Original Article

Orthopaedic

Effectiveness of Local Corticosteroids in Carpal Tunnel Syndrome

1. Roohullah Jan 2. Zahid Askar 3. Javed Iqbal

1. Medical Officer 2. Assoc. Prof. 3. PG Trainee Orthopaedics and Trauma unit "B",
Khyber Teaching Hospital, Peshawar, Khyber PukhtoonKhwa

ABSTRACT

Background: Carpal tunnel syndrome (CTS) is one of the most common entrapment peripheral neuro pathymanifested by signs and symptoms of irritation of the median nerve at the level of the carpal tunnel in the wrist. Carpaltunnel syndrome has been treated by local corticosteroid injection but its effectiveness remains unknown in our set up.

Objective: To assess the effectiveness of 40 mg methylprednisolone with 10 mg lignocaine injection proximal to the carpal tunnel in patients with the carpal tunnel syndrome.

Study Design: Descriptive Cross Sectional Study

Place and Duration of Study: This study was done at Department of Orthopaedics and Traumatology, Khyber Teaching Hospital, Peshawar from February,2012 to February, 2013.

Materials and Methods: This study comprised of 32 patients. Local steroid injection consisting of 10 mg lignocaine and 40 mg methyl prednisolone was injected at the volar aspect of the forearm close and proximal to the carpal tunnel. The effectiveness was determined in terms of decrease in at least one base line grade of pain and numbness at affected hand during 4 and 12 weeks follow up.

Results: There were 4 (12.50%) males and 28 (87.50%) females with mean age of male and female was 30.75 $\pm$ 6.23 and 33.42 $\pm$ 7.07 respectively. In patients with severe pain, the effectiveness was 90.90% and 100% at 4 and 12 weeks respectively. Among the patients with mild numbness, the success rate was 83.33%and 91.67% at 4 and 12 weeks respectively while in case of moderate numbness, the effectiveness was 100% at 4 and 12 weeks follow up in patients.

Conclusion: A local single injection of steroids in carpal tunnel syndrome is effective in relieving pain and numbness in short terms.

Key Words: Corticosteroids, Carpal Tunnel Syndrome, Methylprednisolone

INTRODUCTION

Carpaltunnelsyndrome(CTS)isoneofthemostcommonperipheralneuropathy[1] due to an entrapment of the median nerve in the carpal tunnel at the wrist affecting mainly middle aged women. It account for approximately 90% of all entrapmentneuropathies.[2] The classic symptoms of carpal tunnel syndrome are pain, numbness, and tingling in the distribution of the median nerve which are intermittent and typically worse at night where the patient is awakened from sleep and relieves the discomfort by vigorously shaking the hand[3,4]

There are several treatment options for CTS and they can be broadly categorized into surgical and non-surgical. Non-surgical ethodsare effective in patients with mild to moderate CTS.[5] The various non-surgical methods are splinting of the wrist, physical therapy, oral steroids, non-steroid anti-inflammatory drugs(NSAIDs),oralvitaminB6, local injection of corticosteroid with or without insulin and work place modifications etc.[6]

Injection with corticosteroids is one of the many recommended treatments.[7] Established therapy as generally been decompression of the nerve, such as splinting andsteroidinjectionintothecarpaltunnel.[8,9] These applications are frequently effective, although recurrences are common. In many studies it was reported that patients with CTS are first treated with corticosteroid injections proximal to the carpal tunnel before surgery is considered. Some of the techniques for such injection entail injection proximal to or not into the carpaltunnel.[10]

One of the common finding in the patients with CTS is that there is often as well in gat the volar side of the forearm, close to the carpaltunnel, which might contribute to the compression of themediannerve.[11] Moreover, the risk of damaging the median nerve by injection into the narrow carpal tunnel is higher.[12,13]

The rationale for using lignocaine (lidocaine) together with corticosteroids is twofold: the injection is painless, and diminished sensation afterwards shows that the injection was properly carried out.[14,15]

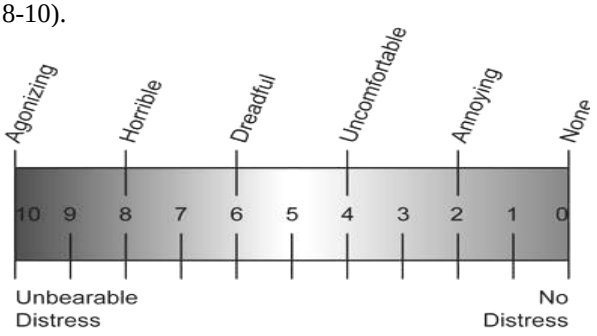
The aim of our study was to know the effectiveness of local corticosteroids injection in carpal tunnel syndrome at 4 and 12 weeks interval in terms of improvement in pain and numbness.

