

Clinical Evaluation of Open Release Surgical Method in Treating Carpal Tunnel Syndrome

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Abstract

Original Research Article

Background: Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. It is more common in the middle age group and more common in women than men. Worldwide open release surgical method is widely used in the treatment of carpal tunnel syndrome. But very few studies have been conducted regarding the treatment of CTS in Bangladesh. So the local data related to the issue are very limited. **Aim of study:** The aim of this study was to evaluate the open release surgical method in treating carpal tunnel syndrome. **Methods:** This was an observational prospective study. The study was conducted at the Department of Orthopedics Surgery in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh during the period from January 2018 to December 2018. In total 60 patients with carpal tunnel syndrome were selected as the study people. Patients were classified into mild, moderate and severe carpal tunnel syndrome according to clinical and nerve conduction grading. **Results:** According to the quantification of the severity of CTS in patients regarding nerve condition grading in several stages we observed before surgery no pain, mild pain, moderate pain and severe pain were found in 0.00%, 0.00%, 56.67% and 43.33% patients respectively. But in 1st follow up (After 1 month) no pain, mild pain, moderate pain and severe pain were found in 61.67%, 20.00%, 11.67% and 6.67% patients respectively. In 2nd follow up (After 3 months) no pain, mild pain, moderate pain and severe pain were found in 93.33%, 3.33%, another 3.33% and 0.00% patients respectively. Finally in 3rd follow up (After 6 months) only no pain and mild pain were found in 98.33%, 1.67% patients respectively. In this stage moderate pain or severe pain were not found. **Conclusions:** Now a day, the frequencies of carpal tunnel syndrome has been increased specially in females. Open release surgical method is an effective method of the treatment of carpal tunnel syndrome. Sensory symptoms (Paresthesia, numbness and nocturnal pain) were more common than symptoms of motor weakness. Dominant hand involvement was more common.

Keywords: Carpal, Tunnel, Syndrome, CTS, Tinels test.

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INTRODUCTION

In Bangladesh very few studies have been conducted regarding the treatment of CTS. Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy [1, 2]. It is a common focal peripheral nerve compression. It has an estimated life time risk of 10% with an annual incidence of 0.1% in adults [3]. It has an estimated prevalence of 3-16% with an incidence of 139 per 1,00,000 person years for men and 506 per 1,00,000 person years for women^{1,4}. CTS is more common in the age group of 45-65 years and more common in women than men⁵. Several factors cause

CTS, including pregnancy and lactation [6, 7]. Since almost all the females go through childbearing more than once in their lives, study on their causal or aggravation of CTS can be of value. The compression of median nerve in the carpal tunnel causes the signs and symptoms of CTS. The condition is usually bilateral, but the dominant hand seems to be more severely affected [8]. Numbness and paresthesia in the first three fingers are the classical symptom of CTS [1]. Typically, the symptoms present at night and often awakens the patient from sleep. The common symptoms include: numbness, tingling and burning in median

nerve region [2]. In severe cases, there may be weakness when using hands while doing activities like turning keys, opening doorknobs or opening jar lids. In clinical examination, conventional tests for diagnosis of CTS are the Tinels test, Phalens test and the median nerve compression test [2]. In presence of aggravation of symptoms these tests are considered to be positive. The most accurate test is the electromyogram with a sensitivity of 49-84% and a specificity of 95% [1, 2]. The treatment of CTS depends on the severity and can range from paracetamol, Ibuprofen, Vit B1, B6, B12 application of cock up night wrist splints, physiotherapy to injecting corticosteroids into the carpal tunnel and eventually releasing the median nerve by surgery. Females have a higher incidence of CTS and pregnancy and lactation are risk factors and increase in intensity is seen in future pregnancies. Since invasive methods are avoided during pregnancy, early detection and treatment with noninvasive methods is of utmost importance. Till date studies conducted on CTS in pregnant women have not used standard electrodiagnostic methods [3, 4, 7]. The confirmatory diagnosis of CTS is the electrophysiological study which is specific to the tune of 95%. These are performed for accurate diagnosis, to determine the exact site of entrapment and to preclude alternative diagnosis which mimic CTS in presentation [9]. The aim of the study was to evaluate of carpal tunnel syndrome conservatively in women.

