Role of bone graft and bone graft substitutes in isolated subtalar arthrodesis

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Disclosure

Our disclosure is in the Final AOFAS Mobile App. We have no potential conflicts with this presentation.
Subtalar arthrodesis is a well established surgical procedure for subtalar pathologies not responding to conservative management, including posttraumatic subtalar arthrosis (e.g. intraarticular calcaneal and talar fractures), primary degenerative arthrosis without identifiable etiology, inflammatory arthrosis (e.g. rheumatoid arthrosis), talocalcaneal coalitions, postinfectious arthrosis, congenital hindfoot deformities such as pes planovalgus, and posterior tibial tendon dysfunction causing an acquired flatfoot deformity.

The main goals of subtalar arthrodesis are (a) pain relief (b) restoration of hind foot alignment and (c) improvement of function.

One of the major controversies when performing isolated subtalar arthrodesis is the possible impact of concomitant bone grafting (including autograft, allograft or bone graft substitutes) on increasing the union rates and shortening the time to union in isolated subtalar arthrodesis patients including those patients with suboptimal fusion conditions such as smoking.
Research Questions

1. Does bone grafting increase the fusion rates in subtalar arthrodesis patients?
2. Does bone grafting results in shorter time to union in subtalar arthrodesis patients?

Methodology

- We retrospectively reviewed the clinical charts and radiographs of 133 patients with 135 STJ fusions done by two surgeons at our institution between Jan 2010 to Dec 2013.

- The primary diagnoses were flat foot secondary to posterior tibial tendon dysfunction (44 feet), post-traumatic osteoarthrosis (41 feet), primary osteoarthrosis (no other specific diagnosis made) (29 feet), tarsal coalition (11 feet), inflammatory (RA) joint disease (6 feet) and others (4 feet).

- Exclusion criteria included (A) Concomitant or prior foot and ankle fusions (B) Revision subtalar fusion cases (C) Concomitant total ankle replacement and (D) Distraction arthrodesis.
• All patients had failed conservative treatment options including activity modification, NSAIDs, use of orthotics, physical therapy, and injection of steroids into the subtalar joint.

• All procedures were performed in a consistent manner using a standard lateral approach (sinus tarsi incision) with joint debridement and preparation. Fixation was done using 1 or 2 screws based on surgeon preference. The choice of whether to graft or not as well as the type of graft was surgeon’s preference.

• The patients were divided into 2 groups based on graft or no graft usage. The choice of whether to graft or not was not based on any risk factors for nonunion. Grafting was used in 93 feet and no graft in 42 feet.

• STJ fusion was determined by clinical signs of no pain or swelling at the surgical site and by radiographic trabeculation of the most recent postoperative radiographs. All Symptomatic patients underwent CT scan to confirm nonunion.

• Independent t test was used for comparing means.
• Of the 135 subtalar arthrodeeses, 115 went to union (85.2%) and 20 to nonunion (14.8%).
• The mean follow-up was 18.47 month.
• The mean time to union was 2.83 month.
• In the graft group, 78/93 patients achieved union (83.9%) as compared to the non-graft group where 37/42 patients went to union (88 %). This was not statistically significant (p>0.05).
• The mean time to union in the graft group was 2.8 month as opposed to 2.9 month in the non-graft group. This was not statistically significant (P>0.05)
Results

- Out of 133 patients, 41 smokers and 92 non-smokers (94 feet). Smoking resulted in a nonunion rate of 22% (9/41) as opposed to 11.7% (11/94) in non-smokers. In the 9 smokers with nonunion, bone graft or substitute was used in 7 and no graft in 2. If smokers were excluded from our study, the overall union rate would increase from 85.2% to 88.3%. These results were not statistically significant (P>0.05).

- All patients with diabetes (19) achieved union (100%) with bone graft used in 10 patients as opposed to no graft in 9 patients.

- In our series, 6 had Rheumatoid arthritis with union achieved in 5 (4 with graft, 2 with no graft and the only RA patient with nonunion was grafted).

- One patient was on immunosuppressive drugs for leukemia and he went to union with bone graft used.
<table>
<thead>
<tr>
<th>Graft type</th>
<th>Total number</th>
<th>Union</th>
<th>Nonunion</th>
<th>Number of nonunions</th>
<th>Possible risk factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP + Bone marrow aspirate (proximal tibia)</td>
<td>80</td>
<td>67 (83.75%)</td>
<td>13 (16.25%)</td>
<td>6</td>
<td>Posttraumatic (2 were smokers in addition)</td>
</tr>
<tr>
<td>DBM + Bone marrow aspirate (proximal tibia)</td>
<td>8</td>
<td>7 (87.5%)</td>
<td>1 (12.5%)</td>
<td>6</td>
<td>Smokers (only risk factor)</td>
</tr>
<tr>
<td>Iliac crest autograft</td>
<td>2</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>2</td>
<td>AVN Talus (1 posttraumatic / 1 RA and smoker)</td>
</tr>
<tr>
<td>TCP + Silica</td>
<td>2</td>
<td>2 (100%)</td>
<td>0</td>
<td>6</td>
<td>None</td>
</tr>
<tr>
<td>Allograft cancellous chips</td>
<td>1</td>
<td>1 (100%)</td>
<td>0</td>
<td>20</td>
<td>Total</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>93</strong></td>
<td><strong>78</strong></td>
<td><strong>15</strong></td>
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</table>
Conclusion

The use of bone graft or bone graft substitutes didn’t increase the union rate or shorten the time to union in isolated STJ arthrodesis in this retrospective study.

References


