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Efficacy of autologous platelet-rich plasma intradiscal injection in the treatment of discogenic low back pain

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Abstract: Objective To investigate the efficacy of intradiscal injection of autologous platelet rich plasma (PRP) in the treatment of discogenic low back pain (DLBP). **Methods** A retrospective analysis of clinical data from 47 DLBP patients treated at No.908 Hospital of Joint Logistics Support Force from January 2022 to June 2023 was conducted. Patients were divided into an experimental group (treated by PRP combined with celecoxib capsule, *n*=16) and a control group (treated by celecoxib capsule monotherapy, *n*=31) based on the treatment method. The visual analogue scale (VAS) and Oswestry disability index (ODI) scores were recorded before treatment, at 1 week, 1 month, and 6 months after treatment. **Results** VAS scores and ODI scores in the experimental group gradually decreased; the VAS scores and ODI scores in the control group decreased at 1 week after treatment compared to before treatment, but then showed a gradual upward trend; the VAS scores and ODI scores in the experimental group were lower than those in the control group at 1 month and 6 months after treatment (P<0.05). **Conclusion** The long-term efficacy of autologous PRP combined with celecoxib capsule in treating DLBP is superior to that of celecoxib capsule monotherapy and can be considered as an effective treatment for DLBP.
Keywords: Platelet rich plasma; Discogenic low back pain; Celecoxib; Intradiscal injection
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Discogenic low back pain (DLBP) is a common nonspecific low back pain caused by disc degeneration, accounting for 26% to 42% of chronic low back pain [1]. Lumbar disc-related diseases are showing a growing trend in clinical practice. Chronic low back pain affects patients' quality of life and brings huge health and economic burdens to society [2]. Disc degeneration is accompanied by changes in cells and extracellular matrix in the intradiscal microenvironment, ultimately leading to destruction of disc structure and impaired function, which ultimately causes DLBP [3]. In recent years, with the development of regenerative medicine, intradiscal regenerative therapy has gradually attracted attention as a novel treatment method [4]. Autologous platelet-rich plasma (PRP) is rich in growth factors and cytokines, which can promote tissue repair and cell growth through anabolic effects. It has been widely used in musculoskeletal diseases and has proven its effectiveness [5-7]. Animal studies have found that PRP has a protective effect on disc degeneration [8]. However, current clinical studies on the therapeutic effect of intradiscal injection of autologous PRP are still relatively limited, and there is no consensus on the objective evaluation of its efficacy in clinical practice. This study aims to evaluate the efficacy and safety of PRP intradiscal injection in the treatment of DLBP through a clinical case-control study, providing a reference for clinical application.

1 Materials and methods

1.1 Study objects

Retrospective analysis was conducted on the clinical data of patients with DLBP who received treatment at No.908 Hospital of Joint Logistics Support Force from January 2022 to June 2023. According to the treatment methods, they were divided into experimental group (treated by PRP combined with celecoxib capsule, *n*=16) and control group (treated by celecoxib capsule monotherapy, *n*=31). The diagnostic criteria for DLBP include the following aspects [9]. (1) History: recurrent chronic low back pain. (2) Symptoms: mainly manifested as low back pain, occasionally with hip, buttock, groin area, and anterior thigh pain. (3) Signs: no obvious spinous process and spinous process pressure pain, normal lower limb muscle strength and sensation, negative straight leg raising test and femoral nerve traction test. (4) Imaging manifestations: X-ray and CT examination usually show no significant abnormalities. MRI T2WI images show decreased disc signal, presenting as a "dark disc" signal shadow; on the mid-sagittal position of T2WI images, there is/no small round high signal shadow at the upper endplate of the vertebral body of the responsible/non-responsible gap.

