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Title: Early Clinical Experience with Local Bisphosphonate Delivery for Bone Defect Reconstruction in Benign Aggressive Bone Tumors

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Background: Bisphosphonates inhibit osteolysis associated with benign bone tumors mediated by osteoclasts. They also induce apoptosis of tumor cells and have shown promising reduction of local recurrence rates in small case series. We have developed a surgical method for reconstruction of cavitory bone defects with a combination of cancellous allograft and a synthetic bone graft substitute, able to deliver and elute antibiotics as well as zoledronic acid locally.

Purpose: To report our early clinical experience with local delivery of zoledronic acid for bone defect reconstruction in benign, aggressively behaving bone tumors.

Methods: We prospectively followed 11 patients (9f, 2m, mean age 35 (range 18-62)) with aggressively behaving benign bone tumors (5 GCT, 4 ABC, 2 UBC) who underwent tumor resection with curettage, high speed burring and subsequent bone defect reconstruction utilising a combination of a gentamycin eluting bone graft substitute (Cerament™ |G, BONESUPPORT, Lund, Sweden) and cancellous allograft with serial imaging (X-ray/CT) for a mean of 11 months (range 7-17).

Results: Radiographic evidence of local bone formation and remodeling by far exceeded rates and amounts usually observed with either single component alone. Rapid and homogeneous remodeling typically started in areas with cancellous bone contact in the periphery of the defects but was not limited to the cavities only. Substantial periosteal bone formation was also observed in areas of ungrafted surrounding cortical bone.

Conclusion: Effective local delivery and elution of zoledronic acid appears to substantially enhance and accelerate local bone formation/remodeling in our patients. Further studies to confirm this hypothesis are needed.