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Sonication cultures improve the microbiological diagnostic in low-grade infection of modular megaprotheses

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Introduction: Microbial biofilms growing adherently on prosthetic surfaces may inhibit the detection of pathogens causing prosthetic joint infections. In this context, especially modular megaprosthesis are known for high infection rates followed by high rates of revisions.

Objectives: To evaluate the sonication culture method performed on modular megaprosthesis to improve the microbiological diagnostic in comparison to tissue culture.

Methods: The sonication cultures of the explanted modular megaprotheses were cultured according to the protocol by Trampuz et al in the NEJM. Included were 14 patients with a modular megaprosthesis of lower extremity, whose prostheses had been explanted due to suspected joint infection or revision surgery. The prosthesis was implanted initially due to: Osteosarcoma N=9, Liposarcoma N=1, Malignant Fibrous Histiocytoma N=1, Lymphoma N=1, trauma N=1 and revision of total hip arthroplasty N=1. The diagnosis of infection was evaluated according to the definition of the Musculoskeletal Infection Society (MSIS).

Results: We investigated 14 patients with an explanted modular megaprosthesis of proximal femur (n=4), the distal femur (n=7), total femur (n=2) and the proximal tibia (n=1). From all detected pathogens in sonication cultures the most frequently were *Staphylococcus epidermidis* (n=4) and *Staphylococcus aureus* (n=2) as well as low virulent pathogens (Small colony variants / *Micrococcus* species / *Finnegoldia magna*). The sensitivity / specificity of sonication cultures in all patients was 91% / 100% compared to 54% / 100% in periprosthetic tissue cultures. The sensitivity / specificity of sonication cultures in patients without preoperative antibiotic therapy was 100% / 100% compared to 57% / 100% in periprosthetic tissue cultures.

Conclusions: The outcome of this study showed encouraging results, especially in detection of low grade infection of modular megaprosthesis. Furthermore the differences in sensitivity in patients with and without preoperative antibiotic therapy showed a high impact in false negative microbiological results.