Inclusion criteria: (1) Age between 20 and 60 years old, male or female; (2) meet the above diagnostic criteria for DLBP; (3) without malignant tumors, renal failure, and other serious diseases; (4) no cognitive and communication barriers, with the ability to independently cooperate and complete the study. Exclusion criteria: (1) anatomical structure abnormalities of the lumbar spine, etc.; (2) previous history of lumbar surgery; (3) pregnant and lactating women; (4) patients allergic to the test drugs and intolerant of the test dosage; (5) patients who cannot fully cooperate and participate in diagnosis and treatment, and those who were lost to follow-up.

1.2 Therapeutic methods

Experimental group: Patients received PRP injection

therapy. Twenty mL of blood was drawn from the median cubital vein of the patients in the experimental group, and the blood was placed into a centrifuge tube containing sodium citrate anticoagulant. The centrifuge tube was placed in a high-speed centrifuge (Guizhou Tedia Medical Instruments) for the first centrifugation, with a centrifugal force of 200 g and a centrifugation time of 10 minutes. After the first centrifugation, the blood was stratified, with the upper layer being the supernatant and the lower layer being the red blood cell layer. The supernatant and the liquid below the interface level of 1-2 mm were aspirated into another centrifuge tube using a pipette, and the second centrifugation was performed with the same centrifugal force and time as the first one. The upper 3/4 of the supernatant was removed, and the remaining liquid was evenly mixed with a pipette to obtain autologous PRP. Before injection, 10% CaCl was added to the obtained PRP to activate platelets. The patient was placed in prone position, and the target intervertebral space was located using a C-arm machine. After local anesthesia, a 18G needle was used for puncture. The puncture was performed from 8 cm outside the posterior median line to the target intervertebral space, and the needle tip was located in the central region of the disc under positive and lateral fluoroscopy. The syringe was connected, and 1.5 mL of PRP was injected. If the pressure was too high, the injection was stopped, and the actual injection volume was recorded. On the day of treatment, the patient began to take non-steroidal anti-inflammatory drug (NSAID)–celecoxib capsules (Pfizer, USA, H20140106) 200 mg orally twice daily for 7 consecutive days.

Control group: appropriate bed rest and functional exercise, oral NSAID celecoxib capsules 200 mg twice daily for 7 consecutive days.

1.3 Evaluation criteria

The visual analogue scale (VAS) and Oswestry disability index (ODI) of the two groups were recorded before treatment, at the 1 week, 1 month, and 6 months after treatment. Additionally, the occurrence of related complications during and after treatment was recorded.

1.4 Statistical methods

SPSS 26.0 software was used for data analysis. Quantitative data were described by $\bar{x} \pm s$. Independent sample *t*-test was used for comparison between the two groups. Repeated measures analysis of variance was used for statistical analysis of observation data at different time points. Count data were represented using the number of cases (%), and chi-square test was used for statistical analysis. $P<0.05$ was considered statistically significant.

2 Results

2.1 General Information

There was no statistically significant difference in baseline data between the two groups ($P>0.05$) [Table 1]. No serious complications occurred during the follow-up period in both groups. Typical cases in the experimental group are shown in **Figure 1**.

2.2 Comparison of VAS scores between the two groups

As the treatment time progressed, the VAS scores of the experimental group gradually decreased; the VAS scores of the control group decreased one week after treatment compared to before treatment, and then presented a gradual upward trend. There was no statistically significant difference in VAS scores between the two groups before treatment ($P>0.05$). The VAS scores of the experimental group were lower than those of the control group 1 month and 6 months after treatment ($P<0.05$) [Table 2].

Tab. 1 Comparison of preoperative baseline data between two groups

Group	Case	Age	Gender (M/F, case)	BMI (kg/m^2, $\bar{x} \pm s$)	Hypertension (case)	Diabetes (case)	Follow-up time (months)
Experimental group	16	44.13±10.26	10/6	22.27±3.26	2	1	6.63±0.96
Control group	31	46.00±8.31	11/20	22.86±2.91	6	3	6.65±0.88
***t*/χ^2 Value**		0.68	3.12	0.63	0.03	0.02	0.07
***P* Value**		0.50	0.08	0.53	0.85	0.88	0.94

Note: The patient was a 26-year-old male with low back pain for 6 months. A and B showed weakened $L_{4/5}$ intervertebral disc signal on MRI examination before treatment; C and D was the injection of PRP into the intervertebral disc under the positioning of the C-arm machine; E and F showed partial retraction of the $L_{4/5}$ intervertebral disc on MRI 6 months after treatment.

