Effect of recombinant human bone morphogenetic protein-2/fibrin sealant implatation combined with core decompression on treating avascular necrosis of the femoral head in a rabbit. [Chinese]

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Abstract:

Background: Bone morphogenetic protein-2 has been previously proved to not only stimulate and different bone tissue-derived cells, but also induce differentiation from cell strain into osteoblasts; however, direct application of bone morphogenetic protein has poor effects on repairing bone defects. Objective: To study new bone formation in a rabbit model of avascular necrosis of the femoral head (ANFH) following recombinant human bone morphogenetic protein-2 (rhBMP-2)/fibrin sealant (FS) implantation combining with core decompression. Design, Time and Setting: A randomized controlled animal experiment was performed at the Affiliated Hospital of Medical College of Chinese People's Armed Police Force from January 2005 to December 2007. Materials: Composite was made by rhBMP,2 and FS, and the final concentration of rhBMP-2 was 1 mg/L. Methods: Animal models of ANFH were made by injecting hormone. The rabbits were randomly divided into three groups, including rhBMP-2/FS implantation group, rhBMP-2 implantation group, and core decompression alone group. Main Outcome Measures: Signal changes of femoral head and sclerotin were detected using MRI method; new bone formation was observed under optic microscopy; calcium content was measured using atomic absorrtion spectrophotometer. Results: MRI indicated that new bone replaced primary bone defect channel at week 8 after rhBMP-2/FS implantation. A few of new bones were observed in the rhBMP-2 implantation group, and fiber tissue was still observed in the core decompression alone group. Morphology suggested that a great quantity of mature bone trabecula and plate-shaped bone replaced primary bone defect channel at

week 8 after rhBMP-2/FS implantation. Bone defect was decreased in the rhBMP-2 implantation group, accompanying with a few of bone trabecula and blood capillary but a large quantity of fiber tissues. At week 8 after core decompression alone, bone defect was decreased, and a few of new bones were observed. Fiber tissue still existed in the center, and any bone tissue did not fill in it. Calcium content in the rhBMP-2/FS implantation group was greater than rhBMP-2 implantation group and core decompression alone group ($P < 0.01$). Conclusion: Bone morphogenetic protein can induce new bone formation in ischemic and necrotic femoral head; in addition, the rhBMP-2/FS composite can significantly induce and improve new bone formation.