

Original Research

Carpal tunnel release with a new mini-incision approach versus a conventional approach, a retrospective cohort study



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ABSTRACT

Purpose: We have make use of a new method to perform carpal tunnel release (CTR) through a 1.5–2.0 cm long incision. The aim of this study is to introduce this method and to compare the effectiveness and safety of this approach to the conventional one.

Methods: We included consecutive patients diagnosed with primary carpal tunnel syndrome (CTS) who had CTR from January 2015 to September 2016. A total of 85 patients were included in our study. Among them, 42 patients with mini-incision approach were enrolled in group A, and the other 43 patients with conventional approach were enrolled in group B. Objective tests and subjective evaluations were performed to compare the outcomes of mini-incision approach with the conventional approach. Postoperative complications after the two approaches were also compared.

Results: At the 12-months follow-up, all patients in both groups got recovery. We found no significant differences between the two groups in postoperative pinch strength, grip strength, 2-point discrimination (2-PD), visual analogue scale (VAS) score, Levine score and the Disabilities of the Arm, Shoulder and Hand (DASH) score ($P > 0.05$). However, at the one-month follow-up, the percentage of patients with wound pain in group A was significantly lower than that in group B (0.05% vs. 0.23%, $P = 0.03$). At the 12 months follow-up, the number of patients with persistent wound pain and pillar pain in group B were 2 (4.7%) and 3 (7.0%) respectively, while no patients showed wound pain and pillar pain in group A.

Conclusion: Patients with mini-incision approach have satisfactory surgical outcomes, low postoperative complications, and good appearance.

1. Introduction

Carpal tunnel syndrome (CTS), with a prevalence of 3.8% in the general population, is the most common compressive neuropathy of the upper limbs, and the carpal tunnel release (CTR) is an effective treatment to decompress median nerve by division of the transverse carpal ligament [1,2]. Traditional approach makes use of a longitudinal skin incision from the palm toward the wrist and across the transverse carpal ligament. Though this approach offers excellent visualization, reliable release of the full retinaculum, and ability to identify anatomic variations, it is associated with some intractable complications, including wound pain, scar tenderness, flexor tendon entrapment and thenar as well as hypothenar (pillar) pain, which are difficult to recovery [3,4]. The attempt to perform CTR without extra complications leads to the development of different endoscopic techniques and several mini-incision approaches [5–7].

Endoscopic releases of the transverse carpal ligament were firstly

reported in 1989 and are commonly performed through one or two small incisions [8–10]. This technique helps to reduce incisional discomfort after surgery, but it can lead to frequent incidence of blood vessel injury or incomplete release. Besides, the requirement of expensive apparatus and special skills restrict its extensive application. The mini-incision approach has the advantage of leaving a smaller scar, less scar pain, and lower grade of pillar pain. Though several methods have been proposed, there were still some disadvantages in them [11]. Wilson et al. proposed a double mini-incision approach, which can provide a better visualization [12], but it is limited by the high risk of iatrogenic injury to the cutaneous branch of median nerve. The approach used by Kaleff et al. is one small incision. Though CTR can be safely accomplished by them, incomplete release still occurred in several cases for some reasons [13].

Currently, we have make use of a new method to perform CTR through a 1.5–2.0 cm long incision, which can release median nerve completely and avoid complications of hazardous injuries to important

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structures. The aim of this study is to introduce this method and to compare the effectiveness and safety of this approach to the conventional one.

2. Materials and methods

2.1. Participants

This retrospective study was approved by institutional review board of our hospital. This work has been reported in line with the STROCSS criteria [14]. We included consecutive patients diagnosed with primary CTS who had carpal tunnel release from January 2015 to September 2016. Before December 2015, the conventional approach was used to release carpal tunnel, and after that, a longitudinal mini-incision approach was applied as a new method. The diagnosis of CTS was based on a characteristic history of pain, sensory disturbances, and/or weakness involving the median nerve distribution. All patients enrolled in the study failed conservative treatment with steroid injections, had an electromyography test showing median neuropathy at the wrist, and without other hand pathology.

The exclusion criteria included presence of bilateral symptomatic CTS, inflammatory joint disease, gout, a combined nerve compression, or having previous hand or upper extremity surgery. Patients with incomplete follow-up data were also excluded from this study.

