Evaluation of the Effectiveness of Two Different Local Injection Types for Treatment of Patients of Chronic Tennis Elbow

Nilesh Anil Ghorpade[1], Rupeshkumar Bhagwatji Hatwar[2]

ABSTRACT

Introduction: Tennis elbow or Lateral epicondylitis is a frequently diagnosed elbow condition in orthopaedic practice characterised by pain on resisted wrist extension and tenderness on palpation of the common extensor origin i.e. lateral epicondyle of humerus. Hence, present study will evaluate the effectiveness of two different local injection types for treatment of chronic tennis elbow i.e. local steroid and peppering technique.

Material and methods: This study evaluates the effectiveness of two different local injection types for treatment of chronic tennis elbow patients. 30 patients of chronic tennis elbow in 'CL' group were treated with combination of steroid and local anaesthetic agent using single injection technique and other 30 patients in 'LP' group were treated with local anaesthetic agent alone using peppered injection technique. Outcome of the treatment was measured with Visual Analogue Scale for pain and functional disability was measured with The Patient-rated Tennis Elbow Evaluation (PRTEE) Questionnaire.

Results: The intra group statistical analysis showed a significant reduction in mean VAS score and mean PRTEE score in both 'CL' and 'LP' groups at the 2-weeks, 6 weeks and 6-month follow-ups compared to the pre-treatment values (Baseline). The inter group statistical analysis showed a significant reduction of mean VAS score and mean PRTEE score in 'CL' group as compared to 'LP' group in short term follow up (2 weeks). No statistical difference in reduction of both the scores between two groups at intermediate term of 6 weeks and a significant reduction in both the scores in 'LP' Group as compared to 'CL' Group in long term follow up (6 months).

Conclusion: A combination of steroid and local anaesthetic agent using single injection technique showed early decrease in pain and functional disability compared to local anaesthetic agent alone using peppered injection technique in short term follow up, but this short-term benefits of steroid injection were followed by high recurrence rate.

Keywords: Lateral Epicondylosis, Lateral Wrist Extensor Muscles, Peppered Injection Technique

INTRODUCTION

Tennis elbow is another name of lateral epicondylosis is a painful, chronic and debilitating condition which is characterized by lateral elbow pain. While not usually associated with actually playing tennis, it is a relatively common condition that can affect persons who perform repetitive upper body activities such as carpenters, musicians, and computer programmers.[1]

The condition was first described by Runge in 1873. It is a common condition, affecting between 1% and 3% of the population, generally affecting the middle-aged without gender predisposition. It was described as a chronic symptomatic degeneration of the wrist extensor tendons involving their attachment to the lateral epicondyle of the humerus.[2] It is attributed to an overuse tendinopathy of the lateral wrist extensor muscles where they insert at the elbow. The risk factors include a repetitive use of the elbow, tobacco use, and other hand issues such as carpal tunnel syndrome and deQuervain's tenosynovitis. However, the etiology is not clearly understood, but microvascular trauma, cutaneous nerve injury, and friction wear of the extensor carpi radialis brevis (ECRB) have been proposed.[3]

There are several treatment options such as Nonsteroidal Anti-inflammatory drugs, braces, physiotherapy (short wave diathermy, infrared therapy, and local ultrasound therapy), local steroid injection, local PRP injection, local autologous blood injection, acupuncture, surgery, etc. [4,5] But the effective treatment strategy for Tennis elbow remains unknown.[6] Rest and anti-inflammatory medication may be the proper treatment for acute stage Tennis elbow.[7]

Steroid injections in articular, periarticular or soft tissue structure relieve pain, inflammation and improve mobility.[8] Local steroid injection has been used since 1950 as treatment strategy for tennis elbow.[9] It yields a short-term decrease in pain which is superior to nonsteroidal anti-inflammatory drug therapy and physical therapy. The significant short term benefits of corticosteroid injection are paradoxically reversed after six weeks, with high recurrence rates.[10]

