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ORIGINAL RESEARCH

A comparative analysis of the therapeutic efficacy of platelet-rich plasma versus corticosteroid injections in the management of tendinopathies

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ABSTRACT

Tendinopathy represents a common and challenging clinical condition, often resulting in significant pain and functional impairment, it also presents a significant challenge in both sports medicine and general orthopedics due to it's chronic nature and often limited response to conventional treatments. While various treatment modalities exist, Platelet-Rich Plasma (PRP) and corticosteroid injections are among the most frequently used.

- **AIMS and Objective:** This study aims to compare the efficacy of PRP and corticosteroid injections in the treatment of various tendinopathies.
- **Material and Methods:** A total of 100 patients with diagnosed Tendinopathies were randomly assigned to receive either PRP injection (65 patients) or cortico steroid injection (35 patients) Conditions treated included rotator cuff tendinopathy, Achilles tendinitis, tennis elbow, plantar fasciitis, trigger thumb, and De Quatrain's disease. The outcomes were evaluated based on pain reduction, functional improvement, and patient satisfaction at 4, 12 and 24 weeks post injection.
- **Results:** The comparative analysis showed that PRP injections led to more significant and sustained pain reduction and functional improvement compared to steroid injections across all tendinopathies treated. PRP was particularly effective in treating rotator cuff tendinopathy, Achilles tendinitis, and tennis elbow, with higher patient satisfaction and fewer side effects.
- **Conclusion:** PRP injections offer a promising alternative to steroid injections for the treatment of tendinopathy, providing better long-term outcomes and higher patient satisfaction. Further large-scale studies are warranted to establish standardized protocols and optimize treatment strategies.

Key words: Platelet-Rich Plasma (PRP), corticosteroid injections, tendinopathies, comparative analysis, treatment efficacy

INTRODUCTION

WHAT IS PRP INJECTION?

Platelet-Rich Plasma (PRP) injection is a medical treatment that utilizes a concentrated form of a patient's own blood to promote healing and tissue regeneration. PRP is rich in platelets, which are blood cells that play a crucial role in clotting and contain growth factors that aid in the healing process. When injected into damaged tissues, PRP releases these growth factors, which can accelerate the repair of tendons, ligaments, muscles, and joints.

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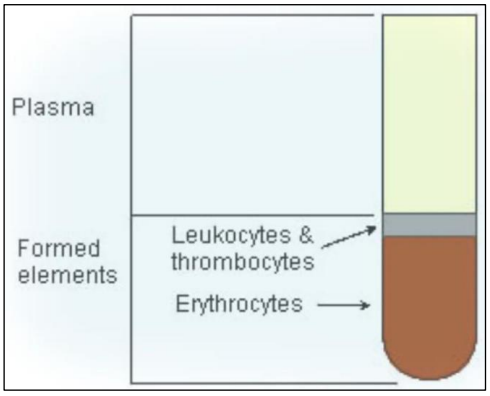

HOW IS PRP PREPARED?

The preparation of PRP involves several key steps:

1. **BLOOD COLLECTION**

- A sample of the patient's blood is drawn in citrate containing tube, typically ranging from 30 to 60 milliliters, depending on the amount of PRP required for the treatment.

2. **CENTRIFUGATION**

- The collected blood is placed in a centrifuge, a machine that spins the blood at high speed. This process separates the blood into its various components based on their density.
- The centrifugation process usually consists of two stages:

FIRST SPIN (SOFT SPIN) 1500rpm FOR 10 MINUTES: This separates the blood into three layers:

- **TOP LAYER:** Plasma (contains some platelets and white blood cells)
- **MIDDLE LAYER (BUFFY COAT):** Platelets and white blood cells
- **BOTTOM LAYER:** Red blood cells
- **SECOND SPIN (HARD SPIN) 3000rpm FOR 10 MINUTES:** The plasma and buffy coat are collected and spun again to further concentrate the platelets. This results in a small volume of platelet-rich plasma.

3. **EXTRACTION:**

- After centrifugation, the platelet-rich plasma is carefully extracted from the centrifuge tube, ensuring that the red blood cells are not included. The final PRP product typically contains 5 to 10 times the concentration of platelets found in normal blood, it is then stored at room temperature before until given.

