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Comparative Evaluation of Autologous Blood vs. Corticosteroid Injection in Lateral Epicondylitis: A Randomised Trial at SKMCH Muzaffarpur

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Abstract: ***Background: Lateral epicondylitis, commonly referred to as tennis elbow, is a frequent musculoskeletal condition characterized by pain and tenderness over the lateral elbow. While corticosteroid injections have been the mainstay of treatment, they are associated with short-term benefits and high recurrence rates. Recently, autologous blood injections have emerged as a biological alternative to promote tissue regeneration. Objective: This study aimed to compare the efficacy and long-term outcomes of autologous blood injection versus corticosteroid injection in the treatment of lateral epicondylitis in a tertiary care setting. Methods: A randomized controlled trial was conducted at Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur. A total of 100 patients clinically diagnosed with lateral epicondylitis were included and randomly assigned to two equal groups. A) Group A (n = 50): Received 2 ml autologous venous blood mixed with 1 ml of 0.5% bupivacaine. B) Group B (n = 50): Received 80 mg methylprednisolone acetate with 1 ml of 0.5% bupivacaine. Pain was assessed using the Visual Analogue Scale (VAS) and Nirschl Staging System at baseline, 1 week, 4 weeks, 12 weeks, and 6 months. Results: Patients in Group B reported faster pain relief initially at 1 and 4 weeks (p < 0.01). However, at 12 weeks and 6 months, Group A showed significantly better pain reduction and lower recurrence. At 6 months, 88% of Group A reported complete pain relief, while only 52% in Group B achieved similar outcomes. Recurrence rate was 10% in Group A versus 34% in Group B. Conclusion: Autologous blood injection provides superior long-term outcomes with lower recurrence compared to corticosteroid injection. It is a cost-effective and biologically rational alternative in the treatment of lateral epicondylitis.***

Keywords: Lateral epicondylitis, Autologous blood, Corticosteroid, Tennis elbow, VAS, Nirschl staging, Randomized trial, SKMCH Muzaffarpur

1. Introduction

Lateral epicondylitis, commonly known as "tennis elbow, " is one of the most frequently encountered conditions in orthopedic outpatient departments. It primarily affects individuals engaged in repetitive wrist extension and gripping activities, and despite the name, it often occurs in non-athletes. The condition is characterized by localized pain and tenderness over the lateral epicondyle of the humerus, particularly at the origin of the extensor carpi radialis brevis (ECRB) tendon.

The estimated incidence of lateral epicondylitis ranges from 1% to 3% in the general population, peaking between the ages of 35 and 54 years. In our local experience at SKMCH Muzaffarpur, a significant proportion of patients are manual laborers, mechanics, farmers, and homemakers—individuals prone to repetitive strain injuries.

Pathophysiology

Historically referred to as tendinitis, the current understanding of lateral epicondylitis is more aligned with **tendinosis**—a degenerative, non-inflammatory process. Histopathological studies describe the presence of angiofibroblastic hyperplasia, microtears, collagen disorganization, and an absence of inflammatory cells. These features suggest that therapies focusing solely on inflammation, such as corticosteroids, may not target the root cause.

Existing Treatment Options

Treatment strategies have traditionally included:

- Non-steroidal anti-inflammatory drugs (NSAIDs)
- Physical therapy
- Bracing or immobilization
- Local corticosteroid injections

Among these, **corticosteroid injections** have been widely used due to their rapid pain relief. However, multiple studies have raised concerns about their long-term efficacy, recurrence rates, and complications such as tendon rupture, skin atrophy, and suppression of tendon healing.

Biological Alternatives

Emerging regenerative options such as **autologous blood injection (ABI)** and **platelet-rich plasma (PRP)** are based on the hypothesis that the growth factors in blood promote intrinsic healing. ABI is a low-cost and simple alternative compared to PRP and does not require specialized equipment. When injected at the site of degeneration, autologous blood delivers cytokines and growth factors, initiating the healing cascade and stimulating fibroblast activity and collagen synthesis.

