

## Endoscopic Carpal Tunnel Release in Jamaica – Seven Years Experience

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### ABSTRACT

**Objective:** To assess the patient profile and outcome of treatment, by endoscopic release, of patients with carpal tunnel syndrome.

**Methods:** A descriptive study was done using data from two sets of patients who had endoscopic carpal tunnel release in Jamaica from 2004 to 2006 and 2006 to 2010. The medical records of patients who had a diagnosis of carpal tunnel syndrome using symptoms, clinical signs and confirmation by nerve conduction test were reviewed. The data were analysed using SPSS and Microsoft Excel®.

**Results:** A total of 68 patients with 75 cases of carpal tunnel syndrome were done. Fifty-two (76%) of these patients were females and about 50% were older than 41 years old. There were 61 (90%) unilateral cases. Of these, the majority of cases affected the right hand. All patients had improvement in symptoms after one week, required minimal analgesic use, had good compliance with rehabilitation and returned to work after about two weeks. There were three cases of pilar tenderness, two cases of transient paraesthesia in the index finger which resolved after three weeks. There were three failed cases from the first series which had to be converted to open carpal tunnel release. The complication rate was 6.7%. No serious complications occurred in the second series and all were treated successfully without interventional surgery. The rate of conversion to open release was 4%.

**Conclusion:** Carpal tunnel affects mostly middle aged females and when treatment is done by endoscopic release, there is a fast resolution of symptoms and early return to work.

**Keywords:** Carpal tunnel surgery, carpal tunnel syndrome, endoscopic carpal tunnel release

## Liberación Endoscópica del Túnel Carpiano en Jamaica – Siete Años de Experiencia

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### RESUMEN

**Objetivo:** Evaluar el perfil del paciente y el resultado clínico del tratamiento de pacientes con el síndrome del túnel carpiano tratados mediante liberación endoscópica.

**Métodos:** Se llevó a cabo un estudio descriptivo, usando datos de dos conjuntos de pacientes a quienes se les realizó una liberación endoscópica del túnel carpiano en Jamaica entre 2004 y 2006; 2006 y 2010. Se revisaron las historias clínicas de pacientes con un diagnóstico de síndrome del túnel carpiano, usando síntomas, señales clínicas y confirmación mediante la prueba de conducción de nervio. Los datos fueron analizados usando SPSS y Microsoft Excel®.

**Resultados:** Se analizó un total de 68 pacientes con 75 casos de síndrome del túnel carpiano. Cincuenta y dos (76%) de estas pacientes fueron mujeres, y aproximadamente 50% tenían más de 41 años de edad. Hubo 61 (90%) casos unilaterales. De éstos, la mayoría de casos tuvo afectación de la mano derecha. Todos los pacientes experimentaron una mejoría en los síntomas después de una semana; necesitaron un uso mínimo de analgésicos, cumplieron bien con la rehabilitación, y regresaron al trabajo luego de dos semanas aproximadamente. Hubo tres casos de sensibilidad del talón de la mano, y dos casos de parestesia transitoria del dedo índice, que se resolvieron después de tres semanas. Hubo tres casos fallidos que tuvieron que ser convertidos en liberación abierta del túnel carpiano. La tasa de complicación fue 6.7%. No ocurrió ninguna complicación seria en esta serie, y todas fueron

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*tratadas exitosamente sin intervención quirúrgica. La tasa de conversión para abrir la liberación fue 4%.*

**Conclusión:** *El túnel carpiano afecta principalmente a las mujeres de mediana edad, y cuando el tratamiento se realiza mediante liberación endoscópica, se produce una resolución rápida de los síntomas y un temprano regreso al trabajo.*

**Palabras claves:** Cirugía del túnel carpiano, síndrome del túnel carpiano, liberación endoscópica del túnel carpiano

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## INTRODUCTION

Carpal tunnel syndrome (CTS) is defined as median nerve compression within the carpal tunnel. It is seen commonly amongst middle aged individuals and affects females more than males. Carpal tunnel release was first performed by Herbert Galloway in 1924 (1). The name 'carpal tunnel syndrome' was first used in print by Kremer *et al* in 1953 but was not popularized until it was used by George Phalen. Phalen published a series of clinical papers between 1950 and 1957, based on surgical cases he had done (2, 3).

