

Lower Limb Lengthening Using Magnetic Intramedullary Lengthening System: 100 Limb Segments

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Background and Objective

- Magnetic intramedullary (IM) lengthening nails avoid many problems associated with external fixators.
- Only one device is currently FDA-cleared.
- **Objective:** Report our experience with the first 100 bone segments that had unilateral or bilateral lengthening using a magnetic IM lengthening nail system.

Methods

- IRB-approved retrospective review
- January 2012 to March 2014 (consecutive cases)
- 77 patients (42 males / 35 females)
- 100 segments (71 femora / 29 tibiae)
- Mean age: 21 years (7–69 years)
- Mean lengthening goal: 4.9 cm (1.8–6.7 cm)
- Outcome measures:
 - Lengthening achieved, healing index, and complications

Etiology	Number of segments
Congenital femoral deficiency / Fibular hemimelia / Tibial hemimelia	37
Achondroplasia	14
Post-traumatic limb shortening	14
Skeletal dysplasia	9
Hypochondroplasia	6
Hemihypertrophy	4
Ollier disease	3
LLD / Clubfoot	3
Post-septic arthritis	3
Miscellaneous conditions*	7
Total	100

*Miscellaneous: Marfan's syndrome, hip dysplasia, post hip replacement, post sarcoma, congenital knee fusion, and developmental knee fusion. LLD, limb length discrepancy.

Results

- 96 segments (96%) achieved lengthening goal:
 - 63 segments without complications
 - 33 segments with complications that resolved after treatment
- 3 segments (3%) failed to achieve lengthening goal:
 - 2 segments (joint subluxation)
 - 1 segment (rod failure)
- A 69-year-old patient (1 segment) died after achieving desired lengthening due to abdominal abscess and toxic megacolon (*not related to lengthening surgery*).

Results

	Femora (71 segments)	Tibiae (29 segments)	p-value
Follow-up average (years)	1.5 (0.6–2.9)	1.5 (0.7–3.3)	1.0
Length achieved (cm)	4.52 (1.8–6.5)	4.87 (2–6.7)	0.31
No. of segments achieved desired lengthening	68 / 71	29 / 29	0.70
Consolidation Index (days/cm)	30.5 (11–67)	46.8 (23–112)	0.0001
Complications (51 total complications in 36 limb segments)	28% (20/71)	55% (16/29)	0.01
Implant-related complications	16% (8 rod and locking screw failures)		

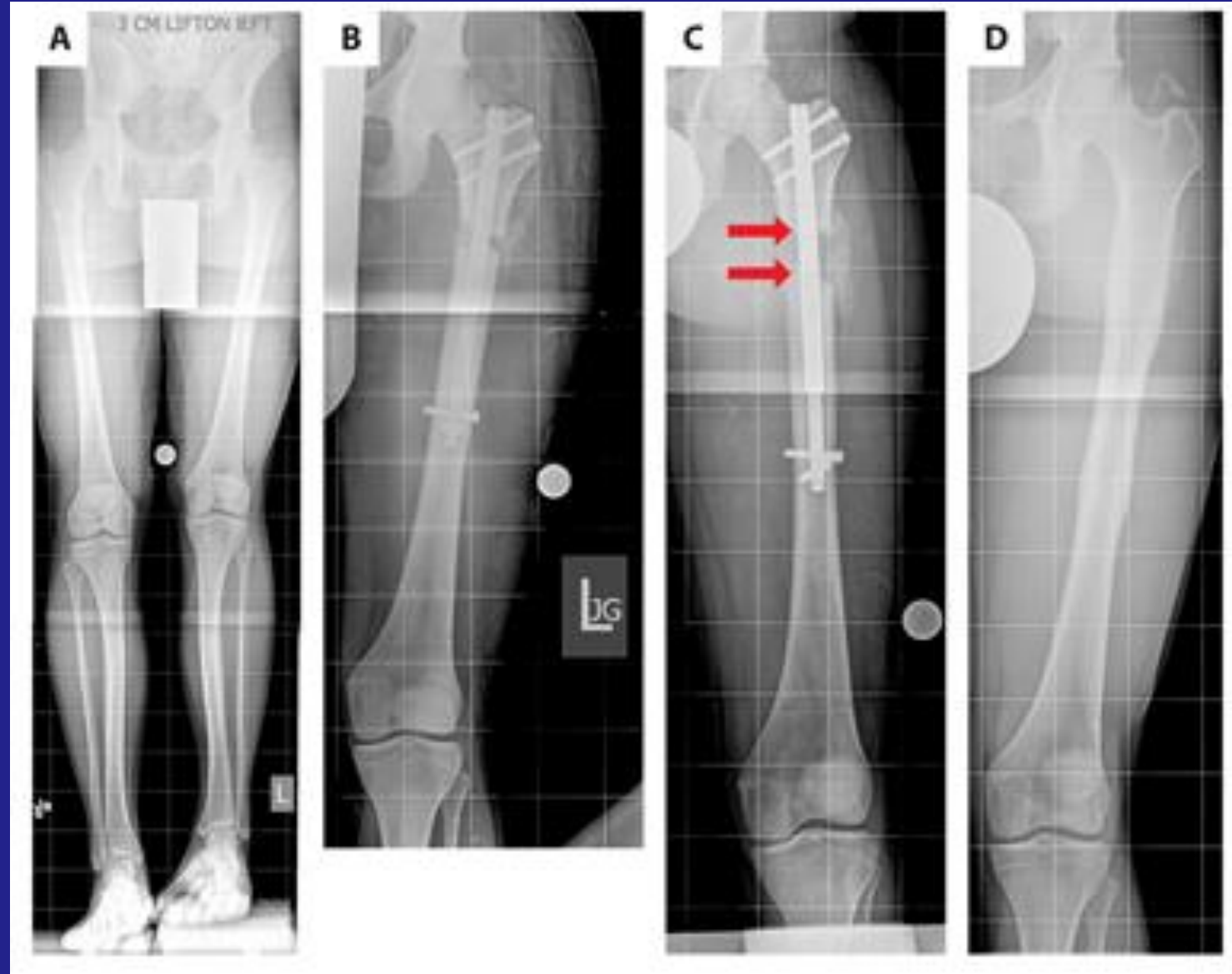
19 y.o. man w/ left CFD (femoral LLD = 4 cm)

A, Preop erect AP film.

