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Review Article

Platelet-Rich Plasma Therapy for Chronic Low Back Pain with Neuropathic Component in a Pain Medicine Clinic in Mexico: Retrospective Study

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Abstract

Introduction: Low back pain is a common problem affecting millions worldwide. Even after surgical treatment some patients do not improve; others suffer from persistent radiculopathy. We define Complex Chronic Low Back Pain (CCLBP) as any low back pain that has lasted for at least three months and has at least two triggering pain mechanisms. **Objective**: To describe our experience with platelet-rich plasma (PRP) therapy in managing CCLBP with a neuropathic component **Methods**: Quantitative, retrospective analysis from 57 medical records of patients treated with PRP for CCLBP. We used IBM-SPSS 21 to obtain descriptive statistics, Chi-square, Student T and Odds-Ratio. **Results**: The mean age of our sample was 59.8 (±14.4) years, with 6.51 (±8.7) years of pain and a follow-up of 9 (±12.2) months. 33.3% had lumbar surgery, 29.8% had lumbar trauma, 31.6% used a walking aid, 56.7% had MODIC changes on MRI, and 42% of them received intraosseous-PRP technic. 84.2% reported severe pain (VAS 8-10). The results showed that 96.5% of patients experienced some improvement after PRP treatment. Additionally, 10.5% experienced pain suppression. No significant differences in age, lumbar trauma, lumbar surgery, diseases, or the use of walking aids between patients who benefited from PRP treatment and those who did not. VAS after treatment shows significance ($p<0.01$) with 5.36±2.6 points. Subjects with less than five years of radicular pain had an improvement greater than 3 points on VAS (OR 7.38, IC95% 1.72-31.7). **Conclusion**: Autologous platelet-rich plasma injections for chronic low back pain with a neuropathic component are an effective alternative to address CCLBP's current challenge. New studies with greater statistical power are necessary to make a statement of efficacy, but with the data obtained, it seems a promising option.

Keywords: Platelet-Rich Plasma, Low Back Pain, Radiculopathy, Intraosseous

INTRODUCTION:

Chronic low back pain is a complex and disabling condition affecting many worldwide. In 2019, low back pain was the leading cause of worldwide healthy years of life lost (YLDs), costing 63.7 million YLDs [1]. Neck and lumbar pain lead to significant health spending, with an estimated 134.5 billion dollars [2].

Low back pain diagnosis is challenging as there is no specific root cause in 90% of patients, resulting in ineffective treatment. However, some authors propose that categorizing patients based on their clinical and imaging characteristics can help identify the sources of pain. Because low back pain covers a spectrum of different types of pain (e.g., nociceptive, neuropathic and nociplastic) that frequently overlap and are involved all the lumbar tissues (e.g., soft tissue, vertebrae, zygapophyseal and sacroiliac joints, intervertebral discs, and neurovascular structures) [3]. Recently, clinicians have used Modic changes (MC) through magnetic resonance imaging in patients with degenerative spine diseases [4]. These changes are strongly associated with low back pain. [3]. Low back pain is a complex and multiple etiology pain, and to address the causes, we have used the definition of chronic complex low back pain (CCLBP), defined as low back pain lasting more than three months that present two or more nociceptive sources. As for treatment options for low back pain, clinical practice guidelines mainly suggest non-pharmacological approaches such as exercise, medication, or physical therapy; however, these interventions often have minor effects [5]. In the case of people presenting with low back and radicular pain, epidural corticosteroid injections have become a standard in the pain management algorithm in the last 30 years with heterogeneous long-term results. Platelet-rich plasma (PRP) has been used clinically for tissue regeneration and repair and has demonstrated a regenerative ability to repair injured tissue. Recent studies indicate that PRP therapies for low back pain are not inferior compared to standard corticosteroid therapy, with the advantage of longer sustained analgesia and no marked side effects [6,7]. We have worked with a regenerative medicine approach for a few years to relieve chronic complex low back pain and this work pretends describe characteristics of the patients and their response on the pain scale (VAS) of patients with CCLBP with neuropathic component (CCLBP-N) treated with PRP at a pain medicine clinic in Tijuana.