Treatment for CTS includes conservative and surgical means. Surgical treatment can be done by open or endoscopic release. Open decompression of the median nerve involves the division of the transverse carpal ligament and deep fascia of the forearm under direct visualization (4). Since the late 1980s, less invasive procedures have been practised. The Chow, Agee and Brown techniques have been practised with the aim of improving postoperative complications (5–7). With these techniques, smaller incisions are made and there is less dissection of the soft tissue with resultant lessening of postoperative pain, faster resolution of symptoms, faster return to work and less incidence of failure (2).

This article focusses on endoscopic release for CTS. This study was done to assess the patient profile and the outcomes of treatment of patients who had endoscopic carpal tunnel release (ECTR) done in Jamaica between May 2004 and December 2010.

## SUBJECTS AND METHODS

A descriptive study was done on 68 patients with 75 endoscopic carpal tunnel releases. These patients had opted for surgical treatment for various indications including failed conservative treatment. The surgeries were done in Jamaica in the parishes of St Andrew and St Ann between 2004 and 2010. The technique used was the Brown Endoscopic Carpal Tunnel Release. This is a two portal technique.

To be included in the study, the patients were diagnosed by history and examination findings. Confirmation was by nerve conduction study. There was one patient who elected to do the endoscopic release based on clinical parameters only.

Two sets of data were combined for this study. The first set was for the period May 2004 to May 2006. There were 43 patients for this period. An additional 25 patients were seen between June 2006 and December 2010.

Literature review was done to obtain information on previous studies so that comparisons could be made.

The data were obtained from medical records kept in the operating theatre and patient records. Five records could not be located and these cases were excluded from some of the analyses. Data entry and analysis were done using SPSS 15.0 for Windows® and Microsoft Excel®. The Statistical Package for the Social Sciences (SPSS) was used for data entry and to obtain frequency analyses for variables of interest.

Patients were followed-up at intervals: one week, one month, six weeks and three months. Some patients were checked one-year post-surgery to assess cosmetic results. The presence of complication was determined by the third visit. By this time, patients who showed no signs were determined to be free of complications. Also, rehabilitation was done mostly through self-programmes while others were supervised up to a month. Improvement in symptoms was assessed clinically. Pain improvement was determined objectively using the visual analogue scale (VAS). Failed release was defined as no improvement in symptoms after endoscopic carpal tunnel release.

## RESULTS

Number of cases, n = 68

\* First study period: May 2004 – May 2006,  
43 patients

\* Second study period: June 2006 – December 2010,  
25 patients

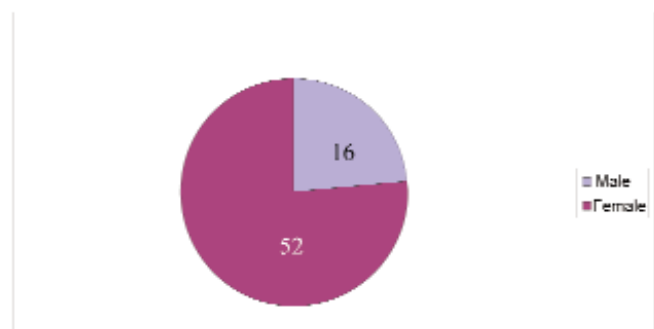


Fig. 1: Sex distribution of patients. Ratio – 3:1 (female:male).

