

**Comparison of surgical out come between virgin carpal tunnel syndrome and previous local steroid injected tunnel**Ali Shahad Safi, Hussein abdradi Alseady, Mohammed Hassan Younise¹**Abstract**

Carpal tunnel syndrome(CTS) is the most commonly occurring peripheral nerve compression neuropathy and its condition characterized by an abnormality of the median nerve function due to compression of the nerve within the carpal tunnel. Surgical release of the transverse carpal ligament is an effective treatment for patients with CTS. Non-steroidal anti-inflammatory drugs, diuretics, vitamin B6 injection, ultrasound therapy, laser therapy, acupuncture, magnetic therapy, bracing and local steroid injections have been used for closed treatment of CTS and effective results in the short-term treatment have been demonstrated clearly only for bracing and local steroid injections. Aim: was to identify the effect of local steroid injection on the outcome of surgical release of CTS. A prospective study that was conducted in the Orthopedic Department of at Basra General Hospital during the period from 1st of July 2005 till end of September 2006 on 40 patients, 20 of them with received local steroid injection (group A) and 20 without local steroid injection (group B virgin carpal tunnel) operations done to release the tunnel with monthly follow up by telephone call because of social and security problems at time of study. Pearson's Chi-square test was used to assess statistical association between injection of local steroid and outcome of CTS surgery. A level of P – value less than 0.05 was considered significant. Postoperatively, in Group A, night pain and grip power were found to be improved in 17 (85%) and 11 (55%) of women, respectively, while 16 (80%) relieved from night pain, paresthesia and numbness. On the other hand, the postoperative follow up of women in group B showed that the improvement of night pain was occurred in 20 cases (90%), relieving of night pain, paresthesia and numbness in 17 (85%), and improvement of grip power was reported in 12 (60%). The analysis of association didn't show statistical significant difference ($P > 0.05$) in surgical outcome between study groups. In conclusion; local steroid injection for CTS prior to surgery didn't affect outcome of surgical release.

Key words: Carpal tunnel syndrome(CTS); Phalen's test positive; Tinel's test

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Introduction

Carpal tunnel syndrome(CTS) is most broadly defined as a condition characterized by an abnormality of the median nerve function due to compression of the nerve within the carpal tunnel (1). It's the most commonly occurring peripheral nerve compression neuropathy (2). A recent population-based study established a prevalence of 2.7% for CTS in the general population (3). It occurs most often in patients between 30 and 60 years old and it is five times more frequent in women than in men (4). It's cause impairment of motor and /or sensory function of the median nerve as it traverses through the carpal tunnel. Its caused either by intrinsic swelling of the median nerve or by extrinsic compression of the nerve by one of many surrounding structures of wrist (5). Harrington et al suggested surveillance diagnostic criteria for CTS should include pain or paranesthesia or sensory loss in the median nerve distribution and one of (Tinel's test positive, Phalen's test positive, nocturnal exacerbation of symptoms, motor loss with wasting of the abductor pollicis brevis, or abnormal nerve conduction studies) (6). Tinel's test (percussion of the median nerve at the wrist creating tingling in the median innervated fingers) is considered to have a specificity of 99% and a sensitivity of 64% (7). Phalen's test (wrist flexion provoking tingling in median innervated fingers within 60 seconds) has a 95% specificity with a sensitivity of 75% (8). Non-steroidal anti-inflammatory drugs, diuretics, vitamin B6 injection, ultrasound therapy, laser therapy, acupuncture, magnetic therapy, bracing and local steroid injections have been used for closed treatment of CTS and effective results in the short-term treatment have been demonstrated clearly only for bracing and local steroid injections (9). Local steroid injection for CTS was shown to provide greater clinical improvement in symptoms one month after injection compared with placebo (10). Surgical release of the transverse carpal ligament is an effective treatment for patients with CTS. Surgical release is indicated for failed conservative treatment, severe symptoms at presentation and various disease states like diabetes, rheumatoid arthritis or CTS with cervical spondylosis when occur together and may exacerbate one another (double crush). Open surgery is easy and cheap and can be done by the general surgeon with a good anatomical knowledge of the hand (11). Failure to benefit from decompression may arise from concomitant disease (for example diabetes) or as a double crush phenomenon with additional

nerve root irritation at cervical spine level. Patients who have experienced severe prolonged compression may have intra-neural fibrosis with a more limited recovery postoperatively (12). Aim of this study was to identify the effect of local steroid injection on the outcome of surgical release of CTS.

