

# Nonsurgical Treatment of Carpal Tunnel Syndrome: A Survey of Hand Surgeons

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**Background:** The nonsurgical treatment of carpal tunnel syndrome (CTS) consists of multiple modalities: splinting, corticosteroid injections, hand therapy, and oral medications. However, data supporting the effectiveness of these different modalities are varied, thus creating controversy regarding the optimal nonsurgical treatment. It is unknown how current hand surgeons utilize nonsurgical treatments for CTS.

**Methods:** An anonymous web-based survey was sent to 3289 members of the American Society for Surgery of the Hand to assess nonsurgical treatment patterns for CTS. We pretested the survey using expert survey and content review and cognitively tested the survey for readability and understandability.

**Results:** We analyzed surveys from 770 hand surgeons. Of the respondents, 41.2% of respondents recommend steroid injections for the treatment of CTS, 81.3% of respondents do not believe that oral steroids are beneficial for the treatment of CTS, and 3.6% of respondents typically prescribe gabapentinoids for the treatment of CTS. In total, 561 (72.9%) respondents always, usually, or sometimes encounter patients with more than two steroid injections for CTS before hand surgeon evaluation.

**Conclusions:** There is variation in the use of nonsurgical modalities for the treatment of CTS among American Society for Surgery of the Hand members. However, patients do not obtain long-term benefit from multiple steroid injections and gabapentinoids for the treatment of CTS, highlighting the importance of dissemination of evidence-based nonsurgical management of CTS. Collectively, these findings underscore the importance of providing clear guidelines as to which patients benefit most from nonsurgical treatments. (*Plast Reconstr Surg Glob Open* 2022;10:e4189; doi: 10.1097/GOX.0000000000004189; Published online 18 April 2022.)

## INTRODUCTION

Carpal tunnel syndrome (CTS) affects approximately one in 10 individuals during their lifetime, causing pain, paresthesias, and hand weakness.<sup>1</sup> Treatment generally consists of nonsurgical modalities and potentially surgical release. Nonsurgical treatment includes splinting, corticosteroid injections, hand therapy, and other oral medications. Besides splinting, the effectiveness of these nonsurgical modalities continues to be debated.<sup>2-4</sup> Moreover, clear guidance is lacking as to the optimal nonsurgical treatment strategy for the treatment of CTS, such as duration, number of nonsurgical treatment modalities

utilized, and decision-making for transition to surgical treatment.

In 2016, the American Academy of Orthopaedic Surgery (AAOS) developed evidence-based clinical practice guidelines (CPG) for CTS. According to these guidelines, there is strong evidence to support splinting and corticosteroid injections.<sup>5</sup> Additionally, the guidelines state, “moderate evidence supports that oral steroid could improve patient reported outcomes compared with placebo.”<sup>5</sup> However, randomized controlled trials have shown no benefit of gabapentinoids, gabapentin or pregabalin, over placebo for the treatment of CTS.<sup>6</sup> Given the wide range of nonsurgical treatment options and the lack of clear benefit for some modalities, understanding the current practice patterns for the nonsurgical treatment of CTS warrants further investigation. These data can help

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shed light on the implementation of guidelines into practice and understand how interpretation of guidelines can lead to differences in practice patterns. Findings from this study can provide a foundation for future efforts to improve the dissemination of evidence-based treatment.

The purpose of this study was to understand the use of nonsurgical treatment modalities among American Society for Surgery of the Hand (ASSH) members. Additionally, we aimed to assess surgeon decision-making for use of specific nonsurgical treatment for CTS. Lastly, we sought to understand if hand surgeons provide feedback to referring providers for guideline discordant or low-value and ineffective nonsurgical treatment of CTS patients. Findings from this study will help provide crucial information regarding the translation of evidence into real-world hand surgical practice.

## METHODS

### Study Sample

We conducted a cross-sectional survey of national practice patterns of hand surgeons. Active, candidate (nontrainee), and retired members of American Society for Surgery of the Hand (ASSH) were invited to participate. ASSH members were recruited via the research email list, with a note stating that completion of the survey inferred consent. We excluded current residents and fellows. A total of 3369 ASSH members were included in the research email list. However, 80 emails were undeliverable, resulting in a potential sample size of 3289. Two emails were sent to recruit participants. This study received exempt status from the University of Michigan's institutional review board.

### Survey Measures and Statistical Analysis

The survey included questions regarding the current nonsurgical practice patterns of hand surgeons, including the use of splints, steroid injections, oral steroids, and gabapentinoids. Additionally, we assessed whether hand surgeons give feedback to referring providers regarding the use of specific nonsurgical treatments for CTS. (See document, Supplemental Digital Content 1, which displays the survey of practice patterns for carpal tunnel syndrome. <http://links.lww.com/PRSGO/C8>.) We captured surgeon demographic data, including age, gender, years of practice, type of residency (eg, general, plastic, or orthopedic surgery), and whether the participant had an active subspecialty certificate in surgery of the hand. We focused on areas of nonsurgical management that are controversial. Therefore, questions about splinting were not included. For corticosteroid injections, we included questions regarding whether surgeons typically recommend steroid injections and the number of injections typically performed. Surgeons were also asked how often they encounter patients receiving more than two steroid injections before referral. Additionally, surgeons were asked whether they provided feedback to referring providers if multiple injections were given. We then assessed how surgeons perceive the effectiveness of oral steroids and if

## Takeaways

**Question:** How do practicing hand surgeons utilize nonsurgical treatment for carpal tunnel syndrome?

**Findings:** Of the respondents, 41.2% recommend steroid injections, 81.3% of respondents do not believe that oral steroids are beneficial, and 3.6% of respondents typically prescribe gabapentinoids.

**Meaning:** There is variation in the use of nonsurgical modalities among hand surgeons, highlighting one area to standardize treatment to improve care quality. Collectively, these findings underscore the importance of providing clear guidelines as to which patients benefit most from nonsurgical treatments.

hand surgeons typically prescribe oral steroids for the treatment of CTS. We asked questions regarding which subset of patients (ie, surgical candidates or patients receiving conservative treatment) had perceived benefit from oral steroids. Lastly, we assessed the role of gabapentinoids, gabapentin and pregabalin, in the nonsurgical treatment of CTS among ASSH members. Questions included in the survey encompassed the perceived effectiveness of gabapentinoids and the type of patients (those receiving surgery or conservative treatment) perceived to benefit from gabapentinoids. We then asked how hand surgeons handle patients using preoperative gabapentinoids in regard to weaning these medications, and whether hand surgeons provide feedback to referring providers that the medications are not indicated if gabapentinoids were prescribed for CTS. The survey instrument was developed with assistance from the Institute for Social Research, Survey Research Center at the University of Michigan.

We pretested the survey using expert review from content and survey methodology experts. Additionally, the survey was cognitively tested to assess readability and understandability. Five physicians cognitively tested the survey, including two hand surgeons. We extracted surgeon demographic, practice characteristics, and practice patterns from Qualtrics. The survey results were then coded and tabulated. We then analyzed the survey results using descriptive statistics. Analyses were performed using Stata 15.0 (StataCorp. 2017. College Station, Tex.: StataCorp LLC).

## RESULTS

The survey was sent to 3289 ASSH members with a total of 770 responