Secondary Correction of Talar Fractures – Asking for Trouble?

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The talus with its contribution to three essential joints is pivotal to global foot function. Consequently, malunions or non-unions after displaced talar body or neck fractures cause significant disability. Malunions of the talus with relevant axial deviation and joint malalignment are seen in up to 32% of cases, predominately after overlooked fractures, non-operative treatment of displaced fractures or inadequate reduction during surgery (summarized in [7, 8]). In all of the studies that were evaluating the patients with respect to malunion, these uniformly had poor results. Non-union of the talar neck is observed in up to 12% of cases after Hawkins type III-fractures especially after inadequate reduction or fixation [2].

With respect to possible treatment, posttraumatic talar deformities can be classified as follows [10]:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>Type I</td>
<td>Malunion / joint displacement</td>
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<tr>
<td>Type II</td>
<td>Non-union with displacement</td>
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<tr>
<td>Type III</td>
<td>Types I/II with partial AVN</td>
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<tr>
<td>Type IV</td>
<td>Types I/II with complete AVN</td>
</tr>
<tr>
<td>Type V</td>
<td>Types I/II with septic AVN</td>
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</table>

AVN is considered to be “partial”, if less than one third of the talar body is involved and “complete” if more than one third of the talar body is affected leading to talar collapse [6, 10].

Salvage procedures after talar malunions and nonunions with symptomatic posttraumatic arthritis include arthrodesis of the ankle, subtalar and/or talonavicular joints, triple arthrodesis, total ankle replacement, and tibiocalcaneal arthrodesis with or without astragalectomy [1-3, 7, 10]. Secondary anatomical reconstruction in cases of nonunions and malunited talar fractures appears worthwhile if the joint cartilage is viable, and no talar collapse or infection has occurred [6].

In type I-III deformities, delayed anatomical reconstruction of the talus with preservation of the joints can be attempted in reliable, active patients with sufficient bone stock. Patients with type I-III deformities and severe, symptomatic posttraumatic arthritis can be salvaged with axial realignment and fusion, while preservation of either the ankle or subtalar joint should be attempted. Sometimes the decision to reconstruct or fuse a joint can only be made interaoperatively while assessing the cartilage status. In patients with systemic diseases like poorly controlled diabetes mellitus, stage IIb peripheral vascular disease, systemic immune deficiency or severe osteoporosis, the benefits of any reconstructive measure should be weighted against possible complications.

Patients with complete AVN and collapse of the talar body (type IV malunions) are subjected to tibiotalar, subtalar or – if necessary – tibiotalocalcaneal fusion with autologous bone grafting after excision of all necrotic bone. In the presence of osteomyelitis (type V malunions) repeated, radical debridelements of infected and necrotic bone will almost invariably lead to subtotal talectomy, although in some cases the talar head and thus the talonavicular joint may still be preserved. In any case, fusion should be limited to the affected, symptomatic joint(s).

There have been some case reports on correction of extra-articular malunions or nonunions of the talar neck without fusion [1, 3-5]. We have first reported on successful secondary reconstruction of talar malunion and nonunion in 10 selected patients followed for an average of 4 years back in 2005 [6]. Between 1993 and 2007, a total of 18 patients (aged 15 – 50 years) who had painful malunions or non-unions were treated by secondary anatomical reconstruction at a mean of 9 months after sustaining a displaced fracture or fracture-dislocation of the talar body or neck [11]. 8 patients were classified as type I, 5 as type II and 5 as type III. Correction was performed by a meticulous osteotomy along the malunited fracture plane or removal of fibrotic tissue and sclerotic bone in cases of non-union in order to regain anatomic aligment. After anatomic reduction, internal fixation was achieved with screws and additional autogenous bone grafting if necessary. No wound healing problems or infections were seen. A solid union was obtained without redislocation in all cases.
Most importantly, no signs of a newly developing AVN or progression of a pre-existing partial AVN have been observed. At a mean period of 3.9 (1 – 8) years after reconstruction 15 of 18 patients (83%) were very content with the result. One patient required ankle fusion 7.5 years after reconstruction, another patient needed talo-navicular fusion after 5 years and a third one required a two-stage fusion of the ankle and the subtalar joint within 18 months after reconstruction. The mean AOFAS ankle hindfoot score increased from 36 to 88 [11]. Similar results have been reported meanwhile from a group in Shanghai, China with 17 patients followed up for 14 months. All patients went on to solid union and no infections were seen [9].

Secondary reconstruction of malunions or nonunions after talar fractures or fracture-dislocations allow almost complete functional rehabilitation in selected active and compliant patients without symptomatic arthritis, no or partial AVN (less than one third of the talar body), and no infection. There appears to be no increased risk of development or progression of AVN. Progression of arthritis may lead to the necessity of secondary fusion – as with primary ORIF of talar fractures.

References


The Role of the Fibula in Distal Tibial Varus and Valgus: A Biomechanical Study

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It has been suggested that supramalleolar osteotomies can normalize the load distribution in the ankle joint. Due to the lack of biomechanical data, recommendations remain arbitrary. The purpose of this biomechanical study was to determine the effect of induced supramalleolar varus and valgus alignment on the tibiotalar joint pressure, in order to explain a possible predisposition to the development of osteoarthritis and determine the rationale behind corrective osteotomy treatment. In this study we quantify the changes of pressure and force transfer across the ankle joint for various amounts of varus and valgus deformity in the supramalleolar area. We assumed that a supramalleolar osteotomy creating a hindfoot varus would result in medial overload of the tibiotalar joint. Likewise we thought that creating a supramalleolar valgus would lead to a pressure shift towards lateral in the tibiotalar joint. The opposite was observed. The restricting role of the fibula was revealed by an osteotomy directly above the syndesmosis. Both in varus and in valgus end-stage ankle osteoarthritis, the role of the fibula should be taken into account and the fibula should be addressed where appropriate.