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Efficacy of Analgesics and Physiotherapy Versus Local Steroid Injections in the Management of Tennis Elbow: A Prospective Observational Study of 100 Patients

Abstract

This prospective observational study, conducted from November 2022 to January 2025 at Dr. Pinnamaneni Siddhardha Institute of Medical Sciences and Research Foundation, Gannavaram, investigates the therapeutic efficacy of a dual modality approach—conservative management using analgesics and physiotherapy (A&P) compared with local steroid injections (LSI)—in patients diagnosed with lateral epicondylitis. One hundred patients, exhibiting considerable heterogeneity in age, sex, occupational exposure, and baseline functional status, were allocated into two treatment arms. Functional outcomes were meticulously assessed using the Patient Rated Tennis Elbow Evaluation (PRTEE) score and supplementary visual analog scales (VAS) at baseline and at serial intervals over a 12-month follow-up period. Our findings reveal that while LSI confers a pronounced early analgesic effect, the long-term functional recuperation converges between the two treatment groups. These results are critically analysed alongside recent post-2020 literature, delineating potential clinical implications, future research directives, and inherent study limitations.

Introduction

Lateral epicondylitis, commonly referred to as tennis elbow, is a degenerative tendinopathy predominantly affecting the extensor tendon origin at the lateral epicondyle of the humerus. Although initially described in association with tennis players, the condition is far more prevalent in individuals engaged in repetitive manual activities and occupational tasks that impose chronic strain on the forearm musculature[1]. The ethology of tennis elbow is multifactorial, involving repetitive micro-trauma, altered tendon biomechanics, and aberrant healing responses, which result in angiofibroblastic hyperplasia and collagen disarray at the extensor carpi radialis brevis (ECRB) insertion[2] [3]. Recent investigations have emphasised the role of both mechanical overload and systemic factors, including genetic predisposition and altered local cytokine profiles, in the pathogenesis of this condition[4] [5].

The management of lateral epicondylitis remains a subject of considerable debate. Conservative measures, such as non-steroidal anti-inflammatory drugs (NSAIDs) combined with physiotherapy, aim to promote tendon remodelling through eccentric exercise and neuromuscular re-education[6] [7]. In contrast, local steroid injections (LSI) provide potent short-term anti-inflammatory effects by modulating the local cytokine milieu and reducing nociceptive input[8] [9]. However, the literature indicates that while corticosteroids may afford rapid symptomatic relief, they may also be associated with adverse effects such as skin atrophy and a potential delay in long-term tendon healing[10] [11]. Recent meta-analyses and randomised controlled trials published after 2020 have provided nuanced insights into these treatment modalities, highlighting that a balanced, individualised approach is essential for optimising both early pain relief and long-term functional recovery[12] [13] [14].

In this context, our study seeks to compare the efficacy of a multimodal conservative treatment—comprising analgesics and physiotherapy—with that of local steroid injections in a heterogeneous cohort of 100 patients with tennis elbow. By evaluating both patient-reported outcome measures (e.g., the Patient Rated Tennis Elbow Evaluation [PRTEE] score) and objective functional assessments (including grip strength and range of motion), we aim to delineate the temporal profile of clinical improvement and correlate these findings with demographic and occupational variables.

Such an approach is critical to refining treatment protocols and aligning them with the latest evidence in musculoskeletal rehabilitation and tendinopathy management[15] [16] [17] [18] [19] [20].

Materials and Methods

• Study Design and Duration

This is a single-center prospective observational study executed over a period extending from November 2022 to January 2025, with a uniform follow-up duration of 12 months post-intervention.

• Study Setting

The study was undertaken at Dr. Pinnamaneni Siddhardha Institute of Medical Sciences and Research Foundation, Gannavaram, a tertiary care facility with a dedicated orthopaedic unit.

• Patient Selection

• Inclusion Criteria:

• Adult patients between 30 and 65 years presenting with clinically diagnosed lateral epicondylitis (manifested by positive Cozen's and Mill's tests, and focal tenderness at the lateral epicondyle)[7].

• A minimum symptom duration of 6 weeks and a baseline PRTEE score equal to or exceeding 50.

• Exclusion Criteria:

• Prior surgical or injection interventions for elbow pathology, systemic inflammatory arthropathies, uncontrolled metabolic disorders (e.g., diabetes mellitus), and evidence of local infection or concurrent neurological impairment.

• Treatment Allocation and Protocols

Patients were assigned to one of two treatment modalities, reflecting both clinician discretion and patient preference:

• Analgesics and Physiotherapy (A&P) Group:

This group received a multimodal regimen comprising NSAIDs (administered at standard therapeutic doses) in conjunction with a structured physiotherapy program. The rehabilitation protocol included ultrasound therapy, TENS, and an individualised regimen of eccentric extensor muscle exercises. Patients were instructed to perform targeted extensor stretching exercises twice daily. The protocol was re-evaluated at 6 weeks, and those exhibiting a minimum of 40% improvement in PRTEE scores continued the same regimen with minor modifications as needed.

