

All Internal Distraction Osteogenesis after Tumor Resection

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INTRODUCTION:

Multiple options for reconstructing bony defects and correcting limb-length discrepancies after tumor resection are available. The use of all internal distraction osteogenesis can be used to reconstruct the defect and correct limb-length discrepancies using the patient's own bone. This study evaluates the outcomes of multiple techniques for all-internal distraction osteogenesis using magnetic lengthening nails.

METHODS:

A retrospective review of twenty cases of all internal distraction osteogenesis were reviewed. The following data was collected from all patients: age at the time of initial surgery, time to follow up, location of the surgery, length of distraction osteogenesis performed, number of surgeries performed, and complications.

RESULTS:

A total of 12 males and 8 females underwent all internal distraction osteogenesis on 16 femurs, 3 tibiae, and 1 humerus. The average age of the patients was 32.0 years (range 9-70), the average defect was 10.3 cm (range 3-23), and the average follow up was 29.9 months (range 3-85). Six patients passed away due to their cancer by final follow up. Four patients were treated with lengthening alone for limb-length discrepancy after hemipelvectomy, after an acute shortening or joint replacement with an average age of 35.5 years (range 22-60), an average defect of 6.3 cm (range 4-11), and an average follow up of 32.3 months (range 9-76.5). Four patients underwent lengthening after intercalary or osteoarticular allograft reconstruction with an average age of 12.7 years (range 9-14), an average defect of 5.6 cm (range 3-6), and an average follow up of 47.6 months (range 39-85). Five patients underwent plate-assisted bone segment transport with an average age of 50.8 years (range 12-65), an average defect of 14.2 cm (range 10-23), and an average follow up of 18.6 months (range 3-41). Five patients were treated with a bone transport nail with an average age of 34.0 years (range 13-70), an average defect of 12.2 cm (range 3.6-18), and an average follow up of 32.2 months (range 11-51.5). Two patients underwent extramedullary distraction osteogenesis with an average age of 43.1 years (range 17-69), an average defect of 13.3 cm (range 5.5-21), and an average follow up of 12.6 months (range 3-22).

The patients undergoing lengthening for a limb-length discrepancy alone required an average of 1.5 surgeries (range 1-2) and had no complications. For the patients undergoing lengthening after allograft reconstruction, only 1 surgery was performed per patient and no complications occurred. The plate-assisted bone segment transport patients required an average of 2.6 surgeries (range 1-5). One patient sustained a superficial wound infection requiring surgical debridement. The patients who were treated with a bone transport nail required an average of 4.4 surgeries (range 2-8). Three patients had hardware failure requiring revision surgery, two patients had locking screws back out, one patient had a retained broken intercalary screw that occurred during removal of the nail, and two patients had a nonunion. One patient required a revision surgery due to early consolidation of the regenerate and one patient formed poor regenerate requiring grafting. Two of the patients had residual limb-length discrepancies at latest follow up. For the two cases of extramedullary nailing, each patient required a total of 5.5 surgeries (range 3-8). One patient required 2 revision surgeries due to 2 separate occurrences of hardware failure, and one patient required a revision surgery due to hardware failure.

DISCUSSION AND CONCLUSION:

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. When 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.