ORIGINAL RESEARCH

Carpal Tunnel release: A single center comprehensive and retrospective study of 48 patients

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ABSTRACT

Purpose: Carpal tunnel syndrome (CTS) is the most common nerve entrapment syndrome. CTS account for approximately 90% of all entrapment neuropathies. The majority of cases are due to compression or irritation of the median nerve in the carpal canal. With advancement in biomechanical and biological research on idiopathic carpal tunnel syndrome, the insight on the pathophysiology of carpal tunnel syndrome has gained much clinical relevance. Open carpal tunnel release is still a gold standard procedure for carpal tunnel syndrome, which has evolved into mini-open procedure with development of new devices. This paper describes comprehensive and retrospective experience of a single center in 48 patients. **Methods:** A retrospective study was performed at Hamdard Institute of Medical Sciences and Research New Delhi India, and in this retrospective study, we included 48 patients (66 wrists) who received open carpal tunnel release between April 2017 and April 2022. A total of 46 patients (64 wrists) were followed up. **Results:** A total of 46 patients (64 wrists) were followed up for an average of 12months. 2 patients were lost during follow up. The follow up outcomes for median scores on QDASH scales. The above scale scores at 1 month postoperatively, 3 months postoperatively, and the last follow-up were significantly lower than those preoperatively, and the differences were statistically significant ($P < 0.001$). Similarly, the scale scores at 3 months postoperatively and the last follow-up also changed compared with scores at 1 month postoperatively; the differences were statistically significant ($P < 0.001$). Conclusions: It was concluded that open carpal tunnel release remains a safe and reliable treatment for carpal tunnel syndrome. The very low incidence of serious complications from the open technique of CTR, when compared with endoscopic CTR as published by different authors in the literature, and the comparable clinical results, appears to make the open technique a safer and preferable option.

Keywords: Carpal tunnel syndrome; Open technique release

INTRODUCTION

Carpal tunnel syndrome (CTS) is the most common nerve entrapment syndrome. CTS account for approximately 90% of all entrapment neuropathies. The majority of cases are due to compression or irritation of the median nerve in the carpal canal. Classical symptoms of CTS include numbness, tingling, burning, or pain in at least two of the three digits supplied by the median nerve (i.e., the thumb and the index and middle fingers). It is diagnosed clinically, often being confirmed by an electromyogram, while ultrasonography criteria have become increasingly useful for the diagnosis (1).

With advancement in biomechanical and biological research on idiopathic carpal tunnel syndrome, the insight on the pathophysiology of carpal tunnel syndrome has gained much clinical relevance. Open carpal tunnel release is still a gold standard procedure for carpal tunnel syndrome, which has evolved into mini-open procedure with development of new devices. Endoscopic carpal tunnel release has become popular in recent practice of hand surgery with an advantage of early recovery of hand function with

minimal morbidity. However, endoscopic carpal tunnel release has its own limitations (2).

MATERIAL AND METHODS

This study was approved by the Ethics Committee of Hamdard Institute of Medical Sciences and Research New Delhi India, and the patient's privacy was strictly protected during the study. In this retrospective study, we included 48 patients (66 wrists) who received open carpal tunnel release between April 2017 and April 2022. A total of 46 patients (64 wrists) were followed up.

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria: (i) Patients diagnosed with CTS by symptoms, signs, electromyography (EMG), and imaging findings. Diagnostic criteria: patients had numbness, pain, and sensory disturbances in the thumb, index finger, middle finger, and the radial side of the ring finger, with or without grip and pinch weakness, and EMG showed median nerve entrapment or thenar atrophy (FIG 1) ; (ii) patients were enrolled in the study who showed no improvement during conservative treatment with wrist splinting for more than 3 months; (iii) all patients were followed up for at least 12 months.

EXCLUSION CRITERIA

(i) CTS caused by increased carpal tunnel contents, such as lipomas, ganglion cysts, and nerve sheath tumors; (ii) patients with peripheral neuropathy of the upper extremity; (iii) patients with rheumatoid arthritis and gout, causing pain and deformities in the hand joints; and (iv) patients with a history of surgery or trauma to the hand or upper limb.

SURGICAL PROCEDURE

After successful anesthesia, the patient was placed in the supine position. The surgeon disinfected and draped the patient. The blood of the upper limb was evacuated using a dispersed blood bandage, and a tourniquet was used to prevent blood return. The superficial palmar arch was then marked. After fully abducting the thumb, the surgeon drew a horizontal line along the thumb, forming an angle with a vertical line drawn between the middle and ring fingers. The surgeon then made the angle bisector and extended it backward by approximately 1 cm, marking the distal outlet of the carpal tunnel. The pisiform was also marked (3). After making the incision and exploring the soft tissue, the median nerve was observed and the surgeon retracted the nerve to ensure that the median nerve was outside the operating area. Then, the transverse carpal ligament was completely incised using a scissor under direct vision (Fig. 2,3). Perineural soft tissue was also released with care and after rinsing the incision, it was sutured with 5–0 Polypropylene suture (Fig 4). The tourniquet was released after pressure dressing.

PATIENT SATISFACTION

The Global Satisfaction Questionnaire was used on a five point scale from 1 (very dissatisfied) to 5 (very satisfied). Patients were questioned at 1 month postoperatively and at the last follow-up.

OUTCOME MEASURES

Quick–Disabilities of the Arm, Shoulder, and Hand (QDASH) consisting of 11 questions was used to analyze the ability to use the upper limbs to perform certain functions. The score was calculated on a scale of 0 to 100, with 0 being completely normal and 100 being completely disabled. Patients were assessed preoperatively, 1 month postoperatively, 3 months postoperatively, and lastly, follow-up using the QDASH scale.

