

Recent advance  
**Carpal tunnel syndrome***Le syndrome du canal carpien***M. Chammas***Service de chirurgie de la main et du membre supérieur, chirurgie des nerfs périphériques, hôpital Lapeyronie,  
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**Abstract**

Carpal tunnel syndrome is the commonest entrapment neuropathy and is due to combined compression and traction on the median nerve at the wrist. It is often idiopathic. Although spontaneous resolution is possible, the usual natural evolution is slow progression. Diagnosis is mainly clinical depending on symptoms and provocative tests. An electromyogram is recommended preoperatively and in cases of work-related disease. Medical treatment is indicated early on or in cases with no deficit and consists of steroid injection in the canal or a night splint in neutral wrist position. Surgical treatment is by section of the flexor retinaculum and is indicated in resistance to medical treatment, in deficit or acute cases. Mini-invasive techniques such as endoscopic and mini-open approaches to carpal tunnel release with higher learning curves are justified by the shorter functional recovery time compared to classical surgery, but with identical long-term results. The choice depends on the surgeon's preference, patient information, stage of severity, etiology and availability of material. Results are satisfactory in 90% of cases. Nerve recovery depends on the stage of severity as well as general patient factors. Recovery of force takes about 2–3 months after the disappearance of 'pillar pain'. This operation has a benign reputation with a 0.2–0.5% reported neurovascular complication rate.

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**Keywords:** Carpal tunnel syndrome; Median nerve compression; Surgery; Endoscopy**Résumé**

Le syndrome du canal carpien, le plus fréquent des syndromes canaux, est dû à des mécanismes combinés de compression et traction du nerf médian au poignet. Il est le plus souvent idiopathique. Bien que des régressions spontanées soient possibles, une aggravation lente est observée le plus souvent. Le diagnostic est avant tout clinique, reposant sur les symptômes et les tests de provocation. Un examen électroneuromyographique est recommandé en période préopératoire ou en cas de maladie professionnelle. Le traitement médical est indiqué de première intention dans les formes non déficitaires et repose sur l'infiltration intracanaulaire de corticoïdes et/ou une orthèse d'immobilisation nocturne en rectitude du poignet. Le traitement chirurgical qui comprend la section du rétinaculum des fléchisseurs, est licite en cas de résistance au traitement médical, dans les formes déficitaires ou dans les formes aiguës. Les techniques mini-invasives (endoscopie, mini-open) aux courbes d'apprentissage plus longues semblent créditées d'une récupération fonctionnelle plus précoce par rapport à la chirurgie classique, mais avec des résultats identiques à long terme. Le choix dépend du chirurgien, de l'information du patient, du stade de gravité, de son étiologie et de la disponibilité du matériel. Les résultats sont satisfaisants dans près de 90 % des cas. Rapidité et importance de la récupération neurologique dépendent du stade de gravité et du terrain. La récupération de force demande deux ou trois mois après régression des douleurs de type *pillar pain*. Cette chirurgie à la réputation de bénignité a 0,2 à 0,5 % de complications majeures neurovasculaires.

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**Mots clés :** Syndrome du canal carpien ; Compression du nerf médian ; Chirurgie ; Endoscopie**1. Introduction**

Carpal tunnel syndrome (CTS) is the commonest entrapment neuropathy and is due to combined compression and

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traction on the median nerve at the wrist. It was first described by James Paget in 1853. In 1913, Marie and Foix published the first description of a neuroma proximal to the flexor retinaculum (FR). The first surgical release of the FR is attributed to Galloway in 1924 [1].

The prevalence of CTS is estimated between 4 and 5% of the population especially between ages 40 and 60 [2]. In 2008, 127,269 people over 20 years were operated for CTS in France, i.e. an incidence of 2.7/1000 (women 3.6/1000, men 1.7/1000) [3]. There were two peaks of frequency, the first and highest between ages 45 and 59 including 75% women, and the second between ages 75 and 84 including 64% women. Since 1999, when 101,900 were operated, an annual rise of 2.8% has been reported. The cost of surgery supported by the social security in 2008 was 108 million Euros. For people aged 18 to 85 with primary operation the global cost of time off work was 81 million Euros, 42 of which were for work-related disease. The duration of leave exceeded 56 days for 38.9% of cases after open surgery, and 71.2% exceeded 28 days after endoscopic release (32.8% of which exceeded 56 days).

