The effect of psychological disturbance on symptoms, self-reported disability and surgical outcome in carpal tunnel syndrome

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In a prospective study, we have evaluated the impact of psychological disturbance on symptoms, self-reported disability and the surgical outcome in a series of 110 patients with carpal tunnel syndrome. Self-reported severity of symptoms and disability were assessed using the patient evaluation measure and the Boston carpal tunnel questionnaire. Psychological distress was assessed using the hospital anxiety and depression scale.

There was a significant association between psychological disturbance and the pre-operative symptoms and disability. However, there was no significant association between pre-operative psychological disturbance and the outcome of surgery at six months. We concluded that patients with carpal tunnel syndrome should not be denied surgery because of pre-operative psychological disturbance since it does not adversely affect the surgical outcome.

It is well-recognised that psychological disturbance and emotional distress can influence the presentation of physical disease. This has been extensively investigated in patients with low-back pain in whom it has been shown that psychological disturbance contributes to long-term disability, and that psychologically disturbed patients report greater disability and worse outcomes from many treatments.

The influence of psychological distress upon symptoms and surgical outcomes has been less widely studied in hand surgery, but psychological factors have been identified as an important predictor of the onset of pain in the forearm. A recent study of the outcome of surgery for carpal tunnel syndrome identified a subset of patients who reported poor general health and had a poorer outcome and an increased risk of complications. Our hypothesis was that psychological disturbance may have contributed to a poor outcome in this subgroup of patients. This prospective study was performed to evaluate the impact of psychological disturbance on symptoms and self-reported disability in patients with carpal tunnel syndrome and to determine the outcome of carpal tunnel release in these patients.

**Patients and Methods**

Between October 2001 and July 2002, we recruited into the study a consecutive series of 110 patients awaiting carpal tunnel decompression. Carpal tunnel syndrome had been diagnosed clinically based on the presence of night pain, pain or pins and needles in the radial digits, associated with a positive Phalen’s and/or Tinel’s sign at the wrist. Nerve-conduction studies were not routinely performed. Psychological scores were not considered when selecting patients for surgery.

All the patients were asked to complete a self-administered questionnaire, which consisted of three validated measures. Symptoms and disability were assessed using the patient evaluation measure (PEM) and the Brigham and Women’s (Boston) carpal tunnel questionnaire (BCTQ). Psychological disturbance was assessed using the hospital anxiety and depression scale. The questionnaires were given before and at follow-up at six weeks and by post six months after surgery.

The PEM is a generic outcome measure for hand surgery. It consists of a series of ten questions concerning feeling, cold sensitivity, frequency of pain, dexterity, movement, strength, use for daily activities and work, appearance and general attitude. Each question is scored using a seven-point scale. The minimum score is 10 and the maximum 70. It has been independently validated.

The BCTQ is a disease-specific measure for assessing severity of symptoms, functional impairment and the outcome of treatment in carpal tunnel syndrome. It consists of two scales, the first of which evaluates symptoms (BCTQ-S) and the second function (BCTQ-F).
The first scale consists of 11 questions concerning severity and frequency of pain at night and in the daytime, numbness, weakness, pins and needles, and loss of dexterity in the hand. Each question offers five responses of increasing severity and is scored from 1 (no symptoms) to 5 (severe symptoms). The mean of 11 responses is taken. The second scale comprises eight questions which assess difficulty with daily tasks such as writing, buttoning clothes, holding a book, gripping a telephone, opening jars, carrying shopping bags and dressing. The eight responses are scored on a five-point scale (1 to 5) and the mean is taken. It has been formally validated, and has been shown to be more sensitive to change in carpal tunnel syndrome than the generic outcome measures, arthritis impact measurement scale or SF-36.

The hospital anxiety and depression scale (HAD) is a screening tool for psychological disturbance in the general population. It comprises 14 questions each of which is scored from 0 to 3. The scale can be divided into two subscales (of seven questions) which assess anxiety and depression. Based on the subscale scores, patients are grouped as non-cases (score 0 to 7) or cases (score 8 to 21).

Patient satisfaction was assessed from the response to an additional statement ‘I am pleased with the result of the treatment?’ A seven-point scale was offered with 1 labelled ‘very much’ and 7 as ‘not at all’. The result at six months was used when available, but for patients who did not return the six-month questionnaire, the response at six weeks was used for analysis.

Statistical analysis. Non-parametric statistical methods were used because the responses of the individual questions and outcome scales were not normally distributed. Statistical analysis was performed using STATA 6.0 (STATA Corp, College Station, Texas). The Wilcoxon matched-pairs test was used to test the null hypothesis that pre- and post-operative scores were the same, and that there was no difference in symptoms, disability and function between psychologically disturbed and normal patients before surgery and at follow-up at six weeks and six months.

