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A study on transforaminal fluoroscopy guided autologous platelet rich plasma injections in patients with lumbar radicular pain

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Abstract

Introduction: Lumbar radiculopathy is a major health problem often treated by surgery or guided lumbar epidural steroids for pain relief. We have used Platelet Rich Plasma (PRP) a novel therapeutic tool of autologous nature that has emerged strongly in recent years to treat patients of prolapsed intervertebral disc. The aim of this study was to evaluate the efficacy of PRP via interlaminar epidural route in treatment of pain in patients with prolapsed inter vertebral disc.

Materials and Methods: Ten patients were injected with five ml of autologous platelet rich plasma under fluoroscopic guidance via interlaminar lumbar epidural injection into area of affected nerve root. They were followed using VAS (Visual Analogue Scale), SLRT (Straight Leg Raising Test) and MODQ (Modified Oswestry Disability Questionnaire) for clinical improvement.

Results: Patients who had received epidural injections of autologous PRP showed improvements in their scores of evaluation tools. Mean VAS Score Pre-Procedure was 6.0 Mean Vas score following procedure was 5.7 at 3 weeks was 4.3 and at the end of 3 months was 3.9 Improvement was sustained during the 3-month study period and was not associated with any complications 50 percent of the patients showed improved in SLRT. Mean Value of Modified Oswestry index Pre-Procedure was 49.2

Conclusion: Autologous PRP can be considered as a good alternative to epidural steroids and surgery in management of patients with chronic prolapsed intervertebral disc

Keywords: PRP, IVDP, radiculopathy, minimally invasive surgical procedure

Introduction

For those under 45, low back pain has emerged as a significant public health concern. It has emerged as one of the primary justifications for restricting physical activity and is escalating to pandemic levels [1]. Physical, socioeconomic, bad health, psychological condition, employment, and environmental factors can all be risk factors for having spine pain. Each of these elements raises the possibility of developing back discomfort [2]. The spinal ligaments, spinal nerve roots, vertebral periosteum, facet joints, paravertebral musculature, and annulus fibrosus are possible sources of low back discomfort [1]. The most typical process is age-related degeneration of the facet joints and discs of the spine. Acute disc herniation in people with prolapsed intervertebral discs (PIVD) results in mechanical compression of the nerve. Within the intervertebral foramina, causing swelling and direct neural activation in the inflammatory response [1]. Both conservative and surgical treatments are available for management. Conservative management can take many different forms, such as rest, analgesics, traction, spinal manipulation, and psychological testing. Others may need low back surgery, and even then, they might not fully recover (failed back syndrome) [2]. Epidural injections containing steroids have been widely used as a kind of pain management. The procedure carries the risk of infection, paralysis, spinal headache, haemorrhage, or haematoma. Steroid use has been linked to recorded cases of septic and aseptic meningitis, as well as spinal cord embolisms [3]. Apart from reducing the hypoglycaemic effect of insulin and interfering with blood glucose control in diabetic patients, severe cases of cushing syndrome, adrenal suppression and myopathy have been reported with steroid use [4].

Till now only steroids in combination with opioids and local anaesthetics has been an option to reduce the pain by reducing inflammation via epidural route. That too, pain relief has been usually temporary and varied lasting for 1 week or upto 1 year. Platelet Rich Plasma (PRP) is a unique autologous therapeutic approach that has gained significant traction in recent years as a result of its effective use in treating elite athletes [5]. Rafael Nadal and Tiger Woods, well-known professional sportspersons, attribute a portion of their "miraculous" recoveries to the use of this mysterious procedure known as the "PRP phenomenon." In rheumatology, orthopedic, and sports medicine symposia, PRP therapy is used often. Despite the dispute, the treatment is successful and doesn't seem to have any negative side effects [7]. PRP has mostly been used for osteoarthritis of the knee as well as chronic tendinopathy and enthesopathy. Its low cost, convenience of use, and apparent safety have made it a crucial tool for pain doctors to use. A significant amount of research on PRP in the fields of orthopaedics and sports medicine has concentrated on tendon injuries, such as patellar tendinosis (jumper's knee), lateral epicondylitis (tennis elbow), Achilles tendinopathy, osteoarthritis, plantar fasciitis, anterior cruciate ligament, and rotator cuff arthroscopic repair [7, 8]. Being a tertiary care facility, we see a lot of patients who are complaining of chronic low back pain because of prolapse of the intervertebral disc. Many of them have tried traditional oral and local treatments without success, and many of them have had unsuccessful back surgeries or lack the funds to undergo surgery. We receive referrals for the epidural analgesia of such patients. Considering PRP's enormous potential, safety, and hopeful outcomes, it was chosen to use it as a modality for pain treatment in such patients as an alternative to steroids despite the fact that there are very few research available on its usage in the lumbar epidural area [3, 9].