MATERIALS AND METHODS

This descriptive cross sectional study was carried out at orthopedic unit KTH Peshawar on 30 patients from date to date. Diagnosis of CTS was made on the basis of presence of pain and numbness in the distribution of the

median nerve, nocturnal exacerbation of symptoms and positive Phalen'smanoeuvre and Durken test confirmed by nerve conduction study (NCS).The inclusion Criteria was: patients with primary, idiopathic CTS having any grade of pain and numbness between 18 to 50 years of age of either gender having symptom duration of at least 3 months. Patients having previous steroid injection for CTS in the same wrist, inflammatory joint disease, diabetes mellitus· Vibration-induced neuropathy, polyneuropathy, pregnancy, trauma to the affected hand in the previous year, previous CTS surgery in the affected hand and known abuse of drugs and/or alcohol were excluded.

The patients with CTS fulfilling the inclusion criteria were recruited from the OPD of department of Orthopedic and Traumatology, KTH. The purpose of the study was explained and informed written consent was taken. Detailed clinical history was taken regarding the presence of pain and numbness at night along the median nerve distribution area at hand along with General physical Examination. Pain was assessed by visual analogue score (VAS) using a 10cm line labeled at "0" with "no pain" and "10" with "worst pain" as shown below and was graded as follows: Grade 0: no pain (VAS 0), Grade 1: Mild pain (VAS 1-3), Grade 2: Moderate pain (VAS 4-7), Grade 3: Severe pain (VAS 8-10).



Numbness was graded as Grade 1: Mild numbness (only finger tips numbness), Grade 2: Moderate numbness (Finger numbness), Grade 3: Severe numbness (fingers to palm numbness).[16]

Examination of the affected upper extremity was performed including phalen test, Durkin and two point discrimination tests. Local steroid injection was prepared containing 10 mg lignocaine and 40 mg methylprednisoloneand injected at the volar aspect of the forearm 4 cm proximal to the wrist crease between the tendons of the radial flexor muscle and the long palmar muscle close to the carpal tunnel. Injections were given with a 3 cm long 0.7 mm needle. Under aseptic condition, the needle was introduced slowly, and the participant was instructed to say stop if he or she felt pins and needles or pain in the fingers. If a resistance was felt the needle was withdrawn a few millimeters then repositioned. The injection was given without much pressure. After injection, the 1 ml fluid bolus was gently massaged towards the carpal tunnel. After 30 minutes of injection, patients were allowed to go home ensuring that there were no complications of local steroid injection. Patients werereassessed to determine intervention effectiveness in terms of improvement in at least one grade of pain on Visual Analogue Scale and numbness at 4 and 12 weeks follow up.

All the above mentioned information including name, age, sex, address wasrecorded in a predesigned proforma. Exclusion criteria wasfollowed strictly to control confounding variables and bias in the study results.

RESULTS

The total number of patients was 32 comprising of 4 (12.50%) males and 28 (87.50%) females. The mean age of male and female was 30.75 $\pm$ 6.23 and 33.42 $\pm$ 7.07 respectively.

Moderate pain was present in 21 (65.62%) patients and 16 (76.19%) improved to no pain at 4 weeks while 18 (85.71%) improved to no pain at 12 weeks follow up. Only 2 (9.52%%) and 1 (4.76%) patients did not improved after local corticosteroid injection at 4 and 12 weeks follow up respectively. Among the patients with severe pain, 2 (18.18%) and 4 (36.36%) patients improved to no pain at 4 and 12 weeks respectively while 1 (9.09%) patient did not improve at all at 4 weeks follow up. In patients with mild pain, the effectiveness was 90.48% and 95.24% at 4 and 12 weeks respectively while in case of severe pain, the effectiveness was 90.90% and 100% at 4 and 12 weeks respectively. Other detail is shown in Table No. 1

Table No. 1: Effectiveness of local steroid injection in terms of improvement of pain on vas at 4 &12 weeks follow up in CTS

Pain Before Local Steroid	Pain after Local Steroid									
	No Pain		Mild Pain		Moderate Pain		Severe Pain		Effectiveness	
	4wks	12wks	4wks	12wks	4wks	12wks	4wks	12wks	4Wks	12wks
Moderate Pain N=21 (65.62%)	16 (76.19%)	18 (85.71%)	3 (14.23%)	2 (9.52%)	2 (9.52%)	1 (4.76%)	0 (0%)	0 (0%)	90.48%	95.24%
Severe Pain N=11 (34.38%)	2 (18.18%)	4 (36.36%)	7 (63.63%)	6 (54.54%)	1 (9.09%)	1 (9.09%)	1 (9.09%)	0 (0%)	90.90%	100%

