Platelet Gel Supplementation in Long Bone Nonunions Treated by External Fixation

Reference:

Scientific Literature Review

Reviewed by: Joshua Decker, DPM
Residency Program: Detroit Medical Center, Detroit, MI

Podiatric Relevance:
The specific indication for the use of platelet rich plasma to aid in bone and wound healing remains a controversial topic in orthopedic surgery. For instance, the literature describing its use to fill bone defects and enhance bone graft incorporation in maxillofacial surgery and in high risk patients undergoing elective foot and ankle surgery have yielded good results; however, its use as a supplement in spinal fusions has produced more controversial results. Because non-unions are a common complication in podiatric surgery, the use of osteoinductive materials, including platelet rich plasma, should be addressed.

Methods:
This study evaluated a prospective sample of twenty patients with aseptic, atrophic nonunion in the diaphysis of a long bone suitable for treatment with external fixation (tibia, humerus and forearm) and frozen platelet gel. That group was retrospectively compared to a historical control group of twenty patients not treated with frozen platelet gel. All patients were treated by the same surgeon with unilateral external fixation supported in compression without opening of the nonunion rim. Two days before the operation, platelet rich plasma was prepared and frozen. On the day of surgery, the frozen platelet rich plasma was thawed to room temperature and injected into the non-union rim with thrombin and calcium gluconate. Three radiologists determined union when a bridging callus was viewed on 3 of 4 cortices.

Results:
The total healing rate of nonunions was 90% (18/20) in the platelet rich plasma group and 85% (17/20) in the historical control group. The mean time until radiographic consolidation was 147 days in the platelet rich group and 153 days in the historical control group. These two variables (healing rate and time to radiographic consolidation) were not statistically significant (p=0.633 and p=0.530 respectively), although on five patients the mean concentration of platelets was 4.1 times that of the baseline platelet count.

Conclusion:
Delayed and nonunion is a common complication of long bone diaphyseal fractures in the human body. On the basis of the findings of this study, the authors did not show any clinical usefulness of isolated percutaneous platelet growth supplementation in diaphyseal long bone nonunions treated by external fixation. The use of platelet rich plasma in foot and ankle surgery remains controversial, and it should continue to be tested in a clinical setting to evaluate its effect on bone healing.