Methodology and Research Design

A prospective study was conducted among 30 cases of patients with findings of lumbar disc herniation/prolapse in MRI, of either sex with age less than 65 years, having complaints of backache + radiculopathy for more than 4 weeks duration with a positive Straight Leg Raising Test (SLRT) and not responding to the conventional treatment who comes to our College during the period of between August 2022 and March 2023. Patients who had consented for the Procedure, Patients who agree for a follow up, Age Less than 65 years, Symptoms of Back pain and Radiculopathy for more than 4 weeks With a Positive SLRT were included in the study while Patient refusal, Intracranial hypertension, intestinal or bladder involvement, coagulation issues, Fever, Sepsis, Usage of oral or intravenous corticosteroids within two weeks of PRP treatment Prior to the operation, sepsis at the injection site, any spinal deformity or fracture were excluded. The patients at the time of Admission were clinically evaluated, Age, Sex, Site, Duration Of Pain, Pain (VAS Score) and Baseline data for the Modified Oswestry Disability Questionnaire (MODQ), SLRT, and lower limb neurological examination will be recorded in the case record before the procedure and Radiologically LS Spine (AP and Lateral Views) and MRI were Taken. After meeting the inclusion criteria, patients received a thorough explanation of the treatment method and were asked for a signed informed consent. PRP was prepared under aseptic conditions from patients' own blood. About 100ml of patient's own blood was taken which will then centrifuged and 5ml of platelet-rich

plasma will be prepared in the blood bank. Under strict aseptic precautions a single injection of five ml of autologous PRP was administered in the epidural space via Transformational approach with an 18G needle under fluoroscopic guidance. After the procedure hemodynamic parameters was monitored and recorded every 5 minutes for 30 minutes and also for any possible complications. Patients were evaluated 30 mins after the procedure and Pain, SLRT and MODQ were recorded, Patients were discharged with advice to avoid too much bending, lifting heavy weight or walking long distances and told to follow-up at 3 week and 3 month. Patient were functionally assessed, VAS score, MODQ and SLRT will be noted at all times. Neurological examination of lower limb was also done which included motor examination in tone, power, reflexes and sensory examination.

Results

In our study, it was shown that in the 30 patients who had undergone autologous PRP injection through a transformational approach had their symptoms improve gradually over 3 months symptomatically as measured by VAS scores, and SLRT. The Mean age was 53.5 years. Sixteen of them in the study were males and 14 of them were females (Table 1) The Spinal levels involved are given under (Table 1). The patients were monitored for a total of three months during which time their symptoms gradually got better. With the exception of six patients, whose VAS score was 5 at the end of 3 months, The mean VAS Score Pre procedure was 6 and 3 months post procedure was 4 the vas for all the others had improved and, at three months, had a VAS SCORE of 4 or less. (Table 3, Figure 2). The mean Modified Oswestry index scoring pre procedure was 53.93 and 3 months post procedure was 32.39 (Table 4, Figure 1). In Majority of the patients (29 of them) their SLRT had improved to > 70 except for one. It demonstrated that the progressive improvement observed persisted throughout the follow-up period of 3 months. There were no complications seen in any of the patients and patients were able to do all their daily activities without the use of pain medication

Discussion

Our findings are in line with the research conducted by Rohan Bhatia (1), Gaurav Chopra (2) where Efficacy of Platelet Rich Plasma via Lumbar Epidural Route in Chronic Prolapsed Intervertebral Disc Patients who had Lumbar Radicular Pain where studied in that study Patients who had received epidural injections of autologous PRP showed improvements in their scores of evaluation tools. Improvement was sustained during the 3 month study period and was not associated with any complications. In Our study the Modified oswestry disability questionnaire score Pre Procedure were 55 as compared to 49 in their study. Post procedure Oswestry disability questionnaire score in their study was calculated at 15 mins and were 47.9 as compared to our study in which the post procedure score was calculated at 30 mins post procedure a mean of 54, at 3 months the score was 29.5 when compared to our study which had a mean of 33, which shows similar results as to their study and that there is significant improvement in results post procedure .Our study findings are also in line with another study conducted by Akeda *et al.* [3]. Where Patients with Degenerative Disc Disease in one or more lumbar discs and chronic low back pain had PRP injected into their disc segments and over the course of six months, vas ratings improved from 7.1±1.2 to 1.8±2.0,