Results

Of the 110 patients, seven did not complete the pre-operative questionnaire and two did not attend for surgery. These were excluded from the study group, leaving 101 patients of whom 82 (81%) completed the questionnaire at six weeks and 86 (85%) at six months (Table I). Four patients were lost to follow-up leaving 97 available for study. There were 75 women and 22 men with a mean age of 53.4 years (21 to 85) (Table I).

The pre-operative HAD scores classified 57 of the 97 patients as normal with no evidence of anxiety or depression (a score of less than eight for both of the subscales). Twenty-four patients were classified as anxious, one as depressed and 15 as both anxious and depressed. There was a highly significant association between the pre-operative depression and anxiety subscales and the mean pre-operative PEM (Wilcoxon test \( p < 0.001 \)) and the mean BCTQ-S (Wilcoxon test, \( p < 0.001 \)) and BCTQ-F scores (Wilcoxon test, \( p < 0.0001 \)) (Table II).

There was a highly significant decrease in the mean PEM, BCTQ-S and BCTQ-F scores at follow-up at six weeks after surgery, with further significant improvements between six weeks and six months. The mean PEM fell from 38.8 before to 23.7 at six weeks (Wilcoxon test, \( p < 0.001 \)) and to 17.6 at six months after operation (Wilcoxon test, \( p < 0.0001 \)). The mean BCTQ-S score fell from 2.98 before to 1.72 at six weeks (Wilcoxon test, \( p < 0.0001 \)) and to 1.48 at six months (Wilcoxon test, \( p = 0.0005 \)). The mean BCTQ-F

### Table I. Details of the follow-up

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>Number of patients</th>
</tr>
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<tbody>
<tr>
<td>Excluded from study</td>
<td>9</td>
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<tr>
<td>Six weeks and six months</td>
<td>71</td>
</tr>
<tr>
<td>Six weeks only</td>
<td>11</td>
</tr>
<tr>
<td>Six months only</td>
<td>13</td>
</tr>
<tr>
<td>No follow-up</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
</tr>
</tbody>
</table>

### Table II. Mean pre-operative and post-operative PEM, BCTQ-S and BCTQ-F scores for the depression and anxiety subgroups pre-operatively and at six weeks and six months after operation

<table>
<thead>
<tr>
<th>Depression</th>
<th>Pre-operative</th>
<th>6 weeks</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEM</td>
<td>BCTQ-S</td>
<td>BCTQ-F</td>
</tr>
<tr>
<td>Normal</td>
<td>36.7</td>
<td>2.89</td>
<td>2.36</td>
</tr>
<tr>
<td>Depressed</td>
<td>51.2</td>
<td>3.55</td>
<td>3.53</td>
</tr>
<tr>
<td>Total</td>
<td>38.8</td>
<td>2.98</td>
<td>2.53</td>
</tr>
<tr>
<td>p value</td>
<td>0.0002</td>
<td>&lt; 0.0001</td>
<td>0.03</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>Pre-operative</th>
<th>6 weeks</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>35.3</td>
<td>2.79</td>
<td>2.25</td>
</tr>
<tr>
<td>Anxious</td>
<td>44.3</td>
<td>3.28</td>
<td>2.95</td>
</tr>
<tr>
<td>Total</td>
<td>38.8</td>
<td>2.98</td>
<td>2.53</td>
</tr>
<tr>
<td>p value</td>
<td>0.0008</td>
<td>0.0001</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* PEM, patient evaluation measure
† BCTQ-S, Boston carpal tunnel score – symptoms
‡ BCTQ-F, Boston carpal tunnel score – function
score fell from 2.53 before to 1.74 at six weeks (Wilcoxon test, \(p < 0.0001\)) and to 1.52 at six months (Wilcoxon test, \(p = 0.002\)) (Table II).

The difference in symptoms, disability and function between psychologically disturbed and normal patients at six weeks was much smaller than that observed pre-operatively, but there was a significant association between pre-operative HAD scores and PEM, BCTQ-S and BCTQ-F scores. At six months follow-up, no statistically significant association was found between the pre-operative HAD score and the mean score of PEM (depression 16.9 vs 21.8, \(p = 0.2\); anxiety 17.3 vs 18.2, \(p = 0.58\)), the mean BCTQ-S score (depression 1.48 vs 1.49, \(p = 0.9\); anxiety 1.49 vs 1.47, \(p = 0.79\)), and the mean BCTQ-F score (depression 1.47 vs 1.82, \(p = 0.18\); anxiety 1.50 vs 1.55, \(p = 0.77\)) (Table II). There was a small but significant reduction in the mean anxiety (pre-operative 6.47 vs 4.51 post-operative, \(p < 0.0001\)) and depression (pre-operative 3.99 vs 2.99 post-operative, \(p < 0.0001\)) scores at six months after surgery.