TENS & Extensor stretching exercises

• Local Steroid Injection (LSI) Group:

Patients with either suboptimal response to initial A&P or those selected primarily based on clinical severity received a single injection of triamcinolone acetonide (40 mg) combined with 1 ml of 2% lignocaine, delivered via a peppering injection technique at the locus of maximal tenderness. Repeat injections were administered if clinical reassessment at 4-week intervals indicated persistent symptoms, provided no contraindications were present.

Positive Mill's test

Positive Cozen's test

Injection at maximal tenderness point

USG therapy

1 ml Triamcinolone acetonide (40 mg)

2% lignocaine

1 ml Triamcinolone (40mg) +
1 ml 2% lignocaine hydrochloride

- **Outcome Measures and Follow-Up Evaluations**

The primary outcome was the PRTEE score, assessed at baseline, 6 weeks, 3 months, 6 months, 9 months, and 12 months. Secondary outcomes included VAS pain scores, grip strength

measurements, range-of-motion assessments, and complication rates (e.g., transient flare reactions, localised skin atrophy, and recurrence of symptoms). Patient satisfaction was also evaluated using a standardised questionnaire.

Results

A total of 100 patients were enrolled in the study. The demographic profile exhibited notable variability: age ranged from 30 to 65 years (mean 48.6 ± 8.2 years), with the cohort subdivided into three age strata (30–40, 41–50, and >50 years). Gender distribution was moderately balanced (54 females and 46 males), while occupational diversity was broad—ranging from office workers and manual labourers to professional athletes. Dominance of the affected limb was noted in 85% of cases.

Table 1: Detailed Demographic Characteristics

Parameter	A&P Group (n=50)	LSI Group (n=50)	Overall (n=100)
Mean Age (years)	47.9 ± 7.4	49.3 ± 8.7	48.6 ± 8.2
Age Distribution (%)	30–40: 18%; 41–50: 52%; >50: 30%	30–40: 16%; 41–50: 54%; >50: 30%	30–40: 17%; 41–50: 53%; >50: 30%
Gender (F:M)	28:22	26:24	54:46
Occupational Categories (%)	Office: 40; Manual: 35; Athletes: 25	Office: 38; Manual: 37; Athletes: 25	Office: 39; Manual: 36; Athletes: 25
Dominant Limb Affected (%)	84	86	85
Duration of Symptoms (months)	3.5 ± 1.2	3.7 ± 1.1	3.6 ± 1.2

Table 2: Baseline and Serial Functional Outcome Measures (PRTEE & VAS Scores)

Time Point	A&P Group (Mean ± SD)	LSI Group (Mean ± SD)	p Value
Baseline (PRTEE)	64.2 ± 7.1	63.8 ± 7.4	0.68
6 Weeks (PRTEE)	42.5 ± 8.3	35.1 ± 7.9	0.002 *
3 Months (PRTEE)	30.8 ± 7.6	28.5 ± 7.2	0.07
6 Months (PRTEE)	22.4 ± 6.8	20.1 ± 6.3	0.09
12 Months (PRTEE)	18.7 ± 6.2	16.2 ± 5.8	0.08
Baseline (VAS)	7.8 ± 1.1	7.6 ± 1.2	0.50
6 Weeks (VAS)	4.2 ± 1.3	3.1 ± 1.2	0.001 *

Table 3: Extended Complication and Adverse Event Profile

Complication/Adverse Event	A&P Group (n, %)	LSI Group (n, %)
Transient Flare Reaction	4 (8%)	6 (12%)
Localized Skin Atrophy	0 (0%)	3 (6%)
Post-Injection Pain	N/A	5 (10%)
Recurrence of Symptoms	7 (14%)	4 (8%)
Tendon Rupture (Severe)	0 (0%)	0 (0%)
Other Minor Adverse Effects	2 (4%) (e.g., transient stiffness)	3 (6%) (e.g., mild ecchymosis)

Discussion

Our study demonstrated that both treatment modalities—analgesics and physiotherapy (A&P) and local steroid injections (LSI)—yielded significant improvements in functional outcomes among patients with lateral epicondylitis. Notably, the LSI group exhibited a marked reduction in PRTEE and visual analog scale (VAS) scores at the 6-week evaluation, suggesting a rapid analgesic effect attributable to the anti-inflammatory properties of corticosteroids[2 8 21]. This early benefit is consistent with previous reports that underscore the capacity of corticosteroid injections to attenuate pain through the suppression of local pro-inflammatory mediators such as interleukin-1 and tumor necrosis factor-α[22 23].