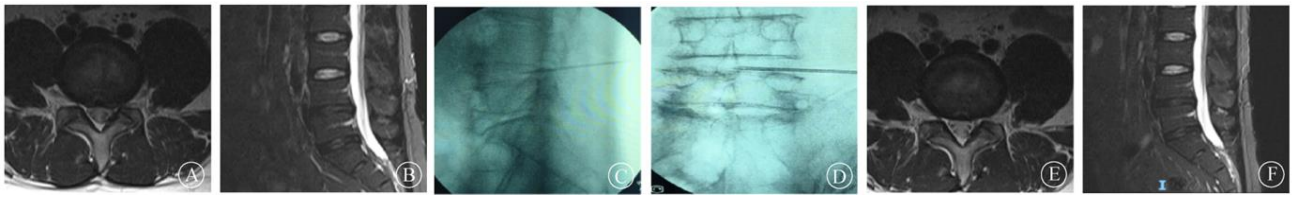

Fig.1 Typical cases in the experimental group

2.3 Comparison of ODI scores between the two groups

There was a statistically significant difference in ODI scores between the two groups (P<0.05). In the experimental group, the ODI score gradually decreased as the treatment time increased. In the control group, the ODI score decreased one week after treatment compared with before treatment, and then gradually increased as time went on. There was no statistically significant difference in ODI scores between the two groups before treatment (P>0.05). One month and six months after treatment, the ODI scores of the experimental group were lower than those of the control group (P<0.05) **[Table 3]**.

Tab. 2 Comparison of VAS scores between two groups (point,$\bar{x}\pm s$)

Group	Before treatment	1 week after treatment	1 month after treatment	6 months after treatment
Experimental group (n=16)	5.19±0.98	4.13±0.81	3.94±0.77	3.75±0.78
Control group (n=31)	5.23±0.81	4.45±0.93	4.48±0.85[a]	4.71±1.01[a]
$F_{time}/F_{group}/F_{interaction}$ Value			25.58/4.13/4.78	
$P_{time}/P_{group}/P_{interaction}$ Value			<0.01/0.01/0.03	

Note: Compared with experimental group, [a]P<0.05.

Tab.3 Comparison of ODI scores between two groups (point,$\bar{x}\pm s$)

Group	**Before treatment**	**1 week after treatment**	**1 month after treatment**	**6 months after treatment**
Experimental group (n=16)	35.59±12.33	30.40±7.31	27.05±5.12	26.38±7.06
Control group (n=31)	35.31±8.77	31.63±27.05	33.45±8.76[a]	33.61±8.98[a]
$F_{time}/F_{group}/F_{interaction}$ Value			12.66/6.76/2.54	
$P_{time}/P_{group}/P_{interaction}$ Value			<0.01/<0.01/0.12	

Note: Compared with experimental group, [a]P<0.05.

3 Discussion

The results of this study showed that both VAS and ODI scores improved in both groups one week after treatment, with no significant difference between the two groups. One and six months after treatment, the VAS and ODI scores continued to improve in the experimental group, while the VAS and ODI scores in the control group were higher than those one week after treatment. This suggests that both PRP combined with celecoxib and celecoxib alone can improve clinical symptoms in the early stage of DLBP, but the long-term efficacy of PRP combined with celecoxib is better than that of celecoxib alone.