OBJECTIVES

General Objective

- To evaluate the open release surgical method in treating carpal tunnel syndrome.

Specific Objectives

- To know more about antenatal care services and present conditions in Bangladesh.

METHODOLOGY AND MATERIALS

This was an observational prospective study. The study was conducted at the Department of Orthopedics Surgery in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh during the period from January 2018 to December 2018. In total 60 patients with carpal tunnel syndrome were selected as the study people. The study protocol was approved by the institutional ethical committee. Each patient was subjected to detailed history and relevant clinical examination with emphasis on elaborate neurological examination. Informed consent regarding participation into the study was taken from the patients. All the information regarding history and examination was recorded in case record form. Patients suspected of suffering from carpal tunnel syndrome were subjected to nerve conduction study. Patients were classified into mild, moderate and severe carpal tunnel syndrome according to clinical and nerve conduction

grading [10]. Apart from electrophysiological study following investigations were performed whenever deemed necessary, CBC, Hb, ESR, T4, TSH, routine serum biochemistry. According to the exclusion criteria, pregnancy < 16 weeks, lactating mothers, patients with history of neurologic disease, hand surgery, hand trauma, diabetes mellitus, cervical spondylosis, osteoarthritis of cervical spine or wrist joint, chronic renal failure, patients with no electrophysiological evidence of carpal tunnel syndrome and those who refused to participate in the study were excluded. The outcome were analyzed from the patient's statuses of baseline, 1st follow up (After 1 month of surgery), 2nd follow up (After 3 months of surgery) and 3rd follow up (After 6 months of surgery). Statistical Software SPSS (version 20) and Microsoft Excel were used to carry out the statistical analysis of the data. A p value of <0.05 using chi-square test was considered statistically significant.

RESULTS

In our study, total study people was 60 in number with carpal tunnel syndrome. The mean age of presentation was 27.50±2.40 years with the range from 20 to 40 years. Among total participants 22 were male which was 37% and the rest 38 were female which was 63% of total participants. So female were dominating in number and the male-female ratio was 1:1.73. The highest number of patients were in the age group of 20 to 25 years. The number of patients of this age group was 23 and it was 38.33%. This trend was followed by 20 (33.33%) from 26-30 years age group, 11 (18.33%) from 31-35 years age group and 6 (10%) from 36-40 years age group. In this study we found, paraesthesias in 43 (71.67%), numbness in 29 (48.33%) and pain that worsens at night in 28 (46.67%) participants. It was seen that, sensory symptoms dominated over motor symptoms. Tinel's and Phalen's sign were positive in 45% and 55% patients respectively. The major risk factors or causes were attributed to hypothyroidism (20%), occupational pattern (16.67%) and gout (3.3%). In 13.33% of the patients, the cause could not be identified. According to the quantification of the severity of CTS in patients regarding nerve condition grading in several stages we observed before surgery no pain, mild pain, moderate pain and severe pain were found in 0.00%, 0.00%, 56.67% and 43.33% patients respectively. But in 1st follow up (After 1 month) no pain, mild pain, moderate pain and severe pain were found in 61.67%, 20.00%, 11.67% and 6.67% patients respectively. In 2nd follow up (After 3 months) no pain, mild pain, moderate pain and severe pain were found in 93.33%, 3.33%, another 3.33% and 0.00% patients respectively. Finally in 3rd follow up (After 6 months) only no pain and mild pain were found in 98.33%, 1.67% patients respectively. In this stage moderate pain or severe pain were not found.

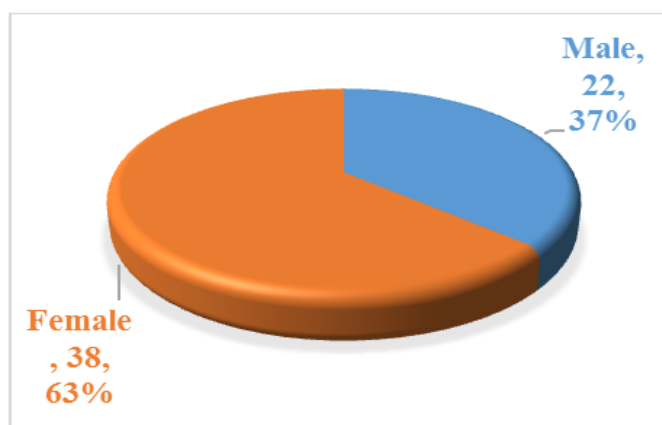


Fig-1: Gender distribution of participants (n=60)

