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Review Article

Is Platelet-Rich Plasma (PRP) Superior to Autologous Whole Blood Injection (ABI) in Improving Clinical Outcomes for Musculoskeletal and Tendinopathic Conditions?

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Abstract

Objective: To systematically review and synthesize the comparative clinical evidence evaluating platelet-rich plasma (PRP) versus autologous whole blood injection (ABI) for the treatment of chronic tendinopathies and related musculoskeletal conditions. **Methods:** A systematic literature search of PubMed, MEDLINE, Embase, and the Cochrane Library was performed from database inception through 2025. Studies were included if they directly compared PRP with ABI or closely related autologous blood–derived products and reported pain or functional outcomes. Randomized controlled trials and high-quality comparative clinical studies were eligible. Data extraction included study design, pathology, injection protocol, outcome measures, and follow-up duration. Given substantial heterogeneity in PRP formulations, injection techniques, and outcome measures, a qualitative synthesis was performed. **Results:** Fourteen studies met inclusion criteria, including trials in lateral epicondylitis, plantar fasciitis, and proximal hamstring tendinopathy. Across conditions, both PRP and ABI consistently produced significant improvements in pain and function. Several studies demonstrated faster early symptom improvement with PRP; however, long-term outcomes were generally comparable between groups, with no consistent evidence of PRP superiority. **Conclusion:** Current clinical evidence does not demonstrate consistent superiority of PRP over ABI for chronic tendinopathies. Given similar long-term outcomes and substantially lower cost and complexity, ABI represents an effective and rational biologic treatment option. These findings suggest that mechanical needling and baseline biologic stimulation may play a more important role than supraphysiologic platelet concentration alone.

Keywords: Platelet-rich plasma; Autologous whole blood injection; Tendinopathy; Orthobiologics; Lateral epicondylitis; Plantar fasciitis

Introduction

Chronic tendinopathies are degenerative disorders characterized by collagen disorganization, increased proteoglycan content, neovascularization, and impaired intrinsic healing rather than classic inflammatory pathology [1,3]. These conditions, including lateral epicondylitis, plantar fasciitis, and proximal hamstring tendinopathy, represent some of the most common causes of musculoskeletal pain and functional limitation in both athletic and general populations [1,4]. Histopathologic studies consistently demonstrate features of failed tendon healing rather than acute inflammation, challenging the traditional paradigm of anti-inflammatory treatment [2,3].

Conventional management strategies—including activity modification, bracing, nonsteroidal anti-inflammatory medications, corticosteroid injections, and structured physical therapy—often provide incomplete or transient symptom relief [1,4,5]. Although corticosteroid injections may produce short-term improvement, multiple studies have demonstrated high recurrence rates and inferior long-term outcomes, underscoring the need for therapies that promote biological repair rather than symptomatic suppression [5-7].

In response, orthobiologic injection therapies have gained increasing attention for their potential to modulate the local tissue environment and stimulate intrinsic tendon healing [8,9]. Platelet-rich plasma (PRP), produced by centrifugation of autologous blood to achieve supraphysiologic platelet concentrations, has become one of the most widely used biologic treatments in sports medicine [8-10]. PRP delivers increased concentrations of platelet-derived growth factor, transforming growth factor–β, vascular endothelial growth factor, epidermal growth factor, and insulin-like growth factor, all of which play roles in chemotaxis, cell proliferation, angiogenesis, and extracellular matrix synthesis [8,11]. However, clinical outcomes following PRP injection remain inconsistent, in part due to substantial heterogeneity in preparation methods and injection protocols [9,10,12].

Autologous whole blood injection (ABI) represents a simpler and less costly biologic alternative. ABI involves injection of unprocessed venous blood, delivering platelets, leukocytes, and plasma proteins at physiologic concentrations while also inducing local bleeding and mechanical stimulation through tendon fenestration [4,13]. Several clinical trials have demonstrated clinically meaningful improvements following ABI in chronic tendinopathies, raising questions regarding whether supraphysiologic platelet concentration is truly necessary for therapeutic benefit [13-15].

Notably, an increasing number of comparative clinical trials have reported similar outcomes between PRP and ABI across multiple tendinopathies, including lateral epicondylitis, plantar fasciitis, and proximal hamstring tendinopathy [14-16]. These findings suggest the possible existence of a biologic dose–response threshold and highlight the potential importance of mechanical needling and nonspecific biologic stimulation in driving tendon healing [12,15,16].

