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Improved Long-Term Erectile Function Recovery and Quality of Life Outcomes With Combined Platelet-Rich Plasma and Radial Shockwave Therapy for Erectile Dysfunction

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Abstract

Purpose: This study aimed to comparatively evaluate the 12-month clinical efficacy and durability of treatment response between platelet-rich plasma (PRP) monotherapy and the combination of PRP with radial extracorporeal shock wave therapy (rESWT) in men with erectile dysfunction (ED).

Materials and Methods: In this retrospective, multicenter cohort study, data from 100 patients treated for ED across two centers between 2021 and 2024 were analyzed (PRP+rESWT: n=55; PRP monotherapy: n=45). The primary outcome measure was the International Index of Erectile Function-Erectile Function domain score (IIEF-EF). Secondary endpoints included the Erection Hardness Score (EHS), the Sexual Quality of Life-Male questionnaire (SQoL-M), and the Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS). All outcomes were assessed at baseline and at 1, 3, 6, and 12 months.

Results: Both groups demonstrated significant improvements from baseline at all time points ($p<0.001$). At 12 months, the PRP+rESWT group exhibited significantly higher IIEF-EF scores (25.3±3.4 vs. 23.1±2.8; $p<0.001$; Cohen's d=0.71), EHS (3.53±0.66 vs. 2.98±0.58; $p<0.001$), SQoL-M (45.2±5.4 vs. 42.4±5.1; $p=0.008$), and EDITS (29.1±3.7 vs. 24.6±4.1; $p<0.001$). Minimal clinically important difference responder analysis revealed that 78.2% of patients in the combination group achieved the IIEF-EF threshold versus 57.8% in the monotherapy group ($p=0.028$).

Conclusions: Combined PRP and rESWT may be associated with more durable clinical improvements over 12 months compared with PRP monotherapy. Prospective randomized controlled trials are warranted to validate these findings.

INTRODUCTION

Erectile dysfunction (ED) is defined as the persistent inability to achieve or maintain a penile erection sufficient for satisfactory sexual intercourse [1]. The global prevalence of ED has risen substantially over recent decades, with epidemiological projections estimating an increase from approximately 152 million affected men in 1995 to 322 million by 2025 [2]. Population-based studies indicate that roughly 52% of men between the ages of 40 and 70 experience some degree of erectile impairment, with prevalence estimates ranging widely from 3% to 76.5% depending on the age group, geographic region, diagnostic criteria employed, and heterogeneity of the study populations examined [3]. This variability notwithstanding, the burden of ED increases markedly with advancing age and the accumulation of cardiometabolic risk factors. Beyond its physiological dimensions, ED exerts considerable adverse effects on psychological well-being, quality of life, and intimate relationships, underscoring the need for effective and durable therapeutic strategies in men's health [4, 5].

Current first-line management of ED relies predominantly on phosphodiesterase type 5 inhibitors (PDE5i), which facilitate erection by enhancing nitric oxide-mediated vasodilation within the corpus cavernosum. Although PDE5i demonstrate clinical efficacy in approximately 60–70% of patients, a meaningful proportion of men fail to achieve an adequate response [6]. Furthermore, concomitant

cardiovascular disease or concurrent nitrate therapy renders these agents contraindicated in a subset of patients [1, 7]. Critically, PDE5i provide symptomatic benefit primarily through transient hemodynamic improvement and do not directly address the underlying structural and vascular pathology of vasculogenic ED. These inherent limitations have fueled growing interest in regenerative treatment approaches aimed at restoring penile vascular integrity and tissue function [8].

Among emerging regenerative strategies, platelet-rich plasma (PRP) therapy has attracted increasing attention as a promising intervention for ED. PRP is an autologous biological product enriched with high concentrations of growth factors — including vascular endothelial growth factor (VEGF), platelet-derived growth factor (PDGF), and transforming growth factor-beta (TGF-β) — that are known to stimulate angiogenesis, promote tissue repair, and enhance endothelial regeneration [9–11]. While both the European Association of Urology (EAU) and the American Urological Association (AUA) currently classify PRP therapy as investigational for ED, the existing literature is constrained by methodological limitations including small sample sizes, absence of control groups, and lack of standardized treatment protocols [11]. Nevertheless, recently published systematic reviews and meta-analyses have reported that intracavernosal PRP injections yield significant improvements in erectile function compared with placebo, with an acceptable safety profile [12, 13]. The magnitude of clinical benefit and, in particular, the long-term durability of PRP's therapeutic effects remain active areas of investigation.

Low-intensity extracorporeal shock wave therapy (Li-ESWT) represents another regenerative modality that has garnered considerable interest in recent years. By delivering mechanical stimuli to penile tissue, Li-ESWT triggers a cascade of biological responses that promote neovascularization and improve cavernosal blood flow [14]. Experimental and clinical evidence suggests that shock wave treatment can upregulate the expression of angiogenic mediators such as VEGF and endothelial nitric oxide synthase (eNOS), both of which play pivotal roles in endothelial function and vascular remodeling [14–16]. An important caveat, however, is that the majority of Li-ESWT literature has been generated using focused shock wave devices; evidence supporting the efficacy of radial devices remains comparatively limited, and some randomized controlled trials have failed to demonstrate superiority of radial ESWT over sham treatment [16]. Despite this, findings from clinical studies suggest that Li-ESWT — particularly in men with vasculogenic ED — may confer durable improvements in erectile function [14, 15].

