

Outcome Assessment of Comparison between Surgical Decompression versus Local Corticosteroid Injection in Carpal Tunnel Syndrome

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ABSTRACT

Aim: To evaluate the effectiveness of surgical decompression versus local corticosteroids for carpal tunnel syndrome in improving clinical outcome and to determine the length of symptom relief

Study Design: This was a comparative, longitudinal and interventional study.

Place and duration of study: OPD and A&E department of Orthopedics Surgery and Traumatology (DOST) Unit I, King Edward Medical University/ Mayo Hospital Lahore. duration of study was 1 year after approval of synopsis.

Methodology: Cases of carpal tunnel syndrome with age 18 years and above were included. The diagnosis of carpal tunnel syndrome was based on general physical examination, nerve conduction studies and additional radiological test. A total 64 patients were selected randomly. They were divided into two groups. GROUP "A" was treated by surgical decompression. Group "B" was treated by local corticosteroids. They were follow up at 3 months, 6 months and 1 year. All the procedures were done by single surgical team. Outcome measuring tools symptom severity scale (CTS) and functional status scale (CTS) were used.

Results: In group A and B the mean age of patients was 45.44±8.39 and 47.22±9.72 years respectively. Mean symptoms severity scale in group-A was higher when compared to group-B at 3 months, 6 month and 1 year with p-value < 0.05. Moreover mean functional severity scale was also improved in group-A when compared to group-B at 3 month, 6 month and 1 year with p-value < 0.05.

Conclusion: Through this study we conclude that surgical decompression of carpal tunnel versus local corticosteroid injection in terms of clinical outcome improvement and to assess the length of symptomatic relief.

Keywords Hand surgery, carpal tunnel syndrome, conservative treatment, steroid injection, surgical decompression

INTRODUCTION

Carpal tunnel syndrome is the most often diagnosed, best interpreted and most easily treated entrapment neuropathy. During the early 20th century carpal tunnel syndrome was understood as brachial plexus or thenar muscles motor branch compression neuropathy. Till 1950 only twelve patients was reported who went under surgical release of transverse carpal ligament for idiopathic carpal tunnel syndrome. So this delay in the precise diagnosis of carpal tunnel syndrome was due to variable manifestation of median nerve compression which attributes to confusion and new developments that altered early investigation pattern in this syndrome¹.

Its prevalence has been estimated to 3.7% in United States. It is more common in females than males up to three times. Also it is more common in middle aged persons, computer operators and laborers doing hand operated work. It affects dominant hand more frequently and in 50% of cases it is bilateral^{2,3,4}.

Mainly carpal tunnel syndrome is idiopathic. The aberrant contents like edema, hemorrhage, inflammation or pathologic substance deposition such as calcium uric, or amyloidosis can cause carpal tunnel syndrome. Systemic diseases like rheumatoid arthritis, diabetes mellitus, hypothyroidism or congenitally smaller canals, polyneuropathy can cause carpal tunnel syndrome^{5,6}.

Treatment option for this disease include both surgical and conservative. In conservative management one of the most popular method is injecting local corticosteroid injection into the carpal canal. The outcome assessment of intra tunnel corticosteroid injection is not measured properly yet and its symptomatic recurrence have varied from eight to 100%. This variation in results may have multiple reasons such as trial design, outcome measures and patient population examined⁷. The surgical carpal tunnel and it is one of the commonest hand operations performed. The risks of the procedure are very small indeed as

well below 1%. It is recommended when there is static numbness, muscle weakness, or thenar atrophy, and when night-splinting no longer relieves symptoms⁸.

Significant improvement in both groups observed and the relief was sustained in patients who underwent decompression patients who underwent surgical release remained asymptomatic during night while only few remained asymptomatic in local steroid injection group but grip strength was not improved in surgical release group as compared to local steroid injection group⁹. In Pakistan, no study at national level has yet been conducted to draw some conclusion or provide some consensus on using of any of these two methods. Hence for this reason we decided to conduct this study for seeing the effectiveness of surgical decompression of carpal tunnel versus local corticosteroid injection in terms of clinical outcome improvement and to assess the length of symptomatic relief¹⁰.

The objective of the study was to evaluate the effectiveness of surgical decompression versus local corticosteroids for carpal tunnel syndrome in improving clinical outcome and to determine the length of symptom relief.

METHODOLOGY

It was a comparative, longitudinal and interventional study, conducted at OPD and A&E department of Orthopedics Surgery and Traumatology (DOST) Unit I, King Edward Medical University/ Mayo Hospital Lahore, from 1 year after approval of synopsis from IRB. The sample size was calculated using mean improvement in the Global Symptoms Score at the end of 20 weeks was 24.2±11.0 in group "A" and 8.7±13.0 in group "B"¹⁴ by taking Confidence Level of 90% and Power of 90%, and total 64 (32 in each group) patients were taken.