## 2. Anatomy

### 2.1. Flexor retinaculum

The carpal tunnel is an osteofibrous outlet [4], which is not extensible and defined as the space between the FR, which forms its ceiling, and the carpus its floor. It is medially limited by the hook of hamate, triquetrum, pisiform and laterally by the scaphoid, trapezium and the septum of the flexor carpi radialis (FCR) tunnel. The floor is formed by the capsule and the anterior radiocarpal ligaments covering the adjacent parts of the scaphoid, lunate, capitate, hamate and trapezium. The FR is composed mainly of transverse fibers and has three parts [5] (Fig. 1):

- the proximal part is a thickening of the deep layer of the antebrachial fascia at the distal radius. This leaflet is prolonged deep to the FCR, flexor carpi ulnaris (FCU) and the ulnar bundle to surround only the 9 flexor tendons and the median nerve;
- the intermediate part or transverse carpal ligament (TCL) is characterized by its bony insertions: medially to pisiform and hook of hamate and laterally to the tubercles of the scaphoid and the trapezium;
- the distal aponeurotic part extends between the thenar and hypothenar muscles. These two last portions represent the 'classic' part of the carpal tunnel.

The surface landmark of the proximal border of the TCL corresponds to the wrist crease. According to Cobb [5], the TCL starts about 11 mm proximal to the capitulunate interval and the carpal tunnel ends about 10 mm proximal to the 3rd carpometacarpal interval (Fig. 2). The mean width of the carpal tunnel from the TCL is  $25 \pm 1.5$  mm distally. This gives an hourglass shape. The mean thickness of the flexor retinaculum is 0.6 to 2 mm proximally and 1.6 to 3.6 mm at the level of the hamate.

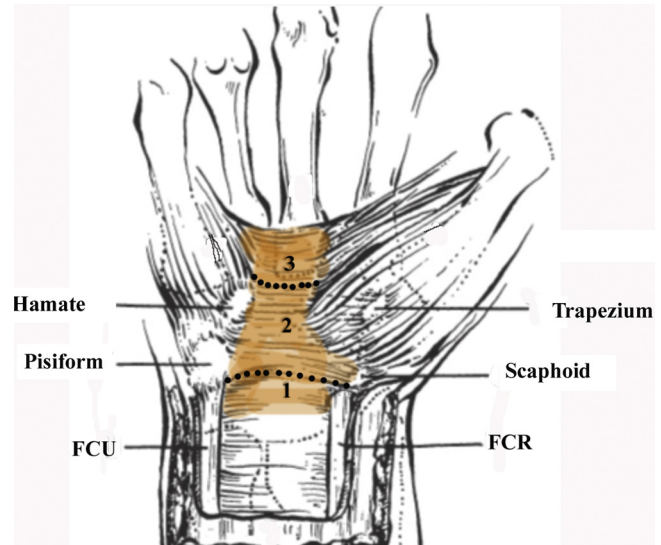


Fig. 1. The three portions of the FR as described by Cobb [5]. 1. Proximal part thickening of the deep layer of the antebrachial fascia at the distal radius. 2. Intermediate part, characterized by its bony insertions: the pisiform and the hook of hamate on the ulnar side, the scaphoid tubercle and the tubercle of the trapezium on the radial side. 3. Distal fascial part extending between thenar and hypothenar muscles.

*Les trois portions du RF d'après Cobb [5]. 1. Partie proximale, épaississement du feuillet profond du fascia antébrachial en regard de la partie distale du radius. 2. Partie intermédiaire ou LTC, caractérisée par ses insertions osseuses : du côté ulnaire le pisiforme et l'hamulus de l'hamatum ; du côté radial, le tubercule du scaphoïde et le tubercule du trapèze. 3. Partie distale aponévrotique tendue entre muscles thénariens et hypothénariens.*



Fig. 2. Radiographic projection of the three areas of FR described by Cobb [5]; its hourglass shape.

*Projection radiographique des trois zones du RF d'après Cobb [5] ; sa forme en sablier.*

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