The peppering techniques of injection was described almost 40 years ago in the treatment of tennis elbow, whereby after the needle is inserted into the tender area, multiple small injections are performed by withdrawing, redirecting and reinserting the needle without emerging from the skin.[11-14] Recent studies show that the peppering technique of injection is of significant importance in treatment of tennis elbow and clinical success of treatment of tennis elbow depends on the injection technique and not on medication.[12,14] Multiple injections (peppering technique) through degenerated tendon

[1]Assistant Professor, [2]Senior Resident, Department of Orthopaedics, ESI-PGIMSR MGM Hospital, Parel, Mumbai-12, India

Corresponding author: Dr Nilesh Anil Ghorpade, Assistant Professor, Department of Orthopaedics, ESI-PGIMSR MGM Hospital, Parel, Mumbai-12, India

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of chronic tennis elbow lead to hematoma formation and this bleeding starts healing process.[13,15]

In primary care, chronic tennis elbow is commonly treated with analgesics and physiotherapy but results are not good, may be due to poor compliance to treatment due to requirement of repetitive hospital visits and side effects of long term analgesics. Hence, present study will evaluate the effectiveness of two different local injection types for treatment of chronic tennis elbow i.e. local steroid and peppering technique.

MATERIAL AND METHODS

The present prospective study was conducted among 60 consecutive patients of chronic tennis elbow in the age group 20-70 years of either sex attending orthopaedic outpatient department after a diagnosis was established. This included interview and clinical examination comprising testing for tenderness over the lateral epicondyle or just distal to it, a positive Cozen's test[16] and Mill's manoeuvre.[17] The patients were screened based on inclusion and exclusion criteria. Evaluation with magnetic resonance imaging (MRI) was not included in this study.

The letter of information was explained and written informed consent was obtained from the patients in a language he or she understands to allow them to be included in the study. Patients were divided sequentially on alternate basis with equal allocation ratio (1:1) into two parallel groups, named as 'CL' and 'LP', of 30 patients each.

Patients with presence of significant pain on the lateral side of elbow during daily activities, i.e. phase 5, 6 and 7, tenderness over common extensor origin, positive resisted wrist extension test (increase in pain during resisted dorsiflexion of wrist with elbow in extension and hand in pronation) and cases with tennis elbow in the chronic stage, i.e. duration of pain symptoms more than 3 months and not relieved by nonsteroidal anti-inflammatory (NSAIDS) drug therapy and physical therapy were included in the study. Patients with abnormal radiographs showing joint pathology of the involved elbow joint, calcifications or any fracture or bony abnormality of the involved elbow joint or any infection of the elbow joint, patients with bleeding disorders, uncontrolled Diabetes Mellitus, and on anticoagulant therapy and history of previous surgeries at elbow joint within last 3 months were excluded from the study.

The patients were provided instructions on what was involved in the treatments and study procedures. Demographic and occupational data was collected along with initial assessment of Visual analogue scale (VAS) and Patient Rated Tennis Elbow Evaluation (PRTEE) questionnaire for tennis elbow. Patients were instructed on completing Visual analogue scale (VAS) and Patient Rated Tennis Elbow Evaluation (PRTEE) questionnaire for tennis elbow and were asked to base their responses on the week prior to the session.

The patients in 'CL' group were treated with local injection of 1ml (40mg) of methylprednisolone acetate (Steroid) combined with 1 ml of 2% lignocaine(local anaesthetic) at the maximal point tenderness at lateral epicondyle by single-injection technique. The patients in 'LP" group were treated with local injection of 2ml of 2% lignocaine at the area of maximum tenderness at lateral epicondyle by peppering injection technique.

All the patients were followed up at the 2nd week, 6th week and 6th month after the injection. Patients were evaluated by Visual analogue scale (VAS) and The Patient-Rated Tennis Elbow Evaluation (PRTEE) score before injection and every follow-up.

