The radiological morphology of peritalar instability

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Disclaim and notification

‘The radiological morphology of peritalar instability’

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My disclosure is in the Final AOFAS Program Book.

I have a potential conflict with this presentation due to financial/material support from Integra by one of the co-authors (BH)
Introduction

Talar stability

*In vitro*, the highly congruent talocrural joint provides up to 100% of frontal plane weightbearing talar stability\(^1,2\)

*Stance phase ankle stability is not controlled by peri-ankle ligament tension*\(^2\)

Daily praxis

*Patients often present with talar frontal plane misalignment*\(^4-7\)

*This implies that factors other than articular surface containment alone also play a role in talar stability*

Possible pathophysiology

*Loss of peritalar stability may cause talar malpositioning within the low congruent peritalar joint surfaces*\(^8\)

*The talus subsequently evidences a 3-D positional change*
Introduction

Goal

To gain insight into this poorly understood talar destabilization process, we assessed standard weightbearing X-rays in a consecutive cohort of patients with varus and valgus ankle osteoarthritis.

Hypothesis

- Peritalar instability results in a three dimensionally unstable talus.
Material & methods

- Frontal, sagittal and horizontal weightbearing standard X-rays in 126 varus and 81 valgus ankles
- Besides frontal varus and valgus, determination of talar sagittal and horizontal position with:
  - sagittal talocalcaneal inclination angle (TCI)
  - horizontal talometatarsal I angle (TMT I)
- Comparison measures to neutral position range, defined as within 2 SD’s of control group data
- These neutral position ranges were:
  - TCI 22 to 39° and TMT I 12 to 19°
- Talar malpositioning defined when outside this neutral position range
  - sagittal plane: talar dorsal- or plantarflexion
  - horizontal plane: talar endo- or exorotation

Fig. 4: Example of talar position determination in a patient with varus ankle osteoarthritis (A):
TCI = 42°, i.e. talar sagittal plantarflexion (B),
TMT I = 48°, i.e. talar horizontal endorotation (C).
Results

- In addition to frontal varus or valgus, 67% of the varus and 46% of the valgus ankles showed talar malpositioning in one or both additional planes.

Fig. 5: Talar malpositioning per plane: frontal varus (A) and valgus (D), sagittal dorsiflexion (B) and plantarflexion (E) and horizontal endorotation (C) and exorotation (F).
Results II

- 11 out of 18 possible talar 3-D malposition patterns were found.
- The six predominant malposition configurations included 80%.
- The talus only exorotated when in varus and dorsalflexed, or when in valgus and neutral or dorsalflexed in sagittal plane.
- The talus did not endorotate when in valgus and dorsalflexed or neutral in sagittal plane.

Fig. 6: Talar varus and valgus radiological morphologies. N = neutral, i.e. within the previously defined neutral position range. The first level represents talar frontal varus and valgus. The second level represents talar sagittal dorsalflexion (DF) and plantarflexion (PF), whereas the final level represents talar horizontal exorotation (EX) and endorotation (EN). Configurations marked with ‡ represent the six predominant malposition configurations.
Discussion

- Peritalar instability obviously results in complex and variable three-dimensional talar instability and malpositioning.

- Anatomical configuration may explain that there were six predominant talar malposition patterns.

- Peritalar instability may be caused by:
  - wearing out of the peritalar ligaments
  - changes in osseous stability, applied forces and peritalar joint congruency
Conclusion

- In peritalar instability, careful radiographic analysis of talar position in all three planes is mandatory
  - this may avoid failure in reconstructive ankle joint surgery
  - despite appropriate hindfoot balancing, talar tilt may persist as a result of persistent peritalar instability


3. Paley D. Principles of Deformity Correction. 3rd printing, 2005. Springer – Verlag Berlin Heidelberg New York (Figure used with permission of D. Paley)


Thank you!