Table: Age distribution of patients during the second study period, June 2006 to December 2010

Age (years)	Frequency	Per cent	Cumulative per cent
20–30	3	12	15
31–40	6	24	45
41–50	4	16	65
51–60	2	8	75
61–70	3	12	90
> 70	2	8	100
Total	20	80	
Missing	5	20	
<b>Total</b>	<b>25</b>	<b>100</b>	

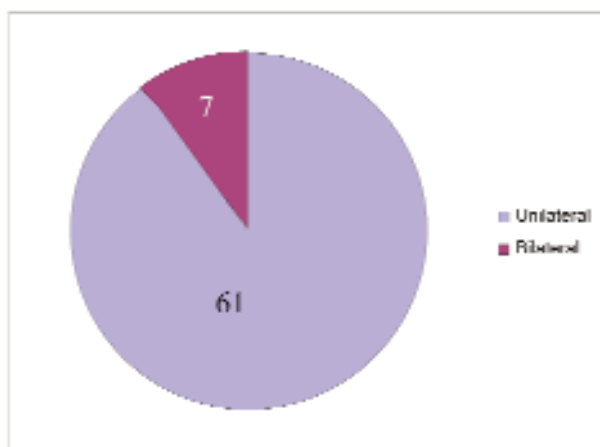


Fig. 2: Details of cases during the two study periods, May 2004 to May 2006 and June 2006 to December 2010.

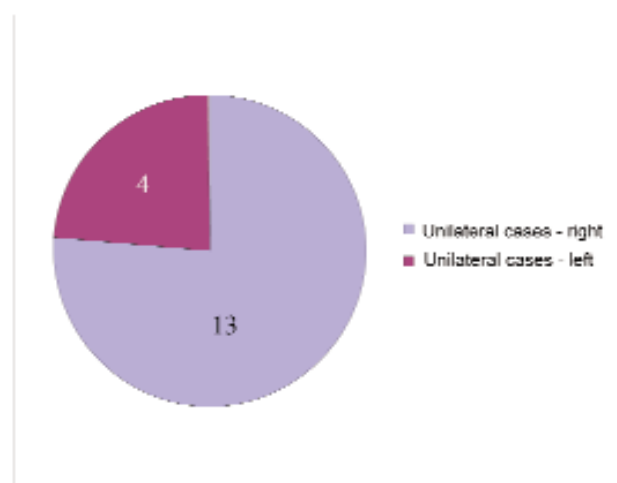


Fig. 3: Details of unilateral cases during the second study period, June 2006 to December 2010.

- \* All patients started physiotherapy after one week. They reported fast resolution of symptoms (within nine days) and returned to work within a month.
- \* There were three failed cases of endoscopic release from the first study period (May 2004 – May 2006). These patients had to be converted to open releases. This represented a conversion rate to open carpal tunnel release of 4%.
- \* Three (4%) cases of pillar tenderness occurred.
- \* There were two (3%) cases of transient paraesthesia in the index finger which resolved after three weeks.
- \* No complications occurred in the cases done during the period June 2006 – December 2010.

## DISCUSSION

Carpal tunnel syndrome is caused by compression of the median nerve. The nerve compression may occur in the carpal tunnel or result from compression caused by the distal forearm fascia (8). Carpal tunnel syndrome is the most common focal peripheral neuropathy. It occurs in 3% of all adults with a female to male (F:M) ratio of 3:1 (8). In this study F:M ratio correlated to the reported finding of 3:1 (Fig. 1).

Carpal tunnel syndrome from diagnostic, pathophysiological and treatment perspectives can be divided into acute and chronic stages (9, 10).

Acute CTS is a compartment syndrome of the carpal tunnel in which there is a rapid rise and sustained increase in the interstitial pressure within the carpal tunnel (10). Acute CTS may be seen in a variety of clinical settings in which there is a rapid increase in oedema within the carpal tunnel or a rapid accumulation of fluid within that space (10).

