

Explanted Precice Magnetic Nails: Can They Be Reactivated?



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Introduction

- Precice nails are magnetically motorized nails that are used for bone lengthening.
- An external remote controller is used to adjust the Precice nail length. The lengthening capacity of Precice nails is 50 to 80 mm.
- Precice nails are usually extracted after solid consolidation of the lengthened bone segment is achieved. Some extracted nails are not fully deployed.
- Certain patients require serial lengthening, which theoretically can be accomplished in stages using one Precice nail.
- It may be desirable to perform part of the lengthening, allow bone healing, and return one or more years later to relengthen with the same nail. This strategy may be gentler for the joints and soft tissues. We call this the “sleeper nail” strategy.
- The aim of this study was to determine whether the Precice mechanism is still functional 1 or more years after the initial treatment.

Methods

- Experimental ex vivo trial was conducted on 102 electively explanted Precice nails (84 patients). All were model P1 or P2.
- Extracted nails were collected postoperatively from May 2013 to June 2016. Nails with clear damage were excluded.
- Using a “fast magnet” external remote controller, nails were reactivated to lengthen and retract. During testing, nails were prevented from reaching their full capacity of lengthening/retraction to avoid jamming the gears.
- Nails passed the test if they succeeded in lengthening to 5 mm short of the maximum stroke capacity and back to 35 mm. Failure was defined as the inability or partial ability to complete the process.

Results

- Of 102 explanted nails, 86 (84.3%) were successfully reactivated.
- Mean implantation duration was 16.5 months (range, 4-47 months).
- 37 P1 Nails:
 - 29 nails (78.4%) passed testing
 - 8 nails (21.6%) failed testing (all had been fully deployed)
- 65 P2 Nails:
 - 57 nails (87.7%) passed testing
 - 8 nails (12.3%) failed testing (1 of 8 was fully deployed)
- No association of statistical significance was detected between reactivation failure and Precice nail type, diameter, length, or in vivo interval.
- Significantly higher failure rate of 56.3% (9/16) ($p < 0.001$) was observed among Precice nails that had been fully deployed (Figure 1).

Discussion

- Dormant Precice nails can be reactivated for further lengthening.
- Reactivation of sleeper Precice nails should be avoided in cases of full deployment, bending, and breakage.
- Reactivation of sleeper Precice nails could reduce the cost of additional implants and allow shorter anesthesia times.
- Patients should be told about the potential need for nail exchange if the sleeper nail fails to reactivate.

References

1. Couto A, Freitas J, Alegrete N, Coutinho J, Costa G. Two consecutive limb lengthenings with the same PRECICE nail: a technical note. *Strategies Trauma Limb Reconstr.* 2018;13(3):199–204.
2. Hammouda AI, Jauregui JJ, Gesheff MG, Standard SC, Conway JD, Herzenberg JE. Treatment of post-traumatic femoral discrepancy with PRECICE magnetic-powered intramedullary lengthening nails. *J Orthop Trauma.* 2017;31(7):369–374.
3. Wagner P, Burghardt RD, Green SA, Specht SC, Standard SC, Herzenberg JE. PRECICE(®) magnetically-driven, telescopic, intramedullary lengthening nail: pre-clinical testing and first 30 patients. *SICOT J.* 2017;3:19.
4. Rozbruch SR, Birch JG, Dahl MT, Herzenberg JE. Motorized intramedullary nail for management of limb-length discrepancy and deformity. *J Am Acad Orthop Surg.* 2014;22(7):403–9.
5. Shabtai L, Specht SC, Standard SC, Herzenberg JE. Internal lengthening device for congenital femoral deficiency and fibular hemimelia. *Clin Orthop Relat Res.* 2014;472(12):3860–8.