Primary care management of patients with carpal tunnel syndrome referred to surgeons: are non-operative interventions effectively utilised?

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Aim: To investigate the non-operative primary care management (splintage, task modification advice, steroid injections and oral medications) of carpal tunnel syndrome before patients were referred to a hand surgeon for decompression.

Design and setting: Preoperative data were obtained on age, gender, body mass index, employment, symptom duration, and preoperative clinical stage for patients undergoing carpal tunnel decompression (263 in the USA, 227 in the UK).

Results: Primary care physicians made relatively poor use of beneficial treatment options with the exception of splintage in the US (73% of cases compared with 22.8% in the UK). Steroid injections were used in only 22.6% (US) and 9.8% (UK) of cases. Task modification advice was almost never given. Oral medication was employed in 18.8% of US cases and 8.9% of UK cases.

Conclusions: This study analyses the non-operative modalities available and suggests that there is scope for more effective use of non-operative treatment before referral for carpal tunnel decompression.

Carpal tunnel syndrome (CTS) usually develops slowly, often with a fluctuating level of symptoms over several months or years, with only gradual deterioration. In such circumstances appropriate conservative treatment can be extremely effective in controlling symptoms for several years, delaying the need for operative intervention.

Decompression of the carpal tunnel is generally considered an effective intervention,^{1,2} but some patients are left with persistent problems such as scar sensitivity, in part arising from the intervention. A decision to go forward with an operative intervention is an important issue for patients and their families, even in situations where the procedure is provided free. Indirect expenses for carpal tunnel decompression for a UK patient average £800 sterling (€1100, \$1600) (range £65–£3970 (€95–€5800, \$130–\$7800)).³ A variety of conservative treatment options are available⁴ which can delay the need for operative intervention with its inherent risks.

Effective primary care modalities of treatment for CTS include task modification, the use of splints and steroid injections proximal to the carpal tunnel. Oral medication is not considered to be of likely benefit. This study seeks to investigate the primary care management of diagnosed carpal tunnel cases considered to merit surgical decompression and referred by general practitioners to consultant hand surgeons in two communities (USA and UK).

METHODS

Study group

There were 490 patients (635 cases) scheduled for carpal tunnel decompression and enrolled in the study from 2000 to 2006. There were 263 patients (345 cases) enrolled at The Curtis National Hand Center in Baltimore, Maryland, USA, and 227 patients (290 cases) enrolled at the Pulvertaft Hand Centre in Derby, UK. Of the US patients, 31.2% (82 patients) had two hands involved, which was not significantly different ($p = 0.41$) from the UK which had 27.8% (63 patients) with two hands involved.

Study design

Preoperative data included information concerning age, gender, body mass index, employment status and duration. Patients were assigned a preoperative clinical stage based on the criteria presented in table 1. Patients were also asked about previous non-operative treatments for CTS provided in primary care. Assessment included Semmes–Weinstein monofilament testing⁵ administered to the middle finger of all patients using the Semmes–Weinstein pressure aesthesiometer kit of five filaments with the following range of results used for scoring: normal (1.65–2.83 filament) corresponds to a score of 1; diminished light touch (3.22–3.61 filament) corresponds to a score of 2; diminished protective sensation (3.84–4.31 filament) corresponds to score of 3; loss of protective sensation (4.56–6.45 filament) corresponds to a score of 4; deep pressure sensation (6.65 filament) corresponds to a score of 5; and tested with no response corresponds to a score of 6.

Inclusion and exclusion criteria

Patients were excluded from the study if there had been prior carpal tunnel decompression to the study hand, if the patient was pregnant, undergoing renal dialysis or suffering from a peripheral neuropathy arising from lead exposure. Patients unable to complete the assessment forms were also excluded. The study received ethical approval from the institutional

Table 1 Preoperative clinical stage

Stage	Description	USA (%)	UK (%)
1	Paresthesia at night or waking in the median territory	0.0	13.1
2	Paresthesia day or night and pain in the median territory	6.0	48.2
3	Either of above with median nerve hypoesthesia	47.0	21.5
4	Wasting of abductor or pollices brevis or diminished protective sensation	42.3	16.4
5	Atrophy of abductor pollices brevis	4.8	0.7

review board in Baltimore and the local ethics committee in Derby.

Statistical method

Comparisons of continuous data were made using *t* tests and categorical data using χ^2 or Fisher's exact test. Data are presented as mean (SD).

RESULTS

The two groups were of similar age (US 56.4 (13.6) years, range of 22.1–100.1 years; UK 54.1 (14.0) years, range 23.8–89.4 years). Body mass index was also similar (US 30.6 (6.6), range 17.4–51.2; UK 30.0 (6.0), range 12.0–45.6). Both groups comprised 29.3% males and 70.7% females. Employment status was significantly different between groups with the bias to professional and managerial in the USA and manual workers in the UK (fig 1).

There were also significant differences ($p < 0.001$) in initial clinical stage, with most US patients classified as stage 3 and the UK patients classified as stage 2 (table 1). Prior treatments are shown in fig 2. The utilisation of modalities of treatment in milder cases is shown in figs 3–5 with mildness defined as clinical stage ≤ 3 (fig 3), duration of symptoms of < 1 year (fig 4), and milder Semmes–Weinstein scores (≤ 2) as shown in fig 5.

Treatment provided in primary care

Complete data were not available on 14 hands (10 UK cases and 4 US cases) and these were eliminated from the study. Percentages refer to cases that had prior treatment. Analysis was made on the basis of treated hands (cases rather than as patients, for splintage and steroid injections are specific to a limb and may have been used twice in a single patient with bilateral symptoms).

