

Chronic Pain Management and Pregnancy

A Platelet Rich Plasma Epidural Case Study

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Introduction:

Platelet Rich Plasma (PRP) has been used extensively in the fields of reconstructive cardiovascular surgery, plastic surgery, spine surgery, oral and maxillofacial surgery, podiatric surgery, advanced wound care and is now being introduced to pulmonary care. PRP is defined as a sequestration and concentration of platelets within the plasma fraction of autologous blood. The philosophy behind the use of PRP is the deliverance of high concentrations of growth factors and cytokines to enhance the healing process.

Platelets are colorless cell fragments, produced when the cytoplasm of bone marrow, termed megakaryocytes, fragment, and enter the circulation.¹ Platelets do not contain a nucleus, but have organelles such as mitochondria and granules, with α granules containing more than 30 bioactive proteins that play an essential role in hemostasis and hard and soft tissue healing.² Each platelet has approximately 50 to 80 α granules and platelet counts of 150,000 to 300,000/ μ L are considered normal in the human blood.^{2,3} PRP should achieve a three- to five fold increase in platelet concentration over baseline, and a PRP count of 1,000,000 μ L is regarded as the benchmark for PRP.⁴ Alpha granules contain numerous proteins and peptides that aid in cellular migration and growth including platelet derived growth factor (PDGF), transforming growth factor (TGF- β), insulin-like growth factor (IGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), platelet factor 4, interleukin-1 (IL-1), platelet derived angiogenesis factor, platelet derived endothelial growth factor, epithelial cell growth factor, osteocalcin, osteonectin, fibrinogen, vitronectin, fibronectin, and thrombospondin.^{2,4} Exogenous delivery of PRP after activation results in platelet aggregation and clotting after approximately 10 minutes.⁵ During this process, platelets are actively secreting proteins from α granules, and within 1 hour approximately 95% of the α granule contents have been secreted.⁵

The theory behind PRP is to increase the concentration of platelets to an injured site. During an acute injury, the addition of PRP increases the concentration of platelets over the baseline that is normally activated during the inflammatory phase.³ Chronic injuries occur when the inflammatory phase has ceased, the phase which platelet activation normally occurs. The addition of PRP to chronic injuries reintroduces activated platelets and restarts the inflammatory phase, leading to healing.³

The efficacy in using PRP has shown promise in many clinical aspects, including augmenting cartilaginous and tendinous/ligamentous injuries. In vitro studies have shown that PRP has the potential of increasing proteoglycan and collagen synthesis in chondrocytes.⁶ When discussing

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tendinous and ligamentous injuries, PRP is thought to reverse the effects of tendinopathy by stimulating revascularization and improving healing at the microscopic level.⁷

In addition to musculoskeletal injuries, clinical and experimental observations indicate that platelets are important and potentially essential for systemic and pulmonary vascular integrity. This is supported by the fact that thrombocytopenia occurs frequently in acute lung injuries and acute respiratory distress syndrome. Adhesive interactions with neutrophils, monocytes and other immune cells in pulmonary artery blood are influenced directly by platelet number. Other anatomic and functional evidence demonstrate that platelets deposit in the acutely injured lung but the exact contributions of platelets remain to be determined.⁸

This purpose of this study is to present a multitude of case studies of both acute and chronic injuries. The patients in these studies have exhausted conservative care options and sought out alternative treatment for their condition in attempt to avoid continued steroid/pharmacotherapy or surgical intervention.

Instances of epidural injections for the purpose of pain relief are widespread and effective, yet even under proper administration the procedure is not without risk. Well established risks include infection, paralysis, and headache indicative of a number of complications including spinal headache, hemorrhage, or hematoma^[1,2,5,6,9]. Injected steroids have been documented to cause septic and aseptic meningitis as well as spinal cord embolisms wherein the steroid itself is the causative agent^[9]. In the case of pregnancy, steroids can prolong labor, lead to complications or even end in either fetal or maternal death; therefore, a need arises to find a safe alternative to steroid injections for pain management in pregnancy.

