Pre-meeting Course on:

**Complex Reconstructions: New Advances and Old Favorites**

Presentation Abstracts / Summaries:

**Session III:**
ANKLE AND HINDFOOT ARTHRODESIS

**2:30 – 3:10 pm**
Ankle Arthrodesis...Do W Still Do This?
David R. Richardson, MD, Moderator

**2:30 – 2:35 pm**
Yes, Through Very Small Incisions
Sheldon S. Lin, MD
Newark, New Jersey

CASE: MS: 57 yr old DM Alcoholic who sustained ankle fx 10 year ago s/p ORIF, had hardware removal and developed OA who has failed AFO

Outline
General Concept of Arthroscopic Fusion
Proposed Benefits
Clinical Data

Key Questions
QUESTION1: Should we do Arthroscopic vs OPEN Ankle Fusion?

PROPOSED BENEFITS?
Small incision
Shorter hospital stay/SDS
Faster healing(? Well maybe)
Improved Outcome

WHO?
High risk population with potential for skin compromise
DM, Elderly, Steroid use , skin compromised

**Literature review**
1991 CORR Myerson and Quill compared open to arthroscopic: demonstrated shorter time to ankle fusion

2005 FAI Ferkel and Hewitt: n=35; 97% ave 11.8 wks no infection/ nerve
Technique shown by Ferkel
Two cannulated screws

1999 FAI: Tim O Brien ...Stone, Johnson:
Conclusion: Shorter OR time, TT, EBL and Hospital days

JBJS 2013  Townshed et al
Ankle Osteoarthritis Scale
SF 36 Physical Component
Flaws
Summary: YES Arthroscopic Ankle Arthrodesis does work better than open technique
Better clinical outcomes
Less Hospital Days
Fusion Rate Comparable

Q2: Does Arthroscopic Ankle Fusion Achieve Fusion?
90% Positive CLINICAL RESULT

Q3: Anatomic limits?
Can we perform ankle fusion in patient with severe deformity?
Two groups A and B
No difference in final coronal plane
No difference in final Sagittal Plane
Fusion Rate of two Groups: Similar

JBJS 2013 Townshed et al Meta-analysis
Demonstrated ability to achieve successful well aligned arthroscopic ankle fusion DESPITE
Significant VARUS or VALGUS

Q4: Screw fixation pattern?
Ferkel Two cannulated screws
My preferred: Homerun screw and medial mallolar screw and supplemental fibula screw
What Happened to our patient?
Add XRAY and MOVIE
Final Post op

Q5: What is Role of Biologics in Arthroscopic Ankle Fusion?
Common Questions?
1. What growth factors/ORTHOBIOLOGICS are commercially available to Orthopedic Surgeon?
2. How does use of these growth factors compare to use of autograft?
3. What will be the financial cost of GF’s?
4. What is current Indications?

1. What growth factors are commercially available to Foot Ankle Surgeon today?
   Autologous Platelet concentrate (PRP)
   Recombinant human bone morphogenic protein
   INFUSE: BMP-2
   OP-1: BMP-7
   Platelet rich plasma
   Autologous Platelet Concentrate
   When Activated, Platelets Release Growth Factors

   Growth Factors in Platelets
   Platelet Derived Growth Factor (PDGF)
   Transforming Growth Factor-β (TGF-β)
   Vascular Endothelial Growth Factor (VEGF)
   Epidermal Growth Factor (EGF)
   Insulin-like Growth Factor (IGF)

2a. How does use of PRP compare to use of autograft? Coetzee and Pomoroy Foot Ankle Int 2005
Study design: syndesmotic fusion rates using PRP augmented bone grafting vs. historical control of non-PRP
augmented bone grafting- syndesmosis during TAA
66 patients to 114 historical controls
Radiographic union analyzed by either radiographs or CT scan
Level Three Evidence: Comparative Analysis: Historical control
High risk Subset: smokers at six months
Historical control-50%
PRP and BG: 80%
Effect of PRP and DBM

Results: Thirty-four of 39 patients (87.2%) achieved radiographic and clinical union. The average time to fusion was 47 (range 37 to 70) days. Poor bone quality and inherent positional ankle deformity were identified as risk factors for nonunion.

Patients who smoked, had diabetes mellitus, peripheral neuropathy, or other medical comorbidities attained ankle union in nearly all cases. In obese patients, there was an observed trend towards ankle nonunion (relative risk 5.81, \( p = 0.049 \), Fisher’s Exact test).

The addition of demineralized bone matrix or platelet-rich plasma did not improve the rate of ankle union.

BMP
FDA (PMA) Approval not in Foot Ankle
rhBMP-2/ACS (INFUSE® Bone Graft) proven safe and effective
2002 FDA approval as an autograft replacement in spine fusion (ALIF) with specific interbody cages
   Based on clinical study with 411 patients
2004 FDA approval as an adjuvant for repair of tibia fractures with IM nail
   Based on clinical study with 299 patients
rhBMP2 in High Risk ankle and Hindfoot Fusion Bibbo et al FAI July 2009
Total of 112 fusions sites (69 patients)
   64% smokers; 19% DM
   High energy 68%; AVN Talus32%
108 fusions (96% union) at mean 11 weeks (as assessed by CT scan)
Ankle 10 wks, subtalar 12.3, TN 12.7 And calcaneocuboid at 10.9 weeks
Complication included non union in 5 of 112 joints (4%)

Conclusion: rhBMP2 is effective adjunct in high risk ankle and hindfoot fusions NON FDA

Other Options
Bone Marrow Aspirate Autologous Bone Marrow
Replacing PRP for bone applications
Few clinical paper exists: Dalari JBJS 2007

Summary: ARTHROSCOPIC ANKLE FUSION
GOOD SUCCESS
LOW MORBIDITY
COMPARABLE FUSION RATES ( Better?)
Think of Biologic adjuncts(PRP, BMP, Bone Marrow)