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[O62] RADIOGRAPHIC AND HISTOLOGICAL ANALYSIS OF A SYNTHETIC BONE GRAFT SUBSTITUTE ELUTING GENTAMICIN IN THE TREATMENT OF CHRONIC OSTEOMYELITIS: A RETROSPECTIVE STUDY IN HUMANS

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Aim: This study describes and correlates the radiographic and histologic changes which develop in a Gentamicin-eluting synthetic bone graft substitute* in the management of bone defects after resection of chronic osteomyelitis (COM).

Method: 100 patients with COM were treated with a single stage procedure, including management of the dead space with insertion of a Gentamicin-eluting synthetic bone graft substitute*. Radiographs of 73 patients with a follow-up of at least 12 months (range 12-33 months) were available for review. Bone defects were diaphyseal in 32, metaphyseal in 34 and combined in 7 patients. In 3 patients, radiographs were not of sufficient quality to allow analysis.

Five patients had subsequent surgery, not related to recurrence of infection, which allowed biopsy of the implanted material. These biopsies were harvested between 12 days and 9 months after implantation. Tissue was fixed in formalin and stained with haematoxylin-eosin and immunohistochemically for bone matrix markers.

Results: Radiographic: 31 of 34 diaphyseal implantations (91%) demonstrated remodelling of the biocomposite, gradually over many months, producing new bone and resulting in a "normal post-osteomyelitic" appearance. In metaphyseal implantations, new bone filled two-thirds or more of the defect in 55% of cases, one to two-thirds was filled in 31% and one third or less was filled in 14%. 22% of patients exhibited radiographic signs of dissolution and remodelling which are specific to this material. The 'Halo' sign of peripheral zone remodelling, the 'Marble' sign of dissolution and the 'Puddle' sign of distal migration can be described.

Histologic: Histological assessment revealed early active remodelling of the biocomposite. The material was osteoconductive with accumulation of osteoblasts and osteoid and woven bone formation on the surface of the Gentamicin-eluting synthetic bone graft substitute* separated by fibrous tissue at the edge of the defect beneath reactive viable host bone. Fibrous tissue contained a heavy macrophage infiltrate and the newly formed matrix contained the specific bone proteins, dentine matrix protein-1 and podoplanin. There was limited evidence of remodelling into lamellar bone at 20 weeks after implantation.

Conclusions: The Gentamicin-eluting synthetic bone graft substitute* exhibits a specific pattern of radiographic change over many months after implantation. The resolution of the bone defect would appear to be due to bone formation, as seen in the histologic and immunohistochemical analysis.

*Cerament G™