Osteotomies and Exposure for Osteochondral Transfer

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Talus Osteochondral Injury: Operative Treatment

• Objectives:
  – Maintain joint congruity
  – Restore anatomic joint surface
  – Rigidly fix unstable fragments
  – Improve blood supply to the fragment
  – Repair osteochondral defects
• Address coexistent pathology:
  – Ligament instability
  – Hindfoot malalignment

Imaging Helps To Plan The Approach

• High quality views of the ankle
  – AP, lateral, mortise
• Stress radiographs to r/o instability
• MRI, CT
  – Characterize OLT location, size
  – Integrity of overlying cartilage
  – Quality of the subchondral bone
• Review prior surgical reports
Arthroscopic Access

- Arthroscopy can access most lesions
  - AM, AL, PL portals
- Supine position
- Bolster under ipsilateral buttoc
  - Bolster to flex hip
- Noninvasive distraction

Arthroscopic Access

- Should be able to access anterior 50% of talar dome
- More posterior access
  - Straight posterior portal (Voto et al)
  - 1 or 2 posteromedial portals (Maffulli et al)
  - Coaxial portals medial or lateral
  - Prone position, posterior arthroscopy with PM, PL portals

Limits of Arthroscopic Access

- Access may be possible for debridement, but not for the perpendicular access required for treatment of certain OLT
- Autologous osteochondral transplantation requires perpendicular access for proper graft placement
Need for Perpendicular Access to Talar Dome

- Soft tissue approaches and/or osteotomies can help improve talar access
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  *Muir et al., AJSM 2006*
  - 20% of M/L talar dome not accessible w/o osteotomy
  - Malleolar osteotomies leave a residual central 15-24% of the talar dome inaccessible perpendicularly

Anterolateral Access Without Osteotomy

- With plantar flexion most lateral lesions can be addressed w/o osteotomy
- Lateral or AL extensile incision
- 4-6 cm incision medial to fibula, centered at ankle joint
  - Vertical anterolateral arthrotomy
  - Protect SPN
  - Incise extensor retinaculum
  - Retract EDL medially

Anterolateral Access Without Osteotomy

- Bump under heel
  - Plantar flexion
  - Anterior talar subluxation
- Anterior fibular periosteal flap including ATFL release +/- CFL release
- Draw talus forward with K-wire or Schantz pin “joy stick” placed in talar body
### Posterolateral Access w/o Osteotomy

- PL approach b/w peroneals and achilles
- Protect sural n laterally
- Retract FHL tendon medially for best access to PL dome
- DF ankle for most dome exposure

Kreuz et al., OsteoArth Cart 2006

### Osteotomies Improve Access to Talus

- Medial
  - Medial malleolar osteotomy
- Lateral
  - Arthrotomy
  - Plafondplasty
  - Fibular osteotomy
- Anterior
  - For large lesions
- Posterior

### Anterior Tibial Plafondplasty

- Anterior margin of tibia corresponding to the OLT in the coronal plane is removed w/o damaging native tibial cartilage
- Medial to tibialis anterior
- Lateral to peroneus tertius
- 20mm prox and distal to ankle
- AITFL intact

Peters et al., EJd 2012
Anterior Tibial Plafondplasty

- 1/4” osteotome, 10mm prox/M/L
- 45° angle with ankle in PF
- Removal 10x10x8 mm window grants perpendicular access to 81% of talus in sagittal plane
- Additional 20% be accessed with posterior approach

Peters et al., FAI 2012; Ahmad et al, FAI 2016

Anteromedial/lateral Trapezoidal Osteotomy

- Wedge cut at distal anterior tibia
- Sag saw cuts, osteotome
  - 30mm height, 10mm width, 20mm depth
- Plantar flex ankle

Anterolateral Tibial Osteotomy
Medial Malleolar Osteotomy

• 10 cm medial incision
• 3cm above joint line to tip of malleolus then curve anterior talar neck
• Retract saphenous vein anteriorly
• Anteromedial arthrotomy, Freer
• Protect PTT with small Homan

Medial Malleolar Osteotomy

• Pre-drill holes for later fixation screws
  – 4-0 partial threaded cancellous
  – Titanium