STATISTICAL ANALYSIS

Data was analysed using Statistical Package for the Social Sciences (SPSS) version 21 software. Descriptive data represented as mean ± standard deviation (SD) for numerical variables. To determine the differences within groups, ANOVA test was used. A p-value < 0.01 was considered statistically significant.

RESULTS

The baseline pain according to mean VAS score of CL Group on pre injection was 5.54 (± 1.13 SD). The mean VAS score observed at 2 week, 6 week and 6 month follow up came out to be 2.40 (± 1.03 SD), 1.84 (± 0.93 SD) and 2.30(± 0.91 SD) respectively. After application of Repeated Measure ANOVA Test, the p value for the fall in mean VAS score came out to be less than 0.01 suggesting a significant decrease in pain level at 2 weeks, 6 weeks and 6 months follow up as compared to baseline in CL Group (table 1, Figure 1).

The baseline pain according to mean VAS score of LP Group on pre injection was 5.48 (± 1.17 SD). The mean VAS score observed at 2 week, 6 week and 6 month follow up came out to be 4.37 (± 0.96 SD), 2.15 (± 0.98 SD) and 1.33(± 0.91 SD) respectively. After application of Repeated Measure ANOVA Test, the p value for the fall in mean VAS score came out to be less than 0.01 suggesting a significant decrease in pain level at 2 weeks, 6 weeks and 6 months follow up as compared to baseline in LP Group (table 2, Figure 1).

The baseline pain and disability according to mean PRTEE score of CL Group on pre injection was 54.98 (± 1.83 SD). The mean PRTEE score observed at 2 week, 6 week and 6 month follow up came out to be 26.83 (± 8.20 SD), 20.42(± 8.90 SD) and 24.92(± 6.42 SD) respectively. After application of Repeated Measure ANOVA Test, the p value for the fall in mean PRTEE score came out to be less than 0.01 suggesting significant decrease in pain levels at 2 week, 6 week and 6 month follow up as compared to baseline in CL Group (table 3, Figure 2).

The baseline of level pain and disability according to mean PRTEE score of LP Group on pre injection was 51.67 (± 9.37 SD). The mean PRTEE score observed at 2 week, 6 week and 6 month follow up came out to be 41.85 (± 7.40 SD), 23.17(± 7.29 SD) and 16.13(± 6.64 SD) respectively. After application of Repeated Measure ANOVA Test, the p value for the fall in mean PRTEE score came out to be less than 0.01 suggesting significant decrease in pain levels at 2 week, 6 week and 6 month follow up as compared to baseline in LP Group (table 4 Figure 2).

VAS Score - CL Group	N	Mean	SD	p- value*
Baseline	30	5.54	1.13	< 0.01
2 weeks	30	2.40	1.03	
Baseline	30	5.54	1.13	< 0.01
6 weeks	30	1.84	0.93	
Baseline	30	5.54	1.13	< 0.01
6 months	30	2.30	0.91	
* Repeated Measure ANOVA Test				

Table-1: VAS score of CL Group at baseline, 2 weeks, 6 weeks and 6 months

VAS Score - LP Group	N	Mean	SD	p- value*
Baseline	30	5.48	1.17	< 0.01
2 weeks	30	4.37	0.96	
Baseline	30	5.48	1.17	< 0.01
6 weeks	30	2.15	0.98	
Baseline	30	5.48	1.17	< 0.01
6 months	30	1.33	0.91	
* Repeated Measure ANOVA Test				

Table-2: VAS score of LP Group at baseline, 2 weeks, 6 weeks and 6 months

PRTEE - CL Group	N	Mean	SD	p- value*
Baseline	30	54.98	7.24	< 0.01
2 weeks	30	26.83	8.20	
Baseline	30	54.98	7.24	< 0.01
6 weeks	30	20.42	8.90	
Baseline	30	54.98	7.24	< 0.01
6 months	30	24.92	6.42	
* Repeated Measure ANOVA Test				