Currently, conservative treatment is recommended for DLBP, including NSAIDs, exercise therapy, and psychosocial interventions [10]. NSAIDs are often the first choice of treatment, and celecoxib, as a typical representative of selective COX-2 inhibitors, is widely used in clinical practice. Celecoxib can rapidly relieve pain, but its long-term use may be limited by drug tolerance, gastrointestinal reactions, and cardiovascular risks [11-12]. The exact efficacy of open surgery for discogenic low back pain has been confirmed, but patients may face significant surgical trauma and a longer recovery period [13]. Additionally, postoperative discomfort such as pain, decreased lumbar stability, and abnormal sensation in the surgical area may occur [14]. Some scholars have proposed minimally invasive interventional methods such as intervertebral disc electrothermal therapy and low-temperature plasma radiofrequency ablation, which improve low back pain symptoms by inactivating painful nerve fibers in the intervertebral disc [15]. While providing immediate pain relief, these minimally invasive interventional methods have smaller trauma and faster recovery compared to traditional surgery. However, they also have some limitations. They cannot delay or reverse the degeneration process of the intervertebral disc and cannot completely eliminate the risk of recurrence of DLBP. At the same time, minimally invasive interventional surgery may require higher costs, which brings a greater economic burden to patients.

With the rapid development of regenerative medicine, the treatment of discogenic problems has gradually shifted towards repairing or regenerating degenerative discs, aiming to restore the normal function of the discs. Among them, PRP, obtained from an individual's own peripheral blood through centrifugation, is rich in various growth factors and provides important support for tissue repair and healing [16]. Studies have shown that PRP promotes angiogenesis, cell proliferation, and collagen synthesis [17]. PRP can improve the blood supply of the disc by promoting angiogenesis within the disc, which helps alleviate discogenic low back pain. Secondly, the cell proliferation and collagen synthesis effects of PRP can promote the repair of disc tissue, slowing down or reversing the process of disc degeneration [17].

Given the unique advantages of NSAIDs and PRP regeneration and repair, combining the two treatment methods can play a mutually reinforcing role. The results of this study showed that the VAS scores of both groups were lower at 1 week after treatment than before treatment, and there was no statistically significant difference between the groups. The initial analgesic and anti-inflammatory effects were mainly due to the effect of celecoxib. However, its analgesic effect depends on the blood drug concentration, which can provide temporary pain relief but often fails to control the pain well after withdrawal. Compared with NSAID treatment methods, the advantage of PRP is that it acts directly on damaged tissue and promotes the biological activity of the tissue, delaying the process of disc degeneration and promoting disc tissue repair. The results of this study showed that the long-term effect of PRP was better, which is similar to the

current research results [18-19].

Based on the results of this study, intradiscal injection of autologous PRP for the treatment of discogenic low back pain (DLBP) shows potential clinical application prospects. Although this study initially explored the therapeutic effect of intradiscal injection of autologous PRP, its specific mechanism of action is still not clear. Further basic research and clinical trials, such as the biological effects of PRP in disc tissue, the impact on cell proliferation and matrix synthesis, will help to deeply understand the biological basis of autologous PRP treatment. At the same time, future research needs to focus on the optimal treatment plan for PRP, including appropriate concentration, injection frequency, and treatment timing. In addition, long-term follow-up studies will better evaluate the persistent effects and potential risks of PRP in the treatment of DLBP.

In summary, intradiscal injection of autologous PRP combined with celecoxib capsules for the treatment of DLBP has a better long-term effect than oral celecoxib capsules alone, and can be used as an effective treatment for DLBP.

