The Importance of Plasma Sprayed Hydroxyapatite Coating on Titanium Plasma Spray in the Osseointegration of Total Ankle Arthroplasty Implants

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Robert Flavin

My Disclosure is in the Final AOFAS Program Book, I have no potential conflicts with this presentation
Introduction

- Predicted 4-8.5 million North Americans will be afflicted by Ankle Arthritis by 2020
- Ankle Arthritis is a major disability similar to Hip Arthritis
- Ankle Arthrodesis remains the Gold Standard of care
- Increasing patient preference for Total Ankle Arthroplasty
Introduction

- Many Implants with Many Differences
  - Implant Geometry, Surface Coating, 2 or 3 component designs (fixed or mobile)
- Mode of Bonding: Ingrowth Osseointegration
- Principle Mode of Failure: Aseptic Loosening
- Our Institution has used implants of two ingrowth coating surface types
  - CoCr Alloy with porous coated sintered titanium beads without Hydroxyapatite (HA)
  - CoCr alloy with porous coated surface with plasma sprayed titanium with HA
Hypothesis

- The revision rates for Cobalt Chrome Alloy TAA stemmed prostheses may be higher without Hydroxyapatite coating.
- Therefore the objectives of this study were to analyze two separate total ankle arthroplasty designs with regards to:
  - revision rates,
  - loose components diagnosed both clinically and radiologically by SPECT-CT,
  - the description of implant ingrowth material on explantation at the time of revision surgery
  - symptomatic Impingement rates.
Materials & Methods

- Retrospective Analysis
- 2 Different Total Ankle Arthroplasty
  - Mobility (Dupuy International, Leeds, UK)
  - Hintegra (Newdeal SA, Lyon, France)
- 33 Mobility TAA performed
- 37 Hintegra TAA performed
- Standardized Postoperative protocol
- Parameters collected from Medical Records
- Coronal and Sagittal tibial implant angles of implantation measured on 6 week weight bearing Radiographs
## Results

<table>
<thead>
<tr>
<th>TAA type</th>
<th>Mobility TAA</th>
<th>Hintegra TAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>63.9 Years (SD 9.9)</td>
<td>62.2 Years (SD 10.8)</td>
</tr>
<tr>
<td>Gender</td>
<td>13 (43%) ♂ 17 (57%) ♀</td>
<td>11 (31%) ♂ 24 (69%) ♀</td>
</tr>
<tr>
<td>Weight</td>
<td>75.2 Kg (SD 15)</td>
<td>77 Kg (SD 14.6)</td>
</tr>
<tr>
<td>Rheumatoid Arthritis</td>
<td>10 (31.2%)</td>
<td>10 (28%)</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>11 (34.4%)</td>
<td>14 (39%)</td>
</tr>
<tr>
<td>Posttraumatic Arthritis</td>
<td>11 (34.4%)</td>
<td>13 (33%)</td>
</tr>
</tbody>
</table>

*(p=0.51) (p=0.58) (p=0.617) (p=0.8081)*
Results

Revision & Impingement Rates

![Bar chart showing revision and impingement rates for different components and conditions.](chart.png)

- **No. of patients**
- **Components**:
  - Tibial Component
  - Talar Component

**conditions**:
- Loosening on SPECT-CT
- Requiring Revision
- Impingement Pain

**Comparison**:
- **Hintegra**
- **Mobility**
Discussion

- The question of optimum implant geometry and surface coating has not been debated in the literature to the best of our knowledge.
- The literature shows clinical results of revision similar to our study but the studies are small case series or from the designer. All studies describe a “steep learning curve” phenomenon.
- Geometrical analysis would show the anterior cortical window and the absence of HA as the potential attributing factors to failure to osseointegrate.
References