Rationale of the Study

In the Indian context, and particularly in resource-limited settings like SKMCH Muzaffarpur, there is a need to validate cost-effective, evidence-based treatment options. While corticosteroids are easily accessible, their use is increasingly being questioned due to early recurrence. On the other hand,

ABI offers a biologically sound and economical intervention that aligns with the underlying pathology of the condition.

This randomized controlled trial was conducted to compare the clinical outcomes of autologous blood versus corticosteroid injection in patients diagnosed with lateral epicondylitis. The focus was not only on pain relief but also on long-term effectiveness, recurrence, and patient satisfaction.

2. Materials and Methods

Study Design and Setting
This randomized controlled trial was conducted at the Department of Orthopaedics, **Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur**, over a 9-month period. Ethical clearance was obtained from the institutional review board prior to patient recruitment. Informed written consent was obtained from all participants.

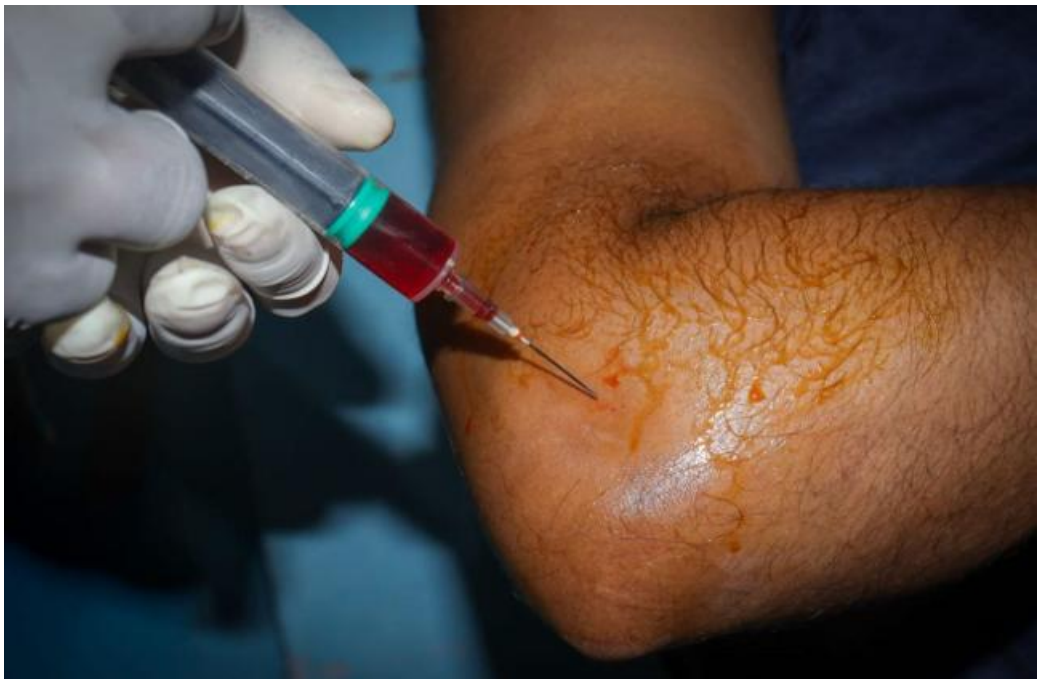
Study Population
A total of **100 patients** diagnosed clinically with lateral epicondylitis were enrolled. Diagnosis was based on the presence of lateral elbow pain, tenderness over the lateral epicondyle, and a positive Cozen's and/or Mill's test.

