Can wrist splints or steroid injections reduce the need for decompression surgery in carpal tunnel syndrome?

What is a scoping report?

Scoping reports ascertain the quantity and quality of the published clinical and cost-effectiveness evidence on health technologies under consideration by decision makers within NHSScotland. They also serve to clarify definitions related to the research question(s) on that topic. They are intended to provide an overview of the evidence base, including gaps and uncertainties, and inform decisions on the feasibility of producing an evidence review product on the topic. Scoping reports are undertaken in an approximately 1-month period. They are based upon a high-level literature search and selection of the best evidence that Healthcare Improvement Scotland could identify within the time available. The reports are subject to peer review. Scoping reports do not make recommendations for NHSScotland. Further information on scoping reports is available at www.healthcareimprovementscotland.org

Key definitions

Carpal tunnel: A passageway formed by the bones and ligaments of the wrist through which the median nerve and the flexor tendons of the fingers and thumb pass.

Carpal tunnel syndrome: Increased tissue pressure and a build-up of fluid at the wrist constricting the median nerve, causing pain, tingling and numbness in the hand.

Background

Common symptoms of carpal tunnel syndrome include numbness, ache and tingling in the thumb, index, middle and ring finger. The pain may radiate up the whole arm. There may be weakness and problems with grip. Symptoms are often worse at night, and may disturb sleep.

Sustained or repeated hand or arm positions can exacerbate symptoms. People experience different levels of severity of the condition (mild, moderate, severe), which may affect one or both wrists. The British Society for Surgery of the Hand classifies mild carpal tunnel syndrome as intermittent paraesthesia; moderate as constant paraesthesia and reversible numbness and/or pain; and severe as constant numbness or pain, weakness and/or wasting of the thumb muscles. In most cases, the cause of carpal tunnel syndrome is unknown.

Approximately 12,000 people in Scotland consulted a GP practice about carpal tunnel syndrome in the financial year 2010–2011, giving a rate of 2.1 per 1,000 population for the year (Lindsey Harkins, Information Analyst, ISD Scotland. Personal Communication, 23 November 2012). The latter information showed the condition to be strongly patterned by sex and age. Carpal tunnel syndrome is more than twice as common among women as men (ibid.). There were very few consultations for carpal tunnel syndrome among people younger than 25 years. Thereafter, for men, incidence rose with age, whereas consultations peaked among women in their 40s and 50s then decreased at older ages (ibid.).

A significant proportion of cases of carpal tunnel syndrome may resolve or improve without treatment. Carpal tunnel syndrome is mainly managed in primary care. In mild to moderate cases, wrist splints are used overnight to keep the wrist extended. Patients are referred to secondary care when it is felt that steroid injection or surgical decompression will relieve symptoms. Steroid injection usually takes place in an outpatient setting. It is not possible to establish the volume of steroid injections for carpal tunnel syndrome undertaken in NHSScotland because this is not a mandatory data item and the coding is insufficiently precise (Stuart Clark, Secondary Care Team, ISD Scotland. Personal Communication, 16 Nov 2012). Surgical decompression for carpal tunnel syndrome is mainly carried out as day surgery. There were 5,200 operations to release trapped peripheral nerves at the wrist — the majority for carpal tunnel syndrome — carried out in NHSScotland in the financial year 2011–2012.

