Series of Medical Science

Open Access
Research Article
Vol 4 Iss 1

Lumbar Transforaminal Epidural Platelet-Rich Plasma Injections: The Novel Modality for the Treatment of Low Back Pain

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Received on 12 September 2023; Accepted on 13 October 2023; Published on 17 October 2023

Abstract

Background: *The low back pain is a common health problem. It causes significant morbidity that limits economic productivity. Platelet-rich plasma (PRP) has been shown to be effective in cosmetic surgical procedures and help accelerate wound healing in trauma and joint injuries. PRP injections use each patient's healing system to improve musculoskeletal problems. Therefore, we investigated the use of lumbar transforaminal epidural PRP (TEPRP) injections for the treatment of low back pain patients.*

Methods: *We evaluated a pain numerical rating scale (NRS) for a total of 210 patients with low back pain at the level of L3-4-5 immediately before the procedure. The patients completed the pain NRS. The score was 0 for no pain and 10 for the worst pain. A successful categorical outcome was defined as a reduction in pain by at least 50%. We also evaluated an assessment of the immediate post-procedure NRS, at 2 weeks, and measured the successful outcomes at 2 months.*

Results: *Immediate NRS response was weakly associated with 2-month outcomes. Patients who responded at 2 weeks were more likely to be responders at 2 months than those who were non-responders at 2 weeks.*

Conclusion: *Immediate post-TEPRP pain relief does not strongly predict long-term effectiveness in pain relief or functional recovery. Response in pain relief or functional recovery at 2 weeks is more strongly associated with 2-month outcomes.*

Keywords: lumbar transforaminal epidural platelet-rich plasma, low back pain

Abbreviations: PRP: platelet-rich plasma; NRS: numerical rating scale; TEPRP: transforaminal epidural PRP

Introduction

Platelet-rich plasma (PRP) therapy uses injections of a concentration of a patient's own platelets to accelerate the healing of injured tissues. The ability to regenerate tissues and decrease pain is through the effect of bioactive molecules and growth factors present in alpha granules. The success of this therapy depends on the method of preparation and composition of the PRP. This novel technique seems to be a promising method for the treatment of chronic back pain. Low back pain is one of the major causes of physical disability affecting both older and younger people and can have enormous socioeconomic and health impacts [1]. One of the major causes of low back pain is age-associated intervertebral disc degeneration, which affects the nervous system around the disc. Stimulation of the nociceptors in the annulus fibrosus causes pain, which is termed "discogenic" pain. Interestingly, degeneration, endplate injury, and inflammation can stimulate pain receptors inside the disc, leaving the external disc intact. Intervertebral disc degeneration can be described as an active process involving changes in tissue and the cellular microenvironment that eventually lead to structural breakdown and impairment of intervertebral disc function [2].

In this study, we elected to investigate the effect of lumbar transforaminal epidural PRP (TEPRP) injections for low back pain.

Patients and Methods

The study was approved by the local Institutional Review Board.

The study included a total of 210 patients with low back pain and receiving lumbar TEPRP injections at the level of L3, L4, or L5 spine level and evaluation of the pain numerical rating scale (NRS of 0-10) prior to TEPRP, immediately after TEPRP, at 2 weeks follow up after TEPRP, and at 2 months follow up after TEPRP.

Successful pain relief was more than 50% NRS reduction. The assessment of post-procedure NRS response, NRS at 2 weeks, and we measure the successful outcome at 2 months.

Study design

This is an observational study at Mount Lebanon Hospital, Balamand University Medical Center, during the period from June 2022 till June 2023, where a total of 210 patients were included in the study, with the main chief complaints of acute low back pain. The same methods, the same dose of PRP, and the same technique of transforaminal PRP injections were used.

Technique of transforaminal platelet-rich plasma injection

The patient lay prone, 3–5 cm from the midline of L3, L4, or L5 spine level, depending on the side with the corresponding symptoms, and under C-arm X-ray, we inserted a 22 gauge spinal needle until it passed the outer edge of the superior joint, we gently withdrew the syringe to check for blood or CSF then we inject 1 ml of omnipaque dye contrast, and we check with C-arm X-ray to see if the drug spreads along the path of the nerve roots into the epidural area, then we inject 2.5 ml of PRP (we take 45 ml of the patient blood then we centrifuge it and make it 3 ml of PRP) and at the end, we withdrew the needle.