Despite the widespread clinical adoption and substantially higher cost of PRP, it remains unclear whether PRP provides clinically meaningful advantages over autologous whole blood injection. Therefore, the objective of this study was to systematically review and synthesize the available comparative clinical evidence evaluating PRP versus ABI and closely related autologous blood–derived therapies in the treatment of chronic tendinopathies.

Methods

A systematic literature search was performed using PubMed, MEDLINE, Embase, and the Cochrane Library from database inception through 2025. The search strategy combined terms related to platelet-rich plasma, autologous whole blood injection, tendinopathy, lateral epicondylitis, plantar fasciitis, hamstring tendinopathy, and autologous blood–derived biologics. Reference lists of relevant articles were manually reviewed to identify additional eligible studies.

Studies were eligible for inclusion if they directly compared PRP with ABI or closely related autologous blood–derived products in a clinical setting and reported pain or functional outcomes. Randomized controlled trials, prospective comparative studies, and high-quality controlled clinical trials were included. Studies comparing PRP or ABI only to corticosteroids or placebo without a direct or biologically relevant comparator were excluded unless they provided contextual evidence regarding the relative efficacy of platelet-based therapies. Basic science studies, animal studies, and case series without comparison groups were excluded.

Data was extracted regarding study design, sample size, pathology, injection protocol, outcome measures, and duration of follow-up. Methodological quality was assessed qualitatively based on randomization procedures, blinding, allocation concealment, and completeness of follow-up. Given substantial heterogeneity in PRP preparation methods, injection techniques, outcome measures, and follow-up intervals, quantitative meta-analysis was not performed, and a qualitative synthesis approach was used.

Results

The initial search identified 247 articles. After screening titles and abstracts and reviewing full texts, fourteen studies met inclusion

criteria. These included five randomized or comparative trials in lateral epicondylitis directly comparing PRP and ABI [17-21], additional contextual trials comparing PRP with other injectates in lateral epicondylitis [22,23], three trials in plantar fasciitis [24-26], one randomized controlled trial in proximal hamstring tendinopathy [27], and four studies providing broader biologic context regarding platelet-derived and blood-derived therapies [28-30].

Lateral Epicondylitis

Lateral epicondylitis was the most extensively studied condition. Raeissadat et al. conducted a randomized clinical trial with one-year follow-up comparing PRP and ABI and demonstrated significant improvement in both groups, with no statistically significant difference in final outcomes [17]. In a separate randomized trial by the same group, both treatments again produced significant improvements in pain and function, and although PRP showed slightly faster early improvement, long-term results were comparable [19].

Thanasas et al. performed a randomized controlled trial comparing PRP with ABI and reported significant improvement in both groups, with PRP demonstrating superior outcomes at early follow-up intervals but no substantial long-term separation between groups [18]. Sandhu et al. compared activated PRP with ABI and found improvement in both groups, with some sustained advantages observed for PRP, although ABI still produced clinically meaningful benefit [20]. Kıvrak and Ulusoy compared PRP, corticosteroid injection, and ABI and reported that both PRP and ABI produced superior long-term outcomes compared with corticosteroids, with PRP demonstrating somewhat greater durability but no dramatic separation from ABI [21].

Contextual evidence from Peerbooms et al. demonstrated the long-term superiority of PRP over corticosteroid injection in lateral epicondylitis, supporting the concept that platelet-based therapies have regenerative potential, although this study did not directly compare PRP with ABI [24]. Rodik and McDermott similarly concluded that PRP performs favorably compared with common injection therapies but did not establish clear superiority over simpler biologic approaches [23].

Collectively, the lateral epicondylitis literature demonstrates a consistent pattern: both PRP and ABI result in significant clinical improvement, PRP may accelerate early symptom relief, but long-term outcomes frequently converge.

Plantar Fasciitis

In plantar fasciitis, Bildik and Kaya performed a prospective randomized double-blind controlled trial comparing PRP with ABI and found no significant differences in pain or functional outcomes between groups, despite substantial improvement in both [24]. Vahdatpour et al. similarly reported comparable clinical improvements with PRP and ABI, with no statistically significant between-group differences [25].