Table-3: PRTEE score of CL Group at baseline, 2 weeks, 6 weeks and 6 months

PRTEE - LP Group	N	Mean	SD	p- value*
Baseline	30	51.67	9.37	< 0.01
2 weeks	30	41.85	7.40	
Baseline	30	51.67	9.37	< 0.01
6 weeks	30	23.17	7.29	
Baseline	30	51.67	9.37	< 0.01
6 months	30	16.13	6.64	
* Repeated Measure ANOVA Test				

Table-4: PRTEE score of LP Group at baseline, 2 weeks, 6 weeks and 6 months

DISCUSSION

In the present study, the baseline mean VAS score and mean PRTEE score before injection in both the groups were comparable.

The Patient-rated Tennis Elbow Evaluation (PRTEE) Questionnaire previously known as the Patient-Rated Forearm Evaluation Questionnaire (PRFEQ) has been shown to be a reliable, valid and a responsive tool for assessing pain and functional disability in patients with chronic Tennis elbow.[18] Rompe et al[19] conducted a study comparing PRTEE to other outcome measures such as DASH (Disabilities of the arm, shoulder and hand), the Roles and Maudsley score, UEFS (Upper Extremity Functional Scale) and numeric pain

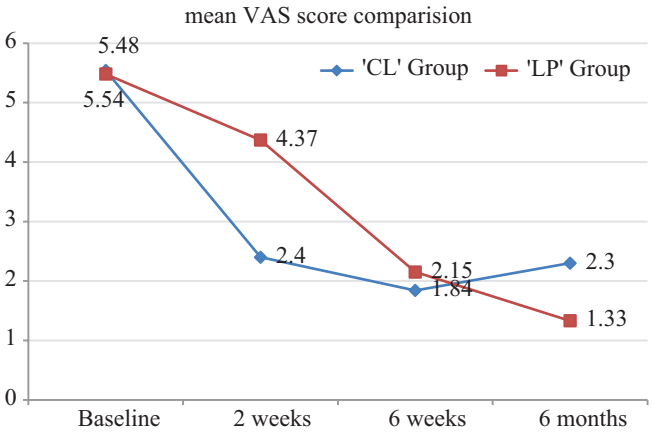

Figure-1: Comparison of VAS score of two groups score at baseline, 2 weeks, 6 weeks and 6 months

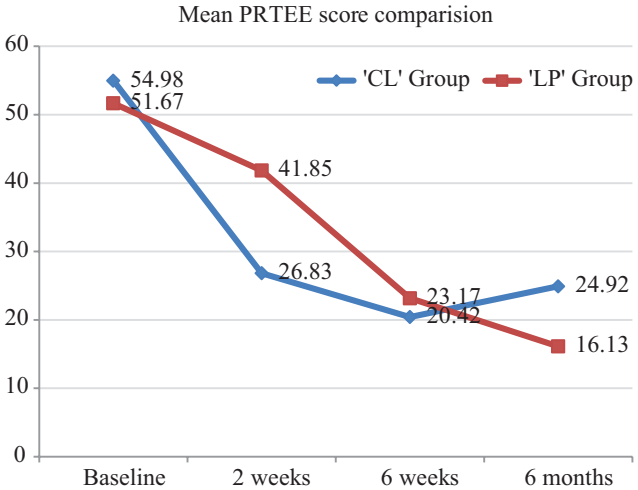

Figure-2: Comparison of PRTEE score of two groups score at baseline, 2 weeks, 6 weeks and 6 months

rating scale, and found that PRTEE was most responsive to change after treatment than other measures for patients with chronic lateral elbow tendinopathy. It reliably detects improvement or worsening in most subjects of tennis elbow. Hence it appears to be one of the most commonly reported measure of health status in patients of chronic tennis elbow and may become the standard primary outcome measure in research of tennis elbow. [19,20]

The intra group statistical analysis of our study showed a significant reduction in mean VAS score and mean PRTEE score in both CL and LP groups at the 2-weeks, 6 weeks and 6-month follow-ups compared to the pre-treatment values. This supports the findings of Dogramaci et al[14] who reported a significantly lower pain (VAS) at 3 week and 6 month follow-ups comparing to the pre-treatment condition in all groups i.e. combination of corticosteroid injections with peppering technique, corticosteroid injections and peppering injections.