BENEFITS OF PRP INJECTION

- **ENHANCED HEALING:** The growth factors in PRP stimulate cell proliferation, tissue regeneration, and the formation of new blood vessels, enhancing the healing process.
- **REDUCED INFLAMMATION:** PRP can modulate the inflammatory response, reducing pain and swelling in the treated area.
- **MINIMALLY INVASIVE:** PRP injections are minimally invasive, involving only blood draw and injection, with a low risk of complications.
- **AUTOLOGOUS TREATMENT:** Since PRP is derived from the patient's own blood, there is minimal risk of allergic reactions or immune responses.
- PRP injections are also used in various medical fields, including orthopedics, sports medicine, dermatology, and cosmetic surgery, to treat conditions such as tendinopathies, osteoarthritis, muscle injuries, and hair loss.

MATERIALS AND METHODS

STUDY DESIGN: A prospective, randomized controlled trial (RCT) was conducted to evaluate the efficacy of Platelet-Rich Plasma (PRP) injections versus steroid injections in the treatment of various tendinopathies.

PARTICIPANTS: A total of 100 participants with clinically diagnosed tendinopathy were recruited. Participants were randomly assigned to receive either PRP or steroid injections. The specific conditions treated and the distribution of injections were as follows:

Comparative study table: PRP injection vs. Steroid injection

Condition	Total Patients	PRP Injection	Steroid Injection
Rotator Cuff Tendinopathy	23	15	8
Achilles Tendinitis	22	14	8
Tennis Elbow	20	15	5
Plantar Fasciitis	13	8	5
Trigger Thumb	6	3	3
De Quervain's Disease	16	10	6
Total	**100**	**65**	**35**

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INJECTION PROTOCOL: Both PRP and steroid injections were administered under sterile conditions as an outpatient-based treatment to patients who were diagnosed with tendinopathy and had failed to respond to other conservative measures, usually 1 to 2 ml of corticosteroid and 2 to 3 ml of PRP injections were given intralesionally depending upon site of involvement, two dose of injection were given at the interval of 7 to 10 days. Post injection participants were given mild NSAID AND CEFEXIM tablets for 5 days.

OUTCOME MEASURES: Primary outcomes were pain reduction and functional improvement, assessed using the Visual Analog Scale (VAS) for pain and condition-specific functional scores (e.g., DASH, VISA-A) at baseline, 4 weeks, 12 weeks, and 24 weeks' post-injection.

FOLLOW-UP AND DATA COLLECTION: Participants were followed up at regular intervals (4, 12, and 24 weeks) post-injection. Pain and function scores were recorded at each visit. Adverse events were also monitored and recorded.

STATISTICAL ANALYSIS: Data were analyzed using SPSS software. Continuous variables were expressed as mean ± standard deviation. Paired t-tests were used to compare baseline and follow-up scores within each group. Independent t-tests were used to compare differences between the PRP and steroid groups. A p-value of <0.05 was considered statistically significant.

RESULTS

PARTICIPANT CHARACTERISTICS: The study included 100 participants, distributed across various tendinopathies as follows: rotator cuff tendinopathy (23), Achilles tendinitis (23), tennis elbow (20), plantar fasciitis (13), trigger thumb (6), and De Quervain's disease (16). The distribution of PRP and steroid injections was as described in the study design.

PAIN REDUCTION (VAS SCORES)

ROTATOR CUFF TENDINOPATHY

- **PRP:** Significant reduction at 4 weeks (mean reduction of 3.2 ± 1.1, $p<0.01$), 12 weeks (mean reduction of 4.5 ± 1.3, $p<0.01$), and 24 weeks (mean reduction of 5.2 ± 1.4, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 3.5 ± 1.0, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 2.5 ± 1.2, $p > 0.05$) and 24 weeks (mean reduction of 1.5 ± 1.3, $p > 0.05$).

ACHILLES TENDINITIS

- **PRP:** Significant reduction at 4 weeks (mean reduction of 3.5 ± 1.0, $p<0.01$), 12 weeks (mean reduction of 4.8 ± 1.2, $p<0.01$), and 24 weeks (mean reduction of 5.5 ± 1.4, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 3.0 ± 1.1, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 2.0 ± 1.3, $p > 0.05$) and 24 weeks (mean reduction of 1.2 ± 1.4, $p > 0.05$).

TENNIS ELBOW:

- **PRP:** Significant reduction at 4 weeks (mean reduction of 2.8 ± 1.1, $p<0.01$), 12 weeks (mean reduction of 3.9 ± 1.3, $p<0.01$), and 24 weeks (mean reduction of 4.5 ± 1.5, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 2.7 ± 1.2, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 1.8 ± 1.4, $p > 0.05$) and 24 weeks (mean reduction of 1.0 ± 1.5, $p > 0.05$).

