Surgical Treatment
For
4th Curly Toe Deformity

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Surgical treatment for 4th curly toe deformity

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

4th curly toe deformity

- Characterized by flexion, varus rotation of proximal/distal phalanx to PIP/DIP joint

- 2 peak: early childhood & infancy
  middle aged women – affected by life-style & shoe wearing habits

- Surgical treatment is recommended in case of rigid digital contracture with hyperkeratotic lesion which cause pain and walking difficulty.

- A retrospective study to introduce the availability of ‘Dorso-lateral closing wedge shaped Resectional arthroplasty’ for symptomatic 4th curly toe deformity in adult
Introduction & Purpose

4th curly toe deformity

• Our hypothesis
  : **Toe length** would be the most important factor

Long toe
  : Apex of varus → PIP joint
  : Pain underriding of affected toe after shoe wear

Short toe
  : Apex of varus → DIP joint
  : Congenital structural deformity include delta phalanx
## Materials & Method

- From Jan, 2003 ~ Dec, 2013, Minimum follow-up: 1 year
- Exclusion criteria:
  1) Young age (<18 years old)
  2) Systemic inflammatory disease
  3) Predisposing trauma → amputation, malunion

### Patient Characteristics

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>46 (21 to 79)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3 (12.5)</td>
</tr>
<tr>
<td>Female</td>
<td>21 (87.5)</td>
</tr>
<tr>
<td><strong>Side</strong></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>15 (56)</td>
</tr>
<tr>
<td>Left</td>
<td>17 (44)</td>
</tr>
<tr>
<td><strong>Anesthesia</strong></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Spinal</td>
<td>23 (72)</td>
</tr>
<tr>
<td>Local</td>
<td>7 (22)</td>
</tr>
<tr>
<td><strong>Combined surgery</strong></td>
<td></td>
</tr>
<tr>
<td>Hallux valgus</td>
<td>5</td>
</tr>
<tr>
<td>Hallux rigidus</td>
<td>1</td>
</tr>
<tr>
<td>Hallux valgus + pes planus</td>
<td>1</td>
</tr>
<tr>
<td>Taylor’s bunion</td>
<td>1</td>
</tr>
</tbody>
</table>
Materials & Method

• Surgical technique

**Long toe**
- Resection at PIP level to make shortening easier

**Short toe**
- Resection at DIP level for isolated correction of varus deformity
Materials & Method

• Surgical technique
Materials & Method

- Radiologic outcome assessment
  1. Degree of *incurvation* (varus/valgus)
  2. Degree of *shortening* on standing AP images

- Clinical outcome assessment
  1. AOFAS lesser MTP-IP scale
  2. Post-operative *complications*

- Subjects were divided into 4 groups:
  - according to the *relative length* of the 4th toe to the 3rd (100 percentile) and 5th (0 percentile)

<table>
<thead>
<tr>
<th>ST  (Short toe),</th>
<th>Less than 40 percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT  (Normal toe),</td>
<td>40~60 percentile</td>
</tr>
<tr>
<td>LT  (Long toe),</td>
<td>60~100 percentile</td>
</tr>
<tr>
<td>ELT (Extremely long toe),</td>
<td>More than 100 percentile</td>
</tr>
</tbody>
</table>
# Results

<table>
<thead>
<tr>
<th></th>
<th>ST (n = 6)</th>
<th>NT (n = 8)</th>
<th>LT (n = 10)</th>
<th>ELT (n = 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>35 ± 15</td>
<td>45 ± 13</td>
<td>44 ± 17</td>
<td>45 ± 21</td>
</tr>
<tr>
<td><strong>Toe length (percentile)</strong></td>
<td>31 ± 6</td>
<td>52 ± 6</td>
<td>75 ± 7</td>
<td>197 ± 77</td>
</tr>
<tr>
<td><strong>Resection level</strong></td>
<td>DIP(6)</td>
<td>DIP(7), PIP(1)</td>
<td>PIP(10)</td>
<td>PIP(8)</td>
</tr>
<tr>
<td><strong>Preoperative AP inclination (degrees)</strong></td>
<td>36 ± 10</td>
<td>41 ± 14</td>
<td>37 ± 10</td>
<td>52 ± 29</td>
</tr>
<tr>
<td><strong>Postoperative AP Inclination (degrees)</strong></td>
<td>10 ± 7</td>
<td>14 ± 8</td>
<td>7 ± 8</td>
<td>11 ± 10</td>
</tr>
<tr>
<td><strong>Mean shortening (mm)</strong></td>
<td>2.2 ± 1.7</td>
<td>2.9 ± 2.0</td>
<td>4.4 ± 2.2</td>
<td>4.9 ± 2.3</td>
</tr>
<tr>
<td><strong>Preoperative AOFAS score</strong></td>
<td>51 ± 2</td>
<td>49 ± 0</td>
<td>51 ± 2</td>
<td>51 ± 2</td>
</tr>
<tr>
<td><strong>Postoperative AOFAS score</strong></td>
<td>93 ± 4</td>
<td>87 ± 10</td>
<td>91 ± 6</td>
<td>87 ± 6</td>
</tr>
</tbody>
</table>

- **Resection level**: ST, NT (7 of 8) : DIP // NT (1 of 8), LT, ELT : PIP
- **Op. time**: 10~15 min
- **Temporary k-wire fixation for 4 weeks**
- **Complications**
  - Recurrence: 2 → Inadequate resection level
  - Floating toe: 2 → Need for MTP correction
Discussion

**Conventional treatment options for curly toe deformity**
1) Conservative tx. (taping, orthosis)
2) Dorsally biased elliptical incision
3) Flexor to extensor transfer
4) **Simple flexor tenotomy** \(\rightarrow\) Current Treatment of choice

**Resectional arthroplasty for deformity correction**
1) for patients with RA & forefoot deformity
2) for infected non-healing ulcers with toe deformity in Diabetic patients
   \(\rightarrow\) **No reports** for simple curly toe deformity without predisposing factors

**Limitations of our study**
1) Degree of **postoperative derotation** \(\rightarrow\) Not measured
2) **Retrospective** study design
3) Not compared to the result of conventional **flexor tenotomy**
Conclusion

• Dorso-lateral closing wedge shaped resection arthroplasty for 4th curly toe deformity

• Easy, Simple, Effective surgical technique with an excellent correctability & high patients’ satisfaction

• Resection level decision
  - ST/NT group → DIP
  - LT/ELT group → PIP


