

## COMPLICATIONS OF SURGERY FOR CARPAL TUNNEL SYNDROME

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### Abstract

The carpal tunnel release is usually a curative treatment for the carpal tunnel syndrome (CTS), but not without complications, it may range from wound infection to nerve laceration. Study population included 150 patients (157 wrists) who had surgery for CTS. Patients were observed for the outcome and associated problems during and after operative procedure.

Thirty seven wrists (23%) developed complications, these complications were; intraoperative in 7 wrists, early postoperative (within first 2 weeks) in 10, and late postoperative (after 2 weeks) in 20.

This finding indicates that failure or complications following surgical release may occur, and in some situations may relate to the dissection or operating surgeon.

### Introduction

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, and its treatment prognosis is affected by many factors<sup>1,2</sup>. Open and endoscopic carpal tunnel release (CTR) are still widely used procedures when the nonoperative means fails<sup>3</sup>. Unfortunately, despite of the success of open CTR, complications and failures have been shown to occur in some patients<sup>2,4,5</sup>. Persistent or recurrence of symptoms after CTR is frequent and are a significant challenge to the surgeons because the outcomes following reoperation have not been as successful as the primary surgery<sup>1,5</sup>.

There are multiple factors associated with the poor results including injury to the median nerve or its branches excessive scar formation preventing the nerve gliding, incomplete surgical release, and injury to the other underlying neurovascular structures. Also patients with postoperative incisional pain "pillar pain" and finger stiffness have significantly more difficulty in recovery and returning to daily activities<sup>1,3-6</sup>.

The present article is a report of the complications of open CTS surgery in our patients and the possible causes.

### Patients & methods

During one year, we prospectively followed 150 patients (157 wrists) who underwent surgery for CTS in Basrah General Hospital at the Orthopaedic Department. Preoperatively, the diagnosis of CTS was based on history, physical examination and electro-diagnostic studies to exclude other causes of pain and paresthesia in the hand. In 33 patients with history of medical diseases or wrist trauma, laboratory and radiological evaluation was also done.

The surgery selection criterion was, incapacitating pain preventing the patient from night sleep and working, in addition to the electrophysiological severity and the failure of conservative treatment.

Patients were 130 females and 20 males with a mean age of 38.8 years (range from 20-70 year), the mean time from the beginning of the symptoms till surgery was 12 months (range 6 months to 9 years). In 7 patients both wrists were subjected to surgery, making a total of 157

wrists.

Open surgical decompression or transverse carpal ligament (TCL) release mostly was carried out under general anesthesia, through a curved mid palmer longitudinal incision, and the patients were discharged at the same day of surgery or the next without splintage. Postoperatively the patients were reviewed after 1 week, 2 weeks and 1 month for the wound state and clinical examinations and for the final satisfaction with the outcome. Later, only the patients with complications or no improvement and with the recurrence of CTS in the other hand been followed. The

complications were categorized into intraoperative which discovered during surgery, including nerve or arterial injuries.

Early postoperative (within first 2 weeks) including wound infection or dehiscence and skin sloughing, and late postoperative (after 2 weeks) such as tender scars, triggering of the fingers, recurrence of symptoms and complex regional pain syndrome (algodystrophy).

### Results

Thirty three patients (22%) with CTS were found to have associated diseases or conditions, as shown in Table (I).

**Table I: Distribution of the associated conditions**

Associated condition	No.
Rheumatoid Arthritis	9
Hypertension	8
Diabetes Mellitus	8
Colle's fracture	4
Hyperthyroidism	2
Perilunate dislocation	1
Charcot Maree Tooth	1
Total	33

Carpal tunnel surgery was performed by many orthopaedic surgeons in our department, under general anaesthesia in 147 wrists (94%) and under local in 10 (6%).

The follow-up period ranged between 4 to 16 months (average 13) and out of 157 wrists that had surgical release, 37 hands (23%) developed complications.

Complications occurred intraoperatively in 7 hands (4%), in the early postoperative period in 10 (6%) and in late postoperative in 20 (13%), as demonstrated in table (II). The intra-operative complications were as follows;

injury to the median nerve or its branches in 4 hands (2.5%), injury to the ulnar nerve branch to adductor pollicis muscle in 1 (0.5%), and superficial palmar arterial arch injury in 2 (1%).

Early postoperative complications including wound infection, skin sloughing and wound dehiscence occurred in 10 hands (6%).

The late postoperative complications, including tender scars in 6 hands (4%), trigger fingers in 6 (4%), recurrence of the symptoms in 5 (3%) and algodystrophy in 3 (2%).

