Resource utilization after surgery for end-stage ankle arthritis:

comparison between ankle replacement, open and arthroscopic ankle fusion

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Background

Ankle fusion and replacement are options for treatment of end-stage arthritis

More recent development of arthroscopic fusion techniques

Compared to open fusion (2-4):
- equal fusion rates
- fewer complications
- decreased pain
- faster mobilization
- shorter length of stay

Limited comparison of resource use
Resource use as a measure of complications?

Complications can be used as a measure of outcome

**BUT**

What counts as a complication?
All complications are not equal and there is considerable variation in how complications are recorded in the literature (1). Resource use can potentially be used as a more standardized way of measuring complications.

**Hypothesis:**

Resource use after arthroscopic ankle fusion (AAF) will be lower than that after open fusion (OAF), and both will be lower than total ankle replacement (TAR).
Methods

Retrospective review of COFAS database

Inclusion: symptomatic end-stage ankle arthritis, unsuccessful non-operative treatment, index surgery between 2003-2013, >2 years follow up, treated at St. Paul's Hospital (Vancouver, BC), skeletally mature, able to give informed consent

Exclusion: prior ankle arthroplasty, prior ankle or hindfoot fusion, active or prior infection, presence of Charcot arthroplathy

- Hintegra total ankle replacement (139 patients)
- Open ankle fusion (70)
- Arthroscopic ankle fusion (86)
Methods

Measures of resource use:

**Index surgery:** OR time, length of hospital stay

**Post-operative course:** additional OR time for re-operations, length of hospital stay for additional admissions, number of follow up clinic visits

Statistical analyses:

Demographic data compared using t-tests, chi-square tests or Fisher's exact test.

Resource use compared between treatment groups using GLM with log-link function adjusted for effect of gender, age at index surgery, BMI, presence of diabetes, presence of inflammatory arthritis, smoking history and surgeon effect.
Results: population demographics

<table>
<thead>
<tr>
<th></th>
<th>Replacement</th>
<th>Arthroscopic fusion</th>
<th>Open fusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (y)</td>
<td>65 ± 10</td>
<td>57 ± 11</td>
<td>56 ± 13</td>
</tr>
<tr>
<td>gender (% male)</td>
<td>51.8</td>
<td>67.4</td>
<td>62.9</td>
</tr>
<tr>
<td>BMI</td>
<td>28.0 ± 4.6</td>
<td>28.7 ± 5.0</td>
<td>28.7 ± 5.0</td>
</tr>
<tr>
<td>DM (%)</td>
<td>7.2</td>
<td>17.4</td>
<td>11.4</td>
</tr>
<tr>
<td>active smoker (%)</td>
<td>3.6</td>
<td>15.5</td>
<td>7.1</td>
</tr>
<tr>
<td>inflammatory arthritis (%)</td>
<td>17.3</td>
<td>3.5</td>
<td>10.0</td>
</tr>
</tbody>
</table>

- TAR patients significantly older than patients receiving fusions.
- Significantly more female patients, patients with inflammatory arthritis receiving TAR vs AAF.
- Significantly fewer diabetic, actively smoking patients receiving TAR vs AAF.
- No significant difference in BMI between groups.
Results: resource use

OR time:
TAR required significantly more OR time than either AAF or OAF (p < 0.01). No significant difference between AAF and OAF.

Length of hospital stay:
All treatment groups differed significantly in length of stay (p < 0.05).
Number of clinic visits

Number of follow up visits:
Patients attended significantly more follow up clinic visits after TAR ($p < 0.01$).

Results: resource use

Reoperations:
46 patients required re-operations

Indications:
- infection / wound breakdown (26%)
- removal of hardware (20%)

% of patients requiring re-operation:
- replacement (20%)
- arthroscopic fusion (14%)
- open fusion (8.6%)

Chi-square test comparing reoperation rate $p = 0.08$. 

mean $\pm$ 95% CI
Results: additional resource use

Additional OR time (for reoperations)

Additional hospital stays

mean ± 95% CI
Summary

Using multiple measure of resource use, arthroscopic ankle fusion compares favourably with replacement and open fusion

Demonstrates that measuring resource use can be a useful surrogate for complications

Resource use measures demonstrate the practical implications of complications for patients, surgeons and health care resources
References