Autologous activated platelet-rich plasma (PRP) in bone tissue healing – does it work?
Assessment of PRP effect on bone defect healing in animal models

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Abstract

Introduction: Platelet-rich plasma (PRP) preparations can be used in bone tissue healing but there are numerous doubts among clinical orthopedists about effectiveness of this method.

Materials and methods: The studies were carried out in 12 rabbits of white termond breed. In operating room we operationally generated cylindrical, unicortical defects of the diameter of 4 mm in the middle of the shafts of both femurs. The defects in the left bones were left without filling and served as controls, and 0.7 ml of the ready-to-use PRP was administered to the defects in the right bones (experimental group). We evaluated the usefulness of the diagnostic methods applied: biomechanical tests, micro-CT tests, densitometry, typical radiology, macroscopic measurements, histopathological examinations.

Results: The macroscopic measurements showed a statistically significant increase in the dimension in the area of the right defect filled with PRP in relation to the control group. In experimented group, the assessment of the X-ray images showed the formation of a callus cuff around the defects. Densitometric examinations showed no statistically significant differences between defects in the experimental and control group. The analysis of the micro-CT examinations showed an increase in the total volume of the tissue examined (Vb) and the low density tissue fraction (Vb₂) in the experimental group. The biomechanical examinations revealed significant decrease in the maximum breaking force (F max) necessary to break the bone in the experimental group in relation to the control group.

Conclusions: Platelet-rich plasma (PRP) stimulates bone formation in the area of bone defects and may accelerate bone regeneration.

Key words: platelet-rich plasma, bone regeneration, bone defects, rabbit model