Patients and methods

Study design, setting: This was a prospective study that was conducted in the Orthopedic Department of at Basra General Hospital during the period from 1st of July 2005 till end of September 2006.

Study Population and sample size: The study included 40 patients (hands) diagnosed with carpal tunnel syndrome. A detailed history and clinical examination was performed according to specially prepared formula (Questionnaire). Nerve conductive study (NCS) was performed in 36 patients, in four patients, we depend on clinical basis. All the patients were female aged between 21 - 60 years old. They were divided into two groups:

- Group A: Included 20 patients received local steroid injection.
- Group B: Included 20 patients with virgin tunnel women (did not receive local steroid injection).

Surgical procedure: Most of operation (38 hands, 95%) are performed under general anesthesia (GA), two operations performed under local anesthesia because of co-medical problems that increasing the risk of GA. Tourniquet applied for all of them, longitudinal palmar approach was done to release the median nerve, close the skin and dress the wound and short course of oral antibiotic (for three days) was prescribed with one-day hospitalization. We depend on monthly follow up by the means of telephone contact as far as clinical evaluation was difficult because of social & security problems at time of study conduction.

Statistical analysis

The data analyzed using Statistical Package for Social Sciences (SPSS) version 25. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Pearson's Chi-square test was used to assess statistical association between injection of local steroid and outcome of CTS surgery. A level of P – value less than 0.05 was considered significant.

Results

A total of 40 women with CTS were the subjects of this study. Mean age was 35.37 ± 10.06 years ranging from 20 to 60 years. Most of women 28 (70%) were in the age group of 20–40 years, and 37 (92.5%) were married. CTS was right-sided in 19 (47.5%) cases, left-sided in 5 (12.5%), and bilateral in 16 (40%) of them. All of the recruited cases (100%) presented with hand pain, 27 (67.5%) presented with cervical pain, 32 (80%) forearm pain, 39 (97.5%) night pain, 38 (95%) paresthesia and numbness, and 24 (60%) complained from muscle wasting (figure 3.2). Results of clinical tests revealed that 38 cases (95%) had positive phalen's test and local pressure test, and 14 (35%) were with positive Lasix test. Nerve conductive study was done for 36 (90%) of patients to evaluate the degree of nerve compression, and showed that 7 (19.5%) suffered from mild compression, while 12 (33.3%) and 17 (47.2%) were with moderate and severe compression, respectively as shown in table and figure (1).

Table 1.

Distribution of the sample subjects by certain general and clinical characteristics

Variable	No. (n= 40)	Percentage (%)
Age (Years)		
20 - 30	13	32.5
31 - 40	15	37.5
41 - 50	8	20.0
> 50		10.0
Marital Status		
Married	37	92.5
Unmarried	3	7.5
Affected Hand		
Right	19	47.5
Left	5	12.5
Bilateral	16	40.0
Phalen Test		
Positive	38	95.0
Negative	2	5.0
Local Pressure Test		
Positive	38	95.0
Negative	2	5.0
Nerve Conductive Study n= 39		
Mild Compression	7	19.5
One Doses	12	33.3
Two Dose	17	47.2

