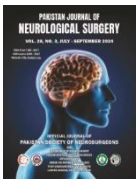

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Original Research

Comparison of the Efficacy of Oral and Local Steroids in the Management of Carpal Tunnel Syndrome

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ABSTRACT

Objective: Among the entrapment neuropathies, the most common neuropathy observed in neurology clinics is carpal tunnel syndrome. One of the treatment options is Corticosteroids. This research was conducted to compare the efficacy of oral steroids with local steroid injection in the carpal tunnel as regards relieving the symptoms and improvement in neurophysiological parameters.

Materials and Methods: This study was performed at the Neurology Department, Punjab Institute of Neurosciences, Lahore. 72 patients were part of the study and divided into 2 groups; Group A (oral steroids) and B (steroid injection). Patients in Group A received a local injection of 1.5cc Normal Saline and oral prednisolone (20 mg once daily for two weeks, followed by 10 mg once daily for the next two weeks), whereas those in Group B received a local injection of 15 mg triamcinolone and an oral placebo for four weeks. The outcome was assessed using the Global Symptom Score. Both groups demonstrated significant improvement in pain while the injection group showed a significant reduction in Global Symptom Score at 4 weeks.

Results: The average age of the patients involved in the study was 47 years. There were 33(46%) males and 39(54%) females. The mean Global Symptom Score for group A was 28.9 at baseline (0 week) and 23.5 at 4 weeks. In group B, it was found to be 27.1 at 0 week and 16.05 at 4 weeks. Independent T-test for comparing groups A and B showed a non-significant p-value at 0 week and significant at 4 weeks (p-value of 0.04).

Conclusion: The study concluded that local injection of steroids (triamcinolone) is more efficacious in improving carpal tunnel syndrome symptoms as compared to patients receiving oral steroids.

Keywords: Carpel Tunnel Syndrome (CTS), Steroids, Triamcinolone, Global Symptom Score (GSS).

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INTRODUCTION

The most common type of entrapment neuropathy is Carpal Tunnel Syndrome (CTS) with an incidence of 2.7-5.8%. It is more common in females and may be associated with the following conditions, obesity, pregnancy, hypothyroidism, diabetes mellitus, and trauma. Common symptoms include pain, numbness, tingling, and burning, more at night.[2] With the progression of the disease, the patient can experience wasting of the thenar eminence and weakened handgrip.[3] CTS is classified as mild, moderate, or severe. Treatment options vary depending on the severity such as medical treatment, physiotherapy, local injection of steroids, and surgery.[4] For mild to moderate cases, wrist splints, oral steroids, and local steroid injections are typically used while severe cases may need surgery.[5,6] This study compared the efficacy of oral steroids to local steroid injections in the treatment of carpal tunnel syndrome.

Imaging studies are typically not required in the diagnosis of carpal tunnel syndrome. However, an MRI of the carpal tunnel may be performed if there is a suspicion of a structural abnormality or a space-occupying lesion. MRI is particularly ineffective in excluding other differential diagnoses; instead, it is time-consuming and resource-intensive.[7,8] Nerve conduction studies (NCS)/Electromyography (EMG) are performed to diagnose carpal tunnel syndrome (CTS).[12] Abnormalities in these investigations are considered the standard for its diagnosis[9,10,11]. Previous research suggests that local corticosteroid injection has its effect for up to ten weeks but the effect is not long-term.[13] Devices and techniques for stretching or manipulating the carpal tunnel have shown some potential, but are still not widely accepted.[4] Oral corticosteroids can relieve the symptoms in some patients but may also cause side effects including gastric irritation, dermatological issues, or weight gain.[15,16] The comparison of the mean Global Symptom Score (GSS) of local steroid injection to oral steroids for the treatment of carpal tunnel syndrome (CTS) may help to develop guidelines for the use of local steroids in specific patients.

