Subtalar and Naviculocuneiform Fusion for Extended Breakdown of the Medial Arch

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Summary
Combined subtalar and naviculocuneiform-I-III-fusion was found to be a successful treatment for an extended breakdown of the medial arch in a consecutive series of 20 patients. This surgical technique yielded reliable fusion and a stable correction of deformity while preserving the talonavicular joint. Although not conclusively substantiated, we strongly believe, that motion at the Chopart joint may be beneficial at long term because it allows better contact force adaptation during the gait.

Introduction
An extended breakdown of the medial arch that may include the talonavicular (TN), naviculocuneiform (NC) and tarsometatarsal (TMT) joints is a challenging problem for the foot and ankle surgeon. A triple arthrodesis may be effective to correct the hindfoot, but its effect for correction of the supination deformity of the forefoot is limited. A compensatory overcorrection at the TN-joint may work at short-term, but probably not avoid further breakdown at NC- and TMT-joints with possible recurrent forefoot supination. We thus developed a rationale with fixation of the talus in correct position on calcaneus with an isolated subtalar (ST) fusion and correction of the forefoot supination deformity with a fusion of NC-I-III-joints. The aim of this study is to report on preliminary results of a first series of 20 treated feet.

Methods
From 05/27/2008 to 12/15/2009 20 feet of 19 consecutive patients (age 65.2 [range, 44.1–80.4] years; female, n=15; male, n=4) underwent an isolated ST- and NC-I-III-fusion. Patients with osteoarthritis of the TN-joint, Charcot neuroarthropathy, or rheumatoid arthritis were excluded. All but one foot presented also a posterior tibial tendon dysfunction: stage IIB, n=9; stage III, n=9; stage IV, n=1. Clinical and radiological follow-up was carried out at 8 weeks, 4 months and 1 year after the operation. Mean follow-up was 16.5 [range, 12–32] months.

Results
In 18 patients (19 feet) flatfoot deformity was fully corrected (Table 1). Fusion at the site of arthrodesis was observed in all feet between 2 and 4 (average, 2.8) months after the operation. No loss of correction was found clinically and radiologically until latest follow-up in all but one patient. In this patient (70 years old, female), the correction at ST-arthrodesis site was insufficient with persisting valgus misalignment. As the patient did not evidence pain and instability feeling, she refused revision surgery until latest follow-up at 12 months. Two patients had a delayed wound healing; one of them needed debridement, but then also healed uneventfully. All patients were satisfied with the obtained results and stated that they would undergo the surgery again.

Conclusions
Combined ST- and NC-I-III-fusion was found to be successful in restoring the longitudinal medial arch after extended breakdown while preserving the TN-joint. This surgical technique yielded reliable fusion and a stable correction of deformity. Although not conclusively substantiated, we strongly believe, that motion at the Chopart joint may be beneficial at long term because it allows better contact force adaptation during the gait.
<table>
<thead>
<tr>
<th>Angle</th>
<th>Preoperative (SD) [°]</th>
<th>Postoperative (SD) [°]</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TN Coverage</td>
<td>35.9 (12.7)</td>
<td>18.9 (13.0)</td>
<td>0.003</td>
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<tr>
<td>First Talar-MT AP</td>
<td>18.5 (14.3)</td>
<td>4.5 (13.5)</td>
<td>&lt;0.001</td>
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<td>First Talar-MT Lateral</td>
<td>-21.1 (9.6)</td>
<td>-8.1 (7.3)</td>
<td>&lt;0.001</td>
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<td>Talocalcaneal</td>
<td>36.7 (8.3)</td>
<td>30.0 (5.1)</td>
<td>0.001</td>
</tr>
<tr>
<td>Calcaneal Pitch</td>
<td>2.3 (2.7)</td>
<td>4.8 (3.6)</td>
<td>0.004</td>
</tr>
</tbody>
</table>