

## ORIGINAL ARTICLE

## OUTCOME OF OPEN CARPAL TUNNEL RELEASE SURGERY

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**Background:** Carpel tunnel syndrome is a common compression neuropathy of the median nerve causing pain, numbness and functional dysfunction of the hand. Among the available treatments, surgical release of the nerve is the most effective and acceptable treatment option. The aim of this study was to see the outcomes of surgical release of carpal tunnel using open technique. **Methods:** This descriptive case series was conducted at the Department of neurosurgery, Ayub Teaching Hospital Abbottabad from April 2013 to March 2014. One hundred consecutive patients with carpal tunnel syndrome were included who underwent open carpal tunnel release surgery. They were followed up at 1, 3 and 6 months. Residual pain, numbness and functional improvement of the hand were the main outcome measures. **Results:** Out of 100 patients, 19 were males. The age ranged from 32 to 50 years with a mean of  $39.29 \pm 3.99$  years. The duration of symptoms was from 5 to 24 months. In the entire series patient functional outcome and satisfaction was 82% at 1 month, 94% at 3 months and 97% at 6 months. 18% patient had residual pain at 1 month post-operative follow-up, 6% at 3 months and 3% at 6 month follow-up. **Conclusion:** Open carpal tunnel release surgery is an effective procedure for compression neuropathy of the median nerve. It should be offered to all patients with moderate to severe pain and functional disability related to carpal tunnel syndrome.

**Keywords:** Carpal tunnel syndrome, Carpal tunnel release

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## INTRODUCTION

Carpal tunnel syndrome is the most common upper limb compression neuropathy and develops as a result of median nerve entrapment in the carpal tunnel at the wrist. It was first described by Paget in 1854.<sup>1</sup> Common features are paraesthesia, pain and numbness in the area of median nerve distribution affecting females more than males. Many conditions can compress the median nerve at the wrist leading to its ischemia and the said features of the disease.<sup>2</sup>

Clinical features depend upon the severity of the disease. The initial complaints are due to involvement of the sensory component of the nerve and later due to involvement of the motor component as well. The most common symptom is burning pain associated with tingling and numbness in the distribution of median nerve distal to the wrist. Patients are usually awakened in the middle of night by the severity of pain and are often found hanging their hand out of bed and shaking it vigorously to relieve the pain.<sup>3</sup>

Several clinical tests mentioned in the literature can help in the diagnosis of carpal tunnel syndrome. In Tinels test the examiner taps gently over the site of median nerve at distal wrist crease. Development of pain and tingling in the fingers supplied by median nerve constitutes a positive sign.<sup>4</sup> In Phalen's test the examiner ask the patient to flex his wrist joint. Flexion of the wrist causes compression of the nerve between the transverse

carpal ligament and flexor tendon in the carpal tunnel leading to paraesthesia in the distribution of median nerve. The test is considered as positive when paraesthesia develops in less than one minute. Patients with advanced disease often note paraesthesia in less than 20 seconds. Hand elevation test can also be employed for the diagnosis of median nerve entrapment.<sup>5</sup>

None of these tests are diagnostic on their own. Therefore a combination of symptoms, signs and clinical tests should be taken into account while making a diagnosis of carpal tunnel syndrome. This can also be supported by nerve conduction studies as well.<sup>6</sup>

Treatment options can be surgical and nonsurgical. Non-surgical options are many, including oral medication, corticosteroid injections, splinting, exercise, and mobilization interventions. However, there is limited evidence of benefit from these interventions.<sup>7</sup> Surgery is the only known treatment option that shows long-term positive results.

The standard surgical procedure is simple decompression of median nerve by division of transverse carpal ligament. This can be contemplated by open, mini open and endoscopic approaches. Open carpal tunnel release is generally accepted as the most effective approach.<sup>8</sup> This study was conducted with the aim to determine the outcomes of surgical release of carpal tunnel using open technique.

## MATERIAL AND METHODS

This descriptive case series included 100 consecutive patients over a period of one year between April 2013 and March 2014. Patients were chosen from those attending Neurosurgery Department of Ayub Teaching Hospital Abbottabad. Carpel tunnel syndrome was suspected in all with clinical criteria (numbness or pain in the median nerve territory and positive Phalen test <60 seconds) and was confirmed by electro-diagnostic study. Exclusion criteria was previous surgery for carpel tunnel syndrome, nerve involvement other than median nerve, cervical radiculopathy, any connective tissue disorders, fracture in hand and wrist, diabetes mellitus and pregnancy. If both wrists were involved the one with more severe symptoms was selected to avoid bias.

Carpal tunnel decompression surgery was performed by one surgeon using the same technique of open carpal tunnel release after proper counselling and consent. General anaesthesia was used and a 2–3 cm incision was made medial to the mid palmer crease. Roof of the tunnel was incised. After cutting the carpal retinaculum complete release of the median nerve to the point of nerve deviation was achieved. Wound was closed with non-absorbable suture. Patients were discharged on second post-operative day and skin stitches were removed on 12 postoperative day. Patients were allowed to return to routine tasks by 4 weeks. Follow-up was scheduled at 1, 3 and 6 months to assess the outcome of carpal tunnel release surgery. At each follow-up the patients were assessed for any residual pain, numbness and functional outcome. Pain severity was assessed with visual analogue score. All the data was recorded on a *pro forma* and analysed by using SPSS-21.0.

