Transmedullary Posts for Cable Fixation in Balanced Cable Transport

Rakhi Banerjee, BS[1], Stephen Wallace, MD[2], Joseph T. Patterson, MD[1]

[1]Keck School of Medicine of USC, Department of Orthopaedic Surgery, Los Angeles, CA, [2]West Coast Lengthening, Lake Oswego, OR

Introduction

- Distraction osteogenesis with balanced cable transport and external fixation for segmental bone defects provides accurate segment alignment while reducing soft tissue morbidity.
- Traditional cable fixation methods require routing cable through intramedullary and extramedullary locations, which may require additional morbidity exposure for implantation and removal.
- Transmedullary posts provide a percutaneous method of introducing and securing cables to bone transport segments via an intramedullary approach.

Objective

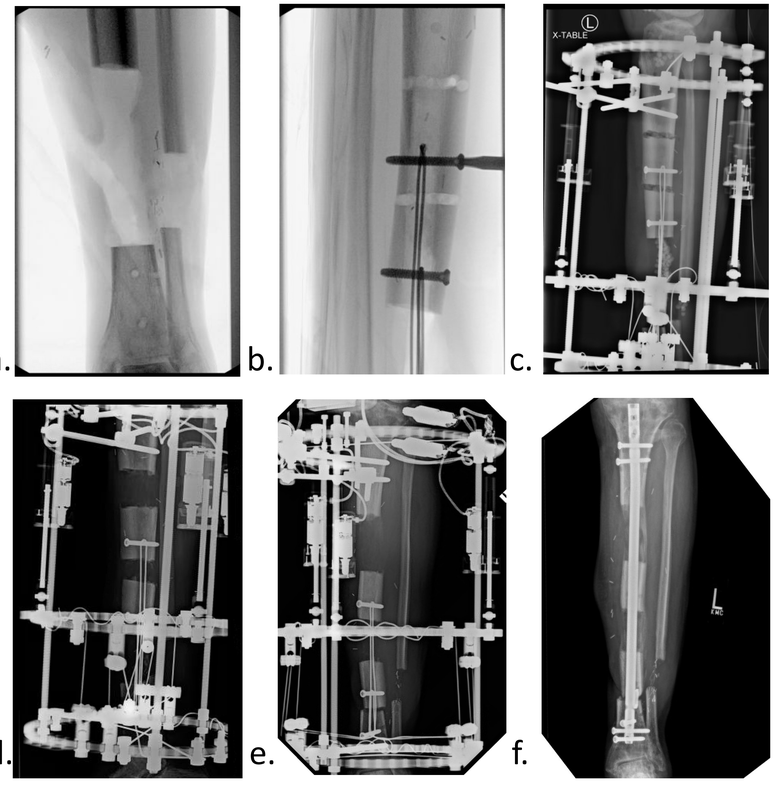
- This study aimed to evaluate clinical outcomes associated with the use of transmedullary posts for cable fixation in balanced cable transport.
- The hypothesis was that measured indices assessing clinical efficacy were similar to those previously published for traditional cable transport.

Materials and Methods

- Design: A multicenter retrospective series of 12 consecutive cases was performed at one private orthopaedic practice and one academic quaternary care hospital.
- Inclusion Criteria: Patients ≥ 18 years of age treated with balanced cable transport in circular external fixation with transmedullary posts for cable fixation between Aug 2024 and Feb 2026.
- Data Collection: Primary outcomes were External Fixation Index (EFI), Lengthening Index (LI), and Healing Index (HI). Secondary outcomes were problems, obstacles, and complications that arose.

Results

- Nine patients with tibial fracture nonunion (7 open, 2 closed) were included.
- The average defect length was 6.1 cm (range 2.8 - 12.8 cm).
- Six patients underwent bifocal bone transport with a single osteotomy and one moving segment, while three underwent trifocal transport with two osteotomies and two moving segments.



a. Initial bone defect following resection of infected bone, b. Placement of transmedullary posts in transport segments, c. Circular external fixation with balanced cable transport, d. Mid-transport, e. Docking of distal segment, f. Regenerate consolidation following removal of transport frame and replacement with intramedullary nail

- Average EFI was 19.8 days/cm, average LI was 12.9 days/cm, average HI was 39.8 days/cm.
- Six problems encountered throughout the study period: muscle contractures (1), axial deviation (1), pin-site infections (2), and frame issues (2).
- Five obstacles required operative intervention: cables routed incorrectly (2), transport segment retracted (1), infection requiring debridement (1), and delayed consolidation requiring revision (1).

Discussion

- Transmedullary posts for cable fixation in balanced cable transport was feasible, technically simple, and facilitated uncomplicated closed cable removal.
- While three of the five obstacles observed in this case series occurred after cable setup, each was resolved with prompt intervention and resulted in no long-term complications.
- External fixation, lengthening, and healing indices were comparable to values reported in traditional transport techniques.
- This approach avoids routing the cable through and around bone, requiring less exposure for insertion and removal, and maintains segment alignment and transport efficiency.
- These findings support the use of transmedullary posts in balanced cable transport.
- A significant limitation of this study is the small sample size, limiting ability to identify statistical significance in data.
- Future studies are needed to further identify efficacy of this procedure with longer term follow-up.

References

1. Paley, D. (1990). Problems, Obstacles, and Complications of Limb Lengthening by the Ilizarov Technique. Clinical Orthopaedics and Related Research, &NA;(250), 81???104. https://doi.org/10.1097/00003086-199001000-00011
2. Quinnan, S. M., & Lawrie, C. (2017). Optimizing Bone Defect Reconstruction—Balanced Cable Transport With Circular External Fixation. Journal of Orthopaedic Trauma, 31(10), e347–e355. https://doi.org/10.1097/bot.0000000000000994
3. Richmond, R. L., Kaszuba, S. V., Tommasini, S. M., & Frumberg, D. B. (2024). Assessing Mechanical Difference in Fulcrums for Balanced Cable Bone Segment Transport. Journal of Limb Lengthening & Reconstruction, 10(2), 91–95. https://doi.org/10.4103/jllr.jllr_13_24

Conflict of Interest Disclosures

No disclosures