

Will Platelet Rich Plasma Open New Era for Treatment of Rotator Cuff Tear?

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About 30% to 70% of chronic shoulder pain is developed by rotator cuff tear, impairing daily living activities, and quality of life.¹⁻³⁾ It is reported that progression of tears is not only characterized by cellular but also extracellular matrix changes including reduced cell number, decreased vascularization, poor matrix organization, changed gene expression and alterations in proteoglycans and collagens, which play an important role in rotator cuff tear pathology.⁴⁻⁶⁾ Some of the up-to-date literatures point out that platelet rich plasma (PRP) provides potential healing environment for tendon to bone attachment.^{7,8)} However, there has been no comparative study of PRP effect on tenocytes collected from the rotator cuff between normal and degenerative torn tendon.

It is well known by many other literatures state that the cell proliferation, or density of tenocytes are much more higher in teared rotator cuff than normal rotator cuff.^{4,9)} Moreover, Anitua et al.^{10,11)} reported that 20% PRP releasate (vol/vol) increased cell proliferation and the production of vascular endothelial growth factor and hepatocyte growth factor in human healthy hamstring tendon. It is proven in the research by Jo et al.¹²⁾ that PRP activated calcium with or without thrombin significantly stimulated the proliferation of tenocytes from human rotator cuff tendons with degenerative tears in a dose-dependent manner.

The mechanism of proteoglycan transformation is also found to be critical in pathology of rotator cuff tear. Lo et al.¹³⁾ revealed changes in proteoglycans; aggrecan increased while decorin decreased in the ruptured rotator cuff tendon when compared with normal cadaveric controls. Elevated level of proteoglycan, tenascin-C and fibronectin, in ruptured rotator cuff was reported.^{14,15)}

The enhancement of gene expression of makers for collagen type I, and decrease of collagen type III level is carried out by

PRP, and resultant positive collagen I/III ratio was achieved in equine tendon explants.¹⁶⁾ de Mos et al.¹⁷⁾ claimed that when PRP was injected to normal tendon of 13 to 15 aged children, number of cell, and total level of collagen were significantly increased, but decreased the gene expressions of type I and III collagen without affecting the III/I ratio was identified.

The effect of PRP was quiet different from that of de Mos et al.,¹⁷⁾ since the gene expression of type I and III collagen in both tenocytes from normal and degenerative tendon were increased, and Yoon et al.¹⁸⁾ showed that there were no statistically significant differences between normal and degenerative tendon. The gene expression of type III collagen was only significantly increased in degenerative tendon. However, the fold-change of type I collagen in degenerative tendon was higher than in normal tendon. Although there were no statistical significances, this increased rate can be considered to reflect a greater impact of PRP on the degenerative tendon.

The retear rate after rotator cuff repair varies depending on tear size of tendon, number of tendons involved, and the age of patients. It is described that rates of retear are up to 80% to 90% exist in the radiology literature and are as high as 57% in the orthopaedic literature.¹⁹⁻²¹⁾ However, according to the previously published studies, when PRP technique is added, decrease of the retear rate of rotator cuff is expected.

PRP, which promotes cellular proliferation and regeneration, is being utilized in many field of medical science and related researches are in full swing. PRP expedites tenocyte proliferation in both normal and degeneratively torn rotator cuff and facilitates tendon matrix synthesis. Not only PRP has a positive effect on cell proliferation, but also elevated matrix gene expression and synthesis in tenocytes from degenerative torn tendon than tenocytes from normal tendon. Applying properly administrated PRP

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in treating rotator cuff tear will promise excellent functional outcome.

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