MATERIALS AND METHODS

Study Design and Setting

A randomized controlled trial was conducted at the Department of Neurology, Punjab Institute of Neurosciences (PINS), Lahore from 01/01/2022 to 31/12/2022. The study was conducted after getting ethical approval (IRB: PINS/LGH IRB No. 1777) from PINS. Patients of CTS (carpel tunnel syndrome) were included with informed consent.

Sampling Technique & Sample Size

A Non-Probability Consecutive Sampling technique was used. A sample size of 72 patients (36 in each group) with carpal tunnel syndrome was estimated using a 95% confidence level and 80% test power. The expected mean GSS was 7.6±3.8 in the oral group and 4.8±4.6 in the local group.

Inclusion Criteria

Patients of either gender, aged 18–60 years, diagnosed with carpal tunnel syndrome were included in this study.

Exclusion Criteria

Patients with uncontrolled diabetes mellitus, having any contraindications to corticosteroids, and pregnant females were excluded from the study.

Patient Groups and Clinical Management

Demographic data (including age, and gender) was recorded. Patients were randomized using the lottery method to one of the two groups: Group A; Oral steroids and Group B; Local steroids injection.

Patients in group A received a 1.5cc injection of normal saline locally on the affected hand, as well as 20mg of prednisolone daily for two weeks, followed by 10mg daily for the next two weeks.

Group B patients received a single injection of triamcinolone (15 mg) on the affected wrist, followed by a four-week oral placebo. A 25-gauge needle was used for local injection, inserted slightly medially into the palmaris longus tendon (at 45 degrees) and guided towards the tip of the middle finger, then advanced 1 to 2 cm to traverse the flexor retinaculum. To prevent intravascular injection, aspiration was performed before injection.

The outcome was assessed by using GSS at baseline and 4 weeks of treatment. The data collection was done using a structured proforma.

Data Analysis

SPSS v23.0 was used for data analysis. Qualitative variables like gender and side of CTS were demonstrated in the form of frequencies and percentages. Quantitative variables like age and GSS were expressed by Mean ± S.D.

To deal with effect modifiers, data was stratified for age, gender, and duration of CTS as well as BMI. After stratification, an independent sample t-test was used to determine the significance difference. A p-value of <0.05 was considered to be significant.

RESULTS

Age Distribution

The research included 72 patients with a mean age of 47.53±14.56 years while the maximum age was 88 years and the minimum age was 21 years. The research included 72 patients with a mean age of 47.53±14.56 years. The maximum age was 88 years and the minimum was 21 years.

Gender Distribution

There were 33 (46%) males and 39 (54%) females. There were 17 (47%) males and 19 (53%) females in group A while 16 (44%) males and 20 (56%) females in group B.

Affected Side

39 (54%) patients had right-sided CTS while 33 (46%) had left-sided CTS.

Global Symptom Score (GSS) at 0 Week

The pre-treatment GSS in group A was 28.94 while it was 27.11 in group B. There is an insignificant p-value of 0.83 in the pre-treatment group in the Global Symptom Score as shown in Table no 1.

Table 1: Global Symptom Score at 0 week.

Group	Mean GSS	Std. Deviation	P value (t-test)
A	28.94	7.61	0.83
B	27.11	6.02	

Global Symptom Score (GSS) at 4 Weeks

At 4 weeks, the GSS in group A was 23.55 while it was 16.05 in group B. There is a significant p-value of 0.07 in the post-treatment (4 weeks) Global Symptom Score as shown in Table 2.

Table 2: Global Symptom Score at 4 weeks

Group	Mean GSS	Std. Deviation	P value t-test
A	23.55	7.12	0.07
B	16.05	4.77	(significant)

Comparison of GSS for Treatment Groups at 0 Weeks and 4 Weeks

Independent T-test for comparing groups A and B at 0 week showed a non-significant p-value at 0 week and a significant p-value of 0.04 in post-treatment 4 weeks (Tables 3 & 4).

Table 3: Comparison of GSS for treatment Groups at 0 week.

Group	Mean GSS	Std. Deviation	P value t-test)
A	28.94	7.61	0.26
B	27.22	6.02	(insignificant)

Table 4: Comparison of GSS for treatment Groups at 4 weeks.

