Surgical Blitz: Total Ankle Arthroplasty

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Conflicts of Interest

- No Conflicts of Interest
- No affiliation or endorsement of any product in this lecture, all efforts made to avoid bias. Discussion may include those listed below:

<table>
<thead>
<tr>
<th>Implant</th>
<th>Mfg.</th>
<th>Mfg. Location</th>
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<tr>
<td>Agility*</td>
<td>DePuy Orthopaedics</td>
<td>Warsaw, IN</td>
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<tr>
<td>INBONE II, Infinity, (Invision*)</td>
<td>Wright Medical</td>
<td>Arlington, TX</td>
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<td>Salto- Talaris (XT*)</td>
<td>Tornier</td>
<td>Stafford, TX</td>
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<td>STAR</td>
<td>Stryker</td>
<td>Kalamazoo, MI</td>
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<td>Cadence</td>
<td>Integra</td>
<td>Plainsboro, NJ</td>
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<td>Hintermann H2</td>
<td>DT Medtech</td>
<td>Baltimore, MD</td>
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<tr>
<td>Zimmer Trabecular Metal</td>
<td>Biomet</td>
<td>Warsaw, IN</td>
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*Revision system
Learning Objectives / Presentation Outline

- Review TAA history
- Understand Indications for TAA
- Understand Relative and Absolute Contraindications for TAA
- Review variable aspects of the TAA Procedure
- Understand Common Complications
- Understand basics of TAA revision
TAA - History

Introduced in the 1970s as alternative to arthrodesis

Many Variables: Approach, Constraint, Mobile bearing, Fixed bearing, Cemented, uncemented

Complications: loosening, subsidence, impingement, severe osteolysis, infection

“It is a matter of time before all prosthesis fail and require arthrodesis.”

Lord and Marotte 1973; Bolton-Maggs et al. 1985; Myerson 2000; Neufeld and Lee 2000
Early TAA demonstrated acceptable early results in satisfaction and survivability, however

Dramatic decline in outcome over time led to return to arthrodesis

3 years → 0% failure, 100% satisfaction
5 years → 33% failure, 100% loosening
15 years → 40% failure, 19% satisfaction
TAA vs AA Comparable Outcomes

TAA implant survival rate 78% and 77% with 7 and 10 year follow up, respectively

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<th>Arthroplasty</th>
<th>Arthrodesis</th>
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<td>Revision Rate</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Amputation</td>
<td>1%</td>
<td>5%</td>
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AA 90% difficulty walking on uneven ground, driving, stairs, prolonged standing.

AA almost 100% experience adjacent joint degeneration at 15-20 years

Haddad et al. 2007; Anderson et al. 2003; Buechel et al. 2004; Bonnin et al. 2004; Schutte and Louwerens 200
TAA Indications: Training/Comfort

Steep Learning curve?

- “No evidence of learning-curve effect… The first 50 patients fared no worse than the next 150 patients in terms of proportion who had a reoperation or failure.” 
  [Spirt et al. 2004](#)
- Longer operative time positive statistically significant correlation with failure rate. [Hosman et al. 2007](#)
- Natural improvement with exposure and consecutive cases
TAA Indications

- Older patient (>50), under 200 lbs, Low physical demands
- Post traumatic or rheumatoid arthritis
- ESAA, moderate-severe pain, loss of mobility, loss of function
- Adjacent/multiple joint arthrosis or contralateral ankle arthrodesis
- Failed several mos conservative treatment
- Adequate perfusion and soft tissue envelope
- Motivated patient, compliant (adherent)

Coester et al. 2001; Neufeld and Lee 2000; Krause and Schmid 2012; Schuberth et al. 2006)
TAA- Contraindications, *relative*

- Young, active patients (<40, manual laborers, work comp)
- Previous local, joint infection
- Severe lower extremity malalignment
- Osteoporosis
- Osteonecrosis/AVN ([Gould et al. 2000](#))
- Generalized vs Localized AVN coupled with appropriate implant
- Prior arthrodesis (!?!) 
- Unrealistic expectations
TAA- Contraindications, absolute

- Active infection, prior osteomyelitis involving joint
- Peripheral vascular disease
- Poor soft tissue envelope
- Neuropathy, Diabetic syndrome
- Charcot neuroarthropathy
- Skeletal immaturity
- Severe neuromuscular disorder limiting protective sensation, proprioception, muscular guarding against deformity

Krause and Schmid 2012; Barg et al. 2012; Colombier et al. 2012; Usuelli and Maccario 2017
Indications vs Contraindications

How to get your privileges revoked in 3 easy steps:
1. 23yo Male with RA
2. 58yo Male with DM, Obesity, Severe neuropathy
3. 45yo Construction worker
TAA Indications: Preparation

Thorough and complete History and Examination “no shocking surprises”

- Diabetes? Smoking? Job?
- Sitting, Standing, Walking, Biomechanical contributors
- Rearfoot position/stability
- Soft Tissue envelope
- Vascular Status
- Radiographs: Foot, Ankle, CT?
TAA Procedure: Incision

Anterior Approach

Excellent exposure

Risk of wound complication

- Superficial Peroneal Nerve
- Extensor Retinaculum
- Tibialis Anterior/ EHL
- Preserve Capsule
- Meticulous tissue handling

TAA- Procedure: Incision

Lateral Approach

Compromised anterior envelope

Possible reduction in soft tissue complications

Reduced risk of implant exposure with wound complications

Tan et al. 2016
TAA: Mobile and Fixed Polyethylene Bearing

Mobile benefits: flexible articulation, mitigates shear forces, sagittal plane correction

Mobile drawbacks: Risk of subluxation leading to impingement, overhang. Change in final position.

Fixed benefits: stability, reduced impingement

Fixed drawbacks: high shear forces may lead to loosening, no adaptive shifting

(Valderrabano et al. 2012; Gaudot et al. 2014; Mehta et al. 2010; Conti and Wong 2002; Lewis 2004; Lee et al. 2013)
TAA- Postoperative Considerations

- Admit for ~24hr pain control monitoring
- ASA po BID while NWB
- Wound checks
- NWB? 6-8; 2 weeks?
- FWB over next 8 wks
- PT
TAA- Common Complications

Wounds- Ankle is susceptible to swelling as surrounding envelope is thin with decreased vascularity vs larger joints. Despite efforts wound edge devascularization, infection, dehiscence may occur.

Minor complications
- Stiffness
- Delayed healing
- Impingement
- Operative fractures

Myerson 2000; Glazebrook et al. 2009
Major Complications require additional surgery with the possibility of implant failure:

- deep infection,
- aseptic loosening,
- severe malalignment,
- implant failure or mobilization
- Talar AVN

Steck et al. 2017; Glazebrook et al. 2009
TAA- Revision considerations

Considerations

- Tibial Bone Loss
- Talar defects

Labek et al. 2011
TAA- Revision considerations

Revisions occur more often than reported

Careful consideration of approach and staging

- **Infection**: Removal, infection management and resolution, revision, monitoring → Complete and verified eradication (cultures/biopsies)
- **Aseptic loosening**: Additional deformity? Bone loss? Same implant different poly?
- **Cystic changes**: Bone loss? Appropriate device? Adjunct biologics? Heightened monitoring (CT scans)?
- **Arthrodesis**?

Conclusion

- TAA may now parallel outcomes of AA
- Patient selection
- Patient selection
- Patient selection
- Preparation
- Prepare for complications - can be devastating
- Consider revision options prior to primary procedure
- Patient selection
Thank you!

- for complete reference list please contact: david@hatchfootandankle.com