Management is dependent on the aetiology and is individualized such as after the treatment of a distal radial fracture with flexed wrist immobilization. Relief may be obtained by a change in wrist position without surgical intervention (11). Other clinical settings include acute haemorrhage into the carpal tunnel caused by trauma, haemophilia or anticoagulation as well as burns and pyogenic infections affecting the wrist and carpal tunnel (10).

Complete conduction block is seen at interstitial pressure levels of approximately 30 mmHg below the patient's diastolic blood pressure. The suggestion is that the primary pathophysiological mechanism underlying median nerve conduction block in acute CTS is related to acute intracompartmental and intraneural ischaemia (9, 10, 12).

Chronic CTS is a compressive neuropathy in which there is an insidious rise in the carpal tunnel interstitial pressure of a moderate degree (9). Chronic CTS may be subclassified as early, intermediate or advanced (9, 10).

In early chronic CTS, the patient's symptoms are usually mild, intermittent and of a short duration (< one year). The symptoms typically occur at nights or with specific activity. No morphological changes such as scarring or oedema are seen in the median nerve at this stage (9, 12).

- \* All patients were compliant with analgesics and achieved good pain control with minimal use of medications.

In chronic intermediate CTS, numbness and paraesthesia are constant symptoms. There is little or no thenar atrophy in spite of prolonged distal motor latencies ( $> 5.0$  msec). The normal sensory latency for the median nerve at the wrist is 3.0 msec and the normal motor conduction delay is 5.0 msec (13). The median nerve demonstrates chronic changes such as epineural and intrafascicular oedema. These changes are largely reversible after carpal tunnel decompression (10, 12).

In chronic advanced CTS, there are marked sensory changes and there is thenar muscle weakness. Electromyographic studies may demonstrate fibrillation potentials. Chronic pathological changes in the median nerve are present and may include endoneural oedema, intraneural fibrosis, partial demyelination and axonal degeneration. Some of these changes are irreversible (10, 12).

In all stages of chronic CTS, the underlying pathophysiological mechanism is the same. The clinical stages correlate with the magnitude and duration of median nerve compression within the carpal tunnel (10–12, 14,)

In the management of CTS, the diagnosis is made by careful clinical evaluation followed by confirmatory nerve conduction studies. Patients present with pain and paraesthesia. This is worse at night accompanied by the patient repetitively flicking the hand/wrist (thermometer “flick sign”). The individual may complain of incoordination and weakness in the affected hand and this occurs because of loss of fine motor control.

Some of the clinical signs that can be elicited in CTS are as follows:

- \* Tinel’s sign - positive
- \* Phalen’s sign - positive
- \*  $\uparrow$  2-point discrimination
- \* Hyperalgesia along palmar aspect of index
- \* Atrophy of thenar muscles
- \* Loss of abduction and opposition of thumb

Nerve conduction study (NCS) is the diagnostic standard for CTS (15). The majority of patients in this study had NCS performed. One patient opted for release on clinical parameters only. He signed the necessary consent allowing this procedure to be performed.

There have been conservative measures that have been described to treat CTS. These include behaviour modification, ergonomics, wrist splinting and steroid use. The use of non-steroidal anti-inflammatory drugs (NSAIDs), diuretics and pyridoxine have also been described (16).

Indications for surgical management of CTS are as follows:

- \* Failed conservative management
- \*  $\geq 2$  injections of steroids
- \* Severe nerve entrapment – as evidenced by thenar atrophy, nerve conduction studies and motor weakness

The surgical option available for treatment has been described under open (classical) and closed ECTR

techniques (11). A limited open release has also been described (17, 18).

The standard incision for open release of the carpal tunnel is longitudinal (11, 19). This incision of the transverse carpal ligament is along the ulna border of the ligament to avoid iatrogenic injury to the median nerve and its recurrent branch (4).

Open carpal tunnel releases afford the advantage of exploration of the carpal tunnel and looking for any mass or lesion that might be responsible for the symptoms. Other issues that arise at the time of open carpal tunnel release are exploration of the motor branch of the median nerve, tenosynovectomy and neurolysis (20).