Table No. 2: Effectiveness of local steroid injection in terms of improvement of nnmbness at 4 &12 weeks follow up in CTS

Numbness Before Local Steroid	Numbness after Local Steroid									
	No Numbness		Mild		Moderate		Severe		Effectiveness	
	4wks	12wks	4wks	12wks	4wks	12wks	4wks	12wks	4Wks	12Wks
Mild N=12 (37.50%)	10 (83.33%)	11 (91.66%)	2 (16.67%)	1 (8.33%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	83.33%	91.67%
Moderate N=20 (62.50%)	1 (5%)	18 (90%)	19 (95%)	2 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	100%	100%

Mild and Moderate numbness was observed in 12 (37.50%) and 20 (62.50%) patients respectively. Among the patients with mild numbness, 10 (83.33%) and 11 (91.66%) patients improved to no numbness at 4 and 12 weeks respectively while 2 (16.67%) and 1 (8.33%) did not improve at all at 4 and 12 weeks follow up respectively. In patients with moderate numbness, 18 (90%) improved to no numbness 12 weeks while 2 (10%) improved to mild numbness at 12 weeks follow up. Among the patients with mild numbness, the success rate was 83.33%and 91.67% at 4 and 12 weeks respectively while in case of moderate numbness, the effectiveness was 100% each at 4 and 12 weeks follow up. Other detail is shown in Table No. 2

DISCUSSION

Carpal Tunnel Syndrome is associated with a variety of systemic conditions local causes like local trauma, overuse of the hand or wrist,or prolonged improper positioning but in majority of the patients, no definite cause could be found. Prolonged extreme posture of the wrist, high amount of repetitive movements and handling of instruments involving vibration are associated with Carpal Tunnel Syndrome.[17]

Our study confirmed beneficial effect of injection with methylprednisolone near the carpal tunnel. The success rate was 90.47% in patients with moderate pain who improved to no pain and mild pain at 4 weeks while at the 12 weeks follow up, it was 95.23%. Inpatients with severe pain, the success rate was 90.90% and 100% at 4 and 12 weeks respectively. Among the patients with mild numbness, the success rate was 83.33%and 91.67% at 4 and 12 weeks respectively while in case of moderate numbness, the effectiveness was 100% at 4 and 12 weeks follow up in patients who improved to no numbness and mild numbness.Islam M,et al,[18]in a comparative trial observed that 80% improvement was observed in steroid group and only minor symptoms were present at 4 weeks follow up.Milo R, et al,[19]evaluate the clinical and electrophysiological effects of local depo-methylprednisolone injection in patients with carpal tunnel syndrome (CTS) over a 6 months period in 21 patients, Prior to injection all patients complained of night pain and awakening and numbness before the treatment. This symptom disappeared in 81% of the patients after one month of local corticosteroid injection.

Our rationale for positioning injections close to the carpal tunnel was that injections at this site are less likely to damage the nerve and are easier to carry out than injections into the carpal tunnel. Otherreason for choosing this site was the common occurrence of a swelling close to the carpal tunnel as this sweeling has been reported by Dammers JWHH et al,[14]in three quarters of the participants. Such a swelling probably consists of fat tissue and hypertrophy of the pronator quadratus muscle. A local lipolytic action of methylprednisolone may reduce the swelling. But on the other hand, according to Wallace WA[20] that local steroid injections only reduce inflammation temporarily and are justified in one specific situation: in the carpal tunnel syndrome associated with pregnancy and danger with injections is that the patient feels better, believes that he or she is cured, and does not return to see the doctor for a long time. By this time the thenar muscles became may be wasted and numbness of the hand in the distribution of the median nerve may have occurred; at that stage it is permanent.

In this study, we assessed the patients for corticosteroids injection effectiveness in CTS at short term, further research is required to determine length of benefit of local corticosteroid injection and benefit for mild and moderate carpal tunnel syndrome and to identify candidates for treatment based on severity and duration of symptoms. Local corticosteroid injection should also be compared to, and combined with, other non-surgical and even surgical interventions to determine the optimum management of CTS.

CONCLUSION

A local single injection of steroids in carpal tunnel syndrome is effective in relieving pain and numbness in short terms.

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Address for Corresponding Author:
Dr. Roohullah Jan
Medical Officer,
Orthopaedics and Trauma unit "B",
Khyber Teaching Hospital, Peshawar,
Khyber PukhtoonKhwa
Email: janroohullah@gmail.com
Contact No: +92-333-9286929