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[O99] RADIOGRAPHIC REMODELING PATTERNS OF A GENTAMICIN-ELUTING HYDROXYAPATITE / CALCIUM SULFATE BIOCOMPOSITE. PRELIMINARY RESULTS FROM A LARGE ANIMAL MODEL

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Aim: A gentamicin-eluting biocomposite consisting of hydroxyapatite and calcium sulfate[1] can provide effective dead space management in chronic osteomyelitis. However, radiographic follow-up after implantation of this novel material has consistently shown evidence of several unique imaging features previously not described with other comparable bone graft substitutes. Conclusive interpretation of these newly described imaging features is difficult as long term follow-up and histological correlation is not yet available. The aim of this study was to establish a large animal model, closely simulating the clinical situation in order to permit further analysis of imaging features in correlation with histological progression of bone remodeling.

Method: Standardised bone defects were created in ten Merino-wool sheep (age: two to four years). Large drill holes (diameter 2.5cm, depth 2cm, volume approx. 10ml) were placed in the medial femoral condyles of both hind legs and filled with a gentamicin antibiotic eluting bone graft substitute*. Initially surgery was carried out on the right hind leg. Three months later, an identical intervention was performed on the contralateral side. With sacrifice planned after six or twelve months, bone voids three, six, nine and twelve months post-implantation are obtained for evaluation. The study was approved by the Animal Care Committee of Thuringia, Germany.

Results: We present our preliminary radiographic results after a follow-up of six months. The biocomposite was clearly visible on all initial post-operative radiographs, showing intimate contact to the surrounding cancellous bone of the distal femur. At one month, a radio-dense ring around the bone void (the so called “halo sign”) was found in four of six bone voids treated with the biocomposite. From 2 months onwards this “halo” typically appeared to progress towards the centre of the treated defects, where spherical remnants of the composite often become increasingly apparent. This pattern has been termed “marble sign” and often appears in combination with the halo-sign. Between three to six months bone remodeling appears to continue, halo- and marble sign increasingly disappear and the composite becomes more and more indistinct from surrounding cancellous bone.

Conclusions: We have established a large animal model, which appears to mimic the clinical situation very well and reproduces comparable radiographic post implantation features previously observed and described in clinical cases (including the “halo” and the “marble” sign). We expect that this model will provide valuable information regarding the correlation between histological and basic & advanced imaging features (including MRI, CT and Dexa scans) in the future.

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