

The Role of Intraarticular Platelet Rich Plasma (PRP) Injection in Patients with Internal Knee Derangements

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ABSTRACT

Platelet Rich Plasma (PRP) is an emerging biotechnology which uses patient's own blood components to create healing effect to their own injured tissues. This study was carried out to evaluate the clinical effects, adverse reactions and patient satisfaction after intraarticular injection of platelet rich plasma in a small group of patients with internal derangements of knee at Combined Military Hospital, Panoaqil, Pakistan. In this single center, open study, 10 patients with internal derangements of knee fulfilling the inclusion criteria received two doses of 3 ml of platelet rich plasma as intraarticular knee injection at two weeks interval. All patients were evaluated at 0, 4 and 12 weeks after treatment using IKDC, TEGNER, KOOS and VAS. Adverse events and patient's satisfaction was recorded. There was significant improvement in all scores. Intraarticular PRP injection is safe and effective method in the conservative treatment of internal knee derangements.

Key Words: Platelet rich plasma. Intra articular knee injections. Internal knee derangement.

Internal Derangement of the Knee (IDK) is an inclusive term used to indicate certain disorders of the joint including torn meniscus, loose bodies in the knee, and damaged collateral or cruciate ligaments.¹ The incidence of meniscal injuries among active duty US service members is 8.27 per 1000 persons per year.² The incidence of cruciate ligaments injury among US soldiers was 3.79 per 1000 cases per year for men and 2.95 cases per 1000 persons per year for women.³

Both operative and nonoperative treatment options exist for anterior cruciate ligament injuries, meniscal injuries and torn knee structures.^{4,5} Surgical treatment options are limited by delayed healing, functional loss, and later development of osteoarthritis⁶ which present challenges and a motivation to search for new therapeutic avenues.

Platelet-Rich Plasma (PRP) is an autologous concentration of blood-derived human platelets in a small volume of plasma. Platelets contain many important bioactive proteins and growth factors which play a central role in the healing process and tissue regeneration.⁷ There is a lot of growing evidence regarding role of PRP in osteoarthritis of knee joint, management of meniscal and ligament injuries.² Platelet-rich plasma can be applied at the site of injury

either during surgery or through an injection performed in the physician's office.

Written informed consent was obtained from the patients after explaining the procedure and possible outcomes. Ethical approval was obtained from the hospital ethics committee. All consecutive cases fulfilling the inclusion criteria were enrolled in the study conducted from August 2013 to January 2014. The patients included were serving military personnel having internal knee derangement involving medial and lateral meniscal tears, injury to the collateral ligaments of knee and anterior or posterior cruciate ligament injuries, age more than 18 years, knee pain lasting more than 3 months, history of twisting injury to knee, failure of conservative treatment for more than 3 months, pain persisting after arthroscopic repair.

At the time of arrival, patients were evaluated in detail by obtaining a complete history, physical examination, demographic data, identification of mechanism of injury and MRI findings. Specially designed proforma was used to collect data from each patient. Data was compiled and results were analyzed using SPSS version 17. One sample t-test was applied to calculate the p-value.

All patients were evaluated at 0, 4 and 12 weeks after treatment using IKDC, TAGNER, KOOS and VAS. Adverse events and patient's satisfaction was recorded.

To prepare PRP, 30 ml of venous blood was drawn under aseptic conditions using butterfly cannula. Each 5 ml sterilized glass tube with pre-added 0.5 ml CPDA -1 solution was filled with 4.5 ml of patient's blood. Double centrifugation method was used at ambient room temperature of 25°C. By this method, 3 ml of PRP was obtained which was injected by 21 gauge 10 ml syringe.

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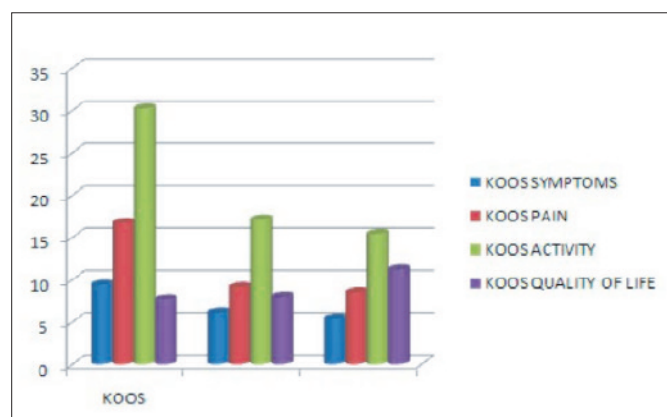


Figure 1: Knee injury and Osteoarthritis Outcome Score (KOOS).

