PRP: What, When and Why?

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I. Overview/Case Presentation

II. Basic Science

Platelets are small, nonnucleated bodies in peripheral blood that are known for their role in hemostasis. Platelets also contain a number of proteins, cytokines, and other bioactive factors that initiate and regulate basic aspects of wound healing. Normal platelet counts in blood range from 150,000/µL to 400,000/µL. Plasma is the fluid portion of blood and contains clotting factors and other proteins and ions. Platelet-rich plasma, with a platelet concentration of at least 200,000 platelets/µL to 1,000,000 platelets/µL, is associated with the enhancement of healing. Platelet-rich plasma contains a 3 to 5 fold increase in growth factor concentrations.

Platelet-rich plasma can potentially enhance healing by the delivery of various growth factors and cytokines from the α-granules contained in platelets. These factors play important roles in cell proliferation, chemotaxis, cell differentiation, and angiogenesis. Please see table below.

III. PRP Preparation

A wide variety of PRP preparation systems are used commercially in the treatment of orthopaedic patients. Due to this variability, it is difficult to compare studies within the current literature to come to a consensus on the use of PRP. There are substantial differences in the content of platelet concentrates produced by the various separation techniques. The most recent topic of discussion is whether a PRP preparation is leukocyte-rich or leukocyte-poor. Several studies have demonstrated a difference in the platelet and growth factor concentrations in PRP produced by platelet separation systems. Standardized dosing and composition of PRP is necessary in order to compare the data from different studies.

IV. Clinical Use

A. Chronic Tendinopathy

Of the uses for PRP in sports medicine, chronic tendinopathy has been widely studied including the use for lateral epicondylitis, achilles tendinopathy, and patellar tendinopathy. Histologic studies have confirmed that tendinoses are not an acute inflammatory process, but instead are associated with angiofibroblastic degeneration, which involves mechanical overloading and abnormal microvascular
responses. Recent studies have shown mixed yet promising results with the use of PRP for these various tendinopathies. Treatment of recalcitrant lateral epicondylitis with PRP has been studied the most in recent years due to the favorable results found in multiple human and animal studies. Treatment with PRP for other chronic tendinopathies such as in the achilles and patellar tendon require further study to confirm its efficacy.

B. Acute Muscle/Ligament Injury

Acute muscle and ligament injuries are extremely common within the sports community, especially at each sport's highest level. When a player can return to play is quite often one of the first questions asked after an injury. Reducing the time that player is out recovering from these injuries has sparked great interest in modalities such as PRP. Many of the studies that show promising results with the use of PRP with these injuries are animal studies. Most of the human studies looking at the use of PRP with acute injuries have limited study participants and are retrospective in nature. With that said, there have been recent studies showing promising results with the use of PRP for these injuries.

C. Intra-operative Use

Historically, platelet derived products have been used intra-operatively for hemostasis and sealing wounds. Multiple studies within the sports medicine community have looked at the use of PRP in common procedures such as rotator cuff repair, ACL reconstruction, and achilles tendon repair. Most of the recent studies have not shown a difference with the use of PRP to aid in the healing process. Currently, the literature would not support the use of PRP on a routine basis intra-operatively for rotator cuff repair, achilles tendon repair, or ACL reconstruction.

D. Osteoarthritis

As many of the athletes we care for age, arthritis becomes an important part of our clinical encounters. Hyaluronic acid injections have become common place within the spectrum of treatment options for DJD, especially within the knee. Recent studies have shown that PRP may be a safe and effective alternative for pain control with these patients.

V. The Future

There have been exciting new developments within the orthopaedic sports medicine community in regards to the use of autologous blood products such as PRP to improve the healing of such ligaments as the ACL which historically have been known for their poor healing potential. Recent animal studies involving the use of an extracellular matrix-based scaffold loaded with autologous platelets applied to a ACL repair have shown promises results. This treatment encouraged both biologic and mechanical healing, as well as, showed decreased development of post-traumatic osteoarthritis. More studies like this are being done to investigate the use of biologics within orthopaedics to enhance the healing potential or possibly eliminate the need for certain procedures such as ligament reconstruction.
VI. References