METHODS:

Selection of data and participants

This quantitative, observational, retrospective design included a sample size of 57 clinical records of individuals treated for CCLP-N. To develop the database, we gathered data on several variables, including sex, age, RMI's MODIC changes, duration of neuropathy, use of walking aids, surgical history, chronic or traumatic conditions, and changes in the VAS scale. Non-probabilistic census sampling was employed in choosing the participants. Patients treated with Platelet-Rich Plasma (PRP) for CCLBP-N with at least six months of pain were considered patients from January 2017 to January 2023, and who had at least one follow-up visit was included (in person or by telephone). Were excluded patients with addictions, fibromyalgia, diabetic neuropathy, neoplastic diseases, Surgical intervention during follow-ups, autoimmune diseases with joint involvement, uncontrolled mood disorders, trauma during follow-ups, and obesity grade 3 (Figure 1). We used the IBM SPSS 21 program to analyze the database and identify group differences. We conducted descriptive statistics, Chi-square, and Student T, Odds Ratio, and a 0.05 p-value was considered significant.

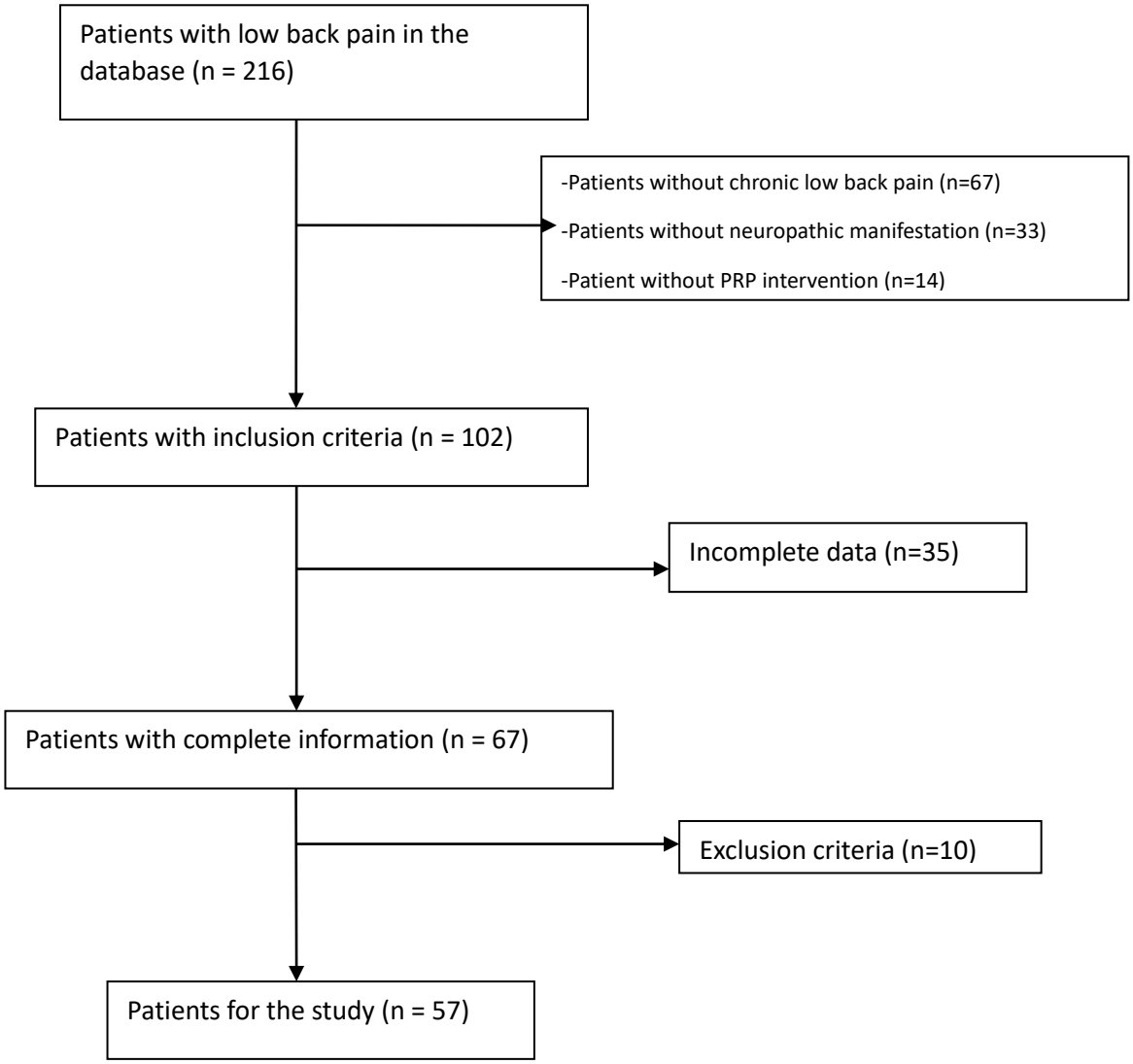


Figure 1. Sample selection

Table 1: Clinical and Sociodemographic Variables

Variable	Frequency	Percentage
Sex		
Female	38	66.7
Male	19	33.3
Age		
Under 50 years old	11	19.3
50 and 65 years old	24	42.1
Over 65 years old	22	38.6
Paresthesia	13	22.8
Use of Gait Aids		
Walking Stick	7	12.3
Adult Walker	6	10.5
Wheelchair	4	7
Comorbidities		
Diabetes	10	17.5
Hypertension	20	35
