Evaluation of Anatomical Structures after Calcaneal Evans- or Hintermann-Osteotomy

Ettinger, S.¹, Yao, D.¹, Claassen, L.¹, Daniilidis, K.², Stukenborg-Colsman, C.¹, Plaass, C.¹

¹ Hannover Medical School (MHH), Department of Orthopedic Surgery at the DIAKOVERE Annastift
² Sporthopaedicum Straubing, Germany
Disclosure

Evaluation of Anatomical Structures after Calcaneal Evans- or Hintermann-Osteotomy

Ettinger, S., Yao, D., Claassen, L., Daniilidis, K., Stukenborg-Colsman, C., Plaass, C.

Our disclosures are in the Final AOFAS Mobile App

We have no potential conflicts with this presentation.

We have to disclose:

• One or more of the authors are paid consultants or got financial support direct or to their institution by the following companies:

  Medartis®, DePuySynthes™, Albrecht®, Extremity Medical™, Stryker®, Arthrex®, Implantcast, Wrigth Medical®,

• One or more of the authors are board members, of the following institutions:

  German Foot and Ankle Society
Introduction

- Flexible Pes planovalgus is characterized by collapsed medial arch, forefoot abduction, midfoot varus and hindfoot valgus.
- Lateral column lengthening calcaneal osteotomy commonly used: Evans- and Hintermann-osteotomy\(^1,2,3,4\)

**Aim:**
- Correct bony deformity
- Anatomical position
- Restore foot biomechanics towards normal

**Figure 1:** Biomechanical changes after calcaneal lengthening osteotomy\(^1\)
Introduction

• Different starting points of the osteotomy:
  ➢ **Evans-OT:** 1,5 cm proximal to the CC-joint, between anterior and medial subtalar facets
  ➢ **Hintermann-OT:** anterior border of the posterior subtalar facet

• Anatomical structures at risk

➢ **Aim:** Which anatomical structures are affected by the performed osteotomy?
Material and Methods

- 14 cadaver feet (Science Care, Arizona, USA)
- Two foot and ankle surgeons performed 7 Evans- and 7 Hintermann-osteotomies
- Preparation following predetermined preparation guidelines.
Material and Methods

- All individual anatomical structures were prepared and, in particular, nervus suralis (Fig. 3a), peroneal tendons (Fig. 3b) as well as articular surfaces (Fig. 3c) evaluated.

Figure 3: Preparation of nervus suralis (a), peroneal tendons (b) and articular surfaces (c). (N: os naviculare; AF: anterior facet; MF: medial facet; PF: posterior facet)
Results

- Mean age of the donors was 80.8 years
- Eight left and six right feet were prepared.

<table>
<thead>
<tr>
<th></th>
<th>N. suralis</th>
<th>Peroneus longus</th>
<th>Peroneus brevis</th>
<th>Lig. cervicale</th>
<th>Anterior subtalar facet</th>
<th>Medial subtalar facet</th>
<th>Posterior subtalar facet</th>
<th>Spring ligament</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evans-OT</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.29%</td>
<td>14.29%</td>
<td>14.29%</td>
<td>42.86%</td>
<td>28.57%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hintermann-OT</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>14.29%</td>
<td>14.29%</td>
<td>14.29%</td>
<td>0</td>
<td>14.29%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1: Damage of anatomical structures after Evans- and Hintermann osteotomy
Results

- Examples

**Figure 4:**
Partial lesion of N. suralis after Hintermann-osteotomy
Results

• Examples

Figure 5: Peroneus brevis arrosion after Hintermann-osteotomy
Results

• Examples

Figure 6:
Lesions of anterior + medial subtalar facets after Evans osteotomy
Conclusion

• Both osteotomies can damage anatomical structures

• The Hintermann osteotomy preserves the calcaneal articular surfaces in a higher percentage than with the Evans osteotomy

• Most other anatomic structures can be preserved with cautious preparation

➢ Further studies should be performed, if these findings correlate with the clinical outcome.
1 Hintermann, B. Valderrabano, V. Lateral column lengthening by calcaneal osteotomy. Techniques in Foot & Ankle Surgery 2(2):84-90 · June 2003
4 Haeseker, GA., Mureau, MA., Faber, FW. Lateral column lengthening for acquired adult flatfoot deformity caused by posterior tibial tendon dysfunction stage II: a retrospective comparison of calcaneus osteotomy with calcaneocuboid distraction arthrodesis. J Foot Ankle Surg. 2010 Jul-Aug;49(4):380-4