

All internal distraction osteogenesis after tumor resection with magnetic intramedullary nails

Lee Zuckerman, M.D.

Keck School of Medicine of the University of Southern California

Significance & Hypothesis/Techniques:

All internal distraction osteogenesis can reconstruct defects and correct limb-length discrepancies (LLDs) with or without deformities. This study evaluates the outcomes of multiple all internal distraction osteogenesis techniques using magnetic intramedullary nails.

Innovation:

The use of all internal distraction osteogenesis after tumor resection is a new technique with limited data in the literature. To our knowledge, this is the largest series of patients treated for tumor resection that have undergone these procedures.

Approach:

A retrospective review of all patients undergoing all internal distraction osteogenesis using magnetic nails was performed. Age, follow-up, reconstruction length, location, number of surgeries, and complications were evaluated.

Results:

Twenty-five patients underwent all internal distraction osteogenesis. Eighteen had a primary bone sarcoma and seven had metastatic disease. The average age was 29 years (4-70), defect/LLD was 10.4 cm (3-23) and follow-up was 46.8 months (9-138). Ten underwent intramedullary lengthening, two with simultaneous deformity correction, averaging 1.25 surgeries (1-2) and 6 cm of lengthening (3-11) with no complications. Six underwent plate-assisted bone segment transport (PABST), averaging 2.6 surgeries (1-5) and a 15.5 cm defect (10-23) with one debridement for infection and one local recurrence. Five had a bone transport nail (BTN), averaging 4.4 surgeries (2-8) and a defect of 12 cm (4-18). Three had hardware failures, two had a nonunion, two had regenerate issues requiring surgery and two had residual LLDs. Four underwent extramedullary AIDO, averaging 5.5 surgeries (3-8) and a defect of 9 cm (5-21). Two patients had hardware failures, with one requiring two revisions and one requiring one revision.

Discussion & Impact:

All internal distraction osteogenesis after tumor resection provides an option for reconstruction of both intercalary defects and treatment of limb-length discrepancy. Simple lengthening after hemipelvectomy, joint replacement and allograft reconstruction required the least number of procedures and had no complications. Reconstructing an intercalary defect with distraction osteogenesis with or without subsequent lengthening required multiple procedures. The PABST technique had the least number of complications followed by the use of an extramedullary nail and bone transport nails. Although each option provided for limb-salvage with distraction osteogenesis, further research is needed to determine if there is an optimal technique for treatment of these complicated reconstructions.