Endoscopic carpal tunnel release can be performed *via* a single portal placed proximally or distally or *via* two ports. This requires the use of an endoscope in the hands of a skilled surgeon. Reports of serious complications such as median nerve laceration have been documented with this method (18, 21, 22). The primary reason for complications in surgical release of the carpal tunnel by this method is the anatomical intricacy of the area and the small incision used.

With this limited exposure, there has to be reliance on topographic landmarks to define the location of important surgical anatomy. Surgeons must maintain a heightened awareness of the anatomical structures at risk, several of which are located at the distal end of the transverse carpal ligament. Allowance has to be given for anatomical variation which is quite frequent in this area (18).

The limited incision techniques (LIT) include a single incision or a two-incision technique. Limited incision techniques involve making smaller incisions to establish limited vision of important structures, such as the superficial palmar arch, before the division of the carpal tunnel (17, 18).

Endoscopic carpal tunnel release has gained increasing acceptance by the medical fraternity and there is an increasing demand by the public for this option in treating CTS. However, the endoscopic challenges are as follows: safe surgery – free from complications; reproducible in the hands of surgeons and capable of coping with most situations.

There is less scarring and pillar tenderness with ECTR (17, 18). Reports also suggest that with ECTR there is more rapid recovery and decreased pain. The results for return of grip or pinch strength are equal when compared with open decompression. The smaller incisions afforded by ECTR allow patients to recover faster (17, 18, 23).

Complication rates are related to experience and skill with the available instrumentation. Brown *et al* in 1993 (5) reported a frequency of 1.7% for nerve injuries. In this study, it was 2.6%. Two patients had transient paraesthesia in the index finger for three weeks as a result of nerve bruising. This spontaneously resolved.

There was less pillar tenderness with ECTR because of the smaller incision when compared with open carpal tunnel releases. In one reported series, 36.5% of patients who had open decompression complained of pillar tenderness when



compared with 3.7% of patients who had decompression by ECTR (23). In this study, the prevalence of pilar tenderness was 4%.

The conversion to open carpal tunnel release in this study was 4%. These were cases in the initial days of the study. Two cases were related to improper technique and the third was with a patient in whom the wrong diagnosis was made as he had objected to nerve conduction studies and consented to surgery based on clinical parameters only. Brown *et al* (5) reported a 2% conversion rate.

Other advantages of the ECTR technique found in this study were:

- \* Minimal postoperative pain – Some patients experienced no postoperative pain or discomfort which accompanied the diminished or absent carpal tunnel symptoms. This resulted in minimal or no use of analgesics. The normal expectation of postoperative pain at the surgical site was not experienced. This caused some patients to question if there was a surgical incision under the dressings when reviewed at the first postoperative visit
- \* Good compliance with rehabilitation protocol
- \* Early return to work – as early as eight days for some clerical workers and 11 days for some manual workers

The Brown ECTR technique was the technique used in this study. Of all the available described techniques, this method has the following advantages: low complication rates (0.97%), reproducible results by other surgeons and it allows examination of the retinaculum postoperatively and repeat division, if necessary (5).

The most important criteria in choosing a surgical technique are the ability to visualize the relevant anatomy, reproducibility of technique, an acceptable complication rate, simply designed/cost effective instrumentation and a reasonable learning curve.

The results of ECTR using the Brown technique fits the criteria for successfully achieving the endoscopic challenges and in the authors opinion earns the right to be established as the new gold standard for treating CTS. The endoscopic release offers a number of advantages as the surgical procedure of choice including cosmesis, comfort, safety and reliability.

Further information could be obtained from assessment on patient profile generating a relationship between occupation, education level and body habitus. In addition, post-operative VAS assessment over shorter frequencies (day one, one week, *etc*), as well as assessing grip strength before and after surgery and speed of return to two point discrimination are areas that warrant further studying.

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