Conflict of Interest: None

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·论　著·

自体富血小板血浆椎间盘内注射治疗椎间盘源性腰痛的疗效

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摘要：目的　探讨自体富血小板血浆（PRP）椎间盘内注射对椎间盘源性腰痛（DLBP）的治疗效果。**方法**　回顾性分析 2022 年 1 月至 2023 年 6 月于联勤保障部队第九〇八医院就诊的 47 例 DLBP 患者的临床资料。根据治疗方法分为 PRP 联合塞来昔布胶囊治疗组（试验组）16 例和单纯塞来昔布胶囊治疗组（对照组）31 例。统计治疗前、治疗后 1 周、治疗后 1 个月及 6 个月的腰痛视觉模拟评分（VAS）及 Oswestry 功能障碍指数（ODI）。**结果**　随着治疗时间的推移，试验组 VAS、ODI 评分逐渐降低；对照组治疗后 1 周的 VAS、ODI 评分较治疗前降低，之后呈现逐渐上升趋势；试验组治疗后 1 个月、治疗后 6 个月 VAS 评分及 ODI 评分低于对照组（$P<0.05$）。**结论**　自体 PRP 联合塞来昔布胶囊治疗 DLBP 远期疗效要优于单纯口服塞来昔布胶囊，可作为 DLBP 的一种有效治疗方式。

关键词：富血小板血浆；椎间盘源性腰痛；塞来昔布；椎间盘内注射

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Efficacy of autologous platelet-rich plasma intradiscal injection in the treatment of discogenic low back pain

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Abstract: Objective　To investigate the efficacy of intradiscal injection of autologous platelet-rich plasma (PRP) in the treatment of discogenic low back pain (DLBP). **Methods**　A retrospective analysis of clinical data from 47 DLBP patients treated at No.908 Hospital of Joint Logistics Support Force from January 2022 to June 2023 was conducted. Patients were divided into a PRP combined with celecoxib capsule treatment group (experimental group, $n=16$) and a celecoxib capsule monotherapy group (control group, $n=31$) based on the treatment method. The visual analogue scale (VAS) of low back pain and Oswestry disability index (ODI) scores were recorded before treatment, at 1 week, 1 month, and 6 months after treatment. **Results**　VAS scores and ODI scores in the experimental group gradually decreased over time; the VAS scores and ODI scores in the control group decreased at 1 week after treatment compared to before treatment, but then showed a gradual upward trend. The VAS scores and ODI scores in the experimental group were lower than those in the control group at 1 month and 6 months after treatment ($P<0.05$). **Conclusion**　The long-term efficacy of autologous PRP combined with celecoxib capsule in treating DLBP is superior to that of celecoxib capsule monotherapy and can be considered as an effective treatment for DLBP.

Keywords: Platelet-rich plasma; Discogenic low back pain; Celecoxib; Intradiscal injection

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椎间盘源性腰痛(discogenic low back pain, DLBP)是由于椎间盘变性引起的一种常见的非特异性腰痛,占慢性腰痛的 26%~42%[1]。腰椎间盘相关疾病在临床上呈现出日益增长的趋势[2]。椎间盘变性伴随椎间盘内微环境的细胞和细胞外基质变化,导致椎间盘结构破坏和功能受损,最终引起 DLBP[3]。近年来,随着再生医学的发展,椎间盘内再生疗法作为一种新型治疗手段逐渐受到关注[4]。自体富血小板血浆(platelet-rich plasma, PRP)富含生长因子和细胞因子,通过合成代谢作用可以促进组织修复和细胞生长,已广泛的应用于肌肉骨骼疾病,并且已经证明其有效性[5-7]。体内动物研究已经发现 PRP 对椎间盘退行性改变有保护作用[8],然而目前关于椎间盘内注射自体 PRP 治疗效果的临床研究仍相对有限,临床实践中对其疗效的客观评估尚未形成一致性的共识。本研究通过临床病例对照研究,旨在评估 PRP 椎间盘内注射治疗 DLBP 的有效性和安全性,为临床应用提供参考。

1　资料与方法

1.1　*研究对象*　回顾性分析 2022 年 1 月至 2023 年 6 月于联勤保障部队第九〇八医院门诊就诊的 47 例 DLBP 患者的临床资料。根据治疗方法分为 PRP 联合塞来昔布胶囊治疗组(试验组)16 例和单纯塞来昔布胶囊治疗组(对照组)31 例。DLBP 诊断标准包括以下几个方面[9]。(1) 病史:反复发作的慢性腰痛。(2) 症状:主要表现为下腰部疼痛,偶见髋部、臀部、腹股沟区、大腿前方疼痛。(3) 体征:无明显棘突及棘突旁压痛,下肢肌力、感觉正常,直腿抬高试验及股神经牵拉试验阴性。(4) 影像学表现:X 线、CT 检查通常无明显异常,MRI 的 T2WI 表现为椎间盘信号减弱,呈现“黑间盘”信号影;在 T2WI 正中矢状位上,有/无责任间隙下椎体上终板处小的圆形高信号影。

