / Varus stress radiographs under anesthesia**

  - **Absolute value**: significantly increased after anesthesia
  - **In terms of differences between contralateral limb**,
    → significantly increased after anesthesia
  - No significant differences among **MRI grades**
Discussion

- **Anterior drawer / Varus stress radiographs under anesthesia**
  - Relatively small value even for complete tear
    → Often not matched to the diagnostic value

• Limitations of our study
  1) Stress test was performed manually
  2) Not correlated to concomitant CFL injury
  3) Small subject number (96)

Summary

- **Anterior drawer / varus stress test performed at outpatient clinic may not be accurate** for the patients with painful chronic lateral ankle instability
M/20

Chronic painful Lt. ankle instability for 3 years

At clinic

Varus stress test 9°

Under anesthesia

13° (increased by 4°)

At clinic

Anterior drawer test 6.9mm

Under anesthesia

9.4mm (increased by 2.5mm)