Medial Malleolar Osteotomy

• Oblique, step cut, chevron
• Measure optimal level for cut
  – 45° toward junction of tibial plafond and medial colliculus
  – Smooth wire to template
  – Aim lateral enough to access lesion
  – Arthrotomy with Freer in corner
Medial Malleolar Osteotomy

- Incise periosteum to mark line of osteotomy and facilitate correct reduction
- Small thin microsag saw
- Complete with osteotome
- Make sure complete all the way posterior

Alexander et al, F AI, '91
Baums et al, JBJS '07
Cohen et al, Tech F&A '02

Medial Malleolar Osteotomy

- Retract posteriorly and inferiorly
  - Sharp Senn retractor
  - Release most posterior capsule attachment with scissors
  - Anterior capsule has to be released from axilla to the tip of MM
  - Release superficial and deep PTT sheath along the posterior edge of the malleolus

Medial Malleolar Osteotomy

- Maximize exposure
  - Apply valgus stress
    - +/- Laminar spreader
    - Pin distractor
- Take care of deltoid!
Medial Malleolar Osteotomy

- Precise reduction
  - Pointed reduction forceps
- Internal fixation performed with the guidance of the predrilled screw holes
- Fixated w/3 x 4.0 cannulated screws (titanium preferable for MRI compatibility)

Lateral Access with Fibular Osteotomy

- Rarely needed
- For large lesion not accessible with arthrotomy
  - Central
  - Posterolateral

Lateral Access with Fibular Osteotomy

- Transverse osteotomy
  - 1 cm proximal to joint line
  - Incise distal syndesmotic ligaments, retract inferiorly
  - Reduce with lateral plate with syndesmotic screw through plate
**Distal Fibular Window Osteotomy**
Allen & DiGiovanni, Tech Ft Ankl 2003

- Rollback fibular window osteotomy
  - Elevate periosteum medial
  - Cuts 5 cm proximal to plafond and 3 cm proximal to this
    - Long enough and proximal enough for access!!
  - Anterolateral arthrotomy, identify inferior portion of ATFL

- Rollback intercalary fragment laterally
- +/- Schantz pin/K wire in talar body
- Pre-drill fibula for post-reduction fixation
- Stabilize with 1/3 tubular plate with fixation in proximal, intercalary, distal fibula segments

**Oblique Fibula Osteotomy**

- Best access to lateral talar dome
- Supine
- Bump under ipsilateral buttock
- 7cm proximally to tip of fibula
- Minimize periosteal stripping on fibula
- Pre-drill fibula
  - Provisionally place plate
**Oblique Fibular Osteotomy**

- Oblique cut @45°
  - Proximal lateral to distal medial
  - Distal edge at level of joint line
  - Greater surface area for healing
- Syndesmosis not disrupted
- Translate LM inferior, posterior
- Invert/varus/translate talus

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**Centro-lateral Access w/Chaput Osteotomy**

- Anterolateral approach
- Predrill for 4-0 screw
- Maintain AITFL attachment
- Osteotomy in 2 planes
  - 1-1.5 cm AL fragment
- Complete with osteotome to protect talus
- ER fragment on ligament
- 66% lateral exposure

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**Centro-lateral Access with Combined Fibula,Tibia Chaput Osteotomy**

- Best combined access to central and lateral lesions
- Lateral extensile approach
- Tibial osteotomy 45° to plafond in coronal plane, aim PL
- Fibular parallel to tibial
  - 10cm proximal to plafond
Combined Fibula, Tibia Chaput Osteotomy

- Fixation plate, screws
  - One perpendicular to osteotomy
  - One parallel to plafond

Osteotomy Post-operative Care

- Non weightbearing splint x 2 wks
- Stitches removed at 2 wks
- Non weightbearing boot wk 2-6
  - Work on ROM DF/PF
- Progress to full weight bearing beginning after 6 weeks

Conclusions

- Soft tissue approaches and osteotomies can help improve talar access
  - Most lesions accessible without osteotomy
  - 15-24% of talus still not accessible even with osteotomy
- Perpendicular access required for proper graft placement
- Approach used is dictated by size and location of lesion as directed by preop MRI or CT scan
THANK YOU!!!