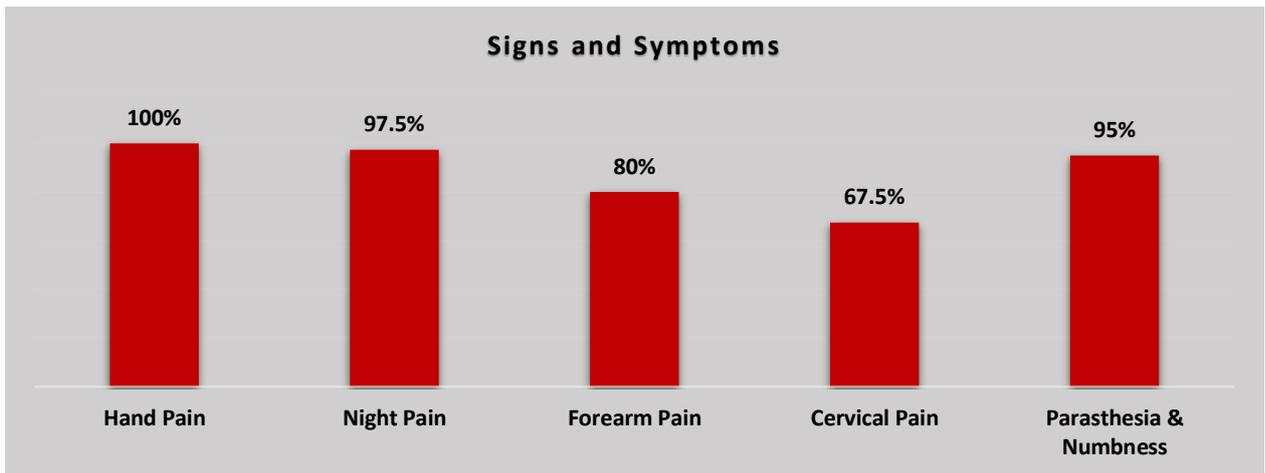


Figure 1.

Distribution of cases by signs and symptoms

Postoperatively, in Group A, night pain and grip power were found to be improved in 17 (85%) and 11 (55%) of women, respectively, while 16 (80%) relieved from night pain, parasthesia and numbness. On the other hand, the postoperative follow up of women in group B showed that the improvement of night pain was occurred in 20 cases (90%), relieving of night pain, parasthesia and numbness in 17 (85%), and improvement of grip power was reported in 12 (60%) as shown in figure (2)

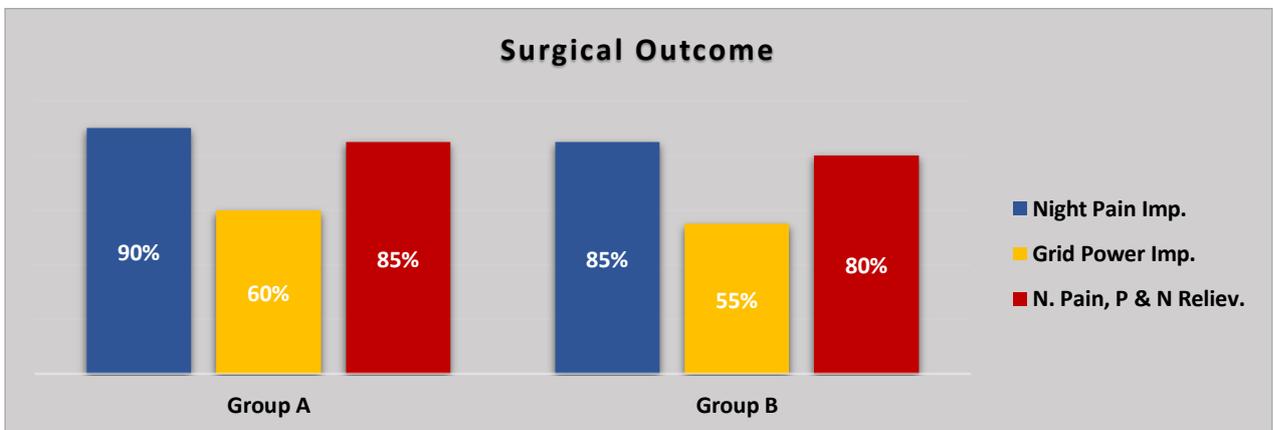


Figure 2.

