Intradiscal platelet-rich plasma for discogenic low back pain: a prospective cohort study of early clinical outcomes and quantitative MRI findings

Xiaohan Pan[a], Gang Peng[b], Qi Yao[a], Zeyu Liu[a], Xiaojun Zhang[a], Wei Jiang[c*], Jie Hao[a*]

[a] Department of Orthopaedic Surgery, Chongqing Municipal Health Commission Key Laboratory of Musculoskeletal Regeneration and Translational Medicine/Orthopaedic Research Laboratory, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China.

[b] Department of Radiology, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China.

[c] Department of Orthopaedic Surgery, Nanchuan Hospital of Chongqing Medical University, Chongqing, China.

Supplementary Method S1. Samplesize Calculation

Sample size was determined using PASS 2023 (version 25.0.6; NCSS, Kaysville, UT, USA). For sample-size estimation, the VAS pain score was chosen as the index endpoint, reflecting its role as the primary clinical outcome in this study and the availability of robust pilot data for VAS. We assumed a one-way repeated-measures design with four repeated measurements (baseline, 1, 3 and 6 months) for each subject, and used a Geisser–Greenhouse corrected F-test to test for a difference among the four means at a two-sided type I error rate $\alpha = 0.05$. Based on pilot data, the mean VAS score was assumed to decrease from 59 mm at baseline to 38 mm at follow-up, with a standard deviation of 18 mm across subjects at each time point. The covariance matrix was specified as first-order autoregressive [AR(1)] with a correlation of 0.30 between adjacent time points. Under these assumptions, to detect the mean pattern “59, 38” (standard deviation of means = 9.09) with 90% power, the required sample size was 15 patients (each measured four times). Allowing for an anticipated 20% dropout, the planned enrolment was 19 patients.

Supplementary Method S2. PRP Characterization

In the first four consecutively scheduled patients, PRP composition was characterized solely for quality control of the preparation process. One day before intradiscal injection, PRP was prepared using the same Arthrex ACP® double-syringe system and centrifugation protocol as in the main study, and paired samples of whole blood and PRP were collected to measure leukocyte, erythrocyte, and platelet counts and to calculate platelet capture efficiency, thereby verifying the consistency of the ACP preparation. In the clinical protocol, PRP was prepared without anticoagulants or other additives and injected into the target disc immediately after centrifugation; therefore, no residual volume was routinely available and compositional assays were not performed for all patients.

Supplementary Table S1. Whole blood and PRP characteristics (n = 4).

Parameter	Whole blood	PRP
Volume (mL)	15.0 ± 0.0	4.7 ± 0.3
WBC (10^3/μL)	4.8 ± 1.0	1.4 ± 0.1
RBC (10^6/μL)	4.6 ± 0.4	0.02 ± 0.01
PLT (10^3/μL)	182.5 ± 17.4	371.8 ± 33.6
Platelet capture efficiency (%)	–	63.7 ± 6.7