RESULTS

GENERAL RESULTS

A total of 48 patients (66 wrists) were included in the study: 12 males (20%) and 36 females (80%). 18 cases (30%) were bilateral. A total of 26 wrists (54.16%) were on the left side and 22 (45.83%) on the right side. The mean age was 58.6 years, ranging from 35 to 85 years (Table 1).

Table 1

Baseline characteristics of the patients	
Patient features	**Number**
Case	48
wrist	66
Age	58.6 (35-85 yrs)
Sex Male Female	 12 (20%) 36 (80%)
Hand Left Right	 26 (54.16%) 22 (45.83%)
Affected side Unilateral Bilateral	 48 cases 18 cases

Fig. 1: Showing thenar atrophy (preoperatively)

Fig. 2: Exposed median nerve after release

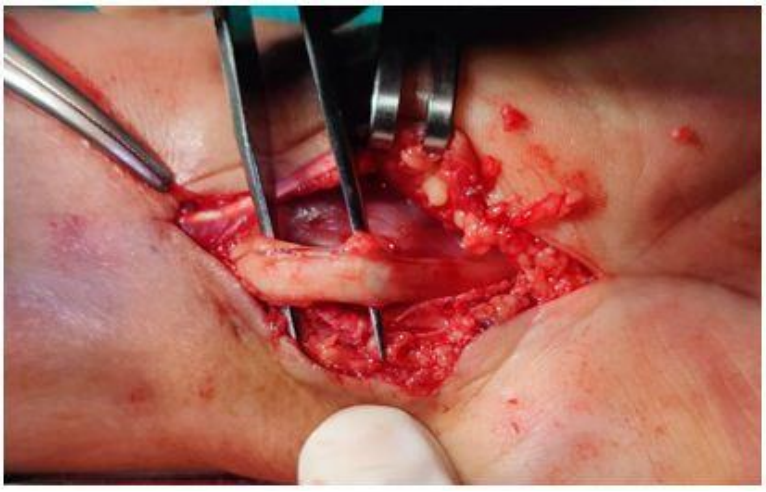

Fig 3. Another case with released median nerve

Fig 4: Skin closed with polypropylene suture

CLINICAL OUTCOMES

A total of 46 patients (64 wrists) were followed up for an average of 12months. 2 patients were lost during follow up. The follow up outcomes for median scores on QDASH scales were listed in Table 2. The above scale scores at 1 month postoperatively, 3 months postoperatively, and the last follow-up were significantly lower than those preoperatively, and the differences were statistically significant ($P < 0.001$). Similarly, the scale scores at 3 months postoperatively and the last follow-up also changed compared with scores at 1 month postoperatively; the differences were statistically significant ($P < 0.001$).

At 1 month postoperatively, the neural symptoms disappeared completely and the hand function returned to normal in 25% (16/64) of the wrists ie. the QDASH score was 0. Approximately 53.12% (34/64) of the wrists recovered completely 3 months postoperatively, and 81.25% (52/64) of the wrists had recovered completely at the last follow-up. At the last follow-up, 92.1% (59/64) of the wrists had lower QDASH than those before surgery.

During the 1-month and the last follow-ups, 91.3% (42/46) and 95.6% (44/46), respectively, of the patients were satisfied or very satisfied with the outcome as per The Global Satisfaction Questionnaire.

Complications: The incidence of complications at the last follow-up was 4.54% (3/66). One patient had no obvious improvement in hand symptoms postoperatively. This patient was later found to have concurrent cervical spondylosis; therefore, we referred him to the spinal surgery department for further treatment. Two patients showed improvements in hand symptoms and function postoperatively; however, symptoms, such as numbness and tingling, relapsed months later. After examination and judgment, we believed that the reappearance of symptoms was due to diabetic peripheral neuropathy. Therefore, both patients were advised to visit the endocrinology department for appropriate glycemic control. No patient reported wound pain postoperatively. The incidence of median nerve injury was 0.

DISCUSSION

Carpal tunnel decompression appears to be a safe operation in most patients, with an overall serious complication rate (requiring admission to hospital or further surgery) of less than 0.1% (4). Serious complications include surgical site infection or dehiscence, or neurovascular or tendon injury. Fortunately, injury to major neurovascular structures during carpal tunnel release is exceedingly low.

Conventional release surgery, which is a simple technique that is widely used, involves completely opening the carpal tunnel, with release of the median nerve, and is definitive and reliable treatment with good efficacy (5). Recent developments in the surgical treatment of carpal tunnel syndrome have resulted in improved surgical techniques to reduce postoperative pain and improve cosmesis. In small incision surgery, the transverse carpal ligament can also be excised to fully decompress the carpal tunnel, which leads to improved efficacy, particularly in terms of functional improvement and reduced scar hyperplasia (6). However, the disadvantage of small incision surgery is that during surgery, it is not possible to fully explore the structure and condition of carpal tunnel or to excise the flexor retinaculum under direct vision, which can lead to incomplete release and the accidental damage to tissues and nerves (7). However,

not all cases of carpal tunnel syndromes can be treated with small incision surgery. Minimally invasive surgery, including small incision surgery, is not applicable for carpal tunnel syndrome caused by secondary diseases, carpal tunnel tumor, and abnormalities in the muscles of the hand or wrist. With the rapid development of endoscopic techniques for minimally invasive surgery, carpal tunnel surgery using wrist arthroscopy has become increasingly used.

CONCLUSION

It was concluded that open carpal tunnel release remains a safe and reliable treatment for carpal tunnel syndrome. The very low incidence of serious complications from the open technique of CTR, when compared with endoscopic CTR as published by different authors in the literature, and the comparable clinical results, appears to make the open technique a safer and preferable option. However, a properly controlled trial of both techniques is necessary to compare them.

CONFLICT OF INTEREST

No conflicts declared

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