Inclusion Criteria:
- Age ≥ 18 years
- Clinical diagnosis of lateral epicondylitis
- Symptoms persisting for at least 2 weeks

Exclusion Criteria:
- Prior corticosteroid injection within 3 months
- History of elbow trauma or surgery
- Coexisting elbow pathology (e. g., arthritis, nerve entrapment)
- Bleeding disorders or anticoagulant therapy
- Diabetes mellitus (to eliminate bias in healing response)
- Pregnancy or breastfeeding

Randomization and Intervention
Patients were randomly allocated using a computer-generated random number table into two groups of 50 each:
- **Group A (Autologous Blood Injection Group):** Received 2 ml of venous blood drawn from the contralateral upper limb, mixed with 1 ml of 0.5% mbupivacaine, injected at the lateral epicondyle.
- **Group B (Corticosteroid Injection Group):** Received 80 mg of methylprednisolone acetate mixed with 1 ml of 0.5% bupivacaine, injected at the same anatomical site.

The injection was administered with the elbow flexed at 90°, forearm pronated, and the anatomical bony landmarks identified. Standard aseptic technique was maintained.



Post-Injection Protocol
- Patients were advised to rest the injected arm for 72 hours.
- No heavy lifting or strenuous activity for 1 week.
- Use of analgesics (not NSAIDs) permitted only if intolerable pain occurred.

Outcome Measures
Pain and functional recovery were evaluated using:
1) **Visual Analogue Scale (VAS):** A 10 cm line marked from 0 ("no pain") to 10 ("worst pain imaginable").
2) **Nirschl Pain Staging System:** A 7-phase system categorizing pain intensity and impact on daily function.

Assessments were performed at:
- Baseline (Pre-injection)
- 1 week
- 4 weeks
- 12 weeks
- 6 months

All evaluations were done by a blinded observer.

Statistical Analysis
Data were compiled using Microsoft Excel and analyzed using SPSS v24.0.

- Continuous variables (VAS, Nirschl score) were analyzed using the Mann-Whitney U test.
- Categorical outcomes (pain-free status, recurrence) were compared using the chi-square test.
- A **p-value < 0.05** was considered statistically significant.

3. Results

A total of 100 patients were included in the study: 50 in the autologous blood injection group (Group A) and 50 in the corticosteroid injection group (Group B). All participants completed the 6-month follow-up.

Demographic and Baseline Characteristics
The two groups were comparable in terms of age, sex distribution, dominance of the affected limb, and symptom duration.
Table I summarizes the baseline characteristics.

Table I: Baseline Characteristics of Study Groups

Parameter	Group A (Autologous Blood)	Group B (Corticosteroid)	p-value
No. of patients	50	50	—
Mean age (years) ± SD	42.8 ± 9.5	43.1 ± 10.2	0.81
Male: Female	27:23:00	26:24:00	0.84
Right: Left side involvement	39:11:00	37:13:00	0.66
Dominant hand involved (n, %)	43 (86%)	41 (82%)	0.59
Mean duration of symptoms (weeks)	8.7 ± 3.6	8.5 ± 3.8	0.77

Pain Reduction Analysis
Visual Analogue Scale (VAS) and Nirschl staging scores were used to assess pain at various intervals. At **1 and 4 weeks**, Group B had statistically significant better pain relief. However, at **12 weeks and 6 months**, Group A showed significantly better outcomes.

Table II: Mean VAS Score Over Time

Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Pre-injection	7.8 ± 1.2	7.6 ± 1.3	0.44
1 week	7.1 ± 1.5	4.2 ± 1.6	<0.001
4 weeks	3.4 ± 2.1	1.7 ± 2.0	0.002
12 weeks	0.9 ± 1.4	1.8 ± 1.6	0.015
6 months	0.5 ± 1.2	2.1 ± 1.8	0.003

Table III: Mean Nirschl Staging Over Time

Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Pre-injection	5.5 ± 1.0	5.4 ± 1.1	0.67
1 week	4.9 ± 1.3	3.2 ± 1.5	<0.001
4 weeks	2.3 ± 1.6	1.1 ± 1.5	0.001
12 weeks	0.6 ± 1.1	1.2 ± 1.3	0.012
6 months	0.3 ± 0.8	1.5 ± 1.4	0.001

Pain-Free Status at 6 Months

- **Group A:** 44 out of 50 patients (88%) were completely pain-free.
- **Group B:** 26 out of 50 patients (52%) were pain-free ($p < 0.001$).

