SCIENTIFIC ARTICLE

Predictors of Scar Pain After Open Carpal Tunnel Release

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Purpose To identify the predictors of scar pain after open carpal tunnel release (CTR).

Methods We enrolled 83 patients with idiopathic carpal tunnel syndrome treated by open CTR. All patients completed the Brigham and Women's (Boston) carpal tunnel questionnaire (BCTQ) preoperatively. We assessed levels of depression preoperatively using the Center for the Epidemiological Study of Depression (CES-D) scale, and pain anxiety using the Pain Anxiety Symptoms Scale. At 3 months after surgery, patients were asked to self-assess treatment satisfaction and scar pain using a 10-point ordinal scale and to complete the BCTQ.

Results The mean BCTQ-symptom (BCTQ-S) score decreased significantly from 2.7 ± 1.1 preoperatively to 1.6 ± 1.0 at 3 months postoperatively, and mean BCTQ-function score decreased significantly from 2.4 ± 1.1 to 1.4 ± 1.0. Overall, scar pain intensity at 3 months postoperatively ranged from 0 to 8 (mean, 2.4 ± 2.2), and overall satisfaction ranged from 2 to 10 (mean, 7.6 ± 2.6). The intensity of the scar pain was significantly correlated with the CES-D scale and BCTQ-S. Multivariable regression analysis showed that depression, assessed using the CES-D scale, and postoperative symptoms, assessed using the BCTQ-S, predicted scar pain intensity, which accounted for 38% of scar pain intensity variance.

Conclusions Depression score and postoperative symptoms predicted scar pain intensity after open CTR. However, the most important contributor to scar pain intensity variance remains unidentified. *(J Hand Surg 2011;36A:1042–1046. Copyright © 2011 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Prognostic I.

Key words Predictor, scar pain, carpal tunnel release, depression.

ALTHOUGH EXCELLENT RESULTS have been reported for carpal tunnel release (CTR) for carpal tunnel syndrome (CTS), some authors note that persistent scar pain frequently occurs.[1,2]

Patients have described a deep-seated ache or pain over the thenar, hypothenar, or surgical incision area.[1] Despite the relatively narrow variation in impairment and pathophysiology associated with CTS and its surgical treatment, postoperative scar pain varies substantially.

The purposes of this study were to identify predictors of scar pain and to determine whether scar pain affects patient satisfaction after open CTR. We tested the null hypothesis that there is no relationship between scar pain after open CTR and demographic factors, electrophysiologic factors, preoperative outcomes, psychological factors, or postoperative outcomes.

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MATERIALS AND METHODS

Our institutional review board approved this prospective study. Patients requesting elective CTR for idiopathic, electrodiagnostically confirmed CTS were included. The exclusion criteria applied were an inability to complete the questionnaire because of cognitive im-

pairment, a history of CTR in the same extremity, and the receipt of workers' compensation (when health care costs related to CTS were paid for principally by workers' compensation insurance).

Between March 2007 and March 2009, 92 consecutive patients underwent open CTR. No eligible patient declined enrollment for our study. One surgeon (K.J.K.) performed all surgical procedures, which were universally performed with use of local anesthesia and a pneumatic tourniquet. Surgery was performed using a previously described limited open technique.[3–5]

Of the 92 patients, 9 dropped out before the scheduled 3-month follow-up visit because 1 died, another emigrated, 4 refused to revisit the clinic, and 3 patients could not be contacted. Therefore, the 83 patients who completed 3 months of follow-up were enrolled in this study. Mean patient age was 54 years (range, 32–78 y; SD, 10.4 y), and 10 were male and 73 were female. We performed bilateral procedures in 19 of the 83 patients and analyzed dominant hands in these patients.

We used neurophysiological test findings to grade CTS as mild, moderate, or severe in accordance with the American Association of Electrodiagnostic Medicine criteria.[6] A total of 12 patients were graded as mild, 39 as moderate, and 22 as severe. Ten patients showed an absence of distal sensory latencies, but no patient showed an absence of distal motor latencies. We also recorded the distal sensory latency and distal motor latency.

Measures

One examiner, independent of treating surgeons, performed all the testing and distributed the questionnaires.

All patients were asked to complete the Brigham and Women's (Boston) carpal tunnel questionnaire (BCTQ)[7] preoperatively and at 3 months postoperatively. In addition, we measured depression preoperatively using the Center for the Epidemiological Study of Depression (CES-D) scale,[8] and pain anxiety using the Pain Anxiety Symptoms Scale (PASS).[9] We assessed patient satisfaction and scar pain 3 months after surgery.

The BCTQ[7] is a disease-specific measure of symptom severity, functional impairment, and treatment outcome for CTS. It consists of 2 scales that evaluate symptoms (BCTQ-S) and function (BCTQ-F).[10] The first scale consists of 11 questions that address the severity and frequency of pain, numbness, weakness, and loss of dexterity. Each of the multiple choice questions offers 5 possible responses of increasing severity, and responses are scored from 1 (no symptoms) to 5 (severe symptoms). Results are expressed as average scores for the 11 responses. Özyürekoğlu et al[11] suggested that the minimal clinically important difference of the BCTQ-S is 1.04. The second BCTQ scale is composed of 8 questions that address difficulties performing daily tasks. Responses to these 8 questions are also scored using a 5-point scale (1 to 5 [greatest difficulty]), and again results are averaged. The BCTQ has been formally validated[7,12] and been shown to be more sensitive than other outcome measures in CTS.[10,12]

The CES-D was designed to measure current level of depressive symptoms. The 20 items on the questionnaire are used to measure the various aspects of depression, and each item is scored using a 4-point scale (0 to 3 [greatest depression]). In addition, the scale also determines how frequently a patient has experienced depressive symptoms over the course of the previous week.[8] The mean values of CES-D score in the community sample was reported as 5 to 11, and a CES-D score of 16 has been used for the cutoff value of depression.[13]

The PASS is a 40-question inventory designed to measure anxiety about pain. The PASS contains 4 subscales that measure the levels of different anxiety types: (1) cognitive anxiety, (2) fear of pain, (3) escape and avoidance, and (4) physiological anxiety. The PASS rates responses using 6-point ordinal scales and awards 50 points to each of 4 subscales (a maximum possible pain anxiety score of 200).[9] The reported mean values of the PASS score in the community sample was 54.[14]

We assessed patient satisfaction using responses elicited by the question: "How satisfied are you with the results of your treatment?" Responses were scored using a 10-point ordinal scale, where 10 indicated complete satisfaction.

Scar pain intensity was assessed based on responses to the question: "How would you rate the discomfort or pain you experienced in the thenar, hypothenar, or surgical incision area last week?" A schematic figure was provided to patients to facilitate understanding of terms "thenar," "hypothenar," and "surgical incision area." Responses were scored using a 10-point ordinal scale, where 10 indicated "the worst discomfort/pain I can imagine."

Statistical analysis

Power analysis indicated that a total of 80 patients would provide 80% statistical power for an effect size of $r = 0.3$ (for correlation analyses) and 84% statistical power for an effect size of $R^2 = 0.15$ with 4 main predictors (for regression analyses), with an alpha value of 0.05.