

Limited Suitability of Calcium Phosphate in the Treatment of Osteoporotic Vertebral Body Fractures – A Prospective, Randomized, Clinical Trial of Percutaneous Balloon Kyphoplasty Comparing Calcium Phosphate Versus Polymethylmethacrylate

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INTRODUCTION: In kyphoplasty and vertebroplasty, polymethylmethacrylate (PMMA) currently represents the standard augmentation material. It is characterized, however, by a lack of osteointegration and its limited biocompatibility.

METHODS: This prospective, randomized trial investigated the feasibility of calcium phosphate (CaP) for augmentation of osteoporotic vertebral body fractures by means of percutaneous balloon kyphoplasty in comparison to PMMA. Inclusion criteria were osteoporotic fractures of vertebral bodies in the thorocolumbar spine, patient age ≥ 65 years, and fracture age ≤ 4 months. Exclusion criteria were tumor lesions and additional posterior instrumentation.

RESULTS: A total of 60 osteoporotic vertebral body fractures in 56 patients were included. CaP and PMMA were randomly applied in 30 cases each. All 60 fractures were classified type A (acc. to Magerl et al.). Of these, 19 were classified type A3.

52/56 patients experienced p.op. pain relief (2.1 ± 1.9 to 8.2 ± 1.5 on a Visual Analogue Scale from 0

“worst” to 10 “best”). Endplate angles were restored by $6.2^\circ \pm 2.9$ on average. For both parameters (pain relief and restoration of endplate angle), no statistically significant difference was found between the groups.

Cement-specific complications were vascular embolism using PMMA (n=2); subtotal “cement-washout” using CaP (n=1); and substantial loss of correction on radiographs 6 weeks p.op. due to cement failure in all fractures type A3, if CaP had been applied (n=9). There was no case of cement failure, when PMMA had been used.

DISCUSSION & CONCLUSIONS: Currently in kyphoplasty, a routine use of CaP cannot be recommended. Due to its minor resistance to bending, extension, and shear forces compared to PMMA, there is a high risk for cement failure and subsequent loss of correction in the well defined clinical setting of osteoporotic vertebral body fractures type A3.