Hypothyroidism	6	10.5
Parkinson	1	1.75
Lumbar Trauma	17	29.8
Lumbar Surgeries	19	33.3
Intraosseus-PRP	14	29.8
Evolution Time		
One year or less	11	19.3
1-5 years	24	42.1
6-10 years	7	12.3
More than ten years	15	26.3
Number of Interventions	4.54 ± 4.5	
Follow-up Time (months)	8.6 ± 8.2	

*Sex was obtained based on name and secondary sexual characters. Race or ethnicity was not collected because it is not a common practice in the clinical records of our country.

PROCEDURE OF PRP TREATMENT

Patient's preparation:

The subjects began an anti-inflammatory diet seven days before treatment and suspended any anti-inflammatory analgesics or natural products with the same effect. One day before the intervention, they were asked to hydrate and fast for a minimum of 4 hours on the day of the procedure.

Applying PRP:

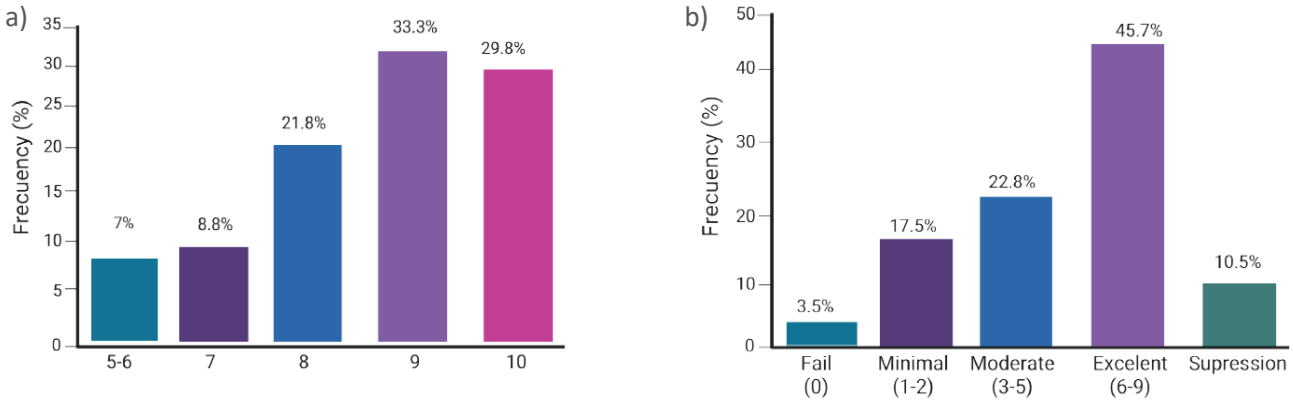
Blood is drawn from a peripheral vein to obtain the required plasma, which varies depending on the sites being treated, but an estimated average was 30 to 50ml of plasma. A PowerSpin™ MX Centrifuge was used at 1800 RPM for 8 minutes to obtain a sufficient concentration of "Growth Factors" that were applied to the lumbopelvic ligaments and at 1800 RPM for 5 minutes to obtain L-PRP for epidural application via the sacral hiatus with a 22 X 3 1/2" spinal needle. The procedure was performed under fluoroscopy with a C-arm, with only local anesthesia on the skin (Figure 2).

Figure 2: Images of procedures with PRP on CCLBP-N

The research was conducted in accordance with the Helsinki Declaration and was approved by the Ethics in research committee of Tijuana.