B, Radiograph obtained immediately after nail insertion.

C, Lengthening completed.

D, Regenerate completely healed and nail removed.



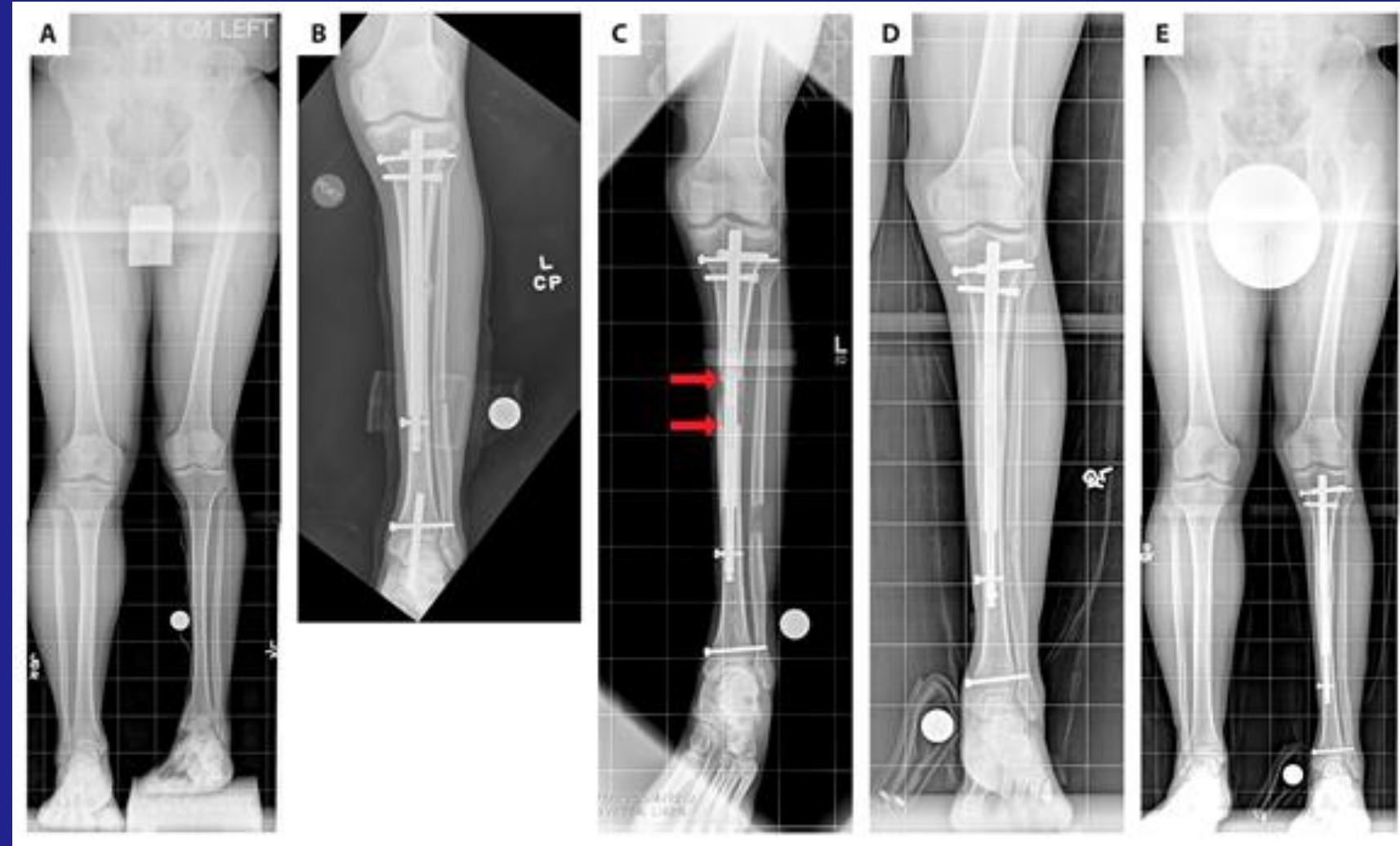
47 y.o. man with left tibial shortening (3.5 cm) and history of clubfoot

A, Preop erect AP film.

B, Radiograph obtained immediately after nail insertion.

C, Lengthening completed.

D and E, Regenerate healed and length equalized.



Conclusions

- The magnetic IM lengthening system provides an attractive alternative to external fixators for lower limb lengthening.
- These first 100 implants represent our learning curve.
- Hardware improvements have been implemented since this study.
- “It’s still limb lengthening...”

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Author Disclosures:

SCS is a consultant for NuVasive Specialized Orthopedics and receives royalties from NuVasive Specialized Orthopedics and Pega Medical. JDC is a consultant for Biomet and Cerament; receives research support from Acelity, CD Diagnostics, and Microbion; receives royalties from University of Florida; and receives fellowship support from Biocomposites. JEH is a consultant for Orthofix, OrthoPediatrics, NuVasive Specialized Orthopedics, and Smith & Nephew; receives research support from NuVasive Specialized Orthopedics; and is on the editorial board of the World Journal of Orthopaedics. AIH, JJJ, and MGG do not have any conflicts to report.