whereas in ours VAS ratings improved from 6.9±1 to 1.4±1 with a p-value of 0.01. Similar to what Bodor *et al.* described, roughly 2/3 of patients saw beneficial results from a single intradiscal PRP injection that lasted for 6-12 months. On the basis of pain relief, ability to resume daily activities, and return to exercise, half of them had excellent responses, and the other half had good response. In a fascinating example, PRP was applied epidurally by Lemper *et al.*, When a patient receiving treatment for neck and back pain becomes pregnant, it is recommended to use other methods of pain management. Like PRP injection candidate rather than epidural steroid. A sequestration and concentration of platelets inside the plasma portion of autologous blood is what is referred to as PRP. PRP is used because it contains high quantities of growth factors and cytokines that help speed up the healing process Alpha granules, which each platelet contains between 50 and 80 of, contain more than 30 bioactive proteins. These proteins are crucial for the maintenance of hemostasis and the repair of both hard and soft tissues. Normal platelet counts range from 150,000 to 300,000/microL. They also contain peptides in cellular migration and growth like interleukin-1 (IL-1), platelet factor 4, and epidermal growth factor (EGF), osteocalcin, osteonectin, platelet-derived angiogenesis factor, platelet-derived endothelial growth factor, epithelial cell growth factor Thrombospondin, fibrinogen, vitronectin, and fibronectin. One million microL of PRP is recognised as the standard for PRP. Exogenous administration of activated PRP results in platelet aggregation and clotting within about 10 minutes, and within an hour, around 95% of the alpha granule contents have been released. PRP increases platelet concentration by three to five times compared to baseline levels. The goal of using PRP is to boost the number of activated platelets present at the site of chronic injury, which will trigger the inflammatory phase and promote recovery. A study on the function of PRP in the axonal development of spinal cord tissues was carried out by Takeuchi *et al.* Anjayani *et al.* discovered that two weeks after perineural PRP injection around the peripheral nerves of leprosy patients with peripheral neuropathy, sensory function had improved. In a patient with trigeminal neuralgia, Doss *et al.* described a case demonstrating the effectiveness of ultrasound-guided PRP to the distal branches of the trigeminal nerve, demonstrating that PRP played a role in myelination and likely altered neuronal activity. After trying unsuccessfully, the conventional conservative techniques in the spine division of physical medicine and rehabilitation clinic, a sizable percentage of patients with radiculopathy desired alternative non-surgical treatments. For thirty of these patients, the

caudal epidural PRP catheter was used. Bret Ferree has replaced the blood patch used to treat a dural rent that causes a CSF leak and occasionally resistant post-dural puncture headache with PRP. Our technique entails passing a needle through the ligamentum flavum in order to inject PRP into the epidural space via an interlaminar route. Interlaminar epidural injections' effects on radicular pain from disc herniation, pain from spinal stenosis, axial back pain without disc herniation, and failed back surgery syndrome have all been thoroughly researched. Benefits include the capacity to treat bilateral pain, a smaller PRP volume requirement, and a higher possibility that PRP injections may reach nearby spinal levels. PRP injections are being an effective alternative minimally invasive procedure in the management of low back pain.

Table 1: Data and Spinal Levels

Demographic Data and Spinal Levels Involved	
Age In Years (Mean)	53.5
Males	16
Females	14
Levels Involved	
L2	1
L3	2
L4	9
L5	10
S1	6

Mean Duration of Pain in months 6.5 months

Table 2: SLRT Scoring

SLRT Pre Procedure	
SLRT of < 35	9
SLRT of 35-70	21
SLRT Post Procedure	
35-70	1
> 70	29

Table 3: VAS scoring

Mean VAS Pre Procedure	
Mean VAS 30 Mins Post Procedure	5.7
Mean VAS 3 Months Post Procedure	4

Table 4: Mean Modified Oswestry disability questionnaire score

Mean Modified Oswestry disability questionnaire score	
Pre Procedure	53.93
Mean of Modified Oswestry disability questionnaire score-	
30 MINS After Procedure	53.86
Mean of Modified Oswestry disability questionnaire score-	
3 Months After Procedure	32.39