## RESULTS

A total of 100 patients, 19 (19%) male and 81 (81%) females were included in the study. Among them 70 were housewives, 6 were drivers, 9 were teachers, 2 were farmers and 13 belonged to other occupations. The age range of patients included was from 32 to 50 years with a mean of  $39.29 \pm 3.99$  years. The duration of symptoms was 5–24 months. (Table-1)

On first follow-up at 1 month, 82 patients had no pain, numbness and paraesthesia, 12 patients had mild pain and 6 patients were complaining of moderate pain and paraesthesia. The patients with mild to moderate pain were kept on analgesics, conservative treatment and were reassured. On second follow-up at 3 months, all the 12 patients with mild pain were pain free and had good function outcome while the pain severity of those 6 patients who had moderate pain decreased to mild and they were satisfied from the functional condition of their

hands. On third follow-up at 6 months only three patients had residual symptoms of pain and numbness that were subjected to further nerve conduction studies and were considered for re-intervention. (Table-1)

In the entire series patient functional outcome and satisfaction was 82% at 1 month, 94% at 3 months and 97% at 6 months. 18% patient had residual pain at 1 month post-operative follow-up, 6% at 3 months and 3% at 6 month follow-up.

There was no other surgery related complications like wound infection, wound hematoma and wound oedema.

**Table-1: Follow-up data**

Follow-up	No pain	Mild pain	Moderate pain	Severe pain	Total
1 month	82(82%)	12 (12%)	6 (%)	0	100
3 months	94 (94%)	6 (6%)	0	0	100
6 months	97 (97%)	3 (3%)	0	0	100

## DISCUSSION

Carpal tunnel syndrome (CTS), one of the most commonly diagnosed hand disorders, accounts for 90% of all compression neuropathies. It is expected that 1 in 5 patients who complains of pain, numbness and a tingling sensation in the hands will be diagnosed with CTS. This diagnosis is based on clinical examination and electrophysiological testing.<sup>9</sup> CTS affects 3.8% of the general population with an incidence of 276:100000/ year. It more frequently affects women than men, with a prevalence rate of 9.2% in women and 6% in men. Bilateral hand involvement is commonly seen at the age of 40–60 years.<sup>10</sup>

CTS affect the life of a patient badly as the hand is the most important tool which one uses for daily activities. Housewives and computer operators are badly affected. The continuous agonizing pain leads to the poor functional outcome related to CTS. Sometimes the severity of pain affects the sleep of the patient as well.<sup>11</sup>

Among the available treatments for CTS; the most effective option is surgical release of the tunnel either by open or endoscopic approach.<sup>8</sup> Although, some researchers suggest that early response of surgery and local anaesthesia are not statistically significant.<sup>12</sup> We decided to see the functional outcome of open carpal tunnel release surgery in our setup. In our study we noted that the most affected population were women (81%). Among them housewives were more in number. This may be attributed to the daily excessive use of hands by housewives for domestic activities. Rask MR<sup>13</sup> and Phalen GS<sup>14</sup> also found an increase number of women affected by CTS in their studies.

We observed that the pain and other symptoms associated with CTS drastically decreased after the release surgery and 82% of patients were pain free at the first follow-up at 1 month. The percentage of pain free patients increased to 94% at the third month and then to 97% at sixth month. As the patients got rid of their pain, their functional outcome and satisfaction automatically improved. Georgiew F *et al*<sup>15</sup> Haupt WF *et al*<sup>16</sup> have similarly found a better pain relief and functional outcome with open carpal tunnel release surgery.

At the 1 month follow-up, we found patients with mild to moderate postoperative residual pain but they ultimately got relief as the time passed so that at 3<sup>rd</sup> and 6<sup>th</sup> month follow-up, majority of them were pain free. Many authors<sup>17-19</sup> have found that the postoperative pain after carpal tunnel release surgery decrease with time. There were no other major postoperative complications noted in our series.

## CONCLUSION

We conclude that carpal tunnel release surgery is a safe and effective option for patients with signs and symptoms of carpal tunnel syndrome who have significant compression on nerve conduction studies. It should be offered to all patients of CTS who has moderate to severe symptoms and who are not responding to conservative treatment. Further studies are needed in this regard to see the effectiveness of this as well as endoscopic approaches to CTS.

## AUTHOR'S CONTRIBUTION

AAK: Principle author, conceived the idea, performed the surgeries, data collection and follow-up, HA and KA: Did literature review, data analysis and write-up of manuscript, conducted the study, GM, BR, NS, KKZ, AS, MM and SA: Data collection and patient follow-up, SNB: supervised the study

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