Table-1: Age distribution of the participants (n=60)

Age (Years)	n	%
20-25	23	38.33
26-30	20	33.33
31-35	11	18.33
36-40	6	10.00

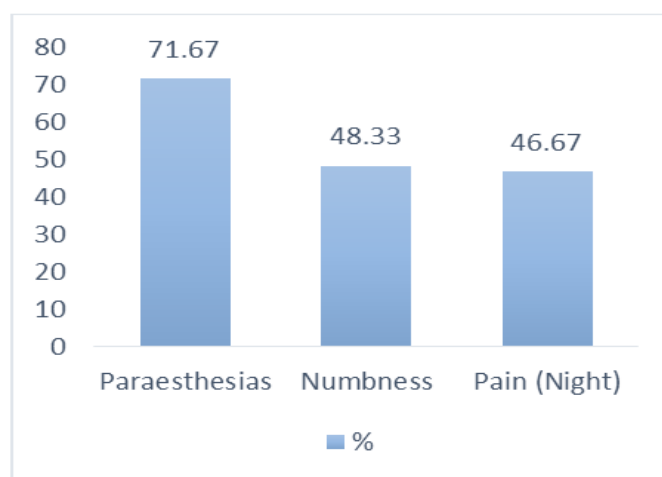


Fig-2: Major symptoms in the participants (n=60)

Table-2: Quantification of the severity of CTS in patients regarding nerve condition grading in several stages (n=60)

Pain Status	Before surgery		1st follow up		2nd follow up		3rd follow up	
	n	%	n	%	n	%	n	%
No pain	0	0.00	37	61.67	56	93.33	59	98.33
Mild pain	0	0.00	12	20.00	2	3.33	1	1.67
Moderate pain	34	56.67	7	11.67	2	3.33	0	0.00
Severe pain	26	43.33	4	6.67	0	0.00	0	0.00

DISCUSSION

Carpal tunnel syndrome (CTS) is a frequent complication of pregnancy. The true prevalence is unknown, but has been reported to be as high as 62% [11-13]. CTS commonly presents during the third trimester, but can occur during the first trimester. It is the most common compression neuropathy of the upper extremity. These changes have been supported by Tupkovic *et al.*, in an evaluation of pregnant women in their third trimester pairing them with age- and sex-

matched controls [14]. In generally in this type of studies pregnant women of third trimester are selected as study population. This happened because CTS occurs most frequently during the third semester of pregnancy [15, 16]. In the present study the mean age of presentation was 27.50 ± 2.40 years with range from 20 to 40 years. Ali Z *et al.*, did a hospital based cross-sectional comparative study to quantify the severity of CTS clinically and electro-diagnostically and to access electro- diagnostic differences between groups with