Malahias et al. provided further mechanistic insight by demonstrating that PRP and platelet-poor plasma produced similar outcomes in chronic plantar fasciitis, suggesting that the therapeutic effect may not depend solely on platelet concentration but rather on needling and local biologic stimulation [26]. These findings reinforce the notion that supraphysiologic platelet concentration may not be essential for clinical improvement in degenerative plantar fascia pathology.

Proximal Hamstring Tendinopathy

Davenport et al. conducted a double-blind randomized controlled trial comparing ultrasound-guided intratendinous injections of PRP and ABI for proximal hamstring tendinopathy and found significant improvement in both groups with no meaningful between-group differences in pain or function [27]. Although limited by sample size, this study mirrors the findings observed in lateral epicondylitis and plantar fasciitis.

Broader Context of Autologous Blood–Derived Therapies

Several included studies provide important context regarding the biologic complexity of blood-derived products. Purtskhvanidze et al. compared autologous platelet concentrate with autologous whole blood in ophthalmologic surgery and demonstrated that both could support tissue repair, underscoring that whole blood itself is a biologically active therapeutic substrate [28]. Man et al. described the successful use of both platelet-rich and platelet-poor plasma in cosmetic surgery, further supporting the concept that multiple blood-derived fractions possess regenerative potential [29].

Shirokova et al. demonstrated that autologous conditioned serum derived from whole blood clot secretome was superior to PRP in knee osteoarthritis, providing compelling evidence that platelet concentration alone does not determine biologic efficacy and that other blood-derived mediators may play critical roles in tissue modulation and repair [30].

Discussion

This systematic review demonstrates that PRP does not consistently provide superior clinical outcomes compared with autologous whole blood injection for chronic tendinopathies. Across lateral epicondylitis, plantar fasciitis, and proximal hamstring tendinopathy, both treatments reliably produce significant improvements in pain and function, and long-term outcomes are generally comparable.

One plausible explanation for these findings is the existence of a biologic dose–response threshold. It is possible that the baseline platelet concentration present in whole blood is sufficient to trigger maximal reparative signaling in degenerative tendon tissue and that further increases in platelet concentration provide diminishing returns. This hypothesis is supported by studies showing similar outcomes between PRP and platelet-poor plasma in plantar fasciitis [26] and superior performance of non-PRP blood-derived products in osteoarthritis [30].

Another critical factor is the mechanical effect of tendon fenestration and needling. Most injection protocols involve repeated needle passes through degenerative tissue, which may itself stimulate bleeding, neovascularization, and initiation of a healing cascade. The relative contribution of mechanical stimulation versus injectate composition remains poorly defined and likely substantial.

The heterogeneity of PRP preparations further complicates interpretation. PRP formulations vary widely in platelet concentration, leukocyte content, activation methods, and injected volume. Few studies report detailed biologic composition, making it difficult to identify whether specific formulations might confer advantages over ABI. It is entirely possible that certain optimized PRP preparations may outperform ABI, but current clinical evidence does not consistently demonstrate this. Economic considerations are also highly relevant. PRP requires specialized equipment, processing time, and consumables, resulting in substantially higher cost compared with ABI. When long-term outcomes are similar, the cost-effectiveness of ABI becomes particularly attractive.

Limitations

This review is limited by heterogeneity in study design, PRP preparation methods, injection protocols, and outcome measures. Many studies have relatively small sample sizes and limited long-term follow-up. The absence of quantitative meta-analysis reflects this methodological diversity. Additionally, few studies report detailed characterization of injectate composition, limiting mechanistic interpretation.

Future Directions

Future research should prioritize standardized reporting of PRP preparation parameters, including platelet concentration, leukocyte content, and activation methods. Large, multicenter randomized controlled trials with standardized protocols and cost-effectiveness analyses are needed. Mechanistic studies exploring growth factor dose–response relationships and the independent effects of needling versus injectate composition may further clarify the optimal role of biologic injections in tendinopathy management.

Conclusion

Current clinical evidence does not demonstrate consistent superiority of platelet-rich plasma over autologous whole blood injection for the treatment of chronic tendinopathies. Although PRP may provide modest early symptomatic benefits in some conditions, long-term outcomes are generally equivalent. Given its lower cost, simplicity, and comparable efficacy, autologous whole blood injection remains an effective and rational biologic treatment option.

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Conflict of Interests

The authors report no conflicts of interest

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