Distribution of study groups by surgical outcome

The analysis of association in table 3.3 didn't show statistical significant difference ($P > 0.05$) in surgical outcome between study groups.

Table 2.

Comparison in outcome of CTS surgery between study groups

Outcome of Surgery	Local Steroid Injection		Total (%) n= 40	P- Value
	Yes (%) n= 20	No (%) n= 20		
Improvement of Night Pain	18 (51.4)	17 (48.6)	35 (87.5)	0.632
Improvement of Grip Power	12 (52.2)	11 (47.8)	23 (57.5)	0.749
Relieving of Night Pain, Paresthesia & Numbness	17 (51.5)	16 (48.5)	33 (82.5)	0.677

Discussion

Carpal tunnel syndrome (CTS) is the most common chronic hand condition referred for surgery. Incidence of surgery for CTS is increasing worldwide [1]. The treatment of CTS depends on severity of symptoms. Severe CTS is defined as presence of thenar muscle wasting and constant numbness. Mild CTS should be treated non-operatively, whilst moderate CTS can be treated either non-operatively (wrist splinting or steroid injecting, or with surgery [2].

Forty patients with CTS were enrolled in this study, in which, CTS was predominant in right hand (47.5%). In accordance with Ahmad et study, as reported that right hand affected 68.5% of the participants [3]. A higher results found in Al-Dabbagh et al study, as right hand was predominant in 72% [4]. Reasonable explanation was that repetitive work in dominant hand increase the risk of CTS, repeated flexion and extension of the wrist defined in various way increase the risk of job related CTS. In the current study, all cases had hand pain (100%), 80% had forearm pain, 95% paresthesia and numbness, and 60% had muscle wasting. Also, 95% had positive phalen's test and local pressure test, and 35% with positive Lasix test. Nerve conductive study showed that severe compression found in 47.2%. These results were higher than Al-Dabbagh et al study, as NCS showed that 32% had sever CTS, also majority of patients had numbness (96%), 87% had nocturnal tingling and only 43% had pain. Furthermore, 78% of cases had positive Phalen's test, and 66% cases had positive Tinel's test [4]. They were near to result in Gonzalez et al study, as numbness found in 93% of cases [5]. Differences observed are due to sample size, age and gender of patients, occupation and comorbid diseases, concerning the difference in provocation tests, they might due to non-homogenous characters of examined patients. Different degree in progression of the condition, as well as methods of performing these tests, as seem to play a significant role specially the percussion Tinel's test [6]. In the present study, the postoperative follow up of patients treated surgically, improvement and relieving of night pain, paresthesia and numbness was better than those treated by steroid, despite non-significant association ($P>0.05$).

In accordance to Ly-Pen study in 2012, who found at the 24-month follow-up, surgery non-significantly was more effective than injection in those achieving 70% improvement ($P = 0.049$) [7]. Similarly, Ren et al study found that functional improvement, symptom improvement and neurophysiological improvement at different follow-up times showed that the differences were non-significant between surgical and non-surgical interventions [8-10].

Differently, Klockari and colleagues found that surgical treatment had a greater and significant improvement of symptoms and neurophysiological parameters at six months. While, at 3 and 12 months, the results were not significant in favor of surgery or conservative treatment ($P > 0.05$) [11-13]. Differently also, at 20 weeks after randomization in Hui et al study, surgery had a significant greater symptomatic improvement than those with steroid injection ($p < 0.001$) [14]. Differences observed can attributed to sample size of each study, duration and severity of the symptoms, follow-up duration, numbers of steroid trails, attendance of patients for follow-up and type of CTS (primary or secondary).

It seemed that the local steroid injection could lead to a transient improvement in electrophysiological parameters one month after injection by the anti-inflammatory and anti-edema effects of the corticosteroid or by inhibiting the spontaneous discharge ability of excitable cells [15]. On the other hand, surgical decompression has traditionally been considered the definitive treatment for CTS. Surgical treatment appears to be more effective for the symptoms of CTS than other non-surgical procedure [16].

Ethical Approval

The study was approved by the Ethical Committee.