The potential for combining PRP and shock wave therapy to yield synergistic regenerative effects has been proposed in recent years. The underlying rationale holds that the microtissue trauma induced by ESWT increases local tissue permeability and activates endogenous repair cascades through cavitation and mechanobiological mechanisms, thereby enhancing the penetration and biological activity of PRP-derived growth factors within the corpus cavernosum [17–19]. Despite the theoretical appeal of this combination approach, studies directly comparing the long-term clinical efficacy of PRP monotherapy versus combined PRP and ESWT remain scarce. Much of the published literature has focused on short-term outcomes, with follow-up periods typically limited to 6 months or less [20], leaving the durability of treatment effects inadequately characterized.

Against this backdrop, the present study aimed to comparatively evaluate the clinical efficacy and durability of treatment response between PRP monotherapy and combined PRP plus rESWT over a 12-month follow-up period in patients treated for ED. Our primary hypothesis was that the combination of PRP and rESWT would be associated with superior and more sustained improvements in erectile function and patient-reported outcomes relative to PRP monotherapy alone.

MATERIALS AND METHODS

1. Study Design and Centers

This retrospective, multicenter cohort study analyzed clinical data from patients treated for erectile dysfunction (ED) at two centers between 2021 and 2024. Patient records were obtained from the clinical databases of participating investigators across all sites, where uniform treatment protocols and standardized data collection procedures were implemented throughout the study period.

Treatment allocation was determined at each center based on clinical assessment findings, patient preference, availability of ESWT equipment, and the treating physician's clinical judgment, without prospective randomization. The study was reported following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational research [21].

2. Ethics Statement

The present study protocol was reviewed and approved by the Institutional Review Board of the Health Sciences Research Ethics Committee of İzmir Kâtip Çelebi University (approval No. 0746). Given the retrospective nature of this study, informed consent was waived by the IRB. The study was conducted in accordance with the principles of the Declaration of Helsinki.

3. Participants

Medical records of male patients aged 30–70 years with a clinical diagnosis of ED who had received either PRP monotherapy or combined PRP and rESWT were reviewed for eligibility.

Inclusion criteria were as follows: a confirmed clinical diagnosis of ED; completion of the full assigned treatment protocol; availability of at least 12 months of follow-up data; and complete questionnaire responses at all scheduled assessment time points.

Exclusion criteria included: prior penile prosthesis implantation; history of radical prostatectomy; prior pelvic radiotherapy; neurological conditions or severe psychiatric disorders (i.e., major depressive disorder, schizophrenia, or bipolar disorder diagnosed according to DSM-5 criteria and confirmed by psychiatric consultation); untreated significant hormonal disorders (defined as total testosterone < 300

ng/dL without ongoing replacement therapy); incomplete or insufficient follow-up data; and use of PDE5 inhibitors at any point during the study period.

4. Patient Flow (STROBE)

A total of 187 patients were screened for eligibility. Of these, 87 were excluded for the following reasons: failure to meet inclusion criteria (n = 32), comprising patients outside the eligible age range (n = 8), prior penile prosthesis implantation (n = 5), history of radical prostatectomy (n = 7), prior pelvic radiotherapy (n = 4), neurological disease or severe psychiatric disorder (n = 5), and untreated hypogonadism (n = 3); incomplete treatment protocol (n = 18); missing 12-month follow-up data (n = 24); and PDE5 inhibitor use during the study period (n = 13). Following application of all eligibility criteria, 100 patients with complete data and follow-up were included in the final analysis (PRP+rESWT: n = 55; PRP monotherapy: n = 45).

5. Sample Size Calculation

Sample size estimation was performed using G*Power 3.1.9 software. Based on data from prior studies comparing the effects of PRP monotherapy and PRP+ESWT combination therapy on IIEF scores, an effect size of 0.97 was assumed, with a statistical power of 95% and a two-sided alpha level of 0.05. These parameters yielded a minimum required sample of 29 patients per group [22]. Accounting for an anticipated 20% attrition rate, the target sample size was set at a minimum of 35 patients per group.

6. Treatment Protocols

All patients in both groups received a total of six PRP treatment sessions administered twice weekly over three weeks, with a minimum interval of 72 hours between sessions. Autologous PRP was prepared using commercially available, CE-marked Class IIb certified tubes. Peripheral venous blood (20–30 mL) was drawn from each patient and centrifuged according to the manufacturer's recommended protocol using a double-spin technique at 3,000 rpm (approximately 1,100-1,500 x g, depending on rotor radius) for 10–15 minutes. Random platelet concentration measurements performed by the tube manufacturer indicated that the mean platelet concentration in the prepared PRP was approximately 3–5 times the baseline whole blood value. Each preparation yielded approximately 2.0–5.0 mL of PRP (mean approximately 3.0-3.5 mL), corresponding to a leukocyte-poor PRP (LP-PRP) formulation. Exogenous activation with calcium chloride ($CaCl_2$) was not employed; endogenous activation mechanisms were relied upon instead. The prepared PRP was administered under sterile conditions via bilateral intracavernosal injection using a multipoint technique, with 3–4 injection points targeting the proximal, mid-shaft, and distal regions of each corpus cavernosum (6–8 injection points in total, approximately 0.3–0.5 mL per point). Penile clamping was applied for 15–20 minutes following each injection to facilitate local retention.