Conversely, patients managed with A&P experienced a more gradual yet sustained improvement, indicative of progressive tendon remodeling and neuromuscular adaptation induced by structured physiotherapy regimens, including eccentric strengthening exercises and transcutaneous electrical nerve stimulation (TENS)[6 7 24]. The slower onset of symptomatic relief in this group may be explained by the underlying biological processes of collagen reorganization and mechanotransduction, which require time to manifest clinically meaningful improvements[25].

A subgroup analysis revealed that younger patients (aged 30–40 years) tended to achieve faster functional recovery compared with older cohorts, likely due to a more robust regenerative capacity and less degenerative tendon changes[26]. Occupational factors also played a significant role, with office workers demonstrating slightly better outcomes relative to manual laborers, potentially due to reduced repetitive strain and lower baseline tendon degeneration[27]. Moreover, although both genders benefited from either treatment modality, females presented with marginally higher baseline PRTEE scores, yet their rate of improvement was comparable to that of their male counterparts[28].

When integrating our findings with the recent literature, our data corroborate the emerging consensus that local steroid injections provide superior short-term relief, whereas the long-term outcomes converge with those observed following conservative management with physiotherapy and analgesics[29 30 31]. Table 4 of our manuscript synthesizes several recent studies published after 2020, illustrating that while the immediate analgesic benefits of corticosteroids are evident, the durability of functional recovery may be enhanced by comprehensive physiotherapy protocols[32 33 34].

It is imperative to note that the potential adverse effects associated with corticosteroid injections—such as transient pain flares, localized skin atrophy, and a risk of symptom recurrence—necessitate a cautious approach, particularly in patients with chronic or recurrent lateral epicondylitis[35 36]. Our study reported a modest incidence of such complications, which underscores the need for careful patient selection and the potential benefit of combining interventional and conservative strategies in a tailored treatment algorithm.

Table 4: Comparative Synthesis of Recent Literature Outcomes

Study (Year)	Sample Size	Intervention Modality	Outcome Metrics (PRTEE/VAS)	Principal Findings
Gupta et al. 2021	80	Steroid injection vs. physiotherapy	VAS, PRTEE	Noted significant early pain relief with steroid use
Li et al. 2022	75	Combined treatment vs. physiotherapy alone	PRTEE	Enhanced outcomes with combined interventions
Martinez et al. 2023	90	NSAIDs & physiotherapy vs. steroid injection	PRTEE	Both modalities effective long-term; steroids faster
Nair et al. 2023	100	Multimodal conservative therapy vs. injection	VAS, grip strength	Reported comparable functional gains at 12 months
Present Study	100	A&P vs. LSI	PRTEE, VAS	Early improvement with LSI; convergence of long-term results

In summary, our observations suggest that while both A&P and LSI are effective in managing lateral epicondylitis, the optimal treatment strategy may require balancing the rapid symptom relief provided by steroid injections with the long-term benefits associated with physiotherapy-driven tendon rehabilitation. Future studies should focus on multicenter randomized controlled trials with extended follow-up periods and the incorporation of advanced imaging modalities and biomarkers to further elucidate the mechanistic underpinnings of tendon healing and optimize individualized treatment protocols[37] [38] [39] [40].

Future Directions

Future investigations should aim to conduct multicentric randomized controlled trials to validate these observational findings. Emphasis should be placed on integrating advanced imaging techniques, such as high-resolution ultrasound and MRI, to correlate tissue-level changes with clinical outcomes. Additionally, exploring the role of novel biologic agents, regenerative medicine techniques (e.g., platelet-rich plasma, dextrose prolotherapy), and their combinatory effects with physiotherapy could yield insights into optimizing treatment algorithms. Extended follow-up studies (beyond 12 months) and detailed cost-effectiveness analyses will further refine clinical decision-making and guideline development.

Limitations

The present study is limited by its observational design and non-randomized allocation, which may introduce selection bias. The single-center setting may also restrict the generalizability of our findings to broader populations. Although our follow-up duration of 12 months is robust, it remains insufficient to capture the full spectrum of long-term outcomes and potential late recurrences. Future research incorporating randomized methodologies and longer-term surveillance is warranted.

Conclusion

In this heterogeneous cohort of 100 patients, both conservative management using analgesics and physiotherapy and local steroid injections resulted in substantial improvements in pain and function, as evidenced by progressive reductions in PRTEE and VAS scores. Local steroid injections provided a distinct early analgesic benefit; however, the long-term functional outcomes converged between the two modalities. These findings underscore the importance of individualized treatment strategies that balance early symptom control with durable functional recovery. Further randomized controlled studies are essential to refine these therapeutic paradigms and optimize patient-specific interventions in the management of lateral epicondylitis.

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