Responders to Platelet-Rich Plasma in Osteoarthritis: A Technical Analysis

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1. Introduction: Proximal Knee osteoarthritis (OA) is one of the major causes of pain and physical disability in older sportsmen. The management of chondral disease is challenging because of its inherent low healing potential. New studies have focused on modern therapeutic methods that stimulate cartilage healing process and improve the damage, including the use of platelet-rich plasma (PRP), an autologous growth factor treatment. PRP is prepared from autologous blood by centrifugation to obtain a highly concentrated sample of platelets, which is four to five times higher than that of normal blood. Many papers were published on PRP for knee OA, including a lot of randomized controlled trials (RCTs) and different systematic reviews. Due to the mixed results from controlled studies, the clinical efficacy of PRP in the treatment of knee OA is unclear with shortcomings in the current literature.

2. Purpose: The objective of this study was to evaluate the similarities and differences between the variety of PRP formulations, preparation, and uses of this techniques in literature and to try to determine characteristics of the PRP which tend to give the best responses for the treatment of knee osteoarthritis.

3. Methods: A comparison of the outcomes of randomized controlled trials (RCTs) included in the 3 most recent and high-quality meta-analyses to classify the different studies in 2 groups (bad responders group (BRG) and very good responders group (VGRG)). The minimal clinically important improvement (MCII) was defined to help determining whether an observed difference is clinically important. We used MCII values to classify the different studies in 2 groups depending on the outcomes: BRG < MCII and VGRG > 2xMCII.

The full texts were thoroughly read to extract features of the PRP used by the various authors from the 2 groups. Features included the number of injections, time between injections, volume of PRP, centrifugation technique, time after blood puncture before injection, anticoagulation, platelet/erythrocytes or red blood cells (RBC)/leukocytes or white blood cells (WBC) concentration, platelet activation, use of NaHCO₃ tampon, and rehabilitation after infiltration.

4. Results: From the 19 RCTs analyzed, 7 trials were included in the VGRG and 4 in the BRG. Eight studies were not included in any group.

Time after blood puncture before injections was less than 2 hours. Freezing technique was used to conserve the PRP units when other injections were scheduled in the following weeks in 2 to 3 out of 11 studies. In other studies, blood was extracted eachtime. In VGRG, 1 or 2 injections were performed in 4/7 trials given, against 3 in all the studies of the BRG. Time between injections was 2 to 3 weeks in 4/5 studies with many injections. Volume injected varied from 2.5 to 8 mL. Centrifugation technique was variable. Single spinning technique was the one used most (5/7 VGRG) and this technique appears to give better results than double spinning technique. Concerning the quality of PRP, based on the classifications of Mishra and PAW, it was respectively 4B and P2B β in 5/7 studies. The use of PRP with leukocytes is only found in the BRG.

5. Conclusions: There is a lack of standardization in PRP preparation technique for knee osteoarthritis. However, our study helped identify features of PRP recommended for knee OA treatment, such as the use of a single spinning technique, a platelet concentration lower than 5 times the baseline (from 3 to 4), and avoiding leukocytes and erythrocytes. We recommend leveraging this information about PRP for future studies.

6. Reference:

Milants C, Bruyère O, Kaux JF. Responders to Platelet-Rich Plasma in Osteoarthritis: A Technical Analysis. **Biomed Res Int.** 2017;7538604.