Patients in the combination group additionally received radial ESWT. rESWT was administered using a commercially available pneumatic radial shockwave device routinely used in clinical practice. ESWT and PRP were administered within the same session, with shock wave delivery preceding intracavernosal PRP injection. A total of six rESWT sessions were delivered twice weekly over the same three-week period. The rESWT parameters applied were as follows: pressure, 1.5 bar; frequency, 12 Hz; impulses per session, 3,000; and energy flux density (EFD) in the range of 0.09–0.25 mJ/mm² according to manufacturer specifications. Shock waves were delivered to five anatomical regions of the penis: the proximal corpus cavernosum (bilateral), mid-shaft corpus cavernosum (bilateral), distal corpus cavernosum (bilateral), bilateral crura, and the bilateral penoscrotal junction. All treatments were performed without anesthesia. PDE5 inhibitor use was prohibited in both groups throughout the entire study period.

7. Outcome Measures

The primary outcome was the change in the International Index of Erectile Function–Erectile Function domain (IIEF-EF) score from baseline to 12 months. Secondary outcomes included the Erection Hardness Score (EHS), the Sexual Quality of Life–Male questionnaire (SQoL-M), and the Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) [23–26]. All assessments were conducted at baseline and at 1, 3, 6, and 12 months following treatment. A follow-up time window of ± 2 weeks was permitted.

8. Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics (Version 22.0). Continuous variables are presented as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. Normality of distribution was assessed using the Shapiro–Wilk test. Between-group comparisons were performed using the independent samples t-test or Mann–Whitney U test, while categorical variables were compared using the chi-square test or Fisher’s exact test. Changes over time were evaluated using the Friedman test, with pairwise comparisons conducted via the Wilcoxon signed-rank test.

For the primary endpoint, a linear mixed-effects model (LMM) was fitted with time, treatment group, and the time × group interaction as fixed effects, individual patient as a random effect, and study center as an additional fixed effect. Analysis of covariance (ANCOVA) was applied to 12-month outcomes to account for potential baseline differences. Responder analysis was performed to determine the proportion of patients achieving the minimal clinically important difference (MCID) threshold for IIEF-EF. A two-sided p-value of < 0.05 was considered statistically significant.

RESULTS

1. Baseline Patient Characteristics

A total of 100 patients were included in the final analysis (PRP+rESWT: n = 55; PRP monotherapy: n = 45). The mean age of the overall cohort was 49.5 ± 8.7 years (range: 37–70 y). Mean duration of ED was 5.1 ± 3.0 months, and mean body mass index was 27.5 ± 3.1 kg/m². Diabetes mellitus was present in 27%, hypertension in 24%, coronary artery disease in 25%, and hyperlipidemia in 18% of patients. Stratification of baseline IIEF-EF scores revealed that 15% had severe ED, 48% had moderate ED, and 37% had mild-to-moderate ED. No statistically significant differences were identified between the two groups with respect to any baseline characteristic (all $p > 0.05$) (Table 1).

Table 1
Baseline demographic and clinical characteristics

Characteristic	Overall (N = 100)	PRP+rESWT (n = 55)	PRP only (n = 45)	p-value
Age (y)	49.5 ± 8.7	48.9 ± 8.7	50.4 ± 8.6	0.314
BMI (kg/m²)	27.5 ± 3.1	27.2 ± 3.1	27.8 ± 3.1	0.247
ED duration (mo)	5.1 ± 3.0	5.4 ± 3.0	4.7 ± 3.0	0.185
Diabetes mellitus	27 (27.0)	14 (25.5)	13 (28.9)	0.874
Hypertension	24 (24.0)	10 (18.2)	14 (31.1)	0.204
Hyperlipidemia	18 (18.0)	8 (14.5)	10 (22.2)	0.464
Coronary artery disease	25 (25.0)	13 (23.6)	12 (26.7)	0.908
Active smoking	57 (57.0)	31 (56.4)	26 (57.8)	0.886
ED severity (baseline)				0.915
Severe (IIEF-EF 1–10)	15 (15.0)	9 (16.4)	6 (13.3)	
Moderate (IIEF-EF 11–16)	48 (48.0)	26 (47.3)	22 (48.9)	
Mild-moderate (IIEF-EF 17–21)	37 (37.0)	20 (36.4)	17 (37.8)	

Values are presented as mean±standard deviation or n (%). BMI, body mass index; ED, erectile dysfunction; IIEF-EF, International Index of Erectile Function-Erectile Function domain; PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy. p-values calculated using Mann–Whitney U test for continuous variables and chi-square test for categorical variables.

2. Primary Outcome: IIEF-EF Scores

Baseline IIEF-EF scores were comparable between the two groups (PRP+rESWT: 16.5 ± 4.4; PRP monotherapy: 16.6 ± 3.6; $p = 0.889$). Both groups demonstrated statistically significant improvements from baseline at all follow-up time points (all $p < 0.001$) (Fig. 1, Table 2).