Cases of carpal tunnel syndrome of at least 3 months' duration with age 18 years and above of either gender, pregnant, confirmed by electro diagnostic testing having moderate to severe symptoms according to Brigham and Women's Hospital carpal tunnel syndrome questionnaire, were included. The cases with

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Open upper limb fracture, Scarring around wrist, Previous carpal tunnel decompression surgery, or local steroid injection for CTS, Having polyneuropathy and inflammatory arthropathy diagnosed by history, physical examination and laboratory investigation were excluded from study. detailed sociodemographic data and clinical data were also recorded. the diagnosis of the CTS was based on general physical examination, nerve conduction studies and additional radiological tests. The cases were selected by Non-probability, purposive sampling. They were divided into two groups. GROUP "A" was treated by surgical decompression. GROUP "B" was treated by local corticosteroids.. Demographic details of patient (name, age, gender, contact) were obtained. Patients were admitted in the ward and prepared for procedure . Patients were followed in OPD by researcher himself at 3months,6months and 1 year. All the procedures were done by single surgical team and Ethical approval was sought from Institutional Review Board and informed verbal consent was taken from every patient before inclusion in the study and Informed consent was obtained after explaining all the details about the procedure.

The data was entered and analyzed with the help of SPSS version 22. Quantitative variables like age were calculated as mean± standard deviation. Qualitative variables like gender were calculated as frequency and percentage and were presented as tables and graphs. The quantitative variables (surgical decompression Vs. Local Corticosteroid Injection) was compared by independent sample t-test (in case of assumption fulfill) otherwise Mann Whitney U test was applied. The qualitative variables were compared by the Chi-square test / Fisher's exact test. P-value ≤ 0.05 was considered as significant.

RESULTS

In the present study there were a total 64 cases , 32 in each group. As for as descriptive statistics are concerned In group A and B the mean age of patients was 45.44 ± 8.39 and 47.22 ± 9.72 years respectively. Mean symptoms severity scale in group-A was higher when compared to group-B at 3 months, 6 month and 1 year with p-value < 0.05. Moreover mean functional severity scale was also improved in group-A when compared to group-B at 3 month, 6 month and 1 year with p-value < 0.05

Table 1: Comparison of duration of symptoms, preoperative assessment and Symptom severityscale in both study groups at different follow ups n=32 in each group.

Duration of symptoms

Study groups	Mean	S.D	Q1	Median	Q3
Group-A	5.14	2.28	3.12	4.50	6.37
Group-B	9.51	5.34	6.00	8.00	12.37

P value 0.200

Pre-Ops Assessment		Group-A	Group-B	P value
Motor	Present	4(12.5%)	8(25.0%)	0.20
	Absent	28(87.5%)	24(75.0%)	
Sensory	Present	32(100%)	32(100%)	1
	Absent	0	0	
Phalen's test	Present	22(68.8%)	25(78.1%)	0.396
	Absent	10(31.2%)	7(21.9%)	
Tinel's test	Present	31(96.9%)	31(96.9%)	1
	Absent	1(3.1%)	1(3.1%)	

	Study groups	Mean	S.D	Q1	Median	Q3	p-value
Pre-op	Group-A	38.53	4.69	35.00	38.50	41.00	0.149 ^a
	Group-B	40.15	4.28	37.00	41.50	44.00	
At 3 months	Group-A	18.37	10.13	11.00	12.50	26.25	<0.0001 ^b
	Group-B	11.34	7.45	11.00	11.00	11.00	
At 6 months	Group-A	19.65	10.98	11.00	13.50	28.00	<0.0001 ^b
	Group-B	11.06	0.24	11.00	11.00	11.00	
At 1 year	Group-A	23.06	13.44	11.00	18.00	32.50	< 0.0001 ^b
	Group-B	11.03	0.17	11.00	11.00	11.00	

DISCUSSION

hniques have been introduced to increase the success rate of carpal tunnel surgery by reducing postoperative pain and limited

function, and shortening recovery time, for example by adding tCarpal Tunnel Syndrome (CTS) is the commonest entrapment neuropathy. Measurement in the adult population (age 25–74y) showed, for example, that 5.8% of the women and 0.6% of the men are affected¹¹. Carpal Tunnel Syndrome (CTS) is considered as incapacitating and confusing condition presented to orthopedic hand surgeons or rheumatologists.. So the American Academy of Orthopedic Surgeons (AAOS) have set clinical guidelines for the diagnosis of carpal tunnel syndrome, they defined syndrome as compressive, symptomatic neuropathy of median nerve at the location of wrist^{12,13} In USA, Carpal tunnel syndrome (CTS) is considered as the most common entrapment neuropathy¹⁴.

The primary features of carpal tunnel syndrome includes pain and numbness in median nerve distribution area of radial three and half fingers (thumb, index, middle and radial side of half ring finger), it is also recognized by unpleasant tingling sensation in hand. There is also reduction in grip strength and function of hand. These symptoms get worse during night while clumsiness is reported during performing activities during the day requiring wrist flexion. Patient mostly flick his hand to relieve symptoms also called " Flick sign"¹⁵. The diagnosis of carpal tunnel is mainly based on its characteristics symptoms. Some clinicians decide to confirm their findings by electrophysiological examination. Provocation tests do not necessarily contribute to the clinical diagnosis of CTS¹⁶.