clinically mild to moderate CTS and severe CTS [10] 66 consecutive patients were taken. Out of 66 patients of CTS, females were 72.7% and males were 27.3% and the age ranged from 22-75 years. Bahou YG did a retrospective study on 185 patients with carpal tunnel syndrome over an 18-month period [17]. The mean age of the patients was 45 years with range from 19-80 years. Bicerol B did an electrophysiological and ultrasonographic study of carpal tunnel syndrome [18]. Tay LB carried out a retrospective study and included 134 consecutive patients with CTS and it was found that the majority of patients were females (81.3 percent) [1]. In the present study, paraesthesias were present in 75.60% (n=45), numbness in 63.41% (n=38), pain that worsens at night in 53.65% (n=32) of the patients. Weakness of Abductor Pollicis Brevis was less frequent (19.51%) (n=12). These results were comparable with studies done by other researchers [9]. Ali Z *et al.*, in their study found paraesthesia (77.3%), numbness (63.6%), pain that worsens at night (56.1%), and weakness of APB in 19.7% of the patients [10]. In present study, Phalen's test was positive in 57.3% (n=34) patients and Tinel's test was positive in 48.8% (n=29) of the patients. These results are consistent with reports in the literature [1, 10]. Meta-analysis have shown an average sensitivity of 68% and specificity of 73% for a positive Phalen's test [2]. A positive Tinel's sign may be less sensitive (50%) than Phalen's but has a similar specificity (77%) [2]. Ali Z *et al.*, in their study found that Tinel's and Phalen's test were positive in 48.5% and 59.1% respectively [10]. Tay LB *et al.*, found paraesthesia (70.1 percent) and numbness (19.4 percent) were the presenting sensory symptoms [1]. In present study, on the basis of clinical grading, 60% (n=36) patients had mild to moderate grade and 40% (n=24) patients had severe grade of CTS. However, on Nerve Conduction Studies, 30% (n=18) patients had mild to moderate grade and 70% (n=42) patients had severe grade of CTS and this difference between clinical grading and nerve conduction grading was significant (p value = 0.000957). Dominant hand was involved in 89.02% of the cases. Bilateral CTS was present in 65.8% of the cases. These results are comparable with results of other studies [10]. Ali Z *et al.*, found that on clinical assessment, 74.3% had mild to moderate CTS and 25.7% had severe CTS [10]. However, classified by NCS, 62.1% had mild to moderate CTS and 37.9% had severe CTS and this difference between clinical grade and electrophysiological grade was significant (p<0.01). Bilateral CTS was seen in 68.2% of the cases and dominant hand was involved in 87.9% of the cases. In present study, pregnancy was found to be the most common cause/ risk factor for CTS (35%) (n=21), followed by lactation (31.7%) (n=19). It has been seen that hormonal fluctuations during pregnancy and lactation lead to fluid retention in the carpal tunnel leading to CTS [19]. Literature has shown that prevalence of CTS in pregnancy is significant (as high as 62%) [20]. Bahrami MH *et al.*, evaluated 100

pregnant women by hand symptoms, CTS provocation tests, and standard electro diagnostic studies [21]. It was found that prevalence of CTS in pregnant women was significant (hand symptoms and clinical signs 36% and 26% respectively). In present study, hypothyroidism was found in 18.3% of the patients. In hypothyroidism there is deposition of glycosaminoglycans, hyaluronic acid and some mucopolysaccharides in subcutaneous tissues. Deposition of these substances on median nerve sheath leads to CTS [22]. The higher percentage of patients with hypothyroidism may be due to higher prevalence of hypothyroidism in India [23]. Literature also suggests that association of hypothyroidism with CTS is significant. Karpitskaya *et al.*, in 2002 found association between hypothyroidism and CTS significant (P=0.02) [24]. Daniel H *et al.*, examined the relation between carpal tunnel release and diabetes mellitus, thyroid disease, inflammatory arthritis, hemodialysis, pregnancy use of corticosteroids and hormone replacement therapy [25]. It was found that hypothyroidism and CTS had significant association (OR 1.7; 95% CI 1.1, 2.8). In present study gout was found as a risk factor in 2.4% of the cases. Literature also suggests gout as an infrequent cause for Carpal Tunnel Syndrome [3, 9]. It may be due to lack of patients with Tophaceous gout. Rich JT *et al.*, found that out of 2649 carpal tunnel releases, 15 hands in 13 patients had tophaceous gout in carpal tunnel with an incidence of 0.6% [2]. In present study occupational risk factors as a cause of CTS was found in 15.85% patients. These results were comparable with those found in literature [19].

Limitations of the study

This cross-sectional study was conducted in a single community. It was also based on respondent's personal report on satisfaction. So, the results may not reflect the actual scenarios of the whole community.

CONCLUSION AND RECOMMENDATIONS

Carpal tunnel syndrome has a high incidence in pregnant women. Sensory symptoms (Paraesthesia, numbness and nocturnal pain) were more common than symptoms of motor weakness. Dominant hand involvement was more common. Pregnancy and lactation were the most common co-morbid physiological risk factors/ causes for Carpal tunnel syndrome. Nerve conduction studies provide additional objective evidence in diagnosis and severity assessment of Carpal tunnel syndrome.

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