Table 2
IIEF domain scores at each time point

IIEF domain	Time point	PRP+rESWT (n = 55)	PRP only (n = 45)	p-value
Erectile function	Baseline	16.5 ± 4.4	16.6 ± 3.6	0.889
	1 mo	24.3 ± 3.7	24.6 ± 3.5	0.538
	3 mo	26.5 ± 4.0	26.9 ± 2.7	0.679
	6 mo	26.2 ± 3.4	26.0 ± 3.0	0.489
	12 mo	25.3 ± 3.4	23.1 ± 2.8	< 0.001a
Orgasmic function	Baseline	6.2 ± 2.3	6.4 ± 2.1	0.627
	12 mo	8.4 ± 1.7	7.4 ± 1.8	0.002a
Sexual desire	Baseline	5.7 ± 1.8	6.1 ± 2.0	0.272
	12 mo	8.0 ± 1.6	7.5 ± 1.5	0.156
Intercourse satisfaction	Baseline	7.4 ± 2.9	7.1 ± 2.4	0.696
	12 mo	11.2 ± 2.6	10.4 ± 2.6	0.255
Overall satisfaction	Baseline	4.9 ± 1.9	5.4 ± 1.4	0.208
	12 mo	8.3 ± 1.4	7.7 ± 1.5	0.043a
IIEF total	Baseline	40.7 ± 10.4	41.5 ± 8.5	0.639
	12 mo	61.2 ± 7.8	56.1 ± 7.0	< 0.001a
EF 12-mo change (95% CI)		+ 8.8 (7.7–9.9)	+ 6.4 (5.4–7.4)	
Between-group (Cohen's d)	12 mo			0.71

Values are presented as mean±standard deviation. IIEF, International Index of Erectile Function; EF, erectile function; CI, confidence interval; PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy; mo, months.

ap < 0.05 indicates statistical significance between groups.

At the 12-month assessment, patients in the PRP+rESWT group exhibited significantly higher IIEF-EF scores compared with the PRP monotherapy group (25.3 ± 3.4 vs. 23.1 ± 2.8; $p < 0.001$; mean difference: 2.2 points, 95% CI: 0.9–3.5; Cohen's $d = 0.71$). The time × treatment group interaction in the LMM was statistically significant ($F(4, 392) = 8.73$, $p < 0.001$), indicating divergent trajectories over time. No significant between-group differences were detected at the 1-, 3-, or 6-month assessments (all $p > 0.05$). However, between months 6 and 12, IIEF-EF scores in the PRP monotherapy group declined appreciably, whereas the therapeutic gains in the combination group were largely maintained.

Within-group mean IIEF-EF score improvements from baseline in the PRP+rESWT group were: +7.7 ± 3.0 at month 1, + 10.0 ± 3.8 at month 3, + 9.7 ± 3.9 at month 6, and + 8.8 ± 3.9 at month 12 (all $p < 0.001$). In the PRP monotherapy group, the corresponding increases were + 8.0 ± 2.3, + 10.3 ± 2.8, + 9.4 ± 2.8, and + 6.4 ± 3.0, respectively (all $p < 0.001$) (Table 2).

3. Secondary Outcomes

1) Erection Hardness Score (EHS)

Both groups demonstrated significant EHS improvements from baseline (Fig. 2, Table 3). A statistically significant baseline EHS difference was observed (PRP+rESWT: 2.02 ± 0.71 vs. PRP monotherapy: 2.27 ± 0.72; $p = 0.045$). When controlled using ANCOVA, the 12-month between-group difference remained significant (adjusted mean difference: 0.52 points, 95% CI: 0.32–0.72; $p < 0.001$). At 12 months, EHS scores were significantly higher in the PRP+rESWT group (3.53 ± 0.66 vs. 2.98 ± 0.58; $p < 0.001$).

Table 3
Secondary outcome measures at each time point

Outcome	Time point	PRP+rESWT (n = 55)	PRP only (n = 45)	p-value
EHS	Baseline	2.02 ± 0.71	2.27 ± 0.72	0.045a
	1 mo	2.78 ± 0.76	3.07 ± 0.84	0.061
	3 mo	3.11 ± 0.69	3.31 ± 0.79	0.120
	6 mo	3.53 ± 0.66	3.40 ± 0.75	0.439
	12 mo	3.53 ± 0.66	2.98 ± 0.58	< 0.001a
SQoL-M	Baseline	26.7 ± 3.4	26.5 ± 3.1	0.733
	1 mo	34.0 ± 4.0	33.6 ± 3.6	0.659
	3 mo	41.1 ± 4.7	41.5 ± 4.7	0.870
	6 mo	46.6 ± 5.3	47.1 ± 5.5	0.728
	12 mo	45.2 ± 5.4	42.4 ± 5.1	0.008a
EDITS	Baseline	10.3 ± 3.0	10.8 ± 3.5	0.463
	1 mo	16.3 ± 3.9	16.0 ± 4.4	0.743
	3 mo	24.7 ± 4.5	23.7 ± 5.2	0.159
	6 mo	30.0 ± 4.0	28.1 ± 4.8	0.070
	12 mo	29.1 ± 3.7	24.6 ± 4.1	< 0.001a

Values are presented as mean±standard deviation. EHS, Erection Hardness Score; SQoL-M, Sexual Quality of Life-Male; EDITS, Erectile Dysfunction Inventory of Treatment Satisfaction; PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy; mo, months.

ap < 0.05 indicates statistical significance between groups.

2) Sexual Quality of Life – Male (SQoL-M)

SQoL-M scores increased significantly in both groups (Fig. 3). In the PRP+rESWT group, mean scores rose from 26.7 ± 3.4 at baseline to 45.2 ± 5.4 at 12 months, while the PRP monotherapy group demonstrated an improvement from 26.5 ± 3.1 to 42.4 ± 5.1. The between-group difference at 12 months was statistically significant (p = 0.008) (Table 3).