The carpal tunnel syndrome treatment consist of two options: conservative and surgical. Conservative management is reserved for those who has mild to moderate symptoms.it includes oral or intravenous steroids, corticosteroids injections, nonsteroidal anti-inflammatory drugs, vitamin B6 and B12, ultrasound therapy, yoga exercises, carpal bone mobilization and use of splints^{15,17}. O'Connor et al., reported that patients with these methods of treatment experienced improved short term symptomatic relief but in long term there is no proven benefit. There are also other conservative treatment options which have no significant improvement as compared to placebo or control such as exercises, magnet therapy and chiropractic treatment¹⁷. Surgery may be indicated when conservative treatment fails. Surgery is usually reserved for patients with severe symptoms. The basic principle of carpal tunnel syndrome surgery is to release the pressure over the median nerve by releasing flexor retinaculum thus increasing volume of carpal tunnel. Over time, several variations in tecenosynovectomy or transverse carpal ligament reconstruction. there persists confusion on which treatment option is optimal for health outcomes in long-term relief of the patient. Despite the fact that surgical release of carpal tunnel is considered as definitive treatment but it is not a first line treatment option. Hence conservative treatment may not provide cure but in some cases it do provide relief of symptoms. In Pakistan, no study at national level has yet been conducted to draw some conclusion or provide some consensus on using of any of these two methods. Hence for this reason we decided to conduct this study for seeing the effectiveness of surgical decompression of carpal tunnel versus local corticosteroid injection in terms of clinical outcome improvement and to assess the length of symptomatic relief¹⁰.

A study was conducted in which the comparison of the open surgical release of carpal tunnel and non-surgical treatment and there effect was observed on the greatest cross sectional area of the median nerve. The study design was prospective cohort study, it was performed on 78 wrists of 55 consecutive patients who have diagnosed carpal tunnel syndrome. It was noted that there was greater decrease in the cross sectional area of median nerve with surgically dealt wrists as compared to non-surgically managed (difference in means, 1.0 mm²; 95% confidence interval, 0.3–1.8 mm²). The evidence of study was so strong that variation in gender, age and neurological severity could not alter results. So this observational study demonstrated that with surgical decompression of carpal tunnel there is more decrease in median nerve cross sectional area than with non-surgical measures.

Hence smaller cross sectional areas also contribute to better postoperative outcome¹⁸.

In our study, the mean pre-operative symptoms severity scale was 38.53±4.69 in group-A and 40.15±4.28 in group-B. The mean pre-op symptoms severity scale was statistically same in both groups, p-value > 0.05. At 3 month mean symptoms severity scale in group-A was 18.37±10.13 and in group-B it was 110.34±7.45, the mean symptoms severity scale was higher in group-A when compared to group-B, p<0.001. At 6 month mean symptoms severity scale was 19.65±10.98 in group-A and in group-B the mean symptoms severity scale was 11.06 ± 0.24. At 1 years of surgery the mean symptoms severity scale was 23.03±13.47 in group-A and 11.03± 0.17, p-value < 0.0001. The mean symptoms severity scale in group-A was higher when compared to group-B at 6 month and 1 year, p-value < 0.0001.

Also in our study, the mean functional severity scale before surgery in group-A and group-B was 25.62±4.06 and 28.06 ± 3.82, p-value 0.015. Mean functional severity scale in group-A (14±6.82) was higher at 3 month when compare to group-B i.e. 8.28 ±0.99, p-value < 0.0001. At 6th months the mean functional severity scale in group A and group B was 15.37±7.48 and 8.25 ± 0.98 respectively, p-value < 0.0001. Moreover the mean functional severity scale was also higher in group-A (16.31±8.09) than group-B (8.25±0.98) at 1 year.

Similar to our objectives, one study compared the conservative versus surgical method for carpal tunnel syndrome and included 44 (77%) patients assigned to surgery. At 12 months, 101 (87%) patients have completed the follow-up and results were analyzed. Among total, 52 out of 59 underwent non-surgical treatment and 49 out of 57 underwent surgery. After 12 months analysis of results according to carpal tunnel syndrome assessment questionnaire showed significant improvement in function (CTSAQ function score: Δ -0.40, 95% CI 0.11–0.70, p=0.0081) and symptoms (CTSAQ symptom score: 0.34, 0.02–0.65, p=0.0357). Similar to our results this study has demonstrated that both treatment group have symptomatic relief but in terms of outcome surgical management is better. Mostly studies above mentioned report similar results to our study. Where both surgical as well as non-surgical treatments are effective in reduction of symptoms and improving basic function of the patients, the surgical treatment inevitably serves with better results and overall health outcomes. Therefore our study recommends the use of surgical treatment options wherever needed. However, the decision largely should depend on pre-requisites of the patient characteristics. Further research is also encouraged to explore more in-depth prospects in this regard.

CONCLUSION

Through this study we conclude that surgical decompression of carpal tunnel versus local corticosteroid injection in terms of clinical outcome improvement and to assess the length of symptomatic relief.

Conflict of interest: Nil

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