Bone Reconstitution With Synthetic Bone Graft Material For Revision Ankle Arthroplasty

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Disclosures

• Matthew Beuchel, MD
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Objectives

- Determine if synthetic bone graft was successful in reconstitution of bony defects in revision total ankle arthroplasty
  - Often have osteolysis from prior implants
    - 76-85% of all Agility® implants
- PRO-DENSE®
  - Produced by Wright Medical
  - Fully synthetic injectable graft substitute
    - 75% calcium sulfate dihydrate
    - 25% calcium phosphate
  - Not indicated as a primary load bearing structural support or to be sole support of implant
• Calcium sulfate
  • Used for over 100 years
  • Osteoconductive
  • Fast resorption time, 6 weeks
    • Quicker calcium sulfate absorption allows for vascular ingrowth through pores

• Calcium phosphate
  • Several different forms
    • Granules attract and bind osteogenic proteins, VEGF, BMP-2
  • High compressive strength but brittle
  • Resorption of 95% in 26-86 weeks
Study population

- All total ankle revisions done by a single surgeon over a 3 year period
  - 94 patients
  - 43 patients had use of PRO-DENSE®
    - 37 had at least 3 month follow up
  - All were revisions of Agility® total ankle implants
Demographics

- Age
  - Avg: 66 yrs old
    - Range: 45-85 yrs old
- Sex
  - Male: 18
  - Female: 19
- Years since primary implant
  - Avg: 9.5 yrs
    - Range: 4-16 yrs
- Number or prior revisions
  - Avg: 0.7
    - Range: 0-3
  - 16 had retention of Agility® components
  - 14 had poly exchange
Results

- Location of PRO-DENSE®
  - Tibia: 23
  - Talus: 23
  - Fibula: 7
  - Calcaneus: 5
- Amount of PRO-DENSE®
  - Avg: 8.25 ml
  - Range: 4-20 ml
- Bone reconstitution
  - Yes: 24 (65%)
  - No: 8 (22%)
  - Partial: 5 (14%)
- Follow up
  - Avg: 503 days
  - Range: 99-1333 days
Failures of reconstitution

- No reconstitution
  - 5 in talus
  - 1 in tibia
  - 2 in fibula
  - 4 of 8 had retention of Agility® components

- Partial reconstitution
  - 4 in talus
  - 1 in tibia
  - 3 of 5 had retention of Agility components
Revision arthroplasties

- No infections
- No seromas
- No wound complications
- 5 patients have undergone further revision
- 1 patient is scheduled for revision
- 1 patient would benefit but of advanced age, comorbidities

- $7/37 = 19\%$ further revision rate
  - In spite of only 65\% radiographic reconstitution rate
Limitations and conclusions

- Retrospective review
- No patient outcome scores
- Used plain radiographs to assess bone reconstitution
  - Often metal artifact on CT
- Limited follow up
  - Patients often from out of state
- PRO-DENSE® has been shown to effectively reconstitute bone during revision total ankle arthroplasty
  - Exercise caution if limited surrounding structural support:
    - Pathologic medial malleolus fractures
    - Extensive talar body loss or prior devascularization
References