3) Treatment Satisfaction (EDITS)

EDITS scores showed a consistent upward trend in both groups (Table 3, Fig. 4). At 12 months, treatment satisfaction was significantly higher in the PRP+rESWT group (29.1 ± 3.7 vs. 24.6 ± 4.1; p <

0.001). Satisfaction levels in the combination group were maintained between months 6 and 12, whereas a notable decline was observed in the monotherapy group.

4) Other IIEF Domain Scores

At 12 months, the PRP+rESWT group achieved significantly higher scores in the orgasmic function domain (8.4 ± 1.7 vs. 7.4 ± 1.8; p = 0.002) and the overall satisfaction domain (8.3 ± 1.4 vs. 7.7 ± 1.5; p = 0.043). No significant between-group differences were observed in the sexual desire or intercourse satisfaction subscales (Table 2).

DISCUSSION

This retrospective, multicenter cohort study provides clinically relevant comparative data on the long-term efficacy of PRP monotherapy versus combined PRP and rESWT in men with ED. The central finding is that, while both treatment approaches were associated with meaningful clinical improvements in the short and medium term, the combination of PRP and rESWT appeared to confer greater durability of therapeutic benefit over the 12-month follow-up period.

To the best of our knowledge, this study is among the few to report 12-month comparative outcomes between PRP monotherapy and PRP combined with radial ESWT. The extended follow-up duration directly addresses the concern raised by Du et al. [20] in their meta-analysis regarding the predominance of short-term data in the existing literature.

The substantial improvements observed in both groups during the first 6 months are consistent with the broader literature. Recent meta-analyses have demonstrated that PRP therapy yields significant gains in IIEF scores relative to placebo, with mean improvements ranging from 2.85 to 3.21 points [12, 13]. The IIEF-EF gains in our study — approximately 8–10 points — considerably exceed these pooled estimates. Several factors may account for this discrepancy: the relatively short mean ED duration in our cohort (5.1 mo), the administration of multiple PRP sessions, potential selection bias inherent to the retrospective design, and regression-to-the-mean effects.

One of the most clinically noteworthy findings is the divergence between groups at 12 months. While the PRP+rESWT group largely preserved the gains achieved at month 6, the PRP monotherapy group exhibited a consistent decline across all outcome measures during the 6–12 month interval. The 2.2-point between-group difference in IIEF-EF at 12 months was highly statistically significant (p < 0.001), yet its clinical magnitude requires careful contextualization. Since the established MCID for IIEF-EF is approximately 4 points [28], the observed difference falls below this threshold. Nevertheless, the significantly higher MCID responder rate in the combination group (78.2% vs. 57.8%; p = 0.028) suggests clinical relevance at the individual patient level.

The statistically significant baseline difference in EHS values ($p = 0.045$) reflects an inherent limitation of the retrospective design. This imbalance was addressed through ANCOVA, and the 12-month between-group difference remained significant after adjustment (adjusted mean difference: 0.52 points, 95% CI: 0.32–0.72; $p < 0.001$).

The use of a radial-type shock wave device merits specific discussion. The majority of Li-ESWT studies have employed focused devices, which differ from radial devices in wave penetration depth, energy distribution, and tissue interaction characteristics. Caution is warranted when extrapolating our findings to the focused Li-ESWT literature.

It is important to emphasize that both the EAU and AUA currently classify PRP therapy and Li-ESWT as investigational for ED. The findings should be interpreted within this framework, and prospective randomized controlled trials remain essential.

Limitations

Several important limitations warrant acknowledgment. First, the retrospective design inherently restricts causal inference. Second, the absence of routine platelet concentration measurement at each session precludes precise biological characterization. Third, no objective vascular assessment such as penile Doppler ultrasonography was performed. Fourth, the use of a radial-type shock wave device complicates direct comparison with the focused Li-ESWT literature. Finally, data were collected from only two centers, which may limit generalizability.

CONCLUSIONS

The findings of this retrospective cohort study suggest that combined PRP and radial ESWT may be associated with more durable clinical improvements over a 12-month follow-up period compared with PRP monotherapy. While both treatment approaches yielded significant gains in the short and medium term, the combination group demonstrated notably better preservation of therapeutic benefit over time. These results support further investigation of multimodal regenerative treatment strategies within a research context. Nevertheless, validation through prospective, sham-controlled, randomized trials remains essential before these approaches can be considered for broader clinical adoption. It should be noted that, per current EAU and AUA guidelines, PRP-based therapies and Li-ESWT remain classified as investigational.

Declarations

Conflict of Interest:

The authors have nothing to disclose.

CONFLICT OF INTEREST

The authors have nothing to disclose.

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AUTHOR CONTRIBUTION

Conceptualization: Çelen, Akkaya. Data curation: Çelen, Sonbahar. Formal analysis: Çelen. Investigation: Çelen, Sonbahar. Methodology: Çelen, Sonbahar, Akkaya. Project administration: Çelen. Resources: Akkaya. Supervision: Akkaya. Visualization: Çelen. Writing – original draft: Çelen. Writing – review & editing: Sonbahar, Akkaya.

