Ankle Distraction Arthroplasty

Stryker Corporate Meeting
August 31, 2015

S. Robert Rozbruch, MD
Chief, Limb Lengthening & Complex Reconstruction Service
Professor of Clinical Orthopedic Surgery
Ankle Distraction

- Preserves motion
- Does not burn bridges
- “Cartilage” regeneration
- Questions:
  - Hinge
  - Duration frame
  - How much distraction
  - Acute vs Gradual
  - How much stability needed
  - Adjuvant procedures
  - Biological adjuvants
  - Patient selection
  - Prophylaxis for ankle fractures
Ankle Distraction

Mechanical unloading of the joint

- Cartilage reparative process

Intermittent flow of joint fluid and changes in hydrostatic pressure

- Weight bearing and ankle movement in frame
Ankle Distraction Components

- **Biology**
  - Microfracture
  - BMAC/Stem cells

- **Soft tissue**
  - Gastrocsoleus recession

- **Mechanical**
  - Anterior Osteophyte excision
  - Hinged frame
    - Maintain ROM
    - Correct equinus
equines
Frame Duration
10-12 weeks
Talar osteonecrosis
preop

1.3 years later

Austin T. Fragomen, MD · Thomas H. McCoy, MD · Kathleen N. Meyers, MS · S. Robert Rozbruch, MD

5.8 mm needed in bipedal
Weight bearing x-ray
I do 6 mm acute distraction
Abundance Of proteoglycans

Collagen I abundant in superficial layers
Collagen II abundant in deep layers

Columnar morphology

Saw, Anz, Arthrscopy 2011
BMAC: Mesenchymal stem cells
Excision of anterior osteophyte
Gastrocsoleus recession
Insert Along Malleolar Axis

Two 6 mm HA half pins in tibia
Align Hinges with Wire
2 calcaneus wires; 1 talar neck wire
Locking Rod

Can do gradual Correction of Equinus contx
Joint Preservation of the Osteoarthritic Ankle Using Distraction Arthroplasty

Nazzar Tellisi, MD; Austin T. Fragomen, MD; Dawn Kleinman, BS; Martin J. O’Malley, MD; S. Robert Rozbruch, MD

New York, NY

- AOFAS score improved from 55 to 74 *
- 91% of patients report improved pain
  - Best noted with increased follow-up
- Age not significant factor
  - Older patients tended to have better results
- Arc of motion maintained (38 deg.)
  - Improved DF in patients with equinus
- This was first 25 patients (f/u 30 months)
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Level of Evidence</th>
<th>Control Population</th>
<th>Diagnostic Groups Included</th>
<th>Length of Minimum Followup</th>
<th>Good and Excellent Outcome Rate</th>
<th>Study Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>van Valburg <em>et al</em> (1999)</td>
<td>II</td>
<td>None</td>
<td>Severe OA who were considered for arthrodesis</td>
<td>2 years</td>
<td>13/17 (76%)</td>
<td>Prospective</td>
</tr>
<tr>
<td>Marijnissen <em>et al</em> (2002)</td>
<td>II</td>
<td>None</td>
<td>Severe OA who were considered for arthrodesis</td>
<td>1 year</td>
<td>38/54 (70%)</td>
<td>Prospective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Debridement group</td>
<td></td>
<td>1 year</td>
<td>14/17 (82%)</td>
<td>Small RCT</td>
</tr>
<tr>
<td>van Roermund <em>et al</em> (1999)</td>
<td>II/III</td>
<td>None</td>
<td>Post-traumatic ankle OA</td>
<td>1 year</td>
<td>N/A</td>
<td>Prospective</td>
</tr>
<tr>
<td>van Valburg <em>et al</em> (1995)</td>
<td>III</td>
<td>None</td>
<td>Post-traumatic ankle OA</td>
<td>9 months</td>
<td>6/11 (55%)</td>
<td>Retrospective</td>
</tr>
<tr>
<td>Ploegmakers <em>et al</em> (2005)</td>
<td>III</td>
<td>None</td>
<td>Severe OA previously treated with distraction</td>
<td>7 years</td>
<td>16/22 (73%)</td>
<td>Retrospective</td>
</tr>
<tr>
<td>Paley <em>et al</em> (2008)</td>
<td>IV</td>
<td>None</td>
<td>Painful ankle arthritis recommended for fusion</td>
<td>2 years</td>
<td>14/18 (78%)</td>
<td>Case series</td>
</tr>
<tr>
<td>Tellisi <em>et al</em> (2009)</td>
<td>IV</td>
<td>None</td>
<td>Post-traumatic ankle OA</td>
<td>1 year</td>
<td>21/23 (91%)</td>
<td>Case series</td>
</tr>
</tbody>
</table>

Copyright © 2012 by the American Orthopaedic Foot & Ankle Society.
After Distraction + SMO
40 year old
Active man
Played D1
College football
Joint space narrowing
Anterior osteophytes
Joint distracted, anterior osteophytes removed, microfracture, BMAC
35 y/o male, post-traumatic OA, bone on bone, anterior subluxation of talus
Distract, correct subluxation

BMAC, stem cell injection
Patient selection

• Alternative to fusion and replacement
  – Works well for advanced arthrosis
• Joint ROM worth saving
  – Correct equinus contx
• Too young for TAR
  – Older patient did just as well
• Motivated for joint preservation
• Avoid in pt. with stiffness, infection
Why does this work?

- Generate *reparative* tissue
- Correct equinus
- Maintain ROM
- Decrease subchondral sclerosis
RAD set is more manageable and less intimidating

- Full lego set 1000 pieces
- Full circular ex fix set
- Specialized set, 28 pieces
- More manageable
- RAD tray
Marketing ideas

- Courses
  - Incorporate with STAR
  - Joint preservation for now
  - labs

- Case studies
- AOFAS, AAOS, LLRS meetings
- Visiting surgeon programs
- Relook at quality of components
Thank You

www.hss.edu/limblengthening