

Compression of Intercalary Allografts with Magnetic Lengthening Nails, Mid-term Results with a Comparison of Techniques

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Significance & Hypothesis/Techniques:

Using magnetic growing intramedullary nails to compress an intercalary allograft may improve union rates and decrease complications. The purpose of this study is to evaluate union rates, complications, and the mid-term results of this technique. In addition to this, a subset analysis of patients who underwent routine compression post-operatively compared to those who did not is presented.

Innovation:

The use of magnetic growing intramedullary nails for incorporation of allografts is a relatively new technique. Using routine post-operative compression is an even newer variation of this technique.

Approach:

A retrospective review of 17 patients with 35 osteotomy sites on 8 femurs, 9 humeri and 1 tibia was performed. The average age was 35.4 (9-71) with an average follow-up of 55.9 months (12-133). Thirty-two osteotomy sites were primary resections, one site was a chronic non-union previously treated with a carbon fiber nail, and two sites were for a revision of a previously fractured intercalary allograft. The average allograft length was 14.8 cm (6.5-29). All nails were compressed intraoperatively. Ten patients did not undergo routine post-operative compression. Nine patients underwent routine compression, including 2 patients who required revision surgery after not undergoing compression due to hardware complications. Radiographs were evaluated to determine union rates, time to union and to evaluate for both early and late complications.

Results:

Thirty-one out of 35 sites (88.6%) were healed at most recent follow-up, and 29 of the sites (77.1%) healed with a single surgery. When comparing the union rates of the 2 groups, 15/16 (94.4%) of the routine compression group healed, including one patient who was an active smoker (Figure 1), compared to 16/21 (76.2%) who did not undergo routine compression. One of the nails failed in a patient who had routine compression compared to 3 that failed in the non-routine compression group. All 4 patients underwent revision surgery. Two of the 3 patients in the non-routine group subsequently underwent routine compression and healed uneventfully whereas the remaining patient did not undergo compression and the revision hardware failed. The patient in the compression group that underwent revision had routine compression and healed uneventfully. One other patient also sustained a screw failure secondary to over compression in the routine compression group. Complications in the non-routine group included 1 fracture through the allograft after a fall, 1 wound dehiscence, the backing out of 4 screws/pegs with one that required removal, and fracture of 1 screw. There was no evidence of reabsorption of any of the allografts, recurrent tumor, or infections at final follow-up. One late fracture occurred in the compression group that healed uneventfully without surgery.

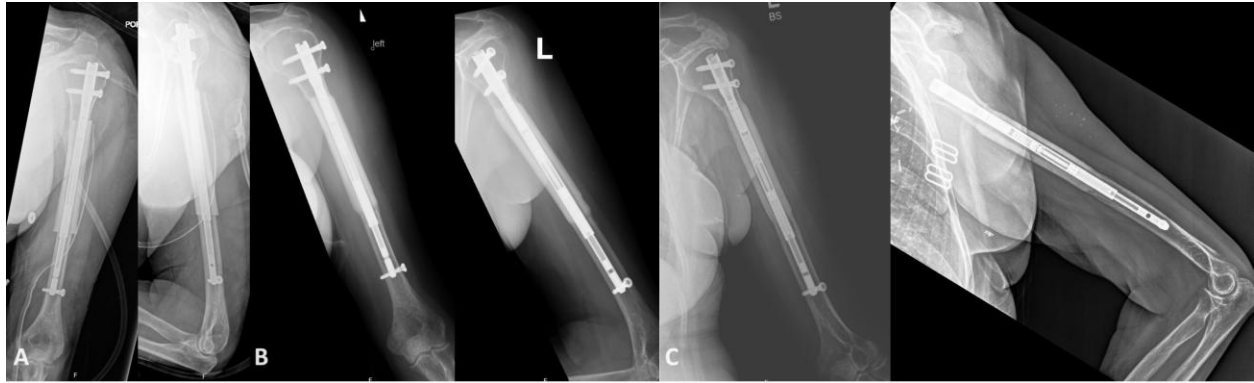


Figure 1: A) AP and lateral humeral radiographs of a 58-year-old female who actively smokes 1/2 pack per day with oligometastatic breast cancer. The patient underwent resection with intercalary allograft reconstruction and underwent routine compression post-operatively. B) AP and lateral radiographs 6 weeks after surgery demonstrating healing of the osteotomy sites and incorporation of the allograft. C) AP and lateral radiographs 4 months after surgery demonstrating continued incorporation and remodeling at the osteotomy sites.

Discussion & Impact:

In this series, there was a union rate of 88.6% at final follow-up with 77.1% after a single surgery. The use of routine post-operative compression improved the rate of healing to 94.4% compared to 762%. The complications in the routine compression group were decreased. Routine post-operative compression appears to improve the union rates and decrease the complications of this technique, although further study is needed.