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Figures

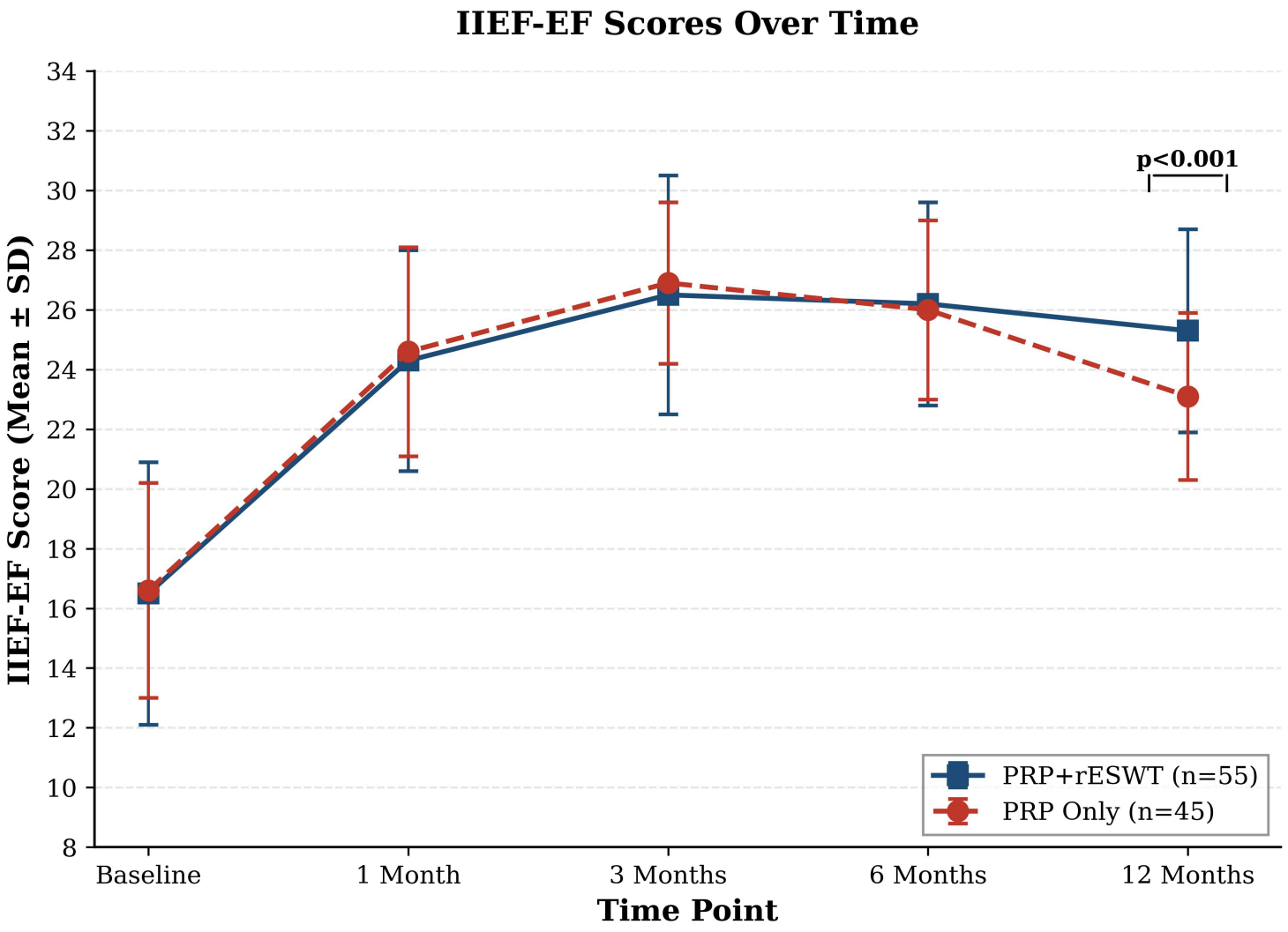


Figure 1

International Index of Erectile Function-Erectile Function domain (IIEF-EF) scores over time by treatment group. Data are presented as mean ± standard deviation. PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy.