Patient satisfaction was high with 88 patients (92.6%) rating their satisfaction with treatment between one and three on a seven-point scale (Table III). There was no significant difference in patient satisfaction between depressed and normal patients (mean satisfaction score 1.93 vs 1.53; Wilcoxon test, \(p = 0.63\)). Anxious patients were slightly less satisfied with the outcome of their treatment than normal patients (mean satisfaction score 2.05 vs 1.28, Wilcoxon test, \(p = 0.005\)). However, even among anxious patients most (32/38, 84.2%) were satisfied.

Eleven patients completed questionnaires at six weeks but did not return questionnaires at six months. There was no significant difference between the mean pre-operative symptom (2.79 vs 3.01, \(p = 0.34\)) and function scores (2.23 vs 2.55, \(p = 0.29\)) or post-operative symptom (1.57 vs 1.74, \(p = 0.42\)) and function (1.58 vs 1.76, \(p = 0.33\)) scores at six weeks for patients with only six-week follow-up and both six-week and six-month follow-up. Patient satisfaction at six weeks was also similar in the two groups.

**Discussion**

The only previously published studies of an association between psychological disturbance and symptoms in the upper limb have concerned diffuse upper-limb pain disorder which is a term used to describe ‘non-specific forearm pain’ when all other conditions have been excluded. Psychological disturbance has been proposed to be an important contributor to this disorder. However, the importance of psychological disturbance in the aetiology of diffuse upper-limb pain disorder has been questioned by a recent case-control study, which found no more evidence of psychological disturbance in patients with diffuse upper-limb pain disorder than in a group of patients with carpal tunnel syndrome. Our finding of a strong association between psychological disturbance and increased self-reported symptoms and disability in patients with carpal tunnel syndrome is therefore a new finding, which replicates the well-recognised tendency to exaggeration of symptoms and disability in psychologically disturbed patients with low back pain. However, we found no association between pre-operative psychological disturbance and the outcome of carpal tunnel release at follow-up at six months suggesting that psychological disturbance does not prevent patients from responding to surgery.

There was a small but statistically significant improvement in HAD scores for anxiety and depression after sur-
surgery. There is some controversy as to whether psychological distress is the cause or effect of chronic pain. The improvement in psychological parameters after surgery lends some support to the theory that psychological distress is at least in part caused by prolonged pain. Overall, patient satisfaction was high (96.6%) and compares with satisfaction of 77% to 91% reported in other series. The outcome measures chosen for our study have been independently validated and are widely accepted. The pre-operative and post-operative scores are similar to those reported by other studies, which have used the Boston carpal tunnel score. The HAD scale is an appropriate instrument for screening for psychological disturbance. It was developed and validated as a screening tool for anxiety and depression for use in general outpatient clinics. A cut-off point of 8 has been suggested for studies wishing to maximise sensitivity. Our study group had a lower prevalence of anxiety (40%) and depression (17%) than those reported in a medical outpatient clinic, in which 54% of patients were on the anxiety subscale and 31% on the depression subscale. Our patients had similar anxiety scores, but a lower median depression score (median 3, interquartile range (IQR) 2 to 6) than was reported in a recent comparative study of psychological disturbance in carpal tunnel syndrome (median 7, IQR 3 to 11) and diffuse upper-limb pain disorder (median 3, IQR 2 to 7).

A potential criticism of our study is that carpal tunnel syndrome was diagnosed clinically and the diagnosis was not confirmed by nerve-conduction studies in most of the patients. Several authors have found that nerve-conduction studies do not improve or predict the outcome of carpal tunnel surgery. In the light of these findings many recent studies have questioned the need for nerve-conduction studies.

The success of surgery in our study was similar to that reported by other studies in which measurement of nerve conduction was used routinely.

We consider that the strengths of our study include prospective recruitment of a consecutive series of patients with high follow-up rates and the use of standardised validated outcome measures. The four patients who were lost to follow-up (3.9%) had similar pre-operative HAD scores to those with full follow-up. Complete follow-up at six months was not available for 11 patients, but the surgical outcome and patient satisfaction at six weeks were similar to those followed up for six months. The symptoms and function scores of most of the patients improved between follow-up at six weeks and six months, and it is unlikely that our failure to obtain complete follow-up in these 11 patients affected the findings or conclusions of our study.

Our study shows that psychologically disturbed patients report increased self-reported severity of symptoms and disability in carpal tunnel syndrome. However, there was no significant difference in the outcome of carpal tunnel release between normal and psychologically disturbed patients. We conclude that patients with carpal tunnel syndrome should not be denied surgery because of pre-operative psychological disturbance, since it does not adversely affect the surgical outcome.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References