2.2. Surgical procedure

All patients is positioned on the operating table in supine position and anesthetized with local anesthesia. The arm pneumatic tourniquet is commonly used. For the conventional approach, the method described by Taleisnik was used [15]. Briefly, a palmar longitudinal incision began at the axis of the ring finger, passed between the thenar and hypothenar eminences, and continued proximally to the proximal flexor crease of the wrist. After exposing the underlying transverse carpal ligament, its ulnar side was cut longitudinally. The median nerve was identified and protected, and then the wound was closed in routine manner. For the mini-incision approach, a special metal guide with a groove at the center is needed. The appearance of the guide is shown in Fig. 1. The incision is started from the intersection of the radial border

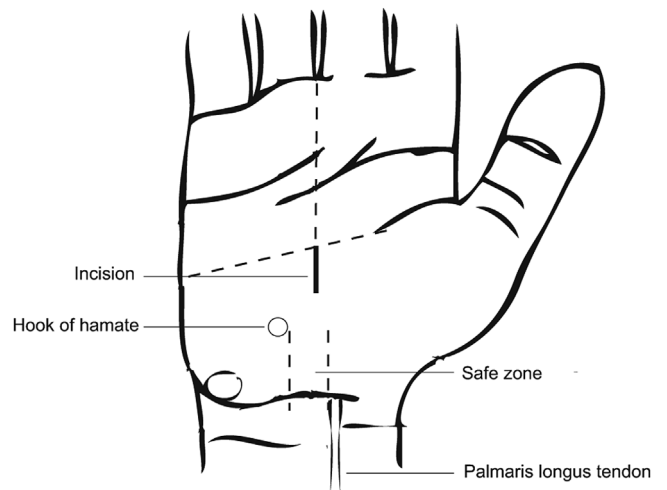


Fig. 2. An illustration of the incision and safe zone.

of the ring finger and the Kaplan's cardinal line, and is advanced proximally for 1.5–2.0 cm (Fig. 2). After opening the palmar aponeurosis, blunt dissection with a mosquito clamp is performed to separate the superficial arterial arch from the surrounding adipose tissue. Above the superficial arterial arch, the guide is inserted into the carpal tunnel in a proximal direction. The safe direction of insertion is the ulnar side of the palmaris longus tendon. Then a knife is inserted along the groove in the guide and the transverse carpal ligament is incised gradually. Both insertion and incision procedures reach proximal wrist crease to facilitate completely division of the proximal portion of transverse carpal ligament (Fig. 3).

All procedures were performed by the same surgeon. The patient's hand is kept in a compression dressing postoperatively without splinting. Finger exercises are started on the same day.

2.3. Outcome evaluation

One to three days before surgery, the basic characteristics of patients were collected and recorded, which included age, gender,

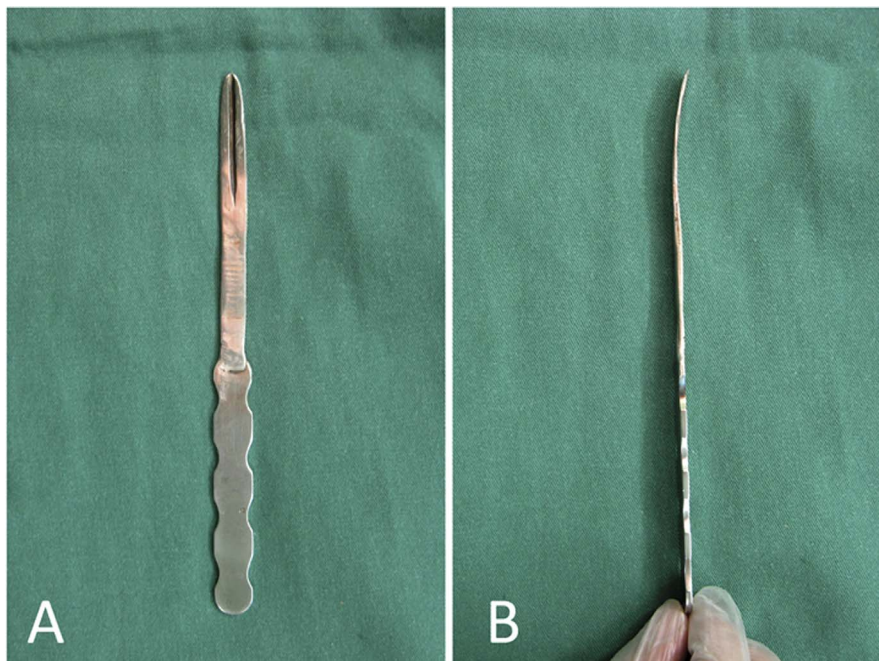


Fig. 1. A metal guide with a groove at the center. (A) Front view of the guide. (B) Side view of the guide.

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