

# EVALUATION OF THE EFFICACY OF SURGICAL TREATMENT OF CARPAL TUNNEL SYNDROME

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## ABSTRACT

**Objective:** To evaluate the efficacy of surgical treatment of carpal tunnel syndrome.

**Material and Methods:** This prospective interventional study was conducted at Trauma and Orthopedic Department Khyber Teaching Hospital, Peshawar, Pakistan from January 2014 to December 2014.

**Results:** A total of 40 patients were included 04 (10%) male patients and 36 (90%) female patients. Pre op Boston Carpal Tunnel Syndrome Questionnaire (BCTSQ) symptomatic part showed moderate disease in 5 patients (10.63%), severe disease in 32 patients (68.10%) and very severe disease in 10 patients (21.27%) while Pre op functional part showed moderate disease in 7 patients (14.9%), severe disease in 29 patients (61.70%) and very severe disease in 11 patients (23.40%). While Post op BCTSQ symptomatic part showed normality in 44 patients (93.61%), mild disease in 3 patients (6.39%) and moderate, severe and very severe disease were 00%. While post op BCTSQ functional part was normal in 45 patients (95.74%), mild in 2 patients (4.26%) while moderate, severe and very severe were 00%.

**Conclusion:** Surgical interventions are reserved for those patients who fail to respond to conservative treatment. Surgical treatment seems to be more effective than splinting or anti-inflammatory in the midterm and long term to treat moderate to severe CTS.

**Key Words:** Carpal Tunnel, Nerve Conduction, Electromyography, Compression Neuropathy, Phalen's Test, Tinel's Test, Direct Compression Test.

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**This article may be cited as:** Khan AS, Khalid M, Khan H, Dilbagh S. Evaluation of the efficacy of surgical treatment of carpal tunnel syndrome. *J Med Sci* 2017; 25: (1) (Supplement) 99-102.

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## INTRODUCTION

Carpal tunnel syndrome is a common peripheral neurological disorder. It affects mainly middle aged women. CTS are diagnosed by appropriate history taking, physical examination and nerve conduction study of the Median nerve<sup>1-4</sup>. Carpal tunnel syndrome (CTS) is one of the most common upper limb compression neuropathies. CTS account for approximately 90% of all entrapment neuropathies<sup>5-9</sup>. It is due to an entrapment of the median nerve in the carpal tunnel at the wrist<sup>10-12</sup>.

The incidence is 0.125%-1% depending upon the criteria used for the diagnosis<sup>13-18</sup>. It is a condition of middle-aged individuals and affects females more often than males. There is marked female preponderance and a peak incidence around 55 to 60 years<sup>19,20</sup>.

It is one of the most widely recognized occupational health conditions; particularly in industries where work involves high force/pressure and the repetitive use of vibrating tools<sup>16</sup>. The median number of days away from work is highest for CTS (27days) when compared to any other major disabling illnesses and injuries<sup>21</sup>.

There are two distinct varieties of CTS - acute and chronic. The acute form is most commonly associated with a fracture of the radius<sup>22</sup>. The chronic form is much more common and symptoms can persist for months to years and is of concern for this study. However, in only 50% of cases is the cause identified, and can be divided into local, regional and systemic causes. Carpal tunnel syndrome is common in pregnant women<sup>23-26</sup>. It is commonly diagnosed during third trimester of pregnancy and it is often bilateral. In the majority of patients symptoms will resolve either spontaneously or will respond to conservative treatment after delivery<sup>23,27,28</sup>.

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**Date Received:** August 1, 2016

**Date Revised:** December 30, 2016

**Date Accepted:** February 10, 2017

## MATERIAL AND METHODS

This prospective interventional study conducted at Trauma and Orthopedic Department Khyber Teaching

Hospital, Peshawar from January 2014 to December 2014. Patients were included in the study through non probability consecutive sampling techniques that came to OPD. Inclusion criteria were followed strictly to eliminate selection bias. Diagnosis was made by clinical history of night pain, pin and needles sensation, paresthesias, pain and muscle weaknesses with poor power of grip. On physical examination patients had positive Tinel's, Phalen's and direct compression provocative test. Nerve conduction study was positive in all patients with median nerve compression neuropathy. Initial trial of conservative treatment with splints and NSAIDs tried for 2-7 weeks but failed. Surgery was done after viral screening and taking consent as a day case under Local anaesthesia in operation theatre with tourniquet. Small incision was given with only 1 or 2 stitches. Single dose of intravenous antibiotic was given pre operatively only. Post operatively only analgesics were given. All the cases were done by same surgeon who was FCPS fellow. Post op mobilization and rehabilitation was encouraged. Phalen's test and compression tests became negative post operatively. There were small scars with good cosmesis. Patients were asked for follow up at day 14<sup>th</sup> for stitch removal, 03 months and six months. Post op nerve conduction study showed improvement. Boston carpal tunnel questionnaire was used to assess patient responses to carpal tunnel syndrome treatment.

The Inclusion Criteria was Idiopathic CTS, CTS confirmed clinically as well as by NCS and EMG, Patients having moderate to severe CTS, Failed previous conservative therapy. While those patients with other comorbidities were excluded from the study.

