

Treatment Outcomes Following Retrograde Femoral Extramedullary Lengthening Using an Internal Lengthening Nail

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Question: Whenever possible, internal lengthening nails have replaced external fixators as the primary device for lengthening long bones. However, there are situations, such as small patients or very young patients, where placing the internal lengthening nail in an intramedullary location is either not safe or not possible due to the limited implant sizes. In these situations, it may be possible to use the internal lengthening nail in an extramedullary location. We have been using a retrograde extramedullary femoral technique without supplemental internal fixation in our patients since 2018. The purpose of this study was to review the outcomes in patients undergoing retrograde femoral extramedullary lengthening.

Answer: We conducted a retrospective chart review of patients who underwent limb-lengthening procedures using an extramedullary retrograde femoral lengthening nail technique. We recorded the magnitude of length discrepancy, the amount of length gained, and the bone healing index. We also reviewed the incidence of complications following this procedure. Descriptive statistics were carried out for the group. The Mann–Whitney test was used to compare gender differences.

Results: The cohort consisted of 17 patients, including 9 males and 8 females. All patients underwent femur lengthening using a magnetic lengthening nail, applied in an extramedullary, retrograde fashion, at a rate of 0.5 to 0.8 mm per day. The mean age for male and female patients was 6.2 ± 1.9 years and 8.0 ± 2.4 years, respectively. There were no significant differences in the amount of length discrepancy present, the amount and percentage of lengthening done, or the bone healing index. (see Table) Three patients developed aseptic bursal fluid collections within the soft tissue around the distal end of the nail. No patient developed complications related to the regenerate bone (deformity or fracture). No patients required a return trip to the operating room and no patients developed contractures of the hip or knee requiring intervention other than conventional therapy or bracing. Patients were followed up for an average of 23 months.

Conclusions: Retrograde extramedullary lengthening of the femur using an internal lengthening nail has been demonstrated to be a safe and effective method of lengthening the femur in young patients as an alternative to using an external fixator. By using the implant in a retrograde fashion, no supplemental internal fixation was required, and no deformities of the regenerate bone were noted. Therefore, retrograde extramedullary femoral lengthening using an internal lengthening nail is a viable alternative to external fixator lengthening in young, skeletally immature patients when intramedullary placement of the nail is not possible.

Table. Summary of patient demographics and results of the extramedullary lengthening procedure.

	Male	Female	P value
Age (years)	6.2 ± 1.9	8.0 ± 2.4	0.1270
LLD (cm)	5.3 ± 1.7	9.4 ± 5.3	0.0673
Length gained (cm)	3.6 ± 0.5	3.9 ± 0.6	0.4275
% length gained	14 ± 3.8	15 ± 3.3	0.9781
Bone healing index (days/cm)	32 ± 8.1	32 ± 7.3	0.6730