AOFAS / AANA Session:

Symposium:

Treatment Options for Acute and Chronic Osteochondral Lesions of the Talus

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Review the Goals

1. Mechanism of injury and diagnosis for acute and chronic osteochondral lesions of the talus
2. Determine the appropriate treatment recommendations for acute osteochondral lesions of the talus
3. Determine the appropriate treatment recommendations for chronic osteochondral lesions of the talus, with and without cystic change
4. Discuss newer treatment options available for osteochondral lesions of the talus

I. Terminology

A. Multiple terms used to describe similar problem, including:
B. Best term probably is Osteochondral Lesion of Talus (OLT)
II. Location and Characteristics of Lesion
   A. Medial lesions are deeper, larger, cup-shaped and are usually non-displaced
   B. Medial dome of talus in mid or posterior third. Medial talar dome/middle row (Raikin zone 4) most common (53% of 428 lesions)
   C. Lateral dome of talus in mid or anterior portion. These are located in lateral/middle second most common (26%)
   D. Lateral lesions are usually shallow and wafer-shaped and often displaced and elevated by levering effect of distal tibia
   E. Lateral lesions occur more in “shear”, while medial lesions occur more with “compression”
   F. There are exceptions to the above rules

III. Staging
   A. Berndt & Harty classified OLT as to their appearance on x-ray into four stages:
   B. Ferkel, Cheng & Sgaglione developed a CT scan staging 1-4. This correlates better with treatment & outcome (Table 1)
   C. MRI staging has been done by Anderson and others
   D. Arthroscopic staging
      1. Arthroscopic classification of Ferkel & Chen is probably best way to stage lesion (Table 2)

IV. Arthroscopic Technique (Ferkel)
   A. Use thigh and ankle holder in supine position with ankle distractor
   B. 2.7-mm 30- and 70-degree arthroscopes with interchangeable cannulae
   C. Use anteromedial, anterolateral and posterolateral portals to visualize and treat the lesion. Use 2.9 and 3.5 shavers and burrs for debridement of the lesion. Small curettes (3.5-, 4.5-mm with different angulations) critical for removal of lesion. Small joint graspers are needed for loose body removal
   D. Treatment of chronic OLT
      1. unroof or remove separated or loose fragment
      2. curettage and/or drill OLT bed using standard, transmalleolar or transtalar approaches with 0.045-mm or 0.062-mm K-wires and drill guide
      3. alternatively, microfracture can be done with or without drilling; abrasion arthroplasty does not appear to be as useful

V. Postoperative Arthroscopic Surgical Treatment
   A. Posterior splint and compression dressing applied at surgery
   B. Remove splint in 1 week for arthroscopic procedures that involve excision and/or drilling and microfracture; then start ROM and strengthening with removable splint non-weight bearing
   C. Drilling with or without curettage
      1. non-weight bearing 2-4 weeks if lesion <1.5cm in diameter
      2. non-weight bearing 6-8 weeks if lesion >1.5cm
   D. Curettage and debridement alone weight bearing in 1 week
   E. Follow-up CT scan or MRI in 6 months to assess healing
VI. Arthroscopic Results
A. Tol et al. (2000)
B. van Dijk (2002)
C. Ferkel (2008)

VII. Future
A. Long term solution to treating full thickness cartilage defects involve cartilage growth enhancement instead of drilling or abrasion
B. Techniques of cartilage growth enhancement

VIII. Osteochondral Autograft Transplantation (OATS)
A. Uses osteochondral graft plugs from the sulcus terminalis of knee, anterior talar head, or medial or lateral non-articulating portions of the talus for graft sources
B. Advantage of single setting procedure
C. Size limitations for autograft transplantations – usually between 8 and 20 mm
D. Question of long-term problems with femoral plug holes and subsequent pain
E. Anteromedial talar lesions
F. Posterolateral lesions
G. Posteromedial talar lesions
H. Allograft OATS – core grafting or en bloc
I. Results – OATS
   1. Scranton et al. (2005) did 50 OATS cases with 2 to 6 year follow-up
J. Results – Allograft OATS
   1. Bugbee et al. (2009) reported to ICRS on 13 ankles in 11 patients with OLT; all involved partial unipolar grafts of the talar dome implanted through an anterior approach without osteotomy