Recurrence Rates

- **Group A:** 3 patients (6%) had symptom recurrence after initial improvement.
- **Group B:** 17 patients (34%) had symptom recurrence ($p < 0.001$).

4. Discussion

This randomized controlled trial compared the short- and long-term efficacy of autologous blood injection versus corticosteroid injection in the treatment of lateral epicondylitis at a tertiary care center in Muzaffarpur, Bihar. Our findings demonstrate that although corticosteroid injections offer quicker pain relief in the early weeks, autologous blood injections result in significantly better outcomes in terms of sustained pain relief and lower recurrence rates at 6 months.

Comparison with Other Studies
Our results are in agreement with those of **Edwards and Calandruccio (2003),** who reported sustained pain relief in 79% of patients treated with autologous blood injection over a 9-month period. Similarly, **Connell et al. (2006)** found autologous blood injections to be beneficial in patients who had failed conservative treatment, showing that biological healing mechanisms may play a vital role in recovery.

In contrast, **Smidt et al. (2002)** and **Hay et al. (1999)** documented that while corticosteroid injections provide rapid symptom relief, these benefits wane over time, and recurrence is common—consistent with our observation of a 34% recurrence rate in the corticosteroid group.

Biological Rationale
The rationale behind the efficacy of autologous blood injection lies in the pathophysiology of lateral epicondylitis itself. Histologically, the condition is characterized by tendinosis and not inflammation. Corticosteroids may provide a placebo-like effect through local pressure changes and temporary nociceptive suppression, but they do not address the degenerative pathology.

Autologous blood, on the other hand, contains essential growth factors such as **platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF),** and **transforming growth factor-beta (TGF-β),** which stimulate the healing cascade by recruiting fibroblasts and promoting collagen regeneration.

Local Relevance
In resource-limited settings such as SKMCH Muzaffarpur, the use of **autologous blood**—a low-cost, minimally processed, and accessible therapy—holds immense potential. The equipment and expertise required are minimal, making it especially suitable in government and rural healthcare centers.

Adverse Events and Safety
Our study observed minor post-injection pain in 18% of the autologous blood group, which resolved within 3–5 days without intervention. In the corticosteroid group, two patients

experienced local skin atrophy. Importantly, **no serious complications** such as tendon rupture, infection, or neurovascular injury were noted in either group.

These findings emphasize the **safety profile** of both interventions when performed under proper technique and sterile precautions. However, the biological approach offers long-term benefit with minimal side effects.

5. Study Strengths and Limitations

Strengths:
- Adequate sample size (n = 100)
- Randomized controlled design
- Blinded outcome assessment
- Multiple follow-up intervals

Limitations:
- No imaging (e. g., ultrasound or MRI) was used to assess tendon healing
- Only one injection was administered per patient
- Six-month follow-up period may not capture very late relapses

Future research could explore multiple ABI injections, longer follow-up, or combination with physiotherapy or PRP to assess synergistic effects.

6. Conclusion

This randomized controlled trial provides compelling evidence that **autologous blood injection** is more effective than **local corticosteroid injection** in the long-term management of lateral epicondylitis. While corticosteroids provide early symptom relief, they are associated with higher recurrence rates and limited biological benefit.

On the contrary, autologous blood injection:
- Provides sustained pain relief up to 6 months,
- Demonstrates significantly lower recurrence,
- Is cost-effective, safe, and biologically rational.

Given the degenerative nature of lateral epicondylitis, biologically regenerative therapies like autologous blood injection are more aligned with the underlying pathology. In resource-limited settings like **SKMCH Muzaffarpur**, ABI offers an affordable and practical alternative to conventional corticosteroid therapy.

We recommend adopting autologous blood injection as a **first-line or adjunctive treatment** in lateral epicondylitis, especially for patients with chronic symptoms or recurrence after steroids.

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