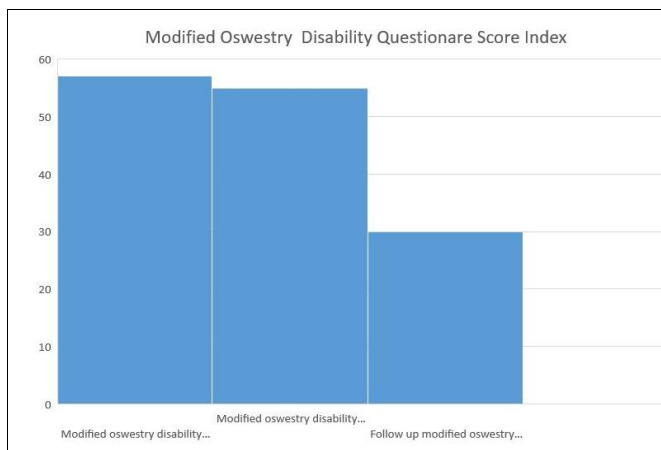


Fig 1: Modified Oswestry disability question are score index

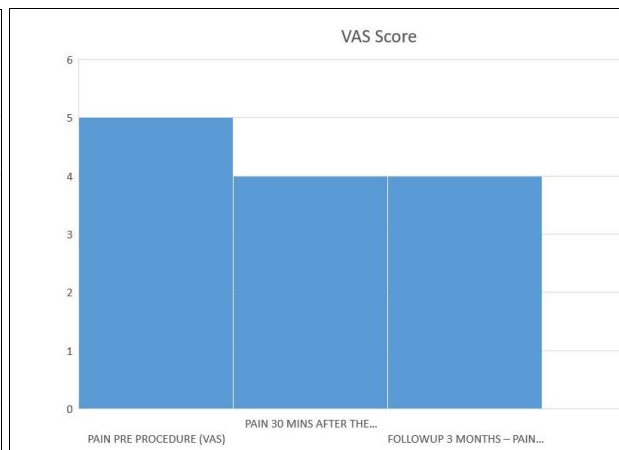


Fig 2: VAS Score

Table 5: Patient Demographics and Data

Sr. No	Age	Sex	Site	Duration of Pain	Pain Pre Procedure (VAS)	Sort Pre Procedure	Modified Oswestry disability questionnaire score Pre Procedure	Pain 30 Mins After The Procedure	Sort 30 mins After procedure	Modified Oswestry disability questionnaire score-30 mins after procedure
1	45	M	L4	7m	5	35-70	57	4	35-70	55
2	56	F	L5	6m	6	< 35	53	6	< 35	52
3	53	M	S1	8m	8	< 35	51	7	35-70	51
4	64	M	L5	1.2y	5	35-70	60	5	35-70	57
5	58	M	L5	9m	7	35-70	36	5	< 35	39
6	45	F	L4	8m	8	35-70	57	7	< 35	56
7	40	M	S1	8m	7	35-70	53	4	35-70	55
8	53	F	L5	9m	6	35-70	48	6	<35	45
9	51	F	L4	1	7	< 35	58	8	35-70	58
10	49	M	L5	7m	5	< 35	59	6	< 35	59
11	56	M	L5	5m	8	35-70	55	7	35-70	54
12	45	F	L4	8m	8	35-70	56	5	35-70	53
13	43	M	L4	9m	4	< 35	59	6	< 35	59
14	48	F	L2	7m	3	35-70	40	4	35-70	41
15	56	M	L4	6m	5	35-70	54	4	35-70	53
16	55	F	L5	3m	6	< 35	54	6	< 35	52
17	37	F	S1	5m	8	< 35	55	7	35-70	54
18	42	F	S1	4m	5	35-70	59	5	35-70	58
19	49	M	L5	4m	7	35-70	43	5	< 35	43
20	46	M	L4	8m	8	35-70	58	7	< 35	57
21	54	M	L3	2m	7	35-70	47	4	35-70	48
22	58	M	L4	7m	6	35-70	54	6	< 35	53
23	53	F	L5	6m	7	< 35	56	8	35-70	55
24	52	F	L3	3m	5	< 35	39	6	< 35	40
25	58	M	L4	6m	6	35-70	60	7	35-70	60
26	49	F	L5	8m	8	35-70	58	5	35-70	58
27	43	M	L5	3m	7	< 35	52	6	< 35	50
28	46	F	S1	1m	8	35-70	55	4	35-70	54
29	54	F	L4	5m	7	35-70	59	4	35-70	58
30	52	M	L5	4M	6	35-70	54	5	35-70	55

Conclusion

Autologous PRP can be considered as a good alternative to epidural steroids and surgery in management of patients with Lumbar Radicular Pain.

Conflict of Interest

Not available

Financial Support

Not available

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