Immediate Weight Bearing after Biplanar Plantar Fixation of Lapidus: A Multi-Centered Study

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Disclosures

- Bret Smith: Treace Medical Concepts (consultant, royalty, stock ownership)
- Robert Santrock: Treace Medical Concepts (consultant, royalty)
- Daniel Hatch: Treace Medical Concepts (consultant, royalty, stock ownership)
- Paul Dayton: Treace Medical Concepts (consultant, royalty)

See final AOFAS Program for complete disclosures.
Introduction

Current Hallux Valgus Treatment Paradigm

• Majority of hallux valgus procedures ➔ two-dimensional (2D) metatarsal osteotomies
  • Able to weight bear (WB) immediately, but 30-78% long-term radiographic recurrence reported\textsuperscript{1,2}
• Recent CT studies indicate 87% bunions are 3-plane deformities with metatarsal frontal-plane rotation\textsuperscript{3}
• Failure to correct met. rotation ➔ increased recurrence
  • 10.0X recurrence if sesamoids not corrected\textsuperscript{4}
  • 12.7X recurrence if met. rotation not corrected (positive “lateral round sign”)\textsuperscript{5}
Introduction

1st TMT (Lapidus) Arthrodesis

• Convenient site for 3-plane anatomic met. correction
• Corrects at apex of deformity (anatomic CORA)
• Traditional limitation ➔ inability to weight bear (WB) early
  • However, recent studies have challenged WB standards following Lapidus, with limited WB at 2-3 wks
• Recently developed multiplanar plating constructs rely on relative stability & secondary (“biologic”) bone healing ➔ may allow for immediate WB
Purpose

Early evaluation of novel procedure & fixation construct that allows for 3-plane correction & immediate WB after Lapidus arthrodesis

Radiographic Assessment:
• Union rate & complications
• 3-plane metatarsal correction
Methods

- Retrospective, multi-center study (4 centers), consecutive series
- Surgical Procedure: Instrumented 3-plane, 1st TMT hallux valgus correction*
  - Multiplanar fixation constructs
    - 2 mini-plates applied with 1st TMT joint held in compression
    - Two construct options:
      1. Dorsal plate + medial plate (57% cases in study)
      2. Dorsal plate + medial-to-plantar plate (43% cases in study)
- Post-op Regimen: Immediate WB as tolerated in post-op boot
- Exclusion:
  - Revision procedures
  - Additional arthrodesis outside 1st TMT joint
  - Moderate to severe arthritis of the 1st MTP joint

*Lapiplasty® System, Treace Medical Concepts, Inc., Ponte Vedra Beach, FL
Methods

- 49 patients, age 41.9±17.9 yrs
- 4.3±1.0 mo follow up (min 3 mo)
- Radiographic analysis
  - Anatomic measures
    - Intermetatarsal Angle (IMA)
    - Hallux Valgus Angle (HVA)
    - Tibial Sesamoid Position (TSP)
    - Metatarsal rotation (Lateral Round Sign)
  - Non-union/complications
- Paired t-test for statistical analysis
Results

Anatomic Radiographic Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre</th>
<th>Post</th>
</tr>
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<tbody>
<tr>
<td>IMA (°)</td>
<td>15.0</td>
<td>5.9</td>
</tr>
<tr>
<td>HVA (°)</td>
<td>23.7</td>
<td>8.3</td>
</tr>
<tr>
<td>TSP</td>
<td>5.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Lat. Round Sign (%)</td>
<td>93.6</td>
<td>4.1</td>
</tr>
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* p < 0.001
## Results

### Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Count</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Delayed wound healing/swelling</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Broken screw in fixation construct</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Hardware removal for soft-tissue irritation</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Undercorrection (IMA&gt;10° or HVA&gt;20°)</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Non-union</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
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Discussion

• Immediate WB possible after 1\textsuperscript{st} TMT fusion with 2 low-profile, unicortical locking plates at 90° orientation without interfrag screw
  • 3-plane correction maintained with minimal complications
  • Multiplanar, relative stability allows WB to stimulate biological healing process via secondary bone healing\textsuperscript{8}
  • Previous biomechanical testing of biplanar plating in cyclic loading demonstrated superiority to anatomic plate & compression screw construct\textsuperscript{9}

• Findings build on studies showing excellent results with early (2-4 wk) WB after 1\textsuperscript{st} TMT fusion\textsuperscript{6,7}
Conclusion

Early results suggest ability to correct all 3 planes of hallux valgus deformity and allow immediate WB following 1st TMT fusion with multiplanar plate fixation
References