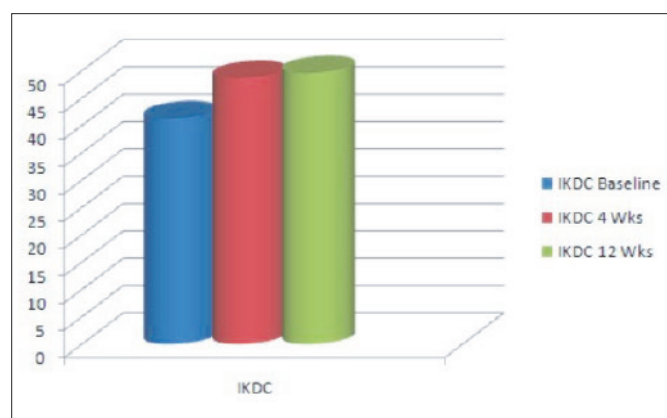


Figure 2: International Knee Documentation Committee (IKDC).

Just prior to injection, 0.1 ml of 10% calcium gluconate was added per 0.9 ml of PRP for activation. After intraarticular injection, patient was observed for 20 minutes for any possible side effects.

The study showed that 90% of the cases were serving soldiers with a mean age of 34.6 ± 6.4 years and pain was the major presenting complaint followed by giving way of knee joint.

Ten percent patients had Medial Meniscal (MM) tear alone, MM and Medial Collateral Ligament (MCL) tear was present in 30% patients, MM and Anterior Cruciate Ligament (ACL) tear in 20% patients; Lateral Meniscal (LM) and Lateral Collateral Ligament (LCL) tear in 20% patients confirmed by MRI of the knee joint.

There was significant improvement in knee injury and Osteoarthritis Outcome Scores (KOOS) including pain, symptom relief and quality of life with p-value of 0.0001. The activity level improved in the patients from baseline score of 1.9 ± 0.56 to 2.9 ± 0.56 and 3 ± 0.66 at the end of 4 and 12 weeks respectively using Tegner Activity Level Scale. There was significant improvement in the first 4 weeks with p-value of 0.0001.

The International Knee Documentation Committee (IKDC) subjective score improved from 41.3 ± 4.83 before to

48.7 ± 3.2 and 49.6 ± 3.3 after 4 and 12 weeks of PRP injection respectively (Figure 2). Visual analogue scale showed improvement from pre-injection score of 7.3 ± 1.3 to 4.3 ± 0.67 and 4 ± 0.66 at the end of 4th and 12th week post-PRP injection respectively. No adverse events were observed except moderate increase in pain for 2 - 3 days after injection, which was treated promptly with ice fomentation, electrotherapy and analgesics. The patient satisfaction rate was 80% after the injection procedure.

In this preliminary study, the authors aimed to perform intraarticular injection of platelet rich plasma in patients having internal knee derangements including medial and lateral meniscal tears and cruciate ligament injuries to determine whether PRP is safe and effective method in reducing pain and improving function in young, physically active patients who have acute or chronic knee injuries. As instantaneous damage to both ligamentous and meniscal structures is commoner than isolated injury, and approximately 40% to 60% of patients who sustain a rupture of the anterior cruciate ligament also sustain a meniscal tear,⁸ so the meniscal injuries as well as collateral and cruciate ligaments were targeted.

The adult meniscus is avascular in the inner two thirds.⁹ The biggest obstruction to healing in a white-white meniscal tear is the avascular nature of the tissue. Nutrition of meniscal tissue occurs via perfusion from blood vessels and via diffusion from synovial fluid.¹⁰ Keeping these facts in mind, we injected PRP into the knee joint in complex knee ligamentous and meniscal injuries to produce the desirable changes in synovial fluid and surroundings, hence producing its effects.

There was mild to moderate increase in pain for initial 2 - 3 days after injection which subsided completely with initial rest, simple analgesics and later on gradual return to daily activities and resumption of therapeutic exercises.

PRP is a new enterant in the armamentarium of treatment modalities against knee injuries. So far the results from this study are promising. The subjective improvement is significant. To the authors' knowledge, this study is first of its kind in Pakistani subjects. These results should prompt further research in this field.

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