SCIENTIFIC ARTICLE

Comparison of Longitudinal Open Incision and Two-Incision Techniques for Carpal Tunnel Release

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Purpose This study analyzes the long-term postoperative symptoms and functional outcomes of patients who underwent either traditional open (single-incision) or 2-incision carpal tunnel release (CTR). Because 2-incision CTR preserves the superficial nerves and subcutaneous tissue between the thenar and hypothenar eminences, it may account for fewer postoperative symptoms and improved functional recovery.

Methods A retrospective chart review identified patients who underwent either open or 2-incision CTR for isolated carpal tunnel syndrome between 2005 and 2008 by a single surgeon. Patients with a history of hand trauma or confounding comorbidities were excluded. We mailed a Disabilities of the Arm, Shoulder, and Hand (DASH) Questionnaire and a Brigham and Women's Carpal Tunnel Questionnaire (BWCTQ) to all eligible participants. Data from the completed questionnaires were analyzed using independent *t*-tests and Pearson's correlation. Significance was set at $p = .05$.

Results A total of 82 patients (106 hands; 27 men and 55 women; mean age, 60.5 y) were eligible to participate. Of these, 51 patients (63 hands; 20 men and 31 women; mean age, 61.1 y) responded (62% response rate). The mean duration of follow-up was 22 months (range, 12–37 mo; SD 7.3 mo). The 2-incision group mean BWCTQ Symptom Severity Scale score (1.13, SD 0.25) was significantly lower than the open group mean Symptom Severity Scale score (1.54, SD 0.70, $p = .001$). The 2-incision group mean BWCTQ Functional Status Scale score (1.24, SD 0.51) was significantly lower than the open group mean Functional Status Scale score (1.71, SD 0.76, $p = .008$). The 2-incision group mean DASH score (5.10, SD 12.03) was significantly lower than the open group mean DASH score (16.28, SD 19.98, $p = .01$).

Conclusions Patients treated with 2-incision CTR reported statistically significantly less severe long-term postoperative symptoms and improved functional status compared with patients treated with traditional open CTR. Future prospective studies with objective measures are needed to further investigate the difference in outcomes found between these 2 CTR techniques. *(J Hand Surg 2010;35A:1813–1819. Copyright © 2010 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic III.

Key words Carpal tunnel release, postoperative symptoms, 2-incision.

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CARPAL TUNNEL SYNDROME (CTS) is a common peripheral neuropathy that results from compression of the median nerve in the carpal tunnel of the hand. CTS is characterized by sensory symptoms (eg, paresthesias, numbness, pain) and functional deficits (eg, thumb weakness, reduced abduction strength) that markedly affect a person's quality of life and ability to perform daily and work-related activities.[1,2]

Currently, there are several surgical techniques for carpal tunnel release (CTR) that use different approaches for transecting the transverse carpal ligament (TCL), which is the most frequently used surgical technique to decompress the carpal tunnel to provide symptom relief and promote recovery of median nerve function. The open technique, which uses a 2- to 4-cm single longitudinal incision between the thenar and hypothenar creases at the base of the palm extending from Kaplan's cardinal line to the distal wrist flexion crease, is the classic and most widely employed technique.[3,4] Limited open techniques use the same approach and landmarks, but with smaller (1.5- to 2-cm) single incisions.[5,6] "Limited open" has also been used to describe a technique that uses 2 small, approximately 1-cm incisions—1 transverse incision at the distal wrist crease and 1 longitudinal incision at the distal site of the TCL—and direct visualization to incise the TCL. This technique is also referred to as "2-incision"[7,8] or "twin-incision."[9] There are also single and 2-portal endoscopic CTR techniques that require an endoscope.[10,11]

A number of studies have shown the efficacy of each of these techniques, but few have adequately compared and investigated the differences between any 2 techniques. Several studies[10–13] have compared the effectiveness of endoscopic techniques with open or limited open procedures; however, they have had mixed results. Agee et al. found quicker return to work times in patients treated with single portal endoscopic CTR compared with those treated with open CTR[13]; others found that 2 portal endoscopic CTR offered no significant short- or long-term improvement in CTS symptoms compared with open CTR ($p > .78$, $p > .16$).[10,11] The one common finding in these studies is that the endoscopic technique is not as cost-effective as the open technique. Several studies[4,5,7] have also compared various forms of limited or modified open procedures with traditional open CTR. Citron et al.[7] compared an ulnar L open incision with the traditional open; they found no difference in pillar pain between the 2 groups and a lower incidence of scar sensitivity in the ulnar L group. Similarly, Siegmeth et al.[4] found no significant difference ($p > .13$) in scar pain or patient evaluation measurement (PEM) score between the superficial nerve-preserving open technique and traditional open groups. Conversely, Jugovac et al. found that scar and pillar tenderness, scar length and width, aesthetic outcome, and surgery time were significantly better in their trial of a limited open group compared with a traditional open group ($p < .036$).[5]

Two studies have compared a 2-incision CTR technique with traditional open CTR. Biyani and Downes reported significantly less pillar pain in their 2-incision group at 2 to 4 months ($p = .003$); however, in response to a questionnaire at 1 to 4 years after surgery, the authors found no significant difference ($p = .13$) in scar tenderness between the groups.[9] Zyluk and Strychar used the Brigham and Women's Carpal Tunnel Questionnaire (BWCTQ) and found no statistically significant differences between their 2-incision and open groups for either the Symptom Severity Scale (SSS) or Functional Status Scale (FSS) score at 1, 3, 6, and 12 months postoperatively.[6] It is difficult to compare the outcomes of these various studies because the authors used different metrics to assess their outcomes. Several have used the PEM, which has been deemed a valid tool for assessing hand disorders.[14] However, only 3 assessed their outcomes using the BWCTQ and none used the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, both of which are American Academy of Orthopaedic Surgeons–recommended instruments for assessing CTR outcomes in research.[15] Given the increasing pressure in health care to provide cost-effective and evidence-based treatments, it is important to investigate the differences in outcomes between these procedures thoroughly using validated and reliable tools such as the DASH questionnaire and BWCTQ.

The purpose of this study was to analyze the long-term postoperative symptom and functional outcomes of patients who underwent 2 types of CTR: traditional open (single-incision) and 2-incision. Because 2-incision CTR is performed indirectly and deep to the TCL, it preserves the superficial nerve branches and subcutaneous tissue between the thenar and hypothenar eminences. Therefore, our hypothesis was that patients who underwent 2-incision CTR will have less severe postoperative symptoms and improved functional outcomes compared with those who underwent open CTR.

MATERIALS AND METHODS

Eligibility and recruitment

We obtained institutional review board approval before performing this retrospective study. We conducted a chart review to identify patients who underwent either