

LOCAL STEROID INJECTION OR CARPAL TUNNEL RELEASE FOR CARPAL TUNNEL SYNDROME - WHICH IS MORE EFFECTIVE?

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ABSTRACT

Objective: To compare the effectiveness of local steroid injection (LSI) and carpal tunnel release (CTR) operation for the treatment of carpal tunnel syndrome (CTS).

Methodology: This is a prospective randomized clinical trial conducted at Khalifa Gul Nawaz Teaching Hospital and District Headquarters Teaching Hospital, Bannu from Feb. 2009 to Sept. 2011. Patients having CTS irrespective of gender, age and ethnicity, were included in this study. They were randomly assigned to two treatment groups by lottery method, LSI group, and open CTR group. Follow-up was done for a total period of 12 weeks. A standardized symptoms questionnaire, the 'Global Symptom Score' (GSS) was used for baseline assessment as well as for outcome measurement. It rates symptoms on a scale from 0 to 50, where '0' indicates no symptoms and '50' indicates the most severe symptoms. Data were analyzed with SPSS 10.

Results: Out of total 40 patients, there were 11(27.5%) males and 29(72.5%) females. The age of the patients ranged from 24-66 years (mean age 45.35 ± 11.65). In 15 cases the age was ≤ 40 years and in 25 cases the age was > 40 years. Out of 40 patients, 20 were assigned to LSI group and 20 to CTR group. The baseline mean GSS for LSI group was 34.80 ± 8.15 and for CTR group 35.45 ± 7.43 . Two weeks after treatment, mean GSS for LSI group was 11.60 ± 6.90 and for CTR group 12.50 ± 7.28 . Four weeks after treatment, mean GSS for LSI group was 9.85 ± 6.39 and for CTR group 7.30 ± 5.68 . Twelve weeks after treatment, mean GSS for LSI group was 22.10 ± 6.90 and for CTR 5.45 ± 6.90 . This trend shows that LSI has temporary effect on GSS in CTS whereas CTR has long-lasting effect.

Conclusion: LSI gives only transient relief in CTS, whereas CTR operation provides long-lasting relief as shown in this short series of 40 patients with short-term follow-up of 12 weeks.

Key Words: Carpal tunnel syndrome, Local steroid injections, Carpal tunnel release.

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INTRODUCTION

Carpal tunnel syndrome (CTS) is defined as a constellation of clinical symptoms and signs caused by compression of the median nerve at the wrist¹. It is the most common entrapment

neuropathy. Its prevalence in the United States has been estimated to at 3.7%². It is three times more common in females than in males and is more prevalent in middle-aged people³. It is more common in computer operators and manual laborers. It is bilateral in nearly 50% of the cases and affects the dominant hand more frequently⁴.

Both conservative and surgical interventions are used for treatment of CTS. Various studies have reported that conservative as well as surgical methods both provide significant relief of symptoms⁵. Treatment modalities commonly employed for CTS include: rest from repetitive movements of hand, immobilization of the hand with a splint in the neutral position, non-steroidal anti-inflammatory drugs, diuretics, oral steroids, local steroid injection in the carpal tunnel and decompression of the median nerve by carpal tunnel release operation⁶.

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Resting the hands and change of occupation relieves the symptoms in a patient who has recent onset of symptoms due to unusual manual labor¹. Splinting of the wrist at night is indicated in patients who tend to sleep with their wrists sharply flexed and who are awakened by severe numbness and pain in the median nerve distribution⁷. Non-steroidal anti-inflammatory drugs, diuretics and pyridoxine have been shown to be no more effective than placebo and oral steroids are effective for short-term management of symptoms⁸.

Local steroids injection (LSI) into the carpal tunnel is a simple method of treatment, easily given in clinic setting. It has been reported to be effective but the benefit achieved is time limited and frequent relapses have been mentioned⁹. Two steroid injections do not improve the results significantly as compared to one injection¹⁰.

Many authors have advocated carpal tunnel release (CTR) operation for treatment of CTS^{11,12}. This procedure is done either as open release or endoscopic release of the transverse carpal ligament both of which have been shown to be equally effective¹³. The long-term success rate of surgery in CTS has been reported to be greater than 75%¹⁴.

From a global point of view, CTS is an important cause of morbidity. There is an increasing temporal trend in the incidence of CTS, which is largely due to increase in the prevalence of risk factors like obesity, diabetes mellitus, greater labor productivity and more frequent use of computers in offices as well as homes¹⁵. It places a great economic and social burden on the nation in the form of lost work days¹⁶.