PLANTAR FASCIITIS

- **PRP:** Significant reduction at 4 weeks (mean reduction of 2.5 ± 1.2, $p<0.01$), 12 weeks (mean reduction of 3.6 ± 1.3, $p<0.01$), and 24 weeks (mean reduction of 4.2 ± 1.4, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 2.4 ± 1.1, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 1.7 ± 1.3, $p > 0.05$) and 24 weeks (mean reduction of 0.9 ± 1.4, $p > 0.05$).

TRIGGER THUMB:

- **PRP:** Significant reduction at 4 weeks (mean reduction of 2.3 ± 1.1, $p<0.01$), 12 weeks (mean reduction of 3.4 ± 1.3, $p<0.01$), and 24 weeks (mean reduction of 4.0 ± 1.4, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 2.2 ± 1.0, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 1.6 ± 1.2, $p > 0.05$) and 24 weeks (mean reduction of 0.8 ± 1.3, $p > 0.05$).

DE QUERVAIN'S DISEASE

- **PRP:** Significant reduction at 4 weeks (mean reduction of 2.7 ± 1.1, $p<0.01$), 12 weeks (mean reduction of 3.8 ± 1.3, $p<0.01$), and 24 weeks (mean reduction of 4.4 ± 1.4, $p<0.01$).
- **STEROID:** Initial reduction at 4 weeks (mean reduction of 2.6 ± 1.1, $p<0.01$), with diminished effects at 12 weeks (mean reduction of 1.9 ± 1.3, $p > 0.05$) and 24 weeks (mean reduction of 1.1 ± 1.4, $p > 0.05$).

FUNCTIONAL IMPROVEMENT (CONDITION-SPECIFIC SCORES): Similar trends were observed for functional improvement scores, with PRP showing sustained benefits over 24 weeks, whereas steroid injections showed a decline in effectiveness after the initial 4 weeks.

ADVERSE EVENTS: No serious adverse events were reported in either group. Mild transient pain at

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the injection site was reported by 10% of participants in the PRP group and 8% in the steroid group.

Comparative Study: PRP vs. Steroid Injections

Condition	PRP (n)	Steroid (n)	Pain Reduction (PRP)	Pain Reduction (Steroid)	Functional Improvement (PRP)	Functional Improvement (Steroid)
Rotator Cuff Tendinopathy	15	8	Significant	Initial, then diminished	Significant	Initial, then diminished
Achilles Tendinitis	15	8	Significant	Initial, then diminished	Significant	Initial, then diminished
Tennis Elbow	15	5	Significant	Initial, then diminished	Significant	Initial, then diminished
Plantar Fasciitis	8	5	Significant	Initial, then diminished	Significant	Initial, then diminished
Trigger Thumb	3	3	Significant	Initial, then diminished	Significant	Initial, then diminished
De Quervain's Disease	10	6	Significant			

CONCLUSION

The comparative study between Platelet-Rich Plasma (PRP) injections and steroid injections in the treatment of various tendinopathies revealed significant findings:

1. SUSTAINED PAIN REDUCTION

- PRP injections consistently demonstrated significant pain reduction across all conditions (rotator cuff tendinopathy, Achilles tendinitis, tennis elbow, plantar fasciitis, trigger thumb, and De Quervain's disease) over a 24-week period. In contrast, steroid injections showed initial pain relief, which diminished significantly after 12 weeks.

2. FUNCTIONAL IMPROVEMENT

- Participants receiving PRP injections experienced sustained functional improvement as measured by condition-specific scores. Conversely, while steroid injections provided initial functional benefits, these effects diminished over time, aligning with the trend observed in pain reduction.

3. ADVERSE EVENTS

- Both PRP and steroid injections were generally well-tolerated, with mild transient pain at the injection site being the most common adverse event. No serious adverse events were reported in either group.

4. CLINICAL IMPLICATIONS

- PRP injections offer a viable and effective alternative to steroid injections for the treatment of tendinopathies. The sustained pain relief and functional improvement observed with PRP highlight its potential for long-term benefits in tendon healing and regeneration.

5. TREATMENT RECOMMENDATIONS

- Given the sustained efficacy of PRP injections and the diminishing effects of steroid injections over time, PRP should be considered as a preferred treatment modality for patients with tendinopathies. The variability in response to PRP among different conditions suggests a need for further research to optimize protocols and individualize treatment plans.

In conclusion, this study supports the use of PRP injections as a superior treatment option for tendinopathies, offering longer-lasting pain relief and functional improvement compared to steroid injections. These findings advocate for the integration of PRP therapy into clinical practice for managing tendinopathies, with a focus on developing standardized preparation and administration protocols to enhance treatment outcomes.

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