Limb Lengthening Reactivation with “Sleeper” Precice Nails

Hamza M. Alrabai, MD,^1 John E. Herzenberg, MD, FRCSC,^2 Shawn C. Standard, MD,^2 Janet D. Conway, MD,^2 and Martin G. Gesheff, MS^2

^1King Saud University, Department of Orthopedics, Riyadh, Saudi Arabia
^2International Center for Limb Lengthening, Rubin Institute for Advanced Orthopedics, Sinai Hospital, Baltimore, Maryland, USA

Introduction

• Precice magnetic motorized nails are normally used for one-time lengthening and are discarded after that.
• In some situations, an additional session of lengthening is required.
• This case series presents group of patients who successfully underwent a second lengthening using the same Precice nail after a period of inactivity.

Methods

• Three patients (6 nails; 4 femora and 2 tibiae)
• One patient has hypochondroplasia and two patients have congenital femoral deficiency.
• The first lengthening was halted in all patients due to variety of reasons, including progressive knee contracture, peroneal neuropathy, knee instability, and pre-consolidation.
• All pre-implanted Precice nails had remaining lengthening capacity ranging from 2.5 cm to 5 cm.
• Through new osteotomies, in situ Precice nails were reactivated for further lengthening.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender</th>
<th>Age (yr)</th>
<th>Diagnosis</th>
<th>Segment (Side)</th>
<th>Precice Type</th>
<th>Remaining Length (cm)</th>
<th>Reason for premature stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>17</td>
<td>Hypochondroplasia</td>
<td>Femur (Right)</td>
<td>(P2) 10.7/275</td>
<td>3</td>
<td>Knee flexion contracture &amp; peroneal neuropathy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Femur (Left)</td>
<td>(P2) 10.7/275</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tibia (Right)</td>
<td>(P2) 10.7/245</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tibia (Left)</td>
<td>(P2) 10.7/245</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>8</td>
<td>Congenital femoral deficiency</td>
<td>Femur (Right)</td>
<td>(P2) 10.7/275</td>
<td>5</td>
<td>Knee instability</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>28</td>
<td>Congenital femoral deficiency</td>
<td>Femur (Right)</td>
<td>(P1) 10.7/230</td>
<td>2.5</td>
<td>Preconsolidation</td>
</tr>
</tbody>
</table>

F; female, M; male, P1; first generation Precice nail, P2; second generation Precice nail, Yr; year.

Results

• Successful reactivation of all 6 Precice nails:
  • Average residual stroke capacity 3.25 cm
  • Intraoperative distraction tests confirmed Precice system functional.
  • Mean additional length 3 cm (range, 1-5 cm)
• Complications
  • Distraction period
    • None
  • Consolidation period
    • Bending (2 nails)
      • 1 tibial nail: valgus bending
      • 1 femoral nail: varus bending
    • Both required conventional intramedullary nail exchange with intraoperative temporary external fixator application

Conclusion

• The concept of “sleeper” magnetic lengthening nails was shown to be effective in these three patients.
• Candidate magnetic lengthening nails must have an adequate lengthening reserve and no signs of impending failure.
• Patients must be informed about possible failure and need for substitute Precice nail.
• “Sleeper” magnetic nail lengthening may shorten the operative time and reduce the overall procedure cost by sparing the need for insertion of a new magnetic lengthening nail.