纳入标准:(1) 年龄 20~60 岁,男女不限;(2) 符合上述 DLBP 的诊断标准;(3) 患者无恶性肿瘤、肾衰竭等各种严重疾病;(4) 临床资料完整。排除标准:(1) 腰部解剖结构异常等;(2) 既往有腰椎手术史;(3) 妊娠期及哺乳期女性;(4) 对本试验药物过敏及试验药量不耐受的患者;(5) 不能全程配合并参与诊断、治疗者,失访患者。

1.2　*治疗方法*　试验组:患者实施 PRP 注射治疗,抽取试验组患者肘正中静脉血 20 mL,将抽取的血液放入枸橼酸钠抗凝剂的离心管中。离心管放入高速离心机(贵州天地医疗)进行第一次离心,离心力设置为 200×*g*,离心时间设置为 10 min,第一次离心后出现血液分层,上层为上清液,下层为红细胞层。将上清液及交界液面以下 1~2 mm 处液体使用吸管吸取至另一离心管,进行第二次离心,离心力和离心时间同第一次,去除上层 3/4 的上清液,吸管将剩余的液体吹打均匀,即可获得自体 PRP。注射前加入 10%氯化钙于获取的 PRP 中以激活血小板。患者俯卧,C 臂机定位目标椎间隙,局麻后采用 18G 穿刺针进行穿刺。自后正中线外 8 cm 穿刺至目标椎间隙,正侧位透视针尖位于椎间盘中心区域。连接注射器,注射 1.5 mL 的 PRP,若压力过大,停止注射,并记录实际注射量。治疗当天开始口服非甾体抗炎药塞来昔布胶囊(美国辉瑞,H20140106)200 mg,每日 2 次,连续服用 7 d。

对照组:适当卧床休息和功能锻炼,口服塞来昔布胶囊 200 mg,每日 2 次,连续服用 7 d。

1.3　*评价指标*　统计两组患者治疗前,治疗后 1 周、1 个月以及 6 个月的视觉模拟评分(visual analogue scale, VAS)和 Oswestry 功能障碍指数(Oswestry disability index, ODI),以及治疗期间以及治疗后出现的相关并发症。

1.4　*统计学方法*　采用 SPSS 26.0 软件分析数据。采用 $\bar{x}\pm s$ 对计量资料进行描述,两组间比较采用独立样本 t 检验,不同时间点观察数据采用重复测量资料的方差分析。采用例数(%)表示计数资料,两组间比较使用 χ^2 检验。$P<0.05$ 为差异有统计学意义。