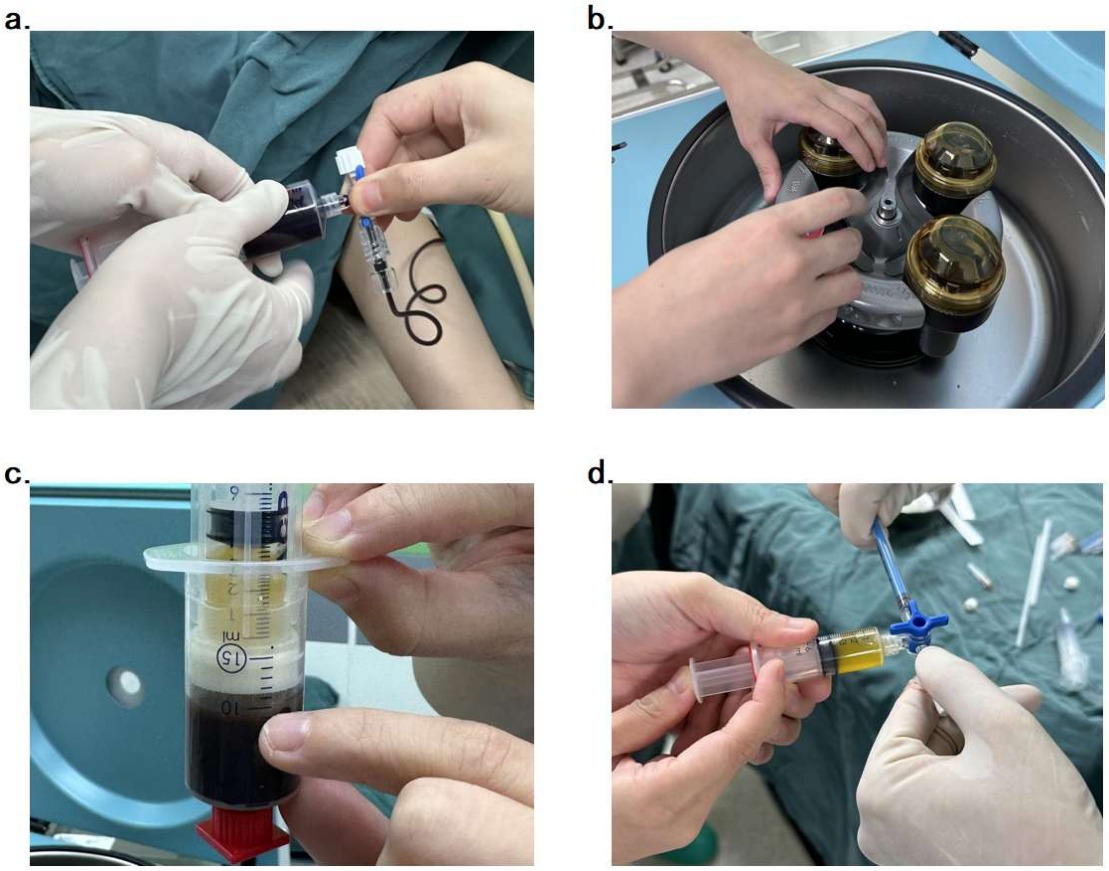
Values are mean ± SD; Platelet capture efficiency (%) was calculated as: (PRP platelet count × PRP volume) / (whole-blood platelet count × whole-blood volume).

Supplementary Table S2. Secondary Outcomes

Outcome	Preoperative (Mean ± SD)	6 Months Postoperative (Mean ± SD)	Statistical Analysis / Findings	Notes
Disc Height Index (DHI, %)	41.62 ± 8.42	41.38 ± 8.29	Paired t-test, p = 0.32 (no significant difference)	No significant difference observed
Pfirrmann Grading	—	—	No change observed	No changes at 6 months
Adverse Events, Complications, Reoperations	—	—	None reported	No adverse events, complications, or reoperations during follow-up
Patient Satisfaction	—	—	Descriptive statistics only	23 satisfied; 6moderate

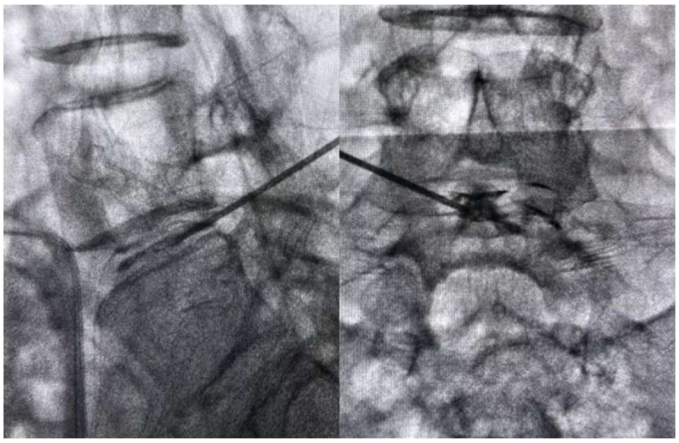
Abbreviations: LBP, low back pain; DHI, disc height index.

Supplementary Fig. S1. Preparation of platelet-rich plasma.



(a) Drawing venous blood. (b) centrifugation. (c) Separation of platelet-rich plasma. (d) Collecting the platelet-rich plasma.

Supplementary Fig. S2. Provocative test.



The injection of iohexol into the intervertebral disc for precise localization and provocation of pain