Rigid Flatfoot Deformity

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Disclosures

• None

Rigid Flatfoot/Stage III

• Varying degrees of deformity/rigidity
• Mostly talonavicular and subtalar joints
Stage III: Non-operative

- Bracing or accommodative insoles
- Orthotics should not try to correct deformity

Stage III: Operative indications

- Pain and deformity not relieved by conservative methods
- Early Tibiotalar tilt

Traditional operative treatment

- Triple arthrodesis
Pre-operative evaluation

- Medical conditions eg diabetes
- Vascular status
- Smoking history
- Ability to be NWBING

Preoperative examination

- Severity of rigidity/deformity
- What joints are involved?
- Fixed forefoot varus
- Equinus contracture

Weightbearing radiographs

- 3 views of foot
- Ankle mortise
Lateral radiograph
- Identify apex of deformity
- TN, NC, TMT
- Midfoot involvement

AP view
- Degree of talonavicular coverage
- Arthrosis of the midfoot

Triple arthrodesis: Goals
- Correct Deformity
- Alleviate arthritic pain
- No in situ fusion
Positioning

- Supine with a bump under ipsilateral hip
- Antibiotics
- Tourniquet
  - Thigh vs Calf

Approach

- Combined medial and lateral approach allows access to subtalar, talonavicular, and calcaneal cuboid joints

- Single medial incision for double arthodesis (ST&TN) or triple?

Lateral approach - transverse

Pros
- Excellent ST joint visualization
- Best access to lateral TN Joint

Cons
- Difficult to see CC Joint
- Deformity causes skin contracture
- Transverse wound gaps with foot correction
Lateral approach

- Watch Superficial peroneal nerve, extensor tendons, peroneal tendons

Lateral approach-longitudinal

- Incision from tip of fibula along fourth ray
- Reflect extensor digitorum brevis distally far enough to visualize CC joint
- Better wound healing of contracted skin

Thoroughly denude surfaces

- Denude surfaces of subtalar, CC, and lateral talonavicular joints
- Really need to mobilize joints
- Avoid joint resection
**Medial approach**
- Medial malleolus to NC joint
- Tibialis anterior at risk distally
- Allows debridement of TN and subtalar joints

**Talonavicular correction**
- I usually pin first
- Abduction, correct rotation, plantarflex → Pin

**Deformity correction**
- Full correction of subtalar joint
- Placed into max varus and then back off as needed, then pin
- Ideal is about a 0-5° of valgus
Gastroc-soleus lengthening

Subtalar fixation
• 1 or 2 screws, 6.5 mm or greater
• Placed through tuberosity small transverse incision
• Direct toward talar neck and body

Talonavicular fixation
2 points
• 2 screws, screw and plate, screw and staple
• Try to compress evenly
Calcaneal cuboid joint fixation

• If deformity is corrected usually a gap is present
• Options include screw, plate, plate with wedge
• Interpositional bone graft

What about not fusing joint at all?

• Gap present and often not painful
• Arthritis may be minimal
• Nonunion rate high
• Supported in several studies
  – Sammarco et al FAI 2006
  – Philippot et al Arch ortho Trauma surg 2010
  – Anand et al FAI 2013
  – Knupp et al JBJSBR 2009

Use of Bone Graft Material

• Controversial
• I do, but
• Autograft, allograft, PRP
Postoperative course

- 6 weeks of minimal weightbearing in a short leg cast
- 4-6 weeks weightbearing as tolerated in a cast or a removable boot
- Usually recommend physical therapy

Potential complications

- Wound healing
- Malunion
- Nonunion
- Persistent pain
- Gait abnormality
- Problems on uneven ground and inclines

Pitfalls

- #1 failure to correct deformity
- Persistent pain
- Overload medially
- Increased deltoid strain
Pitfalls

Overcorrection to varus →
• Lateral overload of the foot,
• Ankle instability
• Peroneal tendon problems,
• Persistent pain
• Failure to correct forefoot varus → lateral foot overload

Outcomes

• Prolonged recovery, 6-12 months
• Greater than 80% patient’s satisfaction
• Marked improvement in pain

Bennett et al 1991 F&A
Graves et al 1993 JBJS
Saltzman et al 1999 JBJS

Long-term complications

• Adjacent joint arthrosis
• Usually > 5-10 years
• Ankle, NC, TMT
  — Saltzman et al JBJS 1999
• Other considerations

Single medial incision only
- Allows accessed to talonavicular and subtalar
- To some extent the calcaneal cuboid (but difficult)
- Fine if only planning to fuse TN, ST
- Risk the deltoid ligament?
- Jeng et al FAI 2006
  – Use of single medial approach for triple

Correction of forefoot varus
- Medial column fusion, NC, TMT
- Cotton osteotomy
57 y/o female rigid flatfoot fixed forefoot varus

Subtalar fusion, LCL, Cotton

73 y/o female rigid hindfoot with midfoot OA
Hindfoot midfoot fusion

Addressing NC sag
43y/o female

Triple w/NC fusion
Deltoid insufficiency

- May be aggravated by increased lever arm of triple arthrodesis
  - Song et al. FAI 2000
- Stress intra-op, and prepared to augment

Deltoid Reconstruction

- Is not a substitute for inadequate bony correction

Minimizing fusion

- Can be difficult in the face of arthritic joints
- If Choparts joints are less involved and mobile, consider isolated Subtalar fusion with FDL tendon transfer to navicular
66y/o female with rigid hindfoot flexible midfoot/ PTTD

6 months s/p subtalar fusion with FDL transfer

Other limited fusions
- Talonavicular alone
- TN and CC joints
- Benefit
  - May retain some hindfoot motion?
45 y/o male with rigid Flatfoot

Double +NC

73 y/o with severe deformity
Summary

- Triple arthrodesis is a salvage for rigid hindfoot OA
- Need to correct deformities
- Spare Choparts joints if possible
- Be aware of deltoid insufficiency

Thank you