**Table II: Distribution of the hands according to the complications**

Complications		Number of hands	percent
Intraoperative	Injury to median nerve & its branches	4	2.5
	Ulnar nerve	1	0.5
	Superficial palmar arch	2	1
Early postoperative	Wound infections, skin slough and dehiscence	10	6
Late	Recurrent symptoms	5	3
	Tender scars	6	4
	Trigger fingers	6	4
	Algodystrophy	3	2
Total		37	23%

**Discussion**

Carpal tunnel syndrome needs a skill in the diagnosis and surgical technique, to reduce morbidity and the risk of complications<sup>5,6</sup>. Open surgical decompression is still the most accepted procedure used in our locality, it allows direct visualization of the median nerve and its branches, and any pathology in the nearby structures, in addition of complete release of the TCL.

The associated medical diseases or traumatic conditions in our study were found in 22% of the patients whom were subjected to surgery, but we did not document their effect on the surgical outcome. In the previous published articles the associated conditions were ranged between 21.2% to 50% and they believe that associated diseases such as diabetes and hypertension increase the risk of symptoms recurrence after surgery<sup>6-9</sup>.

The complication rate of open carpal tunnel release in our series was 23%, and most of the previous studies hidden their complications or did not published, only a few have been shown to occur in 0.83% up to 37% of their cases<sup>6,10-12</sup>.

The most serious sequel was the intraoperative complication of the median nerve or its branches which were iatrogenically transected in 4 wrists (2.5%), and repaired at time of injury in

one, while later in the others because it was missed initially. One of the previous studies reported the damage to this structures in 3.7%<sup>6</sup>, many claimed that the most frequent cause was inadequate exploration or poor visualization during surgery<sup>5,6,11</sup>.

In one hand (0.5%), we had injury to the branch of the ulnar nerve that supply adductor pollicis muscle during the removal of invasive soft tissue tumor which was found accidentally, and injury of the ulnar or its branches during carpal tunnel release also mentioned in many articles<sup>10,11,13</sup>.

Injury of the superficial palmar arch (SPA) occurred in 1% of our cases and was managed by ligation, in Rodner et al study the SPA injured in 3.4% of the cases during CTR<sup>3</sup>. Injury to SPA is more in endoscopic release leading to development of hematoma which may cause delay of wound healing or increased

rate of infection and necrosis of the palmar skin<sup>10,11,14</sup> and they found that the risk of SPA injury is more if dissection extends distal to Kaplan's line more or to the distal border of TCL<sup>14,15</sup>.

Regarding to the early postoperative complications, Rodner et al and Reale et al reported infection rate in 1% and 6% respectively of their cases which are not deep and most can be treated with antibiotics, although sometimes drainage can be necessary<sup>14,6</sup>, in our series the superficial wound infections and skin sloughing was the highest 6%, and all were treated conservatively, lasting for several days.

Late postoperative complications in our study included the recurrence of the symptoms in 5 hands (3%), three of them subjected to second operation and incomplete TCL release were found. In the published studies the recurrence rate of the symptoms was reported in between 3.1% to 40%, also the most frequent cause was incomplete transaction of the TCL and revision of the ligament section completely was the elective therapy of choice<sup>6,9,15</sup>. In our patients, 4% of the hands developed a tender scar after a few weeks following surgery, others reported scar tenderness in 3.4%<sup>16</sup>, and they believe that this because of injury to the small cutaneous branches, and many

surgeons embraced endoscopic release an alternative to open CTR<sup>4,9,17,18</sup>, and also we feel that it may due to fibrosis following injury of the thenar and hypothenar muscles origins during the imperfect incisions, in addition of superadded infection.

Trigger fingers developed in 6 hands (4%) after several months postoperatively and was mostly in the thumb, which is due to the fact that TCL also function as the first tendon pulley and when it was released greater forces are then transmitted to the first annular pulley which becomes the most proximal pulley, and may contribute to the triggering at this site<sup>11</sup>, we managed them according to its grading of severity, either by conservative or surgical treatment.

Lastly 2% of the hands developed algodystrophy, and were treated by physiotherapy and medication which takes a long time, in some series the reported incidence of reflex sympathetic dystrophy was 7 to 16%<sup>6-8</sup>.

In conclusion, we found that the most painful complications following surgery for CTS may be due to improper treatment approach. The reduction of this depends on the use of proper surgical technique with complete exploration and visualization of the median nerve and its branches, and the release of TCL totally.

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