IX. Autologous Chondrocyte Implantation
A. Definition – implantation of in vitro cultured autologous chondrocytes using a periosteal tissue cover or membrane after expansion of isolated chondrocytes
B. Indications for ACI in the Ankle
   1. Patients aged 15 to 55
   2. Focal defect
   3. Unipolar (only talus affected)
   4. Contained
   5. Edge loading
   6. Failed previous surgery
   7. Large lesions with extensive subchondral cystic changes
C. Relative Indications
   1. Multifocal unipolar lesions
   2. Uncontained lesions

X. ACI – Generations
A. Generation 1 – Carticel suspended under a periosteal flap
B. Generation 2 – Carticel inserted under a tissue patch or onto a carrier scaffold
C. Generation 3 – Carrier-free, immature cartilage tissue
XI. Surgical Technique – ACI Generation 1
A. Medial or lateral malleolar osteotomy performed under fluoroscopic control
B. Defect preparation includes removing all damaged cartilage from subchondral bone and
debriding defect on the calcified cartilage layer without penetrating bone
C. Harvest periosteum from distal tibia along the medial malleolus or from just distal to
the pes anserinus and the proximal anterior tibia
D. Mark non-cambium layer of periosteum

XII. Postoperative Care for OATS and ACI
A. Four phases

XIII. Results of ACI – First Generation (ACI-P)
A. Baums et al. (2006)
B. Ferkel et al. (2010)

XIV. Second Generation ACI
A. Collagen-covered autologous chondrocyte implantation (CACI or ACI-C)
B. Hyalograft C
C. Membrane/matrix autologous chondrocyte implantation (MACI)

XV. Third generation ACI

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<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Cystic lesion within dome of talus, intact room on all views</td>
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<tr>
<td>IIA</td>
<td>Cystic lesion with communication to talar dome surface</td>
</tr>
<tr>
<td>IIB</td>
<td>Open articular surface lesion with overlying displaced fragment</td>
</tr>
<tr>
<td>III</td>
<td>Undisplaced lesion with lucency</td>
</tr>
<tr>
<td>IV</td>
<td>Displaced fragment</td>
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Smooth, intact but soft or ballotable</td>
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<tr>
<td>B</td>
<td>Rough surface</td>
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<tr>
<td>C</td>
<td>Fibrillations/fissures</td>
</tr>
<tr>
<td>D</td>
<td>Flap present or bone exposed</td>
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<tr>
<td>E</td>
<td>Loose, undisplaced fragment</td>
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<tr>
<td>F</td>
<td>Displaced fragment</td>
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Table 3. Guideline for Treatment of Osteochondral Talar Lesions

<table>
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<tr>
<th>Lesion</th>
<th>Treatment</th>
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<tr>
<td>Type 1: asymptomatic lesions, low-symptomatic lesions</td>
<td>Conservative</td>
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<tr>
<td>Type 2: symptomatic lesions ≤ 10 mm</td>
<td>Debridement and drilling/microfracturing</td>
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<td>Type 3: symptomatic lesions 11-14 mm</td>
<td>Consider debridement &amp; drilling, fixation, an osteochondral graft or ACI</td>
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<td>Type 4: symptomatic lesions ≥ 15 mm</td>
<td>Consider fixation, graft or ACI</td>
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<td>Type 5: large talar cystic lesions</td>
<td>Consider retrograde drilling + bone transplant, or ACI with sandwich procedure</td>
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<tr>
<td>Type 6: secondary lesions</td>
<td>Consider osteochondral transplant</td>
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For types 4 through 6, debridement and bone marrow stimulation can always be considered a treatment option.
References