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Comparative analysis between minimal access versus traditional accesses in carpal tunnel syndrome: A perspective randomised study

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KEYWORDS

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Summary *Introduction:* Carpal tunnel decompression with division of the transverse carpal ligament has been a highly successful procedure for the treatment of carpal tunnel syndrome. The standard longitudinal incision technique, with a long curvilinear incision, has been the optimal treatment procedure for surgical decompression of the median nerve, for many surgeons. The aim of this study was to compare the traditional open carpal tunnel release (TOCTR) technique with the minimal-access carpal tunnel release (MACTR) technique for the treatment of carpal tunnel syndrome (CTS), presenting our experience.

Materials and methods: A total of 120 patients eligible for carpal tunnel decompression were recruited into the study. The patients were randomised for treatment allocation, at a 1:1 ratio, resulting in 60 patients in group A, treated by standard TOCTR, and 60 patients in group B, treated by MACTR. To evaluate patients' outcomes we used the Boston Carpal Tunnel (BCT) questionnaire; the formed scar was evaluated according to the Vancouver scale and short- and long-term complications. Statistical analysis was performed by the chi-squared test and analysis of variance (ANOVA); Excel was the program used.

Results: In our series, there was no complication related to the surgical intervention of any injury to nerve, artery or tendon structures. In each section of the BCT questionnaire, patients in group B had significantly better results than patients in group A at both 6 and 12 months' follow-up ($p < 0.001$). For the Vancouver scar scale, there was a significant difference between two groups' scores; group B patients had significant improvements compared with group A patients.

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Conclusions: In our perspective randomised study, MACTR showed statistically significant improvement compared to TOCTR. The patient tolerance is reasonably high and the procedure is compatible with the current minimal invasive trend in surgery.

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The carpal tunnel syndrome (CTS) is one of the most common peripheral neuropathies in clinical practice. It is caused by the compression of the median nerve at the wrist region, more precisely at the carpal tunnel. It affects the 1–5% of the general working population,¹ mainly the middle-aged female population,^{2–4} accounting for 90% of all entrapment neuropathies.^{5–7} The general clinical presentation is of painful paraesthesias and/or burning pain in the lateral half of the hand, predominantly in the three first fingers. Typically, the paraesthesias are predominantly nocturnal. The patients may also complain of anaesthesia, loss of dexterity, weakness and, in more advanced cases, loss of motor function and thenar atrophy.^{8,9} The diagnosis is based on clinical presentation and physical examination, which may be confirmed by electrophysiological testing, specifically electroneuromyography (ENMG), based on sensory and motor latency, and the observation of conduction abnormalities.^{8,5,10,11} The conservative treatment for patients with mild symptoms of CTS consists of non-steroid anti-inflammatory drugs, vitamin B6, local steroid injections or hand braces.^{5,12} Surgical treatment is generally required in patients with moderate and severe symptoms.¹² Various methods have been described for the surgical treatment of CTS. Standard open carpal tunnel release with a long palmar curvilinear incision still remains the preferred surgical procedure for many surgeons^{5,6,13}; but, this procedure has many complications including pillar pain, scar tenderness, cosmetic dissatisfaction, loss of grip and pinch strength or time losses due to inability to work.^{2,5,10,14} The aim of this study was to compare the traditional open carpal tunnel release (TOCTR) technique with the minimal-access carpal tunnel release (MACTR) technique for the treatment of CTS, presenting our experience.

Methods and patients

A total of 120 patients eligible for carpal tunnel decompression were recruited into the study from January 2009 to January 2011, from a sample of patients scheduled for CTS selecting the same number of males and females by a random method. The study protocol conformed to the ethical guidelines of the Declaration of Helsinki. An informed consent was obtained from each patient.

Inclusion criteria were diagnosis of CTS with moderate-to-severe symptoms, based on the history of hand dysaesthesia, paraesthesia, numbness in the median nerve distribution, a positive Phalen's flexion test finding and/or a positive Tinel's sign. All patients also underwent nerve conduction tests and had positive electrodiagnostic study findings.

Patients were randomised for treatment allocation, at a 1:1 ratio, resulting in 60 patients in group A, treated by

standard TOCTR, and 60 patients in group B, treated by MACTR. The two groups were homogeneous for sex, age and characteristics. There were 60 men and 60 women. The youngest patient was 54 years old and the oldest was 75 years old. Co-morbidities were evaluated. All patients underwent nerve conduction studies (NCS) before surgery.

The TOCTR and the MACTR techniques were performed after local anaesthesia with an upper-arm pneumatic tourniquet by the same surgeon.

Surgical technique

Patients in group A had carpal tunnel decompression by TOCTR. For the standard technique, a curved longitudinal incision was made parallel to the thenar crease, distally at Kaplan's cardinal line, and was extended 2–4 cm proximally towards the wrist crease obliquely in an ulnar direction at a point in line with the long axis of the flexed ring finger or just on the ulnar side of the palmaris longus tendon (Figures 1–3).

Patients in group B had carpal tunnel decompression by MACTR. A 2-cm-long incision was marked in the proximal palm over the transverse carpal ligament, beginning distally at the insertion of Kaplan's cardinal line drawn with the thumb radially abducted and a line drawn along the radial border of the finger metacarpal (Figure 4). After the skin incision, the subcutaneous tissue was incised with a no. 15 blade and two Ragnel retractors were positioned to separate the edges of the incision. The palmar fascia was divided and the transverse carpal ligament was identified (Figure 5). A no. 15 scalpel was used to incise the carpal ligament and enter the carpal tunnel, for identification of the median nerve (Figure 6). A pop could be felt as a window was made over the transverse carpal ligament. Iris



Figure 1 (TOCTR) preoperative view.

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