A new type of bone stuff with bone morphogenetic protein is used in vertebroplasty.

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Abstract:

BACKGROUND: Calcium phosphate bone cement (CPC) has good biocompatibility and no disadvantages of polymethyl methacrylate (PMMA). CPC with recombinant human bone morphogenetic protein-2 (rhBMP-2) has a microporous structure, and its clinical value can be improved in percutaneous vertebroplasty. OBJECTIVE: To evaluate the feasibility of injectable CPC and fibrin sealant (FS) combined with rhBMP-2 in vertebroplasty of New Zealand white rabbits to replace PMMA. METHODS: CPC/FS/rhBMP-2 was prepared. Tight muscle pouch model in mice was used to evaluate the osteoinductive activities of the implant materials. Imitation of vertebral plasty was used to observe the biomechanical changes of new composite material and PMMA after their implantation. RESULTS AND CONCLUSION: At 2 and 4 weeks of CPC/FS/rhBMP-2 implantation, alkaline phosphatase levels were the highest. At 4 weeks of CPC/FS/rhBMP-2 implantation, new bone formation and chondrocyte maturation could be seen, and the compressive strength and torsion strength were obviously lower than those of the normal vertebral and PMMA implantation ($P < 0.05$). After 8 weeks of implantation, part of the CPC/FS/rhBMP-2 cement was degraded with some increases in compressive strength and torsion strength, and the torsion strength was similar with that of the normal vertebral, but was lower than that of PMMA implantation ($P < 0.05$). Micro CT showed that the new bone was plenty and its formation was in the early stage, and there was no material absorption or surrounding bone ingrowth could be seen in PMMA. It is indicated that good bone induction and bone conduction can be obtained after CPC/FS/rhBMP-2 implantation, and the degradation of CPC/FS/rhBMP-2 can synchronize with new bone formation to

achieve normal bone healing. CPC/FS/rhBMP-2 is expected to replace PMMA in vertebral plasty.