Statistical analysis

	Response at 2 months	
	> 50% improvement in NRS	< 50% improvement in NRS
Response at 2 weeks		
> 50% improvement in NRS	70	30
< 50% improvement in NRS	26	84
	Response at 2 months	
	> 50% improvement in NRS	< 50% improvement in NRS
Immediate response		
> 50% improvement in NRS	82	90
< 50% improvement in NRS	10	28
NRS: numerical rating scale of pain		

Table 1: The 2-week and immediate pain response association with 2-month pain response (NRS).

Discussion

PRP therapy is a natural and non-invasive treatment because it uses platelets from your blood to create a highly concentrated solution to turbocharge the healing process.

Blood platelets contain human growth factors which contribute to cell regeneration, healing, and new tissue growth. PRP therapy has become popular in treating orthopedic and sports injuries but has also been used to treat other common conditions like hair loss [3].

From a sample of your blood, the platelets are separated in a centrifuge. The researchers found PRP a feasible treatment to counter disc degeneration associated with low back pain. But: "It is vital to administer PRP early in the treatment to stimulate the growth of the remaining cells in the disc. If the treatment is delayed, the number of active cells in the disc will be at a minimum, and the PRP will possibly fail to induce the desired impact. Although intradiscal PRP injections show promising results, there is a need for more studies with larger sample sizes and adequate control groups. Further studies are needed to define the subset of patients most likely to benefit from this treatment." The solution is then injected directly into the lower back to accelerate the healing process [4].

The clinical studies that used PRP injections as a therapy for discogenic low back pain reported good results overall. A major and notable advantage of the therapy is the safety of the autologous PRP itself, which does not cause any major complications [5]. Other than a few temporary side effects (soreness at the injection site and numbness in legs), none of the studies reported any serious adverse events or complications resulting from the injections. Because autologous PRP is obtained from the patient's own blood, PRP therapy carries low risks of disease infection and allergic reaction [6]. In addition, it has been reported that PRP has antimicrobial properties, which in turn could reduce postsurgical infection risk.

The logistic regression models were used to determine if the immediate post-procedure NRS score or complete relief states were predictors of a more than 50% improvement in the NRS at 2 weeks or 2 months. The outcomes and percentage of change in NRS were calculated from the procedure to 2 weeks and from the procedure to 2 months, to further assess the association of immediate and 2 weeks responses with 2 months outcomes (50% reduction in NRS) immediately following the procedure and at 2 weeks post-TEPRP were assessed.

The association of the 2-month outcome with the presence or absence of motor blockade was also assessed.

The table demonstrated the statistical analysis that the immediate pain response following transforaminal PRP (82 patients) as numerical pain rating was a poor predictor of patients achieving responder status of > 50% pain relief at 2 months (90 patients). While the < 50% improvement immediately (10 patients) have a < 50% improvement in NRS at 2 months of 28 patients (Table 1).

The pain score at 2 weeks provided excellent response with the 2-month response (70 patients), and the < 50% improvement at 2 weeks remained with < 50% improvement in NRS of 84 patients.

Missing data due to loss of follow-up was unavoidable in this study.

Conclusion

In conclusion, the use of transforaminal PRP for low back pain in immediate relief of index of pain is weakly associated with long-term outcomes, and the clinical response of pain relief at 2 weeks is associated with long-term outcomes.

It is evident from our review that PRP is a safe, effective, and feasible treatment modality and is evolving as a powerful therapy for the treatment of discogenic back pain. Considering the remarkable progress made already and the other potential aspects that remain for further investigation, PRP therapy undoubtedly offers new and exciting prospects for the treatment of degenerative disc disease and other musculoskeletal disorders [7].

However, further studies are required with larger sample sizes and control groups to prove its efficacy and establish its routine use in surgery.

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