I. Introduction

Hallux rigidus results in stiffness and painful motion at the first metatarsophalangeal (MTP) joint. In later stages of hallux rigidus (3 and 4), the pain and dysfunction can be particularly problematic as patients can develop problems with shoe-fitting skin irritation, transfer metatarsalgia, and altered gait mechanics. When conservative measures fail, arthrodesis is the procedure of choice for stage 4 and some stage 3 hallux rigidus cases. Fusion of the hallux MTP joint results in a reliable clinical outcome with obvious biomechanical benefits when positioned appropriately. This is a very common procedure that can be performed in isolation or in conjunction with procedures of the lesser toes (i.e., with shortening osteotomies of the lesser MTs for claw toe deformities or lesser MTP resection in rheumatoid patients).

II. Indications for MTP arthrodesis

a. End stage hallux rigidus (stage 4 and stage 3 with pain during mid-range of motion)
b. Severe bunions
c. Rheumatoid Arthritis
d. Hallux varus
e. Salvage
   i. Failed bunion procedures
   ii. Failed hallux MTP procedures
   iii. Conversion of failed MTP implants

III. Techniques

a. Crossed screws
   i. Are an effective treatment, smaller incisions
   ii. Can require 6 or more weeks of cast immobilization
b. Dorsal plate
   i. Larger incision
   ii. Superior biomechanically
   iii. Locked versus non-locked\textsuperscript{1,2}
      1. Locked plates more rigid
      2. Locked plates may have higher non-union rate without compression
   iv. Newer plates on the market

c. Compression techniques
   i. Lag screws
   ii. Compression devices available with MTP fusion systems
d. Optimal toe positioning
   i. 20-24 degrees dorsiflexion at joint (plate 0-10 degrees)\textsuperscript{3}
      1. Great toe should rest on “ground” with simulated WB
   ii. 7-15 degrees of valgus
      1. Take both clinical and radiographic appearance into account

IV. Outcomes\textsuperscript{1,4,5}

Union rates, clinical outcomes, and satisfaction are very high with either technique. However, there are very little data on newer devices and systems that provide compression.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Technique</th>
<th>Patients</th>
<th>Follow-up (mo)</th>
<th>AOFAS pre</th>
<th>AOFAS post-op</th>
<th>Union rate</th>
<th>Revision rate</th>
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<tr>
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<td>2004</td>
<td>dorsal plate</td>
<td>34</td>
<td>80</td>
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<td>van Doeselaar</td>
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<td>30</td>
<td>(FFI) 38</td>
<td>(FFI) 8</td>
<td>95.0%</td>
<td>9.7%</td>
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</tbody>
</table>

V. Conclusions

a. MTP arthrodesis is a reliable, reproducible procedure
b. Provides excellent functional outcomes
c. Fusion rates well above 90% with current techniques
d. Dorsal plate fixation may allow easier positioning, post-op protocol, and better fusion
e. Good salvage option for severe disorders or failed treatments

VI. Resources: 1-9