Introduction

Prosthesis Mismatch??
But the inability to maintain the corrected deformity may hinge on an inherently unstable prosthesis. Better talus to polyethylene coverage has introduced better stability into total ankle replacement systems improving out ability to correct deformity

Still...
The driving principle behind ALL deformity correction is a perfectly balanced foot beneath the prosthesis. Ignoring this principle always results in implant failure....

One Stage Deformity Correction
Feasible under circumstances where:
1) subtalar joint does not require arthrodesis
   a. osteotomies are utilized for deformity correction instead
2) deformity is supple and passively correctable
3) ligament repair possible due to quality of tissue available (medial and/or lateral collateral ligament)
4) surgeon experience allows perception of procedures required to place ankle replacement above a balanced foot

Two Stage Deformity Correction
Deformity correction that includes adjacent joint arthritis requiring fusion of the subtalar or talonavicular joint(s)
Screw placement may interfere with prosthesis placement
Differing post-operative protocols
   Fusion requires immobilization
   Replacement requires early motion
   May lessen dysvascularity to talus from simultaneous superior and inferior dissection
More Consideration
Deformity correction that includes **severe ankle instability**
**Secondary ligament reconstruction** procedures beyond simpler
modified Brostrom or deltoid reefing
**Early** range of **motion** may **disrupt stability**
achieved through tendon transfers

**And Most Important...**
Deformity correction that includes the **potential for unpredictable**
deformity **recurrence**
This depends on your **comfort level** with more severe deformity
Two stages allows surgeon to **make adjustments** in alignment
during **second stage**
noted **residual deformity** during **weight bearing assessment**
between procedures
improved **predictability** of correction

**Lessons Learned: Assessment**
Assess **clinical deformity** for **reducibility** of mal-alignment
Assess radiographic deformity for **blocking osteophytes** or
abnormal anatomy
Assess **CT scans** for **adjacent joint arthritis** and structural
deformity

**Reconstruction**
**Part I**
Critical to align every component of the deformity
within the foot
If there is any question as to a potential present or
future deformity, correct it at the index procedure
Apply cement in liquid form to the ankle sulcus if varus
or valgus wear has been significant and longstanding

**Part II**
Cement Left in Place
Keeps ankle stable during saw cuts.
Replace ankle and add any additional simple
deformity correction of required (calcaneal osteotomy,
Cotton osteotomy, 1st ray dorsiflexion)

**Extremes Become Possible in Two Stages: Clinical Examples**

**Is All Of This Supported?**
**Newer Literature**
Comparative Ankle Arthroplasty Outcomes with Preoperative Talar
Varus Deformity of 20 Degrees or Greater (Daniels,
et.al. 2012)

Premise

**Limited evidence** to support greater than **15** degrees varus relative contraindication and **20** degrees varus absolute contraindication to total ankle replacement

**Investigation**

Prospective Trial

36 TAA with >**20° varus** vs. 36 neutral

Follow-up average **27 months** (9 to 54)

Multiple validated and unvalidated scoring systems AOFAS, AOS, SF-36

**Additional procedures** in both (heavier in varus group)

What They Found

Coronal plane alignment **improved** from **20° to 1.4°** (p<0.001)

no statistically significant difference in post-operative alignment between varus and neutral groups

**Improvement** in scoring systems all statistically significant AOFAS (p<0.0001), AOS (p<0.0001), SF-36 (p<0.0001)

**Caveat**

**Secondary procedures** were required in **16 varus** group patients

Which essentially makes this a two stage procedure for a majority of the group!

**Avoiding Incision Problems**

How do we get the swelling out to make the first and second surgeries safe?

Postoperative protocols have changed for both stages

- No longer cast within operating room
- Begin compression wrap protocol for 2 to 3 weeks postoperative until all edema absent
- Utilize a wound care center for wraps, or teach PA or physical therapist
- Cast after all edema gone following fusion OR begin PT for TAA after all edema gone

**Improving Motion**

**The Reality:**

1) Unlike the knee, the ankle is a true tri-compartmental joint
a. Articulation occurs between the tibia and talus, but also between the talus and medial/lateral malleoli
   i. Patients with significant arthritis in these “gutters” continue to have arthritic pain and stiffness

- InBone with impinging gutters
- Agility with impinging gutters
- Salto with impinging gutters

b. Gutter debridement is the solution
   i. Prosthesis must have inherent stability to accommodate aggressive gutter debridement, or coronal plane subluxation will occur
   ii. Creates varus/valgus deformity or impingement against malleoli

- Coronal plane instability may not allow aggressive gutter debridement

  - The posterior capsule is an often unrecognized component to ankle joint stiffness
    i. Particularly in post-traumatic arthritics
        1. Capsule is thickened with scar following the index trauma
    ii. Capsule thickening can occur in post-operative phase from ankle replacement
1. Joint space hematoma with even short-term immobilization can cause this contracture
   iii. Solution will involve separate incision posterior capsule release, with early mobilization

Significant stiffness despite no evidence of bone impingement

Generous posterior capsule release through coronal plane Achilles tendon lengthening approach
d. In cavovarus deformities, the posterior based fibula may not undergo sufficient resection to provide clear space for the articulating talus
   i. This also can provide posterior impingement and subsequent stiffness
   ii. Solution will involve resection of impinging fibula against talar prosthesis
      1. Often better done through posterior approach to insure too much fibula is not being removed

Posterior fibula impingining against posterior prosthesis, creating stiffness and pain