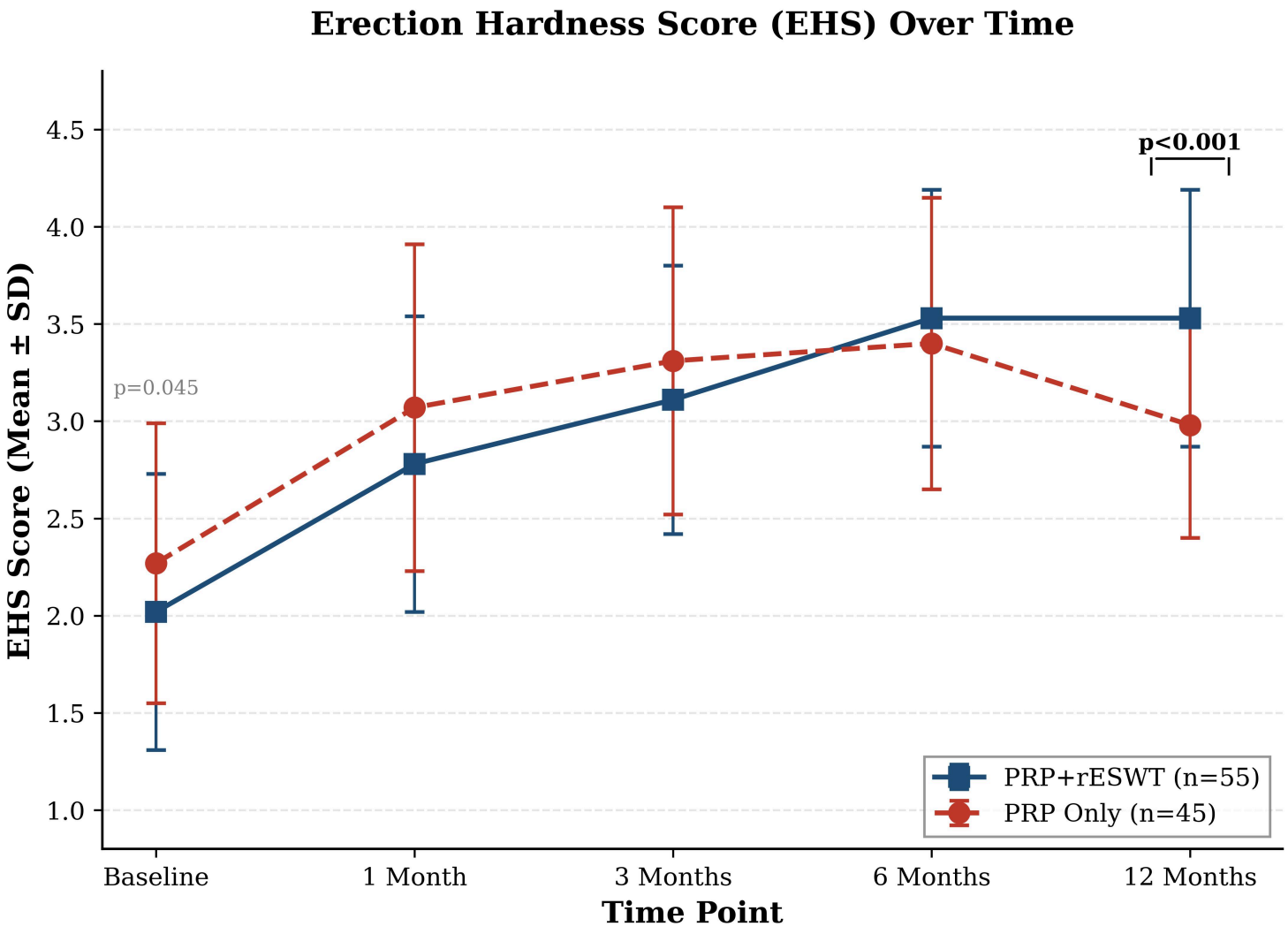


Figure 2

Sexual Quality of Life-Male (SQoL-M) scores over time by treatment group. Data are presented as mean ± standard deviation. PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy.

