

**Hamza M. Alrabai, MD,<sup>1</sup> John E. Herzenberg, MD, FRCSC,<sup>2</sup> Shawn C. Standard, MD,<sup>2</sup> Janet D. Conway, MD,<sup>2</sup> and Martin G. Gesheff, MS<sup>2</sup>**

<sup>1</sup>King Saud University, Department of Orthopedics, Riyadh, Saudi Arabia

<sup>2</sup>International 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.

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

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.