Seventy-three per cent (249 hands) of the US cases were provided with splintage compared with 22.8% (52 hands) of the UK cases (fig 2). The data were analysed to see if cases (hands) with milder clinical stage scores (fig 3), shorter duration (fig 4) or milder sensory loss based on Semmes–Weinstein monofilament testing (fig 5) had been offered splintage more frequently than the overall group. Splinting apparently was not offered more frequently in milder cases. Of the US cases, 22.6% (77 hands) were provided with a steroid injection proximal to the carpal tunnel in primary care before referral compared to 9.8% (25 hands) of the cases in the UK. Milder clinical stages (figs 3–5) were not offered this treatment more frequently. Very few patients in this study were offered advice in primary care concerning task modification at work or in the home (1.8% US,

Figure 1 Employment for US and UK patients.

Figure 2 Prior treatment.

6 cases; 0.4% UK, 1 case). Oral medication was provided in primary care in 18.8% (64) of US cases compared to 8.9% (23) of UK cases. Milder cases were not offered these forms of treatment more frequently than the entire group of patients.

DISCUSSION

The populations studied are very similar in terms of age, gender and body mass index. There are, however, significant differences in employment status. The majority of US patients were professionals or managers and most of the UK patients were manual workers being treated in a state healthcare system (National Health Service).

There are effective and well validated treatment options for CTS in primary care, particularly for those with a short history and intermittent symptoms.

Wrist splints

Wrist splints, retaining the wrist in neutral dorsi palmar flexion,⁶ can be extremely effective in controlling the symptoms of CTS if the symptoms are intermittent in nature or are waking the patient from sleep.⁷ The pressure within the carpal tunnel is lowest when the wrist is in neutral dorsi palmar flexion. Splintage is extensively employed in the US before referral to hospital (73% of cases, 249 hands). However, only 22.8% (52 hands) of UK cases were supplied with splints by general practitioners before referral, despite the fact that the intervention is known to be beneficial with few complications. Milder cases (those most likely to benefit) were not offered this option any more frequently than those cases with more severe symptoms or signs.

Figure 3 Prior treatment of milder cases (clinical stage ≤ 3).

Figure 4 Prior treatment of cases with shorter duration (<1 year).

Steroid injections

Injections of steroid (usually with local anaesthetic) are an extremely effective method of resolving symptoms of CTS of mild to moderate severity. The injection is so effective in these cases that many clinicians who do not have ready access to nerve conduction studies will use a steroid injection diagnostically, particularly when discriminating between CTS and referred pain from more proximal nerve root irritation. Gelberman *et al*⁸ observed that 22% of patients treated with a steroid injection and splintage were symptom-free at 18 month review. Those with mild symptoms of short duration were the likely longer term beneficiaries of this intervention. Inadvertent injection into the median nerve may lead to disabling paresthesia in the median nerve distribution,⁹ but those familiar with the local anatomy can safely provide benefit in the short to middle term, at least in cases with intermittent symptoms. With appropriate training, a primary care physician can become familiar with the local anatomy and minimise the risk of inadvertent nerve injury. If a limited number of practitioners in primary care take referrals from their colleagues and learn the technique it would ensure they received sufficiently large numbers of patients to maintain their skills. Such arrangements are used in only 22.6% (77 hands) of US cases and only 9.8% (25 hands) of UK cases. In our study, milder cases (those most likely to benefit) were not offered this option any more frequently than those with more severe symptoms or signs.

Task modification at work and in the home

Frequent forceful use of the hands exacerbates the symptoms of CTS. Task modification that reduces metacarpophalangeal joint flexion limits lumbrical excursion into the carpal tunnel and may reduce local pressure.¹⁰ The pressure within the carpal tunnel is lowest when the wrist is in neutral dorsi palmar flexion.¹¹ Hand and wrist posture, which maintains the joints near mid range, will minimise the risk of developing raised pressure within the carpal tunnel. Adjusting work station height or the angle or diameter of tools and their handles may be effective in controlling the symptoms of CTS. The importance of nerve excursion during upper limb movements has been emphasised by Wilgis and Murphy.¹² Flexor tendon mobilising techniques applied preoperatively have been shown to reduce the need for carpal tunnel decompression.¹³ Many patients may not be in a position to capitalise on advice on task modification at work. However, many professional, managerial or self-employed manual patients do have the capability of, to an extent, adjusting their work environment. An ergonomic programme outlined by Eversmann¹⁴ reduced the incidence of carpal tunnel disease by 60%. There is currently virtually no

Figure 5 Prior treatment of cases with mild Semmes-Weinstein scores (a score of ≤2).

uptake of this modality of treatment in primary care in the US or the UK.

Oral medications

There are three varieties of oral medications that can be applied in primary care for patients with CTS. Diuretics have been used in the past to diagnose and treat CTS,¹⁵ but there are unnecessary and significant side effects and diuretics have been superseded by steroid injections. Pyridoxine (vitamin B6) was offered as a treatment for nerve compression but Amadio¹⁶ found minimal benefits and low effectiveness. Non-steroidal anti-inflammatory medications are frequently used in primary care and may be offered to patients with CTS. Benefit is likely to be limited unless the cause of median nerve compression has a predominant inflammatory component.¹⁷ Oral medications are known to be relatively unhelpful in treating patients with CTS. Use of oral medication is fairly low in both countries, with 18.8% (64 hands) of US cases and 8.9% (23 hands) of UK cases offered oral agents by their primary care physicians, respectively. Despite their limited value, oral medications are offered in both countries by primary care physicians as frequently as steroid injections, and far more frequently than advice on task modification.

Conclusions

On the evidence of the current study, neither the US nor the UK are currently making the best use of primary care treatments known to be effective for controlling the symptoms of CTS. Primary care physicians do not discriminate between mild and severe symptoms when considering who might benefit from non-operative treatment in primary care.

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