The 18 weeks Referral to Treatment (RTT) Orthopaedic Services Task and Finish Group has developed pathway...
guidelines for suspected carpal tunnel syndrome to support primary and secondary care to implement efficient care pathways\(^4,5\). The pathways were developed by consensus (K James, 18 weeks RTT Standards Project Manager, Scottish Government. Personal Communication, 22 April 2013) among orthopedic consultants, GPs and physiotherapists using existing guidance developed by the Centre for Change and Innovation and the British Society for Surgery of the Hand\(^4,5\). The pathways recommend initial conservative treatment in primary care using wrist splints and non-steroidal anti-inflammatory drugs (NSAIDs) before referral to secondary care unless the patient has constant paraesthesia or numbness or muscle wasting, or has had symptoms for more than 6 months\(^5\). The secondary care pathway provides guidelines on use of steroids (designated as conservative treatment in that setting) and surgery\(^4\). These guidelines are, however, not mandatory: management of carpal tunnel syndrome is currently not standardised in Scotland and there is variation in practice with regard to onward referral (J McEachan, Consultant Orthopaedic Surgeon, NHS Fife. Personal Communication, 16 January 2013; J Gillies, Chair RCGP Scotland. Personal Communication, 21 January 2013). The recent Scottish musculoskeletal audit, based on audit of primary care referrals against the RTT pathway, through the Quality Outcomes Framework referral review project (K James, 18 weeks RTT Standards Project Manager, Scottish Government. Personal Communication, 22 April 2013), found that only 20% of patients referred to secondary care with carpal tunnel syndrome, and who underwent surgery, had previously used a wrist splint and only 22% had received analgesia or NSAIDs\(^6\). For 65% of referrals, no prior interventions were documented.

Although no accurate costings are available for Scotland (R Bhopal, Senior Physiotherapist, NHS Lothian. Personal Communication, 25 January 2013), management of carpal tunnel syndrome is costly to the NHS in the UK, particularly due to the increasing numbers of surgical interventions (D Van der Windt, Professor in Primary Care Epidemiology, Keele University. Personal Communication, 21 January 2013). Conservative treatment for mild or moderate symptoms has the potential to reduce the need for surgery, and hence the number of surgical referrals.

The following questions were scoped:

1. Are wrist splints or steroid injections clinically effective in mild to moderate carpal tunnel syndrome compared with decompression surgery?

2. If clinical effectiveness has been established, are wrist splints or steroid injections cost effective in mild to moderate carpal tunnel syndrome?

**Literature search**

A systematic search of the secondary literature was carried out during 1–6 November 2012. Key secondary resources were searched for policy documents, systematic reviews, evidence-based guidelines and economic studies. The search terms included: carpal tunnel, nerve compression, median nerve entrapment or compression AND splint, brace, steroid, corticosteroid, injection OR decompression, open release surgery, endoscopic surgery, ECTR, surgery or surgical.

As very little evidence was found in the secondary literature, the primary literature was searched on 19 November 2012 using the following databases:

- Medline
- Medline in process
- Embase
- Cinahl
- Web of science.

Results were limited to studies comparing splint or steroid injection with any form of surgery for carpal tunnel syndrome and published in English from 2008 to 2012. Full details are available on request.

**Evidence base**

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<tr>
<th>Publication type</th>
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**Findings**

1. Are wrist splints or steroid injections clinically effective in mild to moderate carpal tunnel syndrome compared with decompression surgery?
A Cochrane systematic review published in 2008 addressed the question of surgical versus non-surgical treatment for carpal tunnel syndrome with a primary outcome of relevant clinical improvement after 3 months. Four randomised controlled trials (RCTs) were included: one published in 1964 and three between 2002 and 2005. Two trials compared surgery with wrist splinting (198 participants in total) and two compared surgery with steroid injection (151 participants in total). The review included trials in patients with carpal tunnel syndrome irrespective of the diagnostic criteria used, resulting in clinically diverse populations. With exception of the 1964 study, all reported adequate methods of randomisation, and one wrist splint trial and one steroid injection trial attempted to blind the outcome assessors.

Meta-analysis was used to compare surgery with non-surgical treatment (splinting or steroid injection) and showed a statistically significant difference in improvement at 3 months in favour of surgery (relative risk (RR)=1.23, 95% confidence interval (CI) 1.04 to 1.46; p=0.018). This pooled result however, based on two trials of steroid injection and one of splinting, is questionable because the results were highly inconsistent between trials ($I^2=91\%$), with one of the steroid injection trials clearly favouring surgery and the other clearly favouring steroid injection. Meta-analyses of other outcomes illustrated similar problems with inconsistency, with the exception of a pooled analysis of the two trials of splinting only that showed a significant reduction in the need for surgery or secondary surgery during follow up in the surgical group compared with splinting (RR=0.04, 95% CI 0.01 to 0.17; p=0.00004; $I^2=0\%$). Meta-analysis of complications (including surgery during follow up) reported in two trials, one of steroid injection and one of splinting, favoured the non-surgical treatments (RR=1.38, 95% CI 1.08 to 1.76; p=0.01; $I^2=24\%$), but pooling these trials of different non-surgical comparators and the various adverse events reported may not be meaningful. The review concluded that surgery relieved symptoms better than wrist splinting, but it was unclear whether surgery was better than steroid injection. The authors also concluded that further research was needed to determine if the findings applied to people with mild symptoms (although this was not defined), as well as whether surgical treatment is better than steroid injection.

