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[O102] CALCIUM SULFATE INDUCED MEMBRANE IN A RAT FEMUR CRITICAL-SIZED DEFECT MODEL: CHARACTERISTICS AND DIFFERENCES FROM PMMA INDUCED MEMBRANE IN MASQUELET TECHNIQUE

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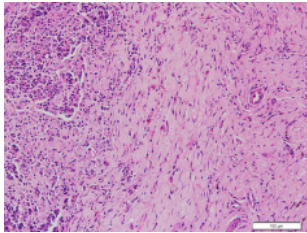
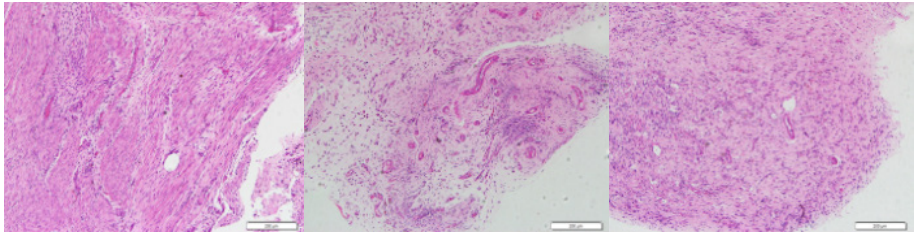
Aim: Calcium sulfate has been recently applied in clinics as a local antibiotic carrier for the treatment of chronic osteomyelitis. We found that calcium sulfate can also induce the formation of membrane in clinical cases. This study aimed to investigate characteristics of calcium sulfate induced membrane and its differences from the membrane in Masquelet technique induced by polymethylmethacrylate (PMMA).

Method: Sprague Dawley rats (n=32) were equally randomized to PMMA group or calcium sulfate group. After femur critical-sized defect model was made, PMMA or calcium sulfate was placed in the site of bone defect. Cellular components, histological changes and growth factor expressions in the calcium sulfate and PMMA induced membranes were compared at 2, 4, 6 and 8 weeks, respectively. In addition, expressions of vWF, IL-6, VEGF, BMP-2, TGF- β and ALP genes in were also compared.

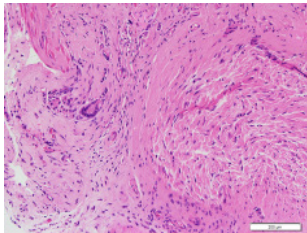
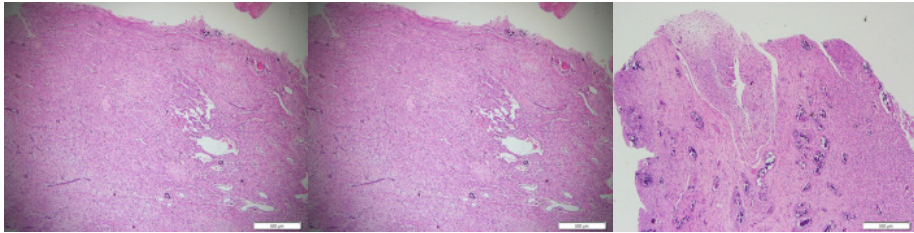
Results: The structural characteristics including locations of blood vessels were similar between calcium sulfate and PMMA induced membranes. However, calcium sulfate induced membrane was thicker than that by PMMA. Mesenchymal stem cell (MSCs; CD34+, CD54+, CD90+) was found in calcium sulfate induced membrane. Levels of BMP-2, TGF- β , ALP and VEGF in calcium sulfate induced membrane were significantly higher than those by PMMA at all time points ($P \geq 0.05$). In addition, we found that osteogenic and neovascular activities of both calcium sulfate and PMMA induced membranes achieved the highest levels at 6 weeks. Moreover, expressions of vWF, VEGF, BMP-2, TGF- β and ALP genes in calcium sulfate induced membrane were significantly higher than those in PMMA induced one ($P < 0.05$).

Conclusions: Calcium sulfate induced membrane has similar structural characteristics but a better capacity of generating higher levels of different growth factors. Calcium sulfate and PMMA induced membrane achieve the highest levels of osteogenic and neovascular activities at 6 weeks. Considering the degradable feature of calcium sulfate, it may have the potential ability to replace PMMA as a novel spacer in Masquelet technique.

Oral Abstracts



Calcium sulfate: 2 weeks 4 weeks 6 weeks 8 weeks



PMMA: 2 weeks 4 weeks 6 weeks 8 weeks

Fig. 1 H&E staining between calcium sulfate and PMMA induced membranes at 2, 4, 6 and 8 weeks, respectively