In the current literature on CTS, there is no consensus of opinion regarding the effectiveness of various modalities of treatment and rigorous studies are required to establish standard criteria for treatment. Moreover there is a scarcity of suitable and validated objective tests for quantifying the severity of CTS and measuring the outcome¹⁷. Most of the studies have been based on subjective questionnaire method of assessment. Electro-diagnostic studies and magnetic resonance imaging offer alternative objective tools for confirming diagnosis, assessing baseline severity of the condition and measuring the outcome¹⁸⁻²⁰. These facilities are not available in many hospitals and are not cost-effective in poor community.

Among the current treatment options, LSI and open CTR, are the two most widely used methods for relieving the symptoms in CTS. This study is designed to evaluate the effectiveness of

LSI in comparison to open CTR operation for CTS.

METHODOLOGY

Patients having CTS were collected from out-patient departments of the District Headquarters Hospital and Khalifa Gul Nawaz Hospital, Bannu, in the period from Feb. 2009 to Sept. 2011. In case of patients having bilateral CTS, only the more symptomatic hand was included in the study. For inclusion in the study, patients were mostly diagnosed clinically on the basis of typical signs and symptoms of CTS which are intermittent pain and paresthesia in the distribution of the median nerve in the hand usually worse at night as well as during daily activities, shaking or flicking one's hand for relieving the symptoms (Flick sign), sensory deficit in median nerve distribution of the hand, weakness of the abductor pollicis brevis muscle and atrophy of the thenar muscles, positive Phalen's test (reproducing pain and paresthesia by holding the wrist in hyperflexed position for 60 seconds) and positive Tinel's sign (tapping over the volar aspect of wrist reproduces pain and paresthesia in the distribution of median nerve)²¹.

Electro-diagnostic studies (EDS) were used for confirming the diagnosis in few doubtful cases of CTS. This facility was not available locally in our institutions, and patients were referred to other cities for these studies. In typical cases of CTS, EDS are not considered mandatory for diagnosis²².

Patients were included in the study irrespective of age, gender, class or ethnicity. An informed consent was taken from each patient. Patients with peripheral poly-neuropathy, cervical radiculopathy and those with recent history of trauma or fractures of the wrist were excluded from the study. Patients having CTS symptoms of less than 3 months duration were excluded because there are chances of spontaneous resolution. Recurrent cases of CTS after previous local steroid injection or previous surgery were also excluded. The profession of the patient was noted in order to get an idea about association of CTS with various manual jobs. Patients were randomly assigned, by lottery method, to two treatment groups: LSI group (20 patients) and CTR group (20 patients).

A Baseline assessment of the severity of symptoms was done on the subjective questionnaire method as described by Herskovitz et al. known as global symptom score (GSS).²³ It is a composite of five clinical symptoms of CTS (pain, numbness, paresthesia, weakness/clumsiness and nocturnal awakening). Each symptom is rated on a scale from '0' (no symptoms) to '10' (severe

symptoms). The sum of the scores of 5 categories is called GSS. In a normal subject, the total score on GSS is '0'. The worst score is 50, which shows the most severe CTS. A baseline GSS was found for every patient. Mean baseline GSS was calculated for each of the two groups.

In each of the patients in LSI group, 40 mg of methyl-prednisolone (Depomedrol) injection was given in the carpal tunnel. No other medicines like analgesics, B-Complex, etc., were used. In the CTR group, the operation was done under local anesthesia as a day-case. Oral antibiotics and analgesics were used for 4-5 days after surgery. Follow-up examination in both the groups was conducted at intervals of 2 weeks, 6 weeks and 12 weeks, after the treatment. The follow-up assessment tool used was the same GSS method. An outcome GSS was found for every patient at 2 weeks, 4 weeks and 12 weeks intervals. Mean GSS was calculated, for each of the two groups, along with standard deviations at these intervals. Statistical analysis of the data was done by using Chi-square test and independent T-test to determine significance.

RESULTS

A total of 40 patients having CTS were included in this study. Out of 40, there were 11 males and 29 females (Table 1). The age of the patients ranged from 24 to 66 years (mean age 45.35±11.65). The profession-wise distribution of the study population is shown in Table 1, which indicates that most commonly the patients of CTS

are manual workers, like laborers, computer operators and those ladies involved in house-hold duties.

Patients were randomized, by lottery method, to two different groups for the purpose of treatment; 20 patients were included in LSI group and 20 patients were included in CTR group. There was no significant difference in the mean age of patients, gender and profession using Chi Square test, in the two groups (Table 1).

There was also no significant difference in the baseline mean GSS of both the groups, using independent T-test (Table 2). At 2 weeks after the treatment, both the groups showed improvement in GSS and the difference in the mean GSS of the two groups was not significant (p-value: 0.69). At 4 weeks, again the difference in the mean GSS of the two groups was not significant (p-value: 0.19), showing almost equal effectiveness of both LSI and CTR at this interval(Table 2).

