ANKLE ARTHRODESIS
Discussion, technical tips, your problems?

Integra™ Ankle Days
Ankle and Hindfoot Training
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J. de Halleux
Ankle arthrodesis - Indications

- Arthritis
  - Primitive
  - Post-traumatic
  - Rheumatoid
  - Post-infection
- Avascular necrosis of the talus/tibia
- Neurologic condition with high degree of ankle instability, not braceable
Ankle positioning: crucial

• Forefoot perpendicular to the long axis of the tibia (neutral position)
  – Plantar flexion leads to:
    • genu recurvatum
    • excessive loading of tarsal joints

• Exceptions:
  – weak quadriceps (polio) with recurvatum of the knee
  – fixed forefoot equinus

The mean and median tibiotalar angles, measured on a standing lateral radiograph of the foot and ankle, were both 114° (range, 98° to 141°).
Tibiotalar angle on a standing lateral radiograph

Courtesy Foot and Ankle Institute, Brussels
Ankle positioning

- Hindfoot valgus: 5°
  - varus leads to locking of the transverse tarsal joint, making a rigid forefoot
  - normal gait, especially on uneven ground

- External rotation: 5° - 10°

- Posterior displacement of the talus under the tibia
  - produce a more normal pattern of gait and decreasing of the stress at the knee.


McGarvey WC, Foot Ankle Int, 19 (6): 363, 1998
WHICH SURGICAL APPROACH?

ANTERIOR APPROACH

Anterolateral (Méary)
- good TT anterior exposure
- posttrauma arthritis

Anteromedial (vascular risk)
- anterior plate

Dubble (Maurer, Kopp)

Pathologie du Pied et de la Cheville, Th Leemrijse et B Valtin, 2009
SURGICAL APPROACH

LATERAL APPROACH (Adams, Mann)

- Fibula resection
  - More complications (infections, pseudarthrosis, nerve lesion (NFS, NS), lesion art fib perforans
  - Mann (no nerve lesions, excellent exposure, better fusion with fibula graft

Pathologie du Pied et de la Cheville, Th Leemrijse et B Valtin, 2009
SURGICAL APPROACH

POSTERIOR APPROACH
Infected pseudarthrodesis

Pathologie du Pied et de la Cheville, Th Leemrijse et B Valtin, 2009
MEDIAL APPROACH (Schuberth)

- good exposure
- art/nerv tib post!
- better fixation (better tibial bone quality in posteromedial than posterolateral)

Surgical Approach

Arthroscopy

- Easy technique if surgeon is experienced in arthroscopy.
- Less wound problems; Faster union than open arthrodesis *
- Lesser pseudarthrosis **
- Shorter hospital stay, but complication, surgical time and RX alignment similar in open /arthroscopic group***

- Contrindications:
  - Deformities
  - Necrosis

** Zvijac Jeand all, Analysis of arthroscopically assisted ankle arthrodesis. Arthroscopy 2002;18:70-5.
*** Townshend D and all, arthroscopic versus open ankle arthrodesis: a multicenter comparative case series, JBJS, January 16, 2013
FIXATION

SCREWS

- Medial and lateral*: as vertical as possible: 30° to tibia
- Threads distal to arthrodesis site

- Third screw: anterior or posterior **
  - Better rotational stability
  - Lower rate of malunion / nonunion

PLATES

- If screws not possible (bone defect, bone necrosis)

** Ogilvie-Harris, Arthrodesis of the ankle: a comparison of two versus three screw fixation in a crossed configuration, Clin Orthop Relat Res, July 1994
threads distal to arthrodesis site!
Case 1
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Case 2
Transfibular approach
Is the degree of deformity still an issue?

Arthroscopy Learning curve++

Courtesy Foot and Ankle Institute, Brussels
Case 4: arthroscopy

Arthroscopic arthrodesis
Necrosis tibial plafond
Case 5

is necrosis of tibial plafond a contraindication for arthroscopic arthrodesis?

Cave the presence of necrosis of the tibial plafond
Cave the presence of necrosis of the tibial plafond
Cave the need for major bone grafting

Cave the presence of necrosis of the tibial plafond
Case 6
When to use a plate versus screws
When to use a plate versus screws
Case 7

When to use a plate versus screws
When to use a plate versus screws

Courtesy Foot and Ankle Institute, Brussels
CONCLUSION

Which Positionning?
- neutral, 5° valgus, 5-10° external rotation

Which Technique/Approach?
- depending on the case
- the experience of the surgeon

Which Fixation?
- screws
- plate if necrosis or bone defect
Case 5: arthroscopy
Distal syndesmosis!
BIOMECHANICAL CONSIDERATIONS during the stance phase gait

1. **Heel strike**: inversion of the heel
   - axes talus and calcaneus less parallel to each other
   - more rigidity to receive initial load

2. **Body weight forward**: eversion of the heel
   - axes talus and calcaneus more parallel to each other
   - more flexibility

3. **Push-off**: inversion (idem)