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Title: Reconstruction of metastatic bone defects with a bisphosphonate eluting bone graft substitute

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Background: Bisphosphonates inhibit the osteoclast mediated bone destruction associated with secondary malignant bone tumors. They also induce apoptosis of tumor cells and could therefore potentially contribute to prevention of local recurrence as well as restoration of bone.

Purpose: To report an early clinical experience with use of local delivery of zoledronic acid in the reconstruction of metastatic bone defects.

Methods: Six patients (5f, 1m, mean age 64 (range 37-81) who had undergone reconstruction of metastatic bone defects with implantation of a gentamycin eluting sulphate-apatite bone graft substitute (Cerament™ |G, BONESUPPORT, Lund, Sweden) which we additionally loaded with zoledronic acid, were prospectively followed for a mean of 12 months (range 6-17). In all 5 female patients, the indication for treatment was a partially contained bone defect associated with incipient or actual pathologic fracture of the acetabulum (n=3) or proximal humerus (n=2) secondary to metastatic breast cancer. The only male patient had wide resection of a solitary lung cancer metastasis from the proximal femur.

Results: Sequential imaging (X-ray/CT) demonstrated progressive consolidation of the inserted graft material without any evidence of persistent osteolysis or local recurrence. Rapid and homogeneous remodeling typically started in well-contained areas with cancellous bone contact. Substantial bone formation was also observed in uncontained areas where graft material had been applied to the surface of metallic implants or surrounding cortical bone in some cases.

Conclusion: This small and inhomogenous case series demonstrates that successful restoration of metastatic bone defects with a bisphosphonate eluting bone graft substitute is possible in selected cases.