Effects of Platelet Rich Plasma on Healing Rate of Long Bones Non-union: A Randomized Double-Blind Placebo Controlled Clinical Trial

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Background and Aim: Non-unions are among the most complex complications of long bone fractures and their treatment remains a dilemma to orthopedic surgeons. Several strategies including electromagnetic fields, absorbable implants and recombinant bone morphogenetic protein have been used for treatment of non-unions with controversial results. Plasma rich platelet (PRP) contains high concentrations of platelet-derived growth factors which stimulate the tissue healing process. The aim of this clinical trial is to determine the effects of PRP on healing rate of long bones non-union.

Materials and Methods: This was a randomized double-blind placebo controlled clinical trial being performed in a 17-month period in Chamran hospital, Shiraz, Iran. We included adult (≥18 years) patients suffering from long bones (Femur, Tibia, Humerus and Ulna) non-union who were randomly assigned to receive mL PRP (n=57) or mL placebo (n=57) in the site of fracture after intramedullary nailing or open reduction and internal fixation (ORIF). We excluded those with infectious non-union, vascular injuries, malignancies, skin defects, metabolic bone disorders and platelet count<150,000/mL. Patients were followed each 90 days till 9 months and were evaluated both clinically and radiologically. The healing rate, failure rate, incidence of infection, mal-union and limb shortening were recorded and compared between groups.

Results: The mean age of the patients in PRP and placebo groups were comparable (24.2±1.9 vs. 24.6±2.3; p=0.49). The clinical and radiological healing rate was significantly higher in those who received PRP compared to placebo (81.1% vs. 73.7%; p=0.02). The limb shortening was significantly higher in those who received placebo compared to PRP (2.5±1.8 vs. 1.8±1.2mm; p=0.04). Injection of PRP was also associated with lower pain scores (p=0.01) and shorter healing duration (p=0.04). The surgical site infection (p=0.9) and mal-union rate (p=0.77) were comparable between groups.

Conclusion: Injection of PRP in the site of non-union of long bones after intramedullary nailing or ORIF results in higher cure rate, lower limb shortening, less postoperative pain and shorter healing period. Infectious complications are not higher compared to placebo. Thus application of PRP could be an available, economic and effective strategy for treatment of long bones non-union.

Keywords: Non-union; Long bones; Plasma rich platelet (PRP); Intramedullary nailing; Open reduction and internal fixation (ORIF).