Extra-articular dorsal closing-wedge osteotomy to treat late-stage Freiberg disease using FiberWire sutures: Technical tips and clinical results


Department of Orthopaedics, Kyoto Prefectural University of Medicine, Kyoto, Japan
Extra-articular dorsal closing-wedge osteotomy to treat late-stage Freiberg disease using FiberWire sutures: Technical tips and clinical results


My disclosure is in the Final AOFAS Mobile App. I have no potential conflicts with this presentation.
**Introduction**

- method of fixation of osteotomy and problems for Freiberg disease

**Purpose**

- We investigated radiographic and clinical results of cases in which the osteotomy site was fixed using polyblend sutures.
13 cases with late stage Freiberg disease, each of whom underwent an extra-articular dorsal closing-wedge osteotomy using polyblend sutures

- male 4, female 9
- 13-72 (mean: 31.7) y.o.
- stage III: 3 cases
- stage IV: 5 cases
- stage V: 5 cases

(Smillie classification)
Methods

- radiographic evaluation
  - presence of OA change
  - period of bone union
  - amount of metatarsal shortening (MS)
    $$ MS = A_{pre} \times \left( \frac{B_{post}}{B_{pre}} \right) - A_{post} $$

- clinical evaluation
  - JSSF scale
  - ROM of 2\textsuperscript{nd} MTPJ

- statistics
  - paired t test (pre vs post)
Operative techniques

A 0.035-in K-wire was used to make burr holes 5-mm proximal and 5-mm distal from the osteotomy site in the neck of the metatarsal bone. An 18-gauge cannula was then implanted in the distal burr hole. After passing a 3–0 nylon suture inside the cannula (a), the cannula was extracted, leaving the nylon suture in place. A polyblend suture was then passed inside the burr hole using the nylon suture as a guide (b).

Next, the same procedure was performed in the proximal burr hole and the back of the metatarsal bone neck was excised by approximately 5–7 mm (c).

The distal side was pushed from the bottom of the metatarsal head for dorsal flexion. The osteotomy site was fixed in place with a polyblend suture using the figure eight suturing method (d, e).
Results

Radiographic evaluation

<table>
<thead>
<tr>
<th>OA change</th>
<th>period of bone union</th>
<th>Metatarsal shortening</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>8.4 ± 0.8 mom</td>
<td>2.45 ± 1.62 mm</td>
</tr>
</tbody>
</table>

JSSF score

Significant difference *: p-value < 0.01
ROM of 2\textsuperscript{nd} MTPJ

\textbf{dorsiflexion}

<table>
<thead>
<tr>
<th></th>
<th>pre</th>
<th>post</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM</td>
<td>34.0±5.2</td>
<td>70.0±10.5</td>
</tr>
</tbody>
</table>

\textbf{plantarflexion}

<table>
<thead>
<tr>
<th></th>
<th>pre</th>
<th>post</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM</td>
<td>12.5±9.8</td>
<td>20.0±8.2</td>
</tr>
</tbody>
</table>

Significant difference *: p-value < 0.01
Case 1: 15-year-old male

- Preop
  - DF: 30
  - PF: 10
  - JSSF Score: 73pts

- Postop
  - DF: 70
  - PF: 20
  - JSSF Score: 100pts
  - Shortening: 1.5 mm
<table>
<thead>
<tr>
<th>author</th>
<th>fixation</th>
<th>period of bone union (mom)</th>
<th>metatarsal shortening (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinnard P</td>
<td>absorbable suture</td>
<td>—</td>
<td>2.5</td>
</tr>
<tr>
<td>Chao KH</td>
<td>K-wire</td>
<td>—</td>
<td>2.1</td>
</tr>
<tr>
<td>Lee SK</td>
<td>PLLA pin</td>
<td>10.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Lee HJ</td>
<td>K-wire</td>
<td>7.0</td>
<td>1.9</td>
</tr>
<tr>
<td>this report</td>
<td>polyblend suture</td>
<td>8.4</td>
<td>2.45</td>
</tr>
</tbody>
</table>
We investigated the radiographic and the clinical results regarding the dorsal wedge closing osteotomy fixed using a polyblend suture for Freiberg disease at late stage.

Bone unions were achieved and symptoms were improved in all cases. The amount of metatarsal shortening was controlled without any problems.

This surgical procedure is concerned to be an effective and useful for Freiberg disease at late stage.
References