2　结　果

2.1　*一般情况*　两组患者基线资料比较差异无统计学意义($P>0.05$)。见表 1。两组患者随访期间均未发生相关严重并发症。试验组典型病例见图 1。

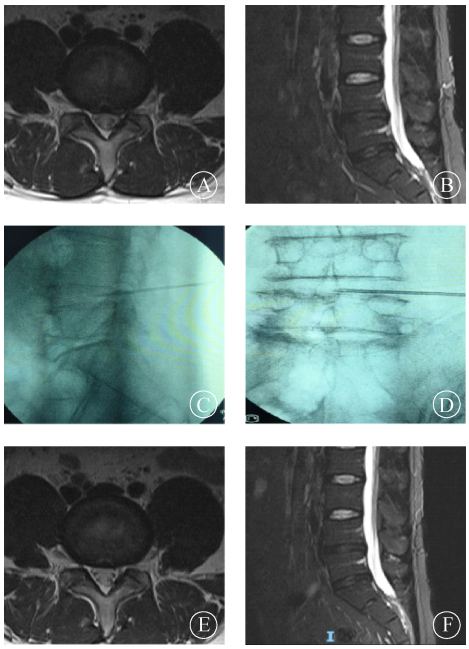
2.2　*两组患者 VAS 评分比较*　随着治疗时间的推移,试验组 VAS 评分逐渐降低;对照组治疗后 1 周的 VAS 评分较治疗前降低,之后 VAS 评分呈现逐渐上升趋势。两组治疗前、治疗后 1 周 VAS 评分比较差异无统计学意义($P>0.05$),试验组治疗后 1 个月、6 个月 VAS 评分低于对照组($P<0.05$)。见表 2。

2.3　*两组患者 ODI 评分比较*　两组间 ODI 评分比较差异有统计学意义($P<0.05$)。试验组随着治疗时间的推移,ODI 评分逐渐降低。对照组治疗后 1 周的 ODI 评分较治疗前降低,之后 ODI 评分呈现逐渐上升趋势。两组患者治疗前、治疗后 1 周 ODI 评分比较差异无统计学意义($P>0.05$)。试验组治疗后 1 个月、6 个月 ODI 评分低于对照组($P<0.05$)。见表 3。

表 1　两组患者基线资料比较

Tab. 1　Comparison of preoperative baseline data between two groups

组别	例数	年龄(岁, $\bar{x}\pm s$)	性别(男/女, 例)	BMI(kg/m^2, $\bar{x}\pm s$)	高血压(例)	糖尿病(例)	随访时间(月, $\bar{x}\pm s$)
试验组	16	44.13±10.26	10/6	22.27±3.26	2	1	6.63±0.96
对照组	31	46.00±8.31	11/20	22.86±2.91	6	3	6.65±0.88
t/χ^2 值		0.68	3.12	0.63	0.03	0.02	0.07
P 值		0.50	0.08	0.53	0.85	0.88	0.94



注:患者男性,26 岁,腰痛 6 个月。A、B 为治疗前 MRI 检查示 $L_{4/5}$ 椎间盘信号减弱;C、D 为 C 臂机定位下行椎间盘内注射 PRP;E、F 为治疗后 6 个月复查 MRI,$L_{4/5}$ 椎间盘部分回缩。

图 1　试验组典型病例

Fig. 1　Typical cases in the experimental group

表 2　两组患者 VAS 评分比较　(分, $\bar{x}\pm s$)

Tab. 2　Comparison of VAS scores between two groups　(point, $\bar{x}\pm s$)

组别	例数	治疗前	治疗后 1 周	治疗后 1 个月	治疗后 6 个月
试验组	16	5.19±0.98	4.13±0.81	3.94±0.77	3.75±0.78
对照组	31	5.23±0.81	4.45±0.93	4.48±0.85[a]	4.71±1.01[a]
$F_{时间}/F_{组间}/F_{交互}$ 值			25.58/4.13/4.78		
$P_{时间}/P_{组间}/P_{交互}$ 值			<0.01/0.01/0.03		

注:与试验组比较,[a]P<0.05。

表 3　两组患者 ODI 评分比较　(分,$\bar{x}\pm s$)

Tab. 3　Comparison of ODI scores between two groups　(point, $\bar{x}\pm s$)

组别	例数	治疗前	治疗后 1 周	治疗后 1 个月	治疗后 6 个月
试验组	16	35.59±12.33	30.40±7.31	27.05±5.12	26.38±7.06
对照组	31	35.31±8.77	31.63±27.05	33.45±8.76[a]	33.61±8.98[a]
$F_{时间}/F_{组间}/F_{交互}$ 值			12.66/6.76/2.54		
$P_{时间}/P_{组间}/P_{交互}$ 值			<0.01/<0.01/0.12		

