

Original article

Revision surgery for recurrent and persistent carpal tunnel syndrome: Clinical results and factors affecting outcomes

Reprise chirurgicale pour syndrome du canal carpien récidivant et persistant : résultats cliniques et facteurs influençant les résultats

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Received 23 March 2015; received in revised form 16 August 2015; accepted 26 August 2015
Available online 3 November 2015

Abstract

Thirty-eight hands in 36 patients with recurrent or persistent carpal tunnel syndrome (CTS) were reviewed retrospectively after a mean of 51 months (range 12–86) to identify factors that may lead to poor outcomes after surgical management. Clinical assessment focused on pain and sensitivity recovery, measured with a VAS and Weber's two-point discrimination test, respectively. At the latest follow-up, we found 11 excellent, 15 good, nine fair and three poor results. The risk of fair or poor results was significantly higher in the presence of intraneural fibrosis, severe preoperative sensory deficit, neuroma of the palmar cutaneous branch of the median nerve, workers compensation claims and number of previous surgeries. This last factor also significantly increased the risk of intraneural fibrosis. Despite disappointing outcomes, identification of these factors may improve our prognostic ability for revision surgery in cases of recurrent CTS.

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Keywords: Recurrent carpal tunnel syndrome; Persistent carpal tunnel syndrome; Neuroma of the palmar cutaneous branch of the median nerve; Median nerve; Hypothenar flap; Synovial flap; Perineural fibrosis; Intraneural fibrosis; Prognostic factors

Résumé

Trente-huit mains chez 36 patients présentant un syndrome du canal carpien récidivant ou persistant ont été revues rétrospectivement avec un recul moyen de 51 mois (12–86 mois) pour identifier des facteurs entraînant des mauvais résultats après prise en charge chirurgicale. L'évaluation clinique a porté sur l'évolution de la douleur et la récupération de la sensibilité, respectivement par l'EVA et le test de discrimination sensitive de Weber. Au dernier recul, nous avons noté 11 résultats excellents, 15 bons résultats, neuf résultats moyens et trois mauvais résultats. Les mauvais et moyens résultats étaient significativement liés à la présence de sclérose intraneurale, la sévérité du déficit préopératoire de sensibilité, les névromes de la branche cutanée palmaire du nerf médian, le statut en accident de travail et le nombre de reprises chirurgicales. De surcroît, ce dernier facteur augmentait significativement la sclérose intraneurale. Malgré des résultats décevants, l'identification de ces facteurs pourrait améliorer notre capacité de pronostic devant ces cas de chirurgie de reprise pour syndrome de canal carpien récidivant ou persistant.

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Mots clés : Syndrome du canal carpien persistant ; Canal carpien récidivant ; Névrome de la branche cutanée palmaire du nerf médian ; Nerf médian ; Lambeau synovial ; Lambeau hypothenarien ; Fibrose périneurale ; Fibrose intraneurale ; Facteurs pronostiques

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1. Introduction

Surgical decompression of the median nerve at the wrist has become one of the most common and successful operations in hand surgery. Complete relief of symptoms of carpal tunnel syndrome (CTS) is usually obtained with a high success rate in the immediate postoperative period. However, complications and treatment failures, including persistence of symptoms, recurrence of symptoms or new symptoms following carpal tunnel release have been reported in 3% to 19% of cases, necessitating re-exploration in up to 12% of cases [1]. Recurrence is defined as the reappearance of CTS symptoms after a symptom-free interval of at least 3 months following carpal tunnel release [2]. In these cases, the most common operative finding at revision surgery is excessive fibrous tissue around the median nerve within the carpal tunnel [3,4]. This results in scar fixation of the median nerve under the flexor retinaculum, and subsequently traction neuropathy [5].

Multiple surgical procedures have been described to treat recurrent CTS, including repeat flexor retinaculum release, potentially combined with external or internal neurolysis, and wrapping of the median nerve by a number of different techniques, including local muscle flaps, fascial flaps, synovial flaps, fat grafts or flaps, pedicled flaps and vein wraps, free tissue transfers and implants such as the Canaletto[®] [6]. Despite all these procedures, outcomes following re-operation for recurrent CTS are disappointing, with persistent symptoms reported in up to 40–90% of cases [7].

The primary aim of this study was to report our clinical results following revision surgery for recurrent CTS. The secondary aim was to identify prognostic factors of recovery after revision surgery for recurrent CTS.

2. Patients and methods

2.1. Patients

Forty hands in 38 patients underwent revision surgery for recurrent CTS after primary decompression for idiopathic CTS. Two patients (two hands) could not be located and were lost to follow-up, leaving 38 hands in 36 patients available for retrospective evaluation. The patients included 10 men and 26 women with a mean age of 49 years (range 22–77) at the time of revision surgery. The right side was involved in 30 cases and the left in eight cases. Twenty-eight patients had been operated on the dominant hand, six on the non-dominant hand and two on both hands. Nine patients (10 hands) were involved in workers compensation claims. The time interval from the first carpal tunnel release to the revision surgery at our institution averaged 5.7 years (0.5–19 years). The time interval from the last treatment elsewhere to our treatment was 1.3 years (0.5–2.2 years).

Before re-exploration of the carpal tunnel in our surgery unit, one carpal tunnel release procedure had been performed in 26 cases, two carpal tunnel releases in eight cases, three in two cases, and four and five in one case each. After the first carpal

tunnel release and a symptom-free period, all the patients developed recurrent or persistent symptoms.

Five hands in five patients had been operated on initially by an endoscopic technique, five hands in five patients by a mini-open approach and 28 hands in 26 patients by an open approach.

Eight complications occurred after the first carpal tunnel release: five cases of type 1 complex regional pain syndrome (CRPS), two instances of delayed wound healing and one hematoma in a patient with von Willebrand's disease.

Preoperatively, there were three types of problems in this series: pain at the operated site in 32 cases, poor distal sensitivity in 24 cases and more rarely, pain in the territory of the median nerve in four cases. In all cases, a variety of medical treatments had failed to alleviate the pain.

In addition, 15 patients presented with palmar cutaneous branch of median nerve (PCBMN) neuromas, which were considered as a different nerve pain problem after CT decompression [8]. In all cases, two symptoms were present together: pain and hypoesthesia or paresthesia in the PCBMN territory.

2.2. Surgical procedure

The procedures were all carried out under brachial plexus regional anesthesia with a pneumatic tourniquet. The incision over the carpal tunnel incorporated the previous incision in cases of a prior open approach or was linear along the axis of the radial side of the ring finger in cases of prior endoscopic or mini-open techniques. The incision was extended proximally along the radial side of the flexor carpi ulnaris (FCU) after a 90° dog-leg at the wrist crease. After proximal identification of the median nerve, dissection was continued down through the palmar incision under loop magnification.

Reconstitution of the flexor retinaculum and the operative findings within the carpal tunnel were recorded and noted in the surgical report. The status of the median nerve was evaluated as follows:

- perineural fibrosis was defined as dense scar tissue surrounding the median nerve trunk, fixing it within the carpal tunnel;
- intraneural fibrosis was defined as interstitial scarring between and around nerve fascicles.

The internal neurolysis had been performed during previous surgeries, making it possible to determine if either perineural or intraneural fibrosis was present.

In seven cases of significant flexor tenosynovitis, we performed a large tenosynovectomy. After identifying the median nerve proximally and distally, it was followed into the carpal tunnel, and external neurolysis was performed in all cases.

At this point, different procedures were performed to cover the median nerve:

- hypothenar fat pad flap in 11 cases [9];
- pronator quadratus flap in one case [10];

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