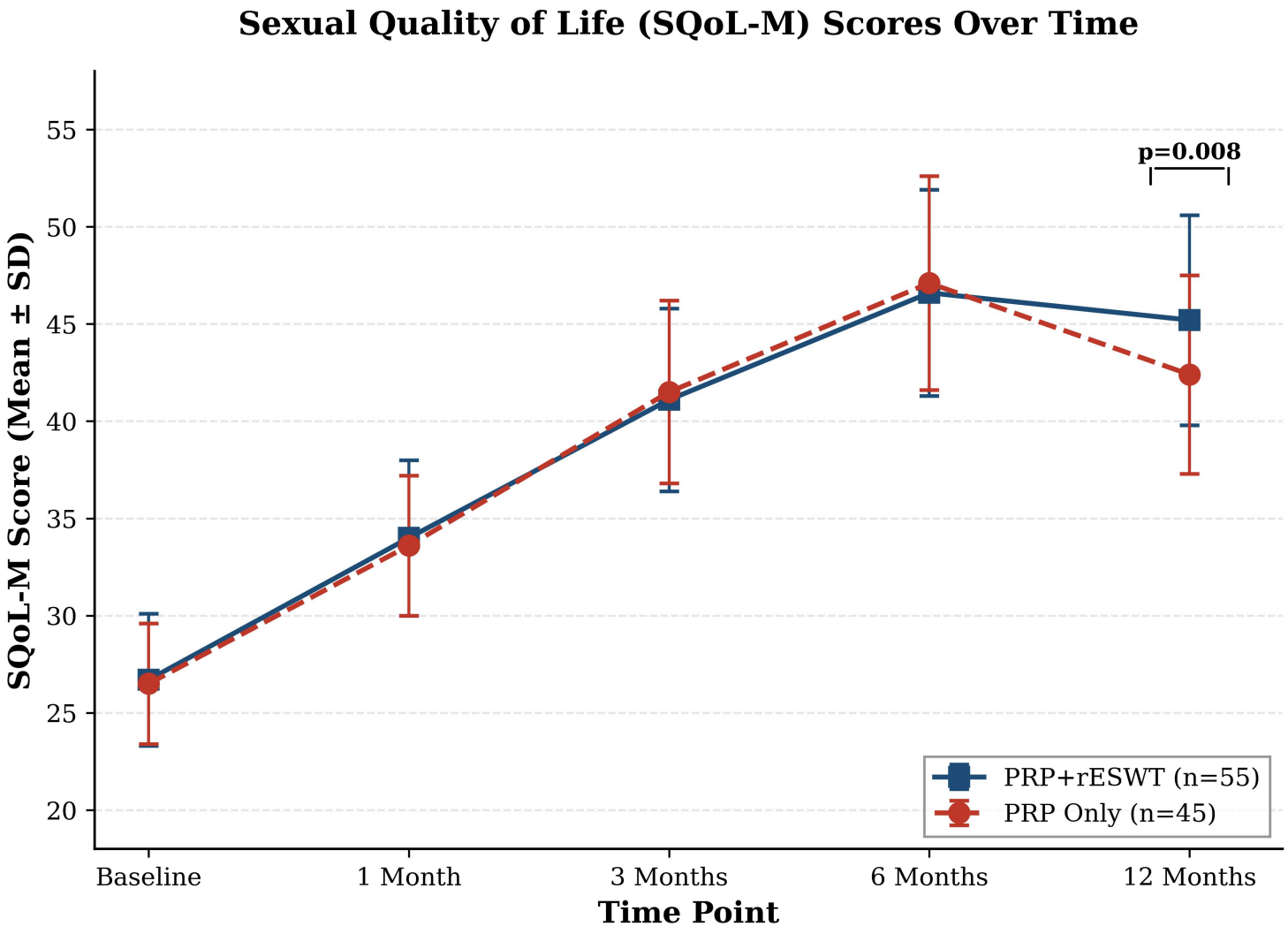


Figure 3

Sexual Quality of Life-Male (SQoL-M) scores over time by treatment group. Data are presented as mean ± standard deviation. PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy.

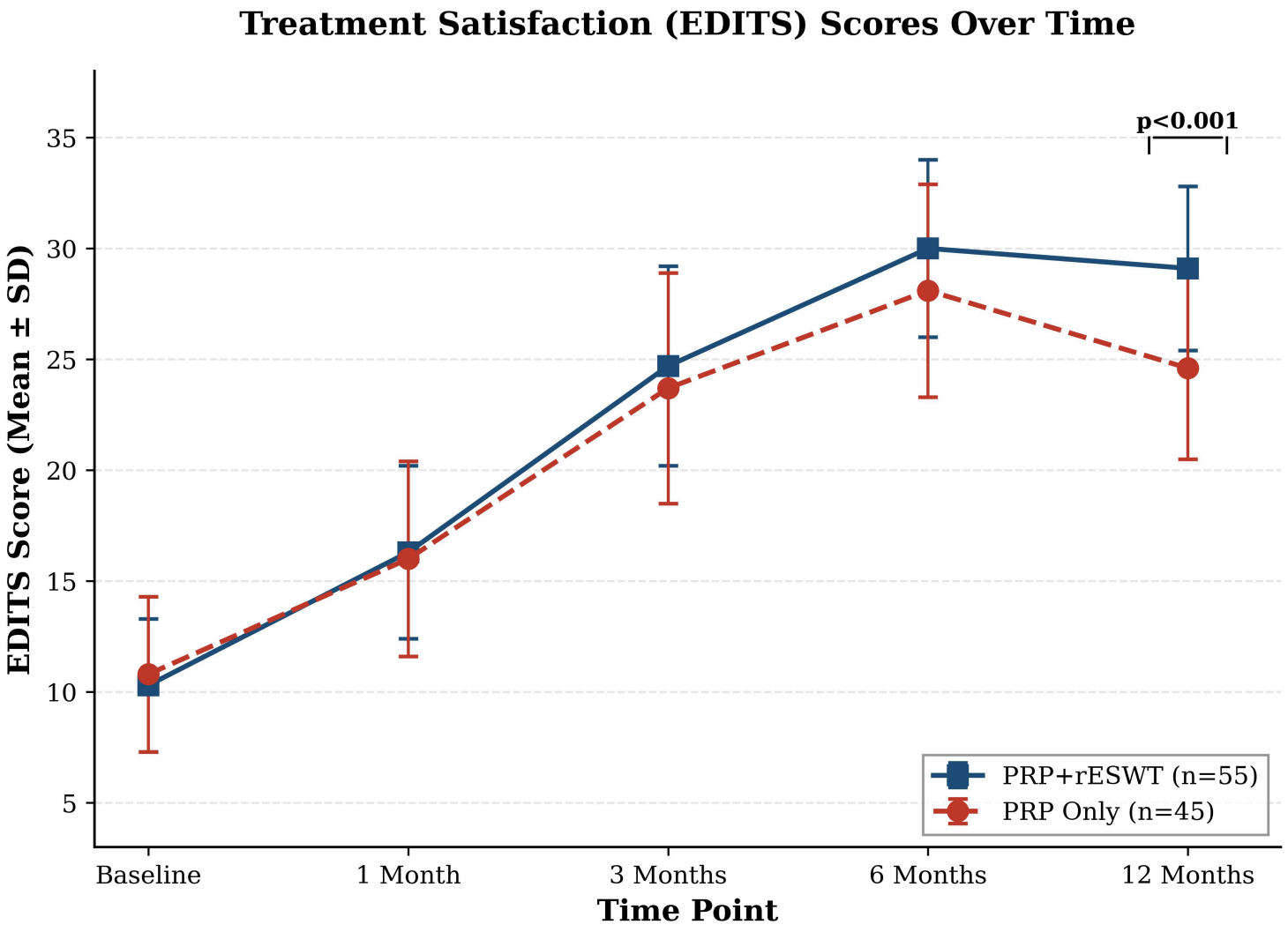


Figure 4

Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) scores over time by treatment group. Data are presented as mean ± standard deviation. PRP, platelet-rich plasma; rESWT, radial extracorporeal shock wave therapy.