注:与试验组比较,[a]P<0.05。

3　讨　论

本研究结果显示,两组 VAS 评分和 ODI 评分在治疗后 1 周均有改善,两组间差异无统计学意义;在治疗后 1 个月和 6 个月时,试验组 VAS 评分和 ODI 评分得到持续的改善;然而在对照组中,治疗后 1 个月和 6 个月的 VAS 评分和 ODI 评分要高于治疗后 1 周。说明 PRP 联合塞来昔布和单纯塞来昔布药物治疗 DLBP 早期均可以改善临床症状,但 PRP 联合塞来昔布远期疗效要优于单纯使用塞来昔布药物。

DLBP 目前多推荐保守治疗,包括非甾体抗炎药、运动疗法和社会心理干预等[10]。非甾体抗炎药常被作为首选治疗,其中塞来昔布作为选择性 COX-2 抑制药的典型代表在临床广泛应用。塞来昔布可以迅速缓解疼痛,但其长期使用可能受到一些限制,包括药物耐受性、胃肠道反应和心血管风险等[11-12]。开放手术治疗 DLBP 的疗效确切,但患者面临较大的手术创伤,需要较长的康复期[13]。此外,术后可能出现疼痛、术后腰椎稳定性降低、手术区域感觉异常等不适症状[14]。一些学者提出椎间盘内电热疗法、低温等离子射频消融等微创介入方式,这些方法通过灭活椎间盘内痛性神经纤维来改善腰痛症状,且创伤较小[15]。然而,微创介入治疗方式也存在一些限制,它们并不能延缓或逆转椎间盘的退化过程,并不能完全消除 DLBP 的复发风险。同时,微创介入手术可能需要更高的费用,给患者带来更大的经济负担。

随着再生医学领域的飞速发展,针对椎间盘源性问题的治疗逐渐向修复或再生退变椎间盘的方向转变,以实现对椎间盘正常功能的恢复。其中,PRP 作为一种重要的治疗手段,由个体自身外周血离心获得,富含多种生长因子,为组织修复和愈合提供了重要的支持[16]。有研究表明,PRP 具有促进血管生成、细胞增殖和胶原合成的作用[17]。PRP 可以通过促进椎间盘内血管生成,改善椎间盘的血液供应,有助于缓解椎间盘源性腰痛。其次,PRP 的细胞增殖和胶原合成作用可促进椎间盘组织的修复,减缓或逆转椎间盘的退变过程[17]。

鉴于非甾体抗炎药和 PRP 再生修复的独特优

势,将两种治疗方式相结合可以起到相互促进的作用。本研究结果显示,两组患者治疗后 1 周的 VAS 评分低于治疗前,且组间差异无统计学意义,前期镇痛消炎作用主要是塞来昔布药物的作用结果。然而,其镇痛效果依赖于血液药物浓度,虽可以提供暂时的疼痛缓解,但在停药后疼痛往往得不到很好的控制。PRP 的优势在于其直接作用于受损组织并促进组织的生物学活性,延缓椎间盘退变进程并促进椎间盘组织修复。本研究结果显示 PRP 的长期疗效较好,这与目前的研究结果类似[18-19]。

椎间盘内注射自体 PRP 治疗 DLBP 显示出潜在的临床应用前景。尽管本研究初步探讨了椎间盘内注射自体 PRP 的治疗效果,但其具体的作用机制仍然不够清楚。进一步的基础研究和临床实验,如 PRP 在椎间盘组织中的生物学效应、细胞增殖和基质合成的影响等,将有助于深入理解自体 PRP 治疗的生物学基础。同时,未来的研究需关注 PRP 的最佳治疗方案,包括合适的浓度、注射次数和治疗时机等参数。此外,长期随访研究将更好地评估 PRP 在 DLBP 治疗中的持久效果和潜在风险。

综上所述,椎间盘内注射自体 PRP 联合塞来昔布胶囊治疗 DLBP 远期疗效要优于单纯口服塞来昔布胶囊,可作为 DLBP 的一种有效治疗方式。

利益冲突　无

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