Conflicts of Interest

The author declare that he has no competing interests.

References

1. Bebbington E, Furniss D. Linear regression analysis of Hospital Episode Statistics predicts a large increase in demand for elective hand surgery in England. *Journal of plastic, reconstructive & aesthetic surgery*. 2015;68(2):243-51.
2. Page MJ, O'Connor D, Pitt V, Massy-Westropp N. Therapeutic ultrasound for carpal tunnel syndrome. *Cochrane Database of Systematic Reviews*. 2013(3).
3. M Ahmad M, A Aljumaily M, IS Sabaawi M. Electrophysiological response to local steroid injection in carpal tunnel syndrome. *Annals of the College of Medicine, Mosul*. 2013;39(2):118-22.
4. Al-Dabbagh KA, Mohamad SA. Sensitivity and specificity of phalen's test and tincl's test in patients with carpal tunnel syndrome. *Diyala Journal of Medicine*. 2013;5(1):1-14.
5. González-Roig JL, Cubero-Rego L, Santos-Anzorandia C. Relationship between clinical probability of carpal tunnel syndrome and neurophysiological studies. *Revista Española de Cirugía Ortopédica y Traumatología (English Edition)*. 2008;52(6):353-8.

6. Bruske J, Bednarski M, Grzelec H, Zyluk A. The usefulness of the Phalen test and the Hoffmann-Tinel sign in the diagnosis of carpal tunnel syndrome. *Acta orthopaedica belgica*. 2002;68(2):141-5.
7. Ren Y-M, Wang X-S, Wei Z-J, Fan B-Y, Lin W, Zhou X-H, et al. Efficacy, safety, and cost of surgical versus nonsurgical treatment for carpal tunnel syndrome: A systematic review and meta-analysis. *Medicine (Baltimore)*. 2016;95(40):e4857-e.
8. Klokari D, Mamais I. Effectiveness of surgical versus conservative treatment for carpal tunnel syndrome: A systematic review, meta-analysis and qualitative analysis. *Hong Kong Physiother J*. 2018;38(2):91-114.
9. Hui AC, Wong S, Leung CH, Tong P, Mok V, Poon D, et al. A randomized controlled trial of surgery vs steroid injection for carpal tunnel syndrome. *Neurology*. 2005;64(12):2074-8.
10. Milani P, Mondelli M, Ginanneschi F, Mazzocchio R, Rossi A. Progesterone-new therapy in mild carpal tunnel syndrome? Study design of a randomized clinical trial for local therapy. *Journal of brachial plexus and peripheral nerve injury*. 2010;5(01):e124-e30.
11. Yousif NG. Fibronectin promotes migration and invasion of ovarian cancer cells through up-regulation of FAK-PI 3 K/A kt pathway. *Cell biology international* 2014;38(1):85-91.
12. Boldron J, Caltabiano S, Debono SD, Thompson R, Scammells M, Westover R, Wu Y, Frugier P. Adhesion molecule expression trigger immune-mediated pathology in lupus-nephritis. *American Journal of BioMedicine* 2014;2(1):27-36.
13. Austin EW, Ao L, Cleveland JC, Fullerton DA, Meng X. Ghrelin reduces myocardial injury following global ischemia and reperfusion via suppression of myocardial inflammatory response. *American Journal of BioMedicine* 2014;2(1):26-36.
14. Ly-Pen D, Andréu J-L, Millán I, de Blas G, Sánchez-Olaso A. Comparison of surgical decompression and local steroid injection in the treatment of carpal tunnel syndrome: 2-year clinical results from a randomized trial. *Rheumatology*. 2012;51(8):1447-54.
15. Erard CM, Santos CB, Tracey SG. Notch signaling in pathogenesis of diseases. *American Journal of BioMedicine* 2014;2(1):1-4.
16. Carlson H, Colbert A, Frydl J, Arnall E, Elliot M, Carlson N. Current options for nonsurgical management of carpal tunnel syndrome. *Int J Clin Rheumtol*. 2010;5(1):129-42.