Anatomical Study of the Posterior Ankle
Examination of the anatomical findings of posterior ankle impingement syndrome

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Our disclosures are in the Final AOFAS Mobile App.
We have no potential conflicts of interest with this presentation.
Purpose

- Posterior ankle impingement syndrome (PAIS) is classified into 2 types: osseous and soft tissue.
- The relations of the posterior talofibular ligament attachment are not identified as the posterolateral tubercle of the talus-attached bone fragment.
- Diagnosis of soft tissue impingement is difficult because the morphological features of the posterior ankle soft tissue have not been clarified.
- We report an autopsy study of the anatomical features of the posterior ankle.

Materials and Methods

- A total of 115 cadaver feet (60 cases)
- Sex
  Men: 60 feet (right: 31 feet, left: 29 feet)
  Women: 55 feet (right: 26 feet, left: 29 feet)
- Mean age: 85.1 years (range, 46–102 years)
Characteristics

● Posterolateral tubercle of the talus (PLT)
  - PLT length
  - PLT width

● Posterior talofibular ligament (PTFL)
  - Fibular attachment width
  - PLT attachment width
The posterior intermalleolar ligament (PIML)

The posteroinferior tibiofibular ligament (PITFL)
Superior component (SC), Deep component (DC)

※PTFL
Posterior talocalcaneal ligament

PITFL-SC attachment width
PITFL-DC attachment width
The rate of PLT length to PLT PTFL attachment width (non-PLT attachment bone fragment)

\[ \frac{b}{a} \times 100 \]

PLT Length: a

PLT PTFL attachment width: b

The rate of PLT and PLT bone fragment PTFL attachment width to PLT bone fragment PTFL attachment width (PLT attachment bone fragment)

\[ \frac{d}{c + d} \times 100 \]

PLT PTFL attachment width: c

PLT bone fragment PTFL attachment width: d
Results

PLT-attached bone fragments

● PLT transverse type 10 feet (8.7%)
● PLT non-transverse type 5 feet (4.3%)

The rate of PLT length to PLT-PTFL attachment width (non-PLT attachment bone fragment)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTFL/PLT × 100</td>
<td>75.0 ± 12.5 (43.3 – 98.6)</td>
<td>74.8 ± 13.2 (43.3 – 98.6)</td>
<td>75.3 ± 11.8 (52.3 – 98.5)</td>
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</tbody>
</table>

The rate of PLT and PLT bone fragment PTFL attachment width to PLT bone fragment PTFL attachment (PLT attachment bone fragment)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>transverse type</th>
<th>non-transverse type</th>
</tr>
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<tbody>
<tr>
<td>PLT bone fragment PTFL attached width/ (PLT + Bone fragment PTFL attached width) × 100</td>
<td>40.8 ± 13.8 (17.3 – 67.9)</td>
<td>45.7 ± 14.5 (17.3 – 67.9)</td>
<td>32.1 ± 7.0 (25.3 – 41.1)</td>
</tr>
</tbody>
</table>

* p < 0.05
Patterns of PIML

Superior medial type
21 cases (18.3%)

Horizontal type
7 cases (6.0%)

V-shaped type
63 cases (54.8%)

Band-shaped type
19 cases (16.5%)

No ligament
5 cases (4.3%)
**PITFL-SC and PITFL-DC attachment width**

<table>
<thead>
<tr>
<th>Width</th>
<th>Average</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>PITFL-SC</td>
<td>5.7 ± 1.2 mm (3.7 – 11.5 mm)</td>
<td>6.1 ± 1.3 mm (4.0 – 11.5 mm)</td>
<td>5.3 ± 0.9 mm (3.7 – 7.0 mm)</td>
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<tr>
<td>PITFL-DC</td>
<td>6.8 ± 1.3 mm (4.4 – 9.8 mm)</td>
<td>6.9 ± 1.1 mm (5.2 – 9.4 mm)</td>
<td>6.6 ± 1.2 mm (4.4 – 9.8 mm)</td>
</tr>
</tbody>
</table>

Width: mean ± S.D.  
* p < 0.05

**PITFL-SC and PITFL-DC**  
Tearing and defects- 23 cases (20.0%)

**PITFL-DC**  
Concavity- 9 cases (7.8%)
Discussion

PLT-attached bone fragments

Differentiation between the Os trigonum and pseudarthrosis after PLT fracture based on macroscopic anatomical findings has limitations.

- **PLT transverse type**: 10 feet (8.7%)
- **PLT non-transverse type**: 5 feet (4.3%)

**PTFL attachment width (%)**

- PLT transverse type: $45.7 \pm 14.5\%$
- PLT non-transverse type: $32.1 \pm 7.0\%$

* $p < 0.05$

Excision of PLT-attached bone fragment

Decrease in PTFL

Consider influence on ankle instability
Possibility of assuming the function of PITFL and PTFL

Extensive attachment to the posterior surface of the ankle joint

Possibly causes soft tissue impingement
PITFL

PITFL-DC
Cone-shaped, was in contact with the talus

Possibly causes soft tissue impingement

Histological examination suggests the presence of impingement

Careful diagnosis with imaging and endoscopy
We observed the characteristics of posterior ankle soft tissue in 115 cadaver feet (60 cases).

In all, 40.8% of the whole PTFL were attached to PLT-attached bone fragments. It is thought that PTFL decreases at the time of the PLT-attached bone fragment extraction.

PIML was present in 110 (95.7%) feet. Five patterns of the ligament course were identified.

Band-type PIML showed extensive attachment to the posterior surface of the ankle joint, suggesting that PAIS was caused by interactions between PIML and osseous factors with ankle plantar flexion.

The PITFL-DC formed a cone shape and was in contact with the talus, possibly causing a soft tissue impingement.

Conclusion

References