Group	Mean GSS	Std. Deviation	P value (t-test)
A	23.55	7.12	0.04
B	16.05	4.77	(significant)

DISCUSSION

Carpal tunnel syndrome (CTS) is the most frequent entrapment neuropathy, affecting 2.7-5.8% of the population with greater incidence in females.[1] This study showed that the pre-treatment GSS in group A was 28.94 and 27.11 in group B. While at 4 weeks, the GSS in group A was 23.55 and 16.05 in group B, the P value was 0.07 which showed that the results are statistically significant whereas there was no significant difference in GSS score at 0 weeks (P value 0.83) so we concluded that local steroid injection has better outcome as compared to oral steroids in improving symptoms of carpal tunnel syndrome. A previous study comparing the two groups, oral and local steroids, revealed that the mean Global Symptom Score (GSS) after 4 weeks was 7.6±3.8 in the oral group and 4.8±4.6 in the local group.[6] Whereas, another study showed. A mean GSS of 7.3±5.6 in the oral group and 9.8±6.3 in the local group after 4 weeks.[7] The difference in these results highlights the need to further investigate the effectiveness of local steroid injections.

Another study was conducted where to ensure consistent pharmacological results same drug was used for oral and local injection administration. Triamcinolone was administered due to its moderate efficacy, easy availability, and lipid solubility, which favors its slow release and prolonged action.[17]

The clinical outcomes of injectable methylprednisolone versus oral prednisone were compared in a study by Wong et al.[18] Schrijver et al. concluded that NCS also gives information regarding therapeutic effects thus NCS results should also be studied along with clinical improvement.[19]

The average age of patients in this study was 42 years, whereas other studies had a range between 40 and 60 years.[20] Our observation of a relatively higher incidence of CTS in females is comparable to other studies with a female-to-male ratio of 1.8:1, which suggests that female hormones may be responsible for this higher incidence.[21]

The literature indicates that the response for local injections of triamcinolone is better than the systemic or oral steroids. This conclusion is also supported by Wong et al.[18] The rationale for this ineffective clinical response following an oral route is that just 10% of the administered drug is active and bound to its receptors exerting its action, while local injections have a much better percentage of receptor binding and thus elicit a better response.[17] The administered steroids inhibit the inflammatory response and improve symptoms.[17] Further studies by Chang and Hui documented similar findings, with a significant difference observed for sensory nerve conduction velocity (SNCV) at the end of the 12-month follow-up period.[20,21,22]

Evidence collected from several studies concludes that oral and locally injected steroids benefit patients with CTS primarily for a shorter duration, but their effectiveness for prolonged periods is less favorable.[23,24,25] Several other studies have demonstrated that corticosteroid injections have little short-term improvement in nerve conduction and CTS symptoms versus placebo or wrist splints.[26,27]

Some studies concluded that multiple steroid injections show no long-term benefit in the

treatment of carpal tunnel syndrome in patients. These results emphasize the need for clear guidelines from which patients will most benefit from nonsurgical treatments.[28,29]

LIMITATIONS

A relatively smaller sample size and shorter duration of follow-up. Moreover, we did not do post-procedure NCS which could have improved the objective assessment of patients after treatment.

RECOMMENDATIONS

A bigger sample size and longer follow-up period are recommended for the study to be more authentic and better conclusion.

CONCLUSION

Locally injected triamcinolone given in the carpal tunnel has better efficacy as compared to oral steroids in relieving the symptoms of carpal tunnel syndrome.

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Additional Information

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AUTHOR'S CONTRIBUTION:

Name of Author	Contribution
Madiha Malik	Data collection.
Usman Ahmad Kamboh	Literature review.
Muhammad Owais Khan	Data analysis.
Muhammad Imran	Methodology.
Mahwish Manzoor	Data analysis.
Mohsin Zaheer	Discussion & overview.
Manzoor Ahmad	Editing & overview.