Two more recent systematic reviews that searched the published literature until 2010 identified one additional RCT, published in 2006, comparing surgery with splinting, that was not included in the Cochrane review (listed as ‘awaiting assessment’). The trial was small (surgery n=11 hands, splinting n=23 hands), of poor quality, and its results would not change the conclusions of the Cochrane review. No more recent RCTs were identified.

The primary literature search conducted for this scoping report identified a 2012 report of 2-year follow-up results for one of the RCTs included in the Cochrane review, however the methods used to analyse the data raise major concerns about the reliability of the results.

2. If clinical effectiveness has been established, are wrist splints or steroid injections cost effective in mild to moderate carpal tunnel syndrome?

The scoping search identified only one published economic evaluation, conducted alongside one of the RCTs included in the Cochrane review, that estimated the cost effectiveness and cost utility of surgery compared with wrist splinting in the Netherlands. The results of this study are not generalisable to Scotland where, unlike in the Netherlands, splinting is markedly cheaper than surgery (R Bhopal, Senior Physiotherapist, NHS Lothian. Personal Communication, 25 January 2013).

In Scotland, ISD is in the process of developing patient level costing but information on the cost of patient episodes containing carpal tunnel procedures is not available at this time (Ishbel Robertson, Principal Information Analyst, Prescribing & Resources – Integrated Resource Framework, ISD Scotland. Personal Communication, 21 December 2012). The nearest available relevant cost information is the national tariff average costs (2012–2013) at healthcare resource group level for ‘minor hand procedures for non-trauma category 2 without complications and co-morbidities’, which includes carpal tunnel and other procedures (ibid.). The elective cost per ‘spell within specialty’ (combines all episodes associated with a patient’s treatment within a single specialty during a stay in hospital) is £1,291. No comparative data for the cost of
surgery compared with non-surgical management of carpal tunnel syndrome in Scotland was identified.

Summary

Scoping identified limited clinical and cost-effectiveness evidence on this topic. A 2008 Cochrane review concluded that surgery relieved symptoms better than wrist splinting, but it was unclear whether surgery was better than steroid injection and further research was needed. No subsequently published information was found to alter these conclusions. The findings from the one economic evaluation identified are not generalisable to Scotland.

Further work for Healthcare Improvement Scotland

A scoping search of the secondary and primary literature identified limited evidence on this topic. The findings indicated that there is unlikely to be sufficient relevant information to warrant production of an evidence note.

Equality and diversity

Healthcare Improvement Scotland is committed to equality and diversity in respect of the nine equality groups defined by age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion, sex, and sexual orientation. As a scoping report summarises information and does not provide recommendations a full EQIA assessment is not deemed necessary.

The scoping report process has been assessed and no adverse impact across any of these groups is expected. The completed equality and diversity checklist is available on www.healthcareimprovementscotland.org

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Mr Roma Bhopal, Senior physiotherapist, NHS Lothian, independent clinical expert
Ms Jane McEachan, Consultant Orthopaedic Surgeon, NHS Fife, independent clinical expert
Dr John Gillies, Chair, Royal College of General Practitioners Scotland, independent clinical expert
Professor Danielle Van der Windt, Primary Care Epidemiology, Keele University, independent clinical expert

Declarations of interest were sought from the clinical advisor and all peer reviewers. All contributions from peer reviewers were considered by the group. However the peer reviewers had no role in authorship or editorial control and the views expressed are those of Healthcare Improvement Scotland.

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