### RESULTS

In our study total of 40 patients included 04 male patients (10%) and 36 (90%) female patients. 33 patients were having unilateral problem which constituted 82.55% while 7 patients were having bilateral problems constituting 17.5%. Pre op BCTSQ symptomatic part was as such that moderate disease was present in 5 patients (10.63%), severe disease in 32 patients (68.10%) and very severe disease in 10 patients constituting 21.27% while Pre op functional part was like moderate disease in 7 patients (14.9%), severe disease in 29 patients (61.70%) and very severe disease in 11 patients (23.40%). While Post op BCTSQ symptomatic part was like normal in 44 patients (93.61%), mild in 3 patients (6.39%) and moderate, severe and very severe were 00%. While post op BCTSQ functional part was normal in 45 patients (95.74%), mild in 2 patients (4.26%) while moderate, severe and very severe were 00%. In our study the complications were very rare with one female patient having intra operative bleeding due to superficial palmar arch injury and 2 patients were with minimal residual symptoms. All other patients reported improvement in their symptoms especially night symptoms.

### DISCUSSION

Non-surgical methods are effective initially in mild to moderate Carpal Tunnel Syndrome (CTS)<sup>29</sup>. The various non-surgical methods include: use of hand brace, splinting of the wrist, ultrasonic therapy, laser therapy, oral steroids, non-steroid anti-inflammatory drugs (NSAIDs), local injection of corticosteroids with and work place modifications<sup>30-37</sup>.

Surgery consists of division of transverse carpal ligament. This reduces the pressure on the median nerve by increasing the space in the carpal tunnel. Surgery is indicated in almost all patients with moderate to severe CTS who did not responded to conservative treatment. An absolute indication for CT release (CTR) is muscular atrophy<sup>38</sup>. Two different types of surgical approaches are in use for the treatment of CTS open and endoscopic release<sup>39</sup>. Open CTR (OCTR) is the traditional option and we followed as well<sup>39</sup>. The classic OCTR uses a curved longitudinal inter-thenar incision, approximately 4 to 5 cm in length<sup>40</sup>. It involves opening of subcutaneous tissue, superficial fascia and transverse carpal ligament and 2 to 3 cm of distal forearm fascia under direct vision. The canal also inspected for mass lesions and anatomical abnormalities.

Open carpal tunnel release is easy to perform and it leads to good symptomatic relief with a low complication rate. In a series of 32 patients who underwent OCTR over a period of four years, 88% of patients reported good functional and symptomatic improvement<sup>41</sup>. The late complications are scar tenderness, loss of grip strength, pillar pain, and rarely reflex sympathetic dystrophy and bow stringing of flexor tendons but none of patient in our study experienced these complications.

To minimize post-operative complications and reduce length of hospital stay, several modifications to the length, location and shape of the incision in OCTR have been described. One of the modifications of classical OCTR is to make a limited transverse incision of  $\leq$  2cm in the same location as classical OCTR. Another modification is a limited open release performed by Atik et al in 2001<sup>42</sup>. The overall success rate of OCTR is more than 95% with a complication rate of less than 3%<sup>43</sup>. But we followed the standard open procedure. In this study as well the rate of good functional outcome as per BCTSQ and complication rate are in acceptable limits (> 93 %).

Studies have found no difference between patients who undergo bilateral simultaneous OCTR when compared to patients who undergo consecutive operations in terms of the post-operative complication rate, hospital stay, time to return to work and the overall cost<sup>44</sup>. This has been reproducibly proved in this study as well, as our 7 patients out of 40 having bilateral disease who underwent single stage release of both side carpal tunnels.

As patient evaluation measure (PEM)<sup>45</sup>, Disabilities of the Arm, Shoulder and hand (DASH)<sup>46</sup>, and Short-

Form-36 (SF-36) are disease non specific tools<sup>47,48,49,50</sup>. Whilst the only disease specific questionnaire that assesses both functional and activity and participation outcome measures is Boston Carpal Tunnel Questionnaire (BCTQ)<sup>51,52</sup> and was chosen for this study.

In a randomized controlled trial, Schrijver et al compared the outcome measures for the severity of complaints with results of NCS and found that nerve conduction studies improved significantly at 12 months<sup>53,54</sup>. Whilst in this study all the patients showed post op normal NCS results at 6 months follow up.

## CONCLUSION

The risk of CTS is high in occupations involving exposure to high pressure, high force, repetitive work, and vibrating tools. The diagnosis of CTS should be based on symptoms and signs and nerve conduction studies. Preventive measures are of paramount importance but once CTS develops it should be surgically treated early to have better results. Surgery is the only treatment that provides cure in moderate, severe and very severe cases.

## RECOMMENDATIONS

More research is needed to study the optimal timing of surgery, optimal pre surgical and postsurgical treatment programs. Also, future studies should concentrate not only on short-term but also on midterm and long-term results.

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**CONFLICT OF INTEREST:** Authors declare no conflict of interest

**GRANT SUPPORT AND FINANCIAL DISCLOSURE** NIL

### **AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under:

**Khan AS:** Idea and data collection.

**Khalid M:** Statistics and references.

**Khan H:** Final correction.

**Dilbagh S:** Follow-up

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.