At 12 weeks, there was recurrence of symptoms in the LSI group and the mean GSS of this group increased to 22.10. On the other hand, in the CTR group the mean GSS further decreased to 5.45 indicating a significant difference and a long-lasting curative effect of CTR (P-value:0.000) {Table 2}.

There were no major complications in either of the two groups. A case of cellulitis was found with LSI and a case of reflex sympathetic dystrophy was found with CTR.

Table 1: Demographic Characteristics of the Study Population

		Group				p-value
		LSI		CTR		
		Count	% within Group	Count	% within Group	
Age (in years)	≤40	7	35.0%	8	40.0%	0.518
	41-55	7	35.0%	9	45.0%	
	>56	6	30.0%	3	15.0%	
Gender	Male	6	30.0%	5	25.0%	0.723
	Female	14	70.0%	15	75.0%	
Profession	Laborer/Farmer	3	15.0%	3	15.0%	0.994
	House- hold Worker	5	25.0%	5	25.0%	
	Computer operator/ Typist	4	20.0%	5	25.0%	
	Office worker	3	15.0%	3	15.0%	
	Others	5	25.0%	4	20.0%	

Table 2: Comparative Statement in both the groups

	Group	n	Mean	Standard Deviation	p-value
Age	Local Steriod Injection	20	46.9000	12.32840	0.406
	Carpal Tunnel Release	20	43.8000	10.98132	
Duration of Symptoms	Local Steriod Injection	20	10.1500	6.75336	0.348
	Carpal Tunnel Release	20	12.5000	8.75695	
GSS Baseline	Local Steriod Injection	20	34.8000	8.14733	0.794
	Carpal Tunnel Release	20	35.4500	7.43020	
GSS after 2 weeks	Local Steriod Injection	20	11.6000	6.90080	0.690
	Carpal Tunnel Release	20	12.5000	7.28011	
GSS after 4 weeks	Local Steriod Injection	20	9.8500	6.39305	0.190
	Carpal Tunnel Release	20	7.3000	5.67636	
GSS after 12 Weeks	Local Steriod Injection	20	22.100	6.8970	0.000
	Carpal Tunnel Release	20	5.450	6.9014	

DISCUSSION

LSI and CTR are the two widely practiced methods of treatment for CTS²⁴. In the current clinical trial; we have compared the efficacy of these two methods.

The age- and gender-wise distribution of patients in this study is comparable to other international studies; the condition being more common in people who are above 40 years of age, especially, in females³. The profession-wise distribution of patients in this study shows the association of this disease with manual jobs, the fact which has been reflected in various studies²⁵.

Our results have shown superior efficacy of CTR over LSI. In case of LSI, there was only a temporary improvement in symptoms whereas CTR had a long-lasting and curative effect in most of the cases.

Hue ACF et al (2005) have conducted a randomized clinical trial of 50 patients having CTS.²⁶ Out of these 25 underwent CTR and 25 received LSI. The patients were followed-up to 20 weeks. The mean improvement in the GSS at the end of 20 weeks was 24.2 ± 11.0 in CTR group 8.7 ± 13.0 in LSI group. The results of this trial are comparable to those of our results.

Ucan H et al (2006) carried out a comparative clinical trial of different modalities of conservative treatment, including LSI, and open CTR²⁷. They used clinical as well as electro-diagnostic parameters for baseline assessment and outcome measurement. Follow-up was done for 6 months. They have concluded that the beneficial

effects of conservative treatment like splinting and LSI were transient and open CTR was superior to conservative treatment.

The incidence of complications was quite low in our study. In LSI group, a single case of cellulitis was found which was treated successfully with parenteral antibiotics. No other clinically significant complication was found in this group. Linskey and Segal (1990) have presented a case of median nerve injury from LSI for CTS²⁸. Inadvertent intra-tendinous injection of steroids resulting in rupture of tendon has been reported²⁹.

In CTR group, one case of reflex sympathetic dystrophy was found which was treated with physiotherapy and psychological support. Complications of surgery so far reported in other studies, include injury to palmar cutaneous branch of median nerve, injury to recurrent motor branch of median nerve, hypertrophic scarring, tendons adhesions, infections, hematoma formation and reflex sympathetic dystrophy^{30,31}. All these complications are rare. Jarvik JG et al (2009) has reported no clinically significant adverse event in a randomized parallel-groups trial of surgery versus non-surgical therapy for CTS¹¹.

CONCLUSION

LSI provides temporary symptomatic relief whereas CTR results in lasting improvement of patients to the endpoint of 12-weeks period, in cases of CTS, shown in the short series of 40 patients with short-term follow-up. Further studies with larger series of patients and longer follow-up are recommended.

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