RESULTS

The sample had a mean age of 59.84 ± 14.4 years (28-87 years) with 8.8 ± 6.6 years of pain evolution with a range of 0-40 years. Spontaneous pain was the most frequent when questioning and exploring neuropathic manifestations (52.6%), followed by evoked pain (38.2). 29.8% of the individuals used gait aids, the cane being the most common (12.3%), followed by the walker (10.5%). 43.9% had comorbidities, 29.8% had lumbar trauma, and 33.3% had undergone at least one previous lumbar surgery. When collecting the information from the imaging diagnoses, it was found that 57.9% had MODIC changes in magnetic resonance (Table 1).



a) Frequency of VAS before treatment with PRP, b) Frequency of level of improvement in VAS after treatment with PRP and follow-up

Figure 3: Frequencies of VAS before PRP and frequency of level of improvement in VAS after PRP

Regarding pain, 84.2% reported severe pain (VAS 8-10). The results showed that 96.5% of patients experienced some improvement after PRP treatment; 10.5% experienced pain suppression (Figure 3). There were no differences in age, lumbar trauma, lumbar surgery, diseases, or the use of walking aids between patients who benefited from PRP treatment and those who did not. VAS after treatment shows a difference ($p<0.01$) with 5.36±2.6 points, and subjects with less than five years of radicular pain were different from those with pain for more than five years ($p<0.05$) with an improvement greater than 3 points on VAS (OR 7.38, 95% CI 1.72-31.7) (Table 2).

Table 2: Comparison of clinical variables and post-intervention improvement in VAS *

Variable	Frequency (%)	Chi-Square	Significance	Odds Ratio, Confidence Interval
Trauma Lumbar	29.8	0.89	p=0.76	1.23 (0.31-4.80)
Lumbar Surgery	33.3	0.00	p= 1.0	1 (0.26-3.86)
Gait aids	29.8	0.02	p=0.88	1.07 (0.28-4.29)
MODIC Changes	57.9	4.03	p=1.0	1.23 (0.31-4.80)
Less than five years of pain	61.4	8.49	p=0.04	7.38 (1.72-31.7)
Change in VAS pain scale after intervention	NA	t-test: 5.36 ± 2.6 points	p<0.01	NA

*Improvement in VAS is considered when there is a decrease in pain by at least 3 points on the scale, NS: no significant, NA: No Apply

DISCUSSION:

Previous studies have studied this treatment with different methodologies by Kirchner et al., who conducted a retrospective observational study using a facet joint, intervertebral disc, and epidural injection of autologous leukocyte-reduced PRP in 86 patients with chronic low back pain; they found significant improvements in VAS scores: 91% of patients reported an "excellent" score in pain improvement. Also, Navani et al. performed a case series in which patients received intradiscal PRP or BMAC-MSC, where it was found that 93% of patients achieved a reduction of more than 50% in their Verbal Pain Scale (VPS) scores at 18 months [8].

In another study, Bise and her team found in 2020 that 24 (40%) of patients had a reduction of numerical pain scale ≥ 50% in patients treated with PRP or steroid. No significant differences in the group operated on with steroids at six weeks [9]; a similar situation was described by Akeda, in his study more than 50% reduction of lumbar back pain, with VAS reduction in 71% (10/14) of patients within four weeks after PRP-release injection; the mean pain score (VAS) significantly decreased by 5 points, similar to that obtained in our population. Akeda also found a correlation between the

patient's improvement and the number of affected discs, a situation we did not evaluate [10].

With a larger sample, Xu evaluated 124 patients for one year, with 63 patients in the steroid group and 61 in the PRP. This study suggests that ultrasound-guided transforaminal PRP injections yield a similar effect as transforaminal steroid injections in treating lumbar disc herniation with radicular pain. It may be a safer alternative in comparison [6]. Another study, a systematic review, surgical intervention did not show reduced leg pain or disability compared with non-surgical treatment. At the same time, Kawabata demonstrated through a systematic review that intradiscal injection therapy of PRP for degenerative disc disease is considered safe and effective [7,11].

Our sample was heterogeneous, and the findings suggest that no clinical characteristics interfered with the beneficial effects in patients affected by chronic low back pain with a neuropathic component. However, the shorter the evolution time, the more likely there would be a significant improvement. Only two individuals did not achieve improvement with their respective treatments, and their characteristics were different from each other. More than two cases are needed to determine whether any of the factors they possessed are sufficient to confer significant risk. Our study was a secondary data analysis, and we could not achieve the biases.

CONCLUSION:

Autologous platelet-rich plasma injections for chronic low back pain with a neuropathic component could be an effective alternative to address the challenge that low back pain currently represents. PRP therapy has no adverse effects compared to pharmacotherapy and has a long period of pain relief. New studies with greater statistical power are needed to state efficacy and include PRP treatment in low back pain guidelines. However, with the data obtained, it seems a promising option.

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