At 2 weeks follow up, CL group showed statistically significant decrease in mean VAS score and mean PRTEE score as compared to LP group. It demonstrates superior effectiveness for combination of steroid and local anaesthetic agent using single injection technique for reduction of pain

and functional disability over local anaesthetic agent alone using peppered injection in the short-term of 2 weeks but statistically no difference in effectiveness at intermediate term of 6 weeks for treatment of chronic tennis elbow. Hay et al[21] showed similar results with local corticosteroid injection group, when compared with oral naproxen. Similarly, Bisset et al[22] and Smidt et al[10] also showed early success with corticosteroid treatment in reduction of pain and improved grip; these findings did not persist, as there was a high recurrence noted in the injection group and ultimately improved outcomes at 1 year with physical therapy and wait and see treatments.

Due to the positive effect of both anti-inflammatory drugs and corticosteroid injections and furthermore, corticosteroid injection therapy appears to be the best treatment option in the short-term for tennis elbow patients with success rates of 92%15. But this improvement occurred despite the absence of histological evidence of inflammation in these conditions. [15] The mechanism of action of steroid remains not clear in treatment of tennis elbow.

At 6 month after injection, the mean VAS score and PRTEE score demonstrated superior effectiveness for local anaesthetic agent alone using peppered injection over combination of steroid and local anaesthetic agent using single injection technique for reduction of pain and functional disability at long-term of 6 months for treatment of chronic tennis elbow. The result of our study is consistent with study of Dogramaci et al[14] who found excellent results with peppering technique injections group as compared to single injection technique corticosteroid group. Dojode CM[22] showed similar results with local corticosteroid injection group, when compared to autologous blood injection group, the study found that autologous blood injection group showed statistically significant decrease in pain compared with corticosteroid injection group at six-month. Similarly, Okçu et al[12] also concluded that long-term clinical success in the treatment of tennis elbow depends on the injection method rather than corticosteroids and the peppering technique appears to be more effective than the single injection technique in the long-term. In prospective and randomized study by Altay et al[11] they compared local anaesthetic with a local anaesthetic-CS mixture, both injections using the peppering technique and reported statistically no difference between the groups. Both groups had excellent results and because the injection of local anaesthetics is known to have no long-term effect in the treatment of tennis elbow, he stated the peppering technique seems to be a reliable method of treatment.

The mechanism of action of peppering injection technique is attributed to local bleeding and hematoma formation by multiple injections (peppering) through the granulation tissue and degenerative tendons. This bleeding starts healing process of the area of tendinosis.[13,15] The mechanical disruption caused by peppering injection may transform a failed intrinsic healing process into an extrinsic response.[11,24]

CONCLUSION

The present study concludes that combination of steroid and local anaesthetic agent using single injection technique showed early decrease in pain and functional disability compared to local anaesthetic agent alone using peppered injection technique in short term follow up, but this short-term benefits of steroid injection were followed by high recurrence rate.

Local anaesthetic agent alone using peppered injection technique have superior effectiveness over combination of steroid and local anaesthetic agent using single injection technique for reduction of pain and disability at long-term of 6 months for treatment of chronic tennis elbow. Local anaesthetic with peppering injection technique is economical and easy to carry out as outpatient procedure, have better relief of pain and long term effectiveness, low recurrence rate, absence of potential complications such as hypoglycaemia, skin atrophy, tendon tears which are associated with corticosteroid injection. This study showed promising response of an alternative treatment that directly addresses the pathophysiology of chronic tennis elbow.

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