The dorsal inter-metatarsal approach for plantar plate and lateral collateral ligament repair of the lesser metatarsophalangeal joints

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I have nothing to disclose and my co-authors have updated their disclosures on the AOFAS website.
Introduction

The plantar plate and collateral ligaments complex as a primary stabilizing force has been substantially clarified in the past decade.¹

Complete release of these stabilizers through Plantar/ Dorsal approaches with a sub-capital osteotomy of the metatarsal have been described in the past.²,³

A more conservative approach to the plantar plate and unilateral collateral ligament may be a viable option when the pathology is limited, more commonly on the lateral aspect.
Objectives

- Quantify optimum exposures to access the plantar plate by a novel approach including sequential release of only lateral collateral ligament and lateral half of plantar plate.
- An attempt to correlate joint exposures with Age, Sex and Foot length of the specimens.
- The ability to pass the sutures with a suture passer and measure their pull-out strength.
Materials and Methods

10 fresh frozen specimens – normal clinically and radiologically.

Prosections were carried across 2, 3, 4 MTP joints randomly with a dorsal curvilinear skin incision followed by sequential deep dissection.

Joint exposures were measured with sizing rods during prosection.

Ability to pass the sutures into plantar plate and lateral collateral ligament and their suture pullout strength were measured.

Descriptive statistics, univariate and multivariate analysis were performed.
Results

- Progressive increase in joint exposure levels as shown in the figures were noted.
- The mean final exposure was 6 mm.
## Results

The ultimate load to failure was 76 N for the lateral collateral ligament and 67 N for the plantar plate.

Even though univariate analysis (Table below) reached statistical significance for Pearson correlation co-efficient, multivariate analysis didn’t reach statistical significance when all the factors were considered.

<table>
<thead>
<tr>
<th>Correlation Coefficients</th>
<th>Capsulotomy (No Distraction)</th>
<th>Capsulotomy (with Distraction)</th>
<th>LCL release</th>
<th>Lateral plantar plate release</th>
<th>Pullout strength (PP suture)</th>
<th>Pullout strength (LCL Suture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.31 (p = 0.1)</td>
<td>-0.20 (p = 0.3)</td>
<td>-0.05 (p = 0.7)</td>
<td>-0.09 (p = 0.6)</td>
<td>-0.07 (p = 0.7)</td>
<td>-0.42 (p = 0.02)</td>
</tr>
<tr>
<td>Foot Length</td>
<td>0.07 (p = 0.7)</td>
<td>-0.32 (p = 0.1)</td>
<td>-0.27 (p = 0.1)</td>
<td>-0.27 (p = 0.1)</td>
<td>0.19 (p = 0.3)</td>
<td>0.38 (p = 0.04)</td>
</tr>
<tr>
<td>F:M</td>
<td>0.11 : 0.08 (P = 0.7)</td>
<td>2.7 : 3.0 (p = 0.3)</td>
<td>3.3 : 3.7 (p = 0.1)</td>
<td>6.1 : 5.9 (p = 0.6)</td>
<td>62.7 : 70.8 (p = 0.4)</td>
<td>56.1 : 88.6 (p = 0.003)</td>
</tr>
</tbody>
</table>
Discussion

The Dorsal intermetatarsal approach provides adequate exposure to allow secure suture passage without the need of a metatarsal osteotomy.

The average joint exposure appeared to be comparable or slightly superior to the technique described by a study on joint exposures.4

The suture pullout strength were comparable to a study on flexor digitorum profundus repair.5
References


Thank You