This paper presents an interesting pain management case wherein the patient being treated for cervical and lumbar pain became pregnant and thus became contraindicated for the corticosteroid injections under fluoroscopy as planned. Due to our clinical success using Platelet Rich Plasma (PRP) in place of steroids for joint and ligamentous and even spinal injuries this was a logical alternative choice^[12]. Blood has proven natural regenerative capabilities thus utilizing platelet rich plasma epidural injections was determined to be the most desirable method for treatment of her back pain during pregnancy.

The practice of re-administering autologous blood with platelets and growth factors concentrated by centrifugation as a means of managing pain and accelerating healing is spreading. While being met with the skepticism that science necessitates, pain relief and accelerated healing have been documented in dental medicine, sports medicine, orthopedic medicine, and wound care, while pilot studies are being conducted in neurological and cardiovascular fields^[3,4,7,8,10,11]. Even studies comparing PRP to corticosteroid injections for the purpose of pain management show PRP to be a safe and effective means of treatment^[3]. Despite the controversy surrounding the efficacy of platelet rich plasma, providing the patient with autologous blood under sterile conditions without sedation was a safe and fast way to provide her with significant pain relief during pregnancy.

MC is a 35 year old female who had her initial consultation on July 11th, 2011. The patient's initial complaints were of neck pain with headaches and radiation of symptoms to the

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parascapular area and upper extremities. She also presented with low back pain and lower extremity radiation of symptoms. This pain has been ongoing since a motor vehicle collision on March 3rd 2011. The patient was pregnant at the time of the accident and experienced temporary contractions following the accident without other pregnancy complications. She was unable to seek conventional therapies for her pain due to the pregnancy.

Upon her initial visit at the office, the patient stated that her pain was worse with sitting or standing. Her exam revealed spinous process tenderness to the cervical, thoracic, and lumbar spine with palpable muscle spasms and limited range of motion due to pain. The risks and benefits of treatment were explained and the patient received a cervical steroid injection on the same day as her initial visit with no complications. She had 3 days of relief before her neck pain returned. A repeat steroid injection was given on July 26th 2011, with little short term relief. Afterward, the patient was referred to physical therapy where she received 6 months of treatment with no long term relief of her pain. When returning back to the office in January 2012 the patient received occasional cervical or lumbar steroid injections with no more than a few weeks of relief before her pain returned.

On June 27th 2012 she returned to the office complaining of neck pain and stating that she was currently 10 weeks pregnant. After considering her pain management options she agreed to a cervical Platelet Rich Plasma (PRP) epidural catheter injection. The procedure was scheduled for July 24th 2012. During the procedure, a Tuohy epidural needle was advanced into the epidural space. An epidural catheter was then used to inject 9cc of platelet rich plasma with 18cc of platelet poor plasma targeting C4 through C6 bilaterally. PRP was also administered as cervical paraspinal trigger point injections using a fan-type distribution. The patient tolerated the procedure well and was able to be sent home after a short recovery.

A follow up call was placed the day after her PRP injection where she stated that she had a 50% improvement in her pain and was only experiencing pain at the injection site. On her one week follow up visit, she reported that her symptoms were still improving and that she was pleased with the results of the PRP injections versus the steroid injections. The patient requested another PRP injection to manage her low back pain which was scheduled for 8/20/12 and the patient reported that her lumbar pain resolved for 3 months after the procedure. Soon after, the patient delivered a healthy child with no adverse effects from the treatment.

This case study suggests that PRP injections are a safe and effective alternative treatment option for pain management of pregnant women. Pain management for pregnancy is limited due to the adverse effects that certain medications and treatment options such as corticosteroids can have on the developing fetus. PRP can possibly be used as an option to treat many other ailments that arise as a direct result of the pregnancy. Further studies are necessary to confirm the efficacy of pain management via PRP injection during pregnancy that was observed in this case.

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