First and Second Metatarsophalangeal Arthrodesis for Failed Second Metatarsophalangeal Joint Surgery

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• My disclosure is in the Final AOFAS Program Book

• The authors have no potential conflicts with this presentation.
Abstract

Second metatarsophalangeal (MTP) joint disease is a challenging clinical problem. Soft tissue and osseous procedures have been used to correct mild, moderate and severe second toe deformities and degenerative conditions with varying degrees of success. Most vexing is the patient has failed multiple forefoot surgeries and is left with intractable second metatarsophalangeal joint pain. The purpose of this paper is to examine the concomitant arthrodesis of both the first and second MTP joints for severe second MTP joint deformity/arthritis as a salvage procedure.
Introduction

Arthritis of the second MTP joint may occur extrinsically after trauma, intrinsically due to inflammatory joint disease, or iatrogenically after failed second toe surgery. Many different procedures have been described to address pain at this joint, however, we have noted that pain is not uncommon after second MTP joint surgery. It was Karlock who first reported second MTP joint arthrodesis along with a variety of different first ray procedures. Our hypothesis is that concomitant second metatarsophalangeal joint arthrodesis and first metatarsophalangeal joint arthrodesis results in a durable procedure with good clinical outcomes for severe deformity and degeneration of the second MTP joint, as well as a salvage procedure for failed second toe surgery.
Materials and Methods

Five feet (five patients) had a concomitant first and second MTP joint arthrodesis for intractable second MTP joint pain and deformity from several etiologies including second metatarsal osteoarthritis (n=5), subluxation (n=2), dislocation (n=2), and failed prior second metatarsophalangeal joint surgery (n=1). The first metatarsophalangeal joint was affected to varying degrees including hallux rigidus (n=5), and hallux valgus (n=5). All patients had failed conservative management. Coughlin cup and cone reamers were used to prepare both first and second MTP joints, followed by placement of an intraarticular lag screw and dorsal plate. The average follow-up was 29.5 months.
Results

Standing radiographic analysis demonstrated fusion of 4 out of 5 second metatarsophalangeal joints, and fusion of 5 out of 5 first metatarsophalangeal joints. Functional capacity score revealed no limitations for 3 out of 5 patients and mild limitations in 2 of 5 patients.
Results

The mean preoperative AOFAS score was 36.8 and mean postoperative score was 78.6  $p = <0.01$. Gait examination demonstrated no limp in 5 of 5 patients.

<table>
<thead>
<tr>
<th>Patient</th>
<th>1st MTP Fixation Technique</th>
<th>Successful Arthrodesis</th>
<th>2nd MTP Subluxation</th>
<th>2nd MTP Fixation Technique</th>
<th>Successful Arthrodesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
<td>Subluxed</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
<td>No</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
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<tr>
<td>3</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
<td>Subluxed</td>
<td>Dorsal plate only</td>
<td>Yes</td>
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<td>4</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
<td>Dislocated</td>
<td>Dorsal plate only</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Dorsal plate with a lag screw</td>
<td>Yes</td>
<td>Dislocated</td>
<td>Kirschner wire only</td>
<td>No</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>6.8 points</td>
<td>1.1 points</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>AOFAS Score</td>
<td>36.8</td>
<td>78.6</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>Second Metatarsal Length (cm)</td>
<td>11.4</td>
<td>9.0</td>
<td>$&lt;0.05$</td>
</tr>
</tbody>
</table>
Despite successful outcomes for first MTP joint arthrodesis, the orthopaedic literature has not described outcomes for second metatarsophalangeal joint arthrodesis. After soft tissue, bony procedures, or even amputation of the second toe, the second MTP joint may still be painful after surgery. Dhukaram et al. noted 14% of patients with moderate to severe residual pain after soft tissue release and PIP joint arthroplasty for second MTP joint subluxation. Haddad et al. reported pain and stiffness and only 69% complete patient satisfaction in a series for crossover second toe deformity using the extensor digitorum brevis transfer. Davies et al. noted that 20% (8/39) of patients had pain after capital oblique metatarsal osteotomy. As a salvage procedure, the partial proximal phalanectomy can be undertaken, but Conklin and Smith reported that 29% of their patients were dissatisfied with this procedure. After second toe amputation, VanderWilde and Campbell reported patient satisfaction of only 68%, and Gallentine and DeOrio noted that 2 of 12 patients (17%) had reservations but were satisfied and that 75% later developed a hallux valgus deformity. Clinical results after second MTP plantar plate repair have not yet been reported. We have found good results with concomitant first and second MTP joint arthrodesis with significant improvement in both VAS and AOFAS scores and maintenance of alignment over a period of 29.5 months.
Conclusions

First and second MTP joint arthrodesis should be considered in the setting of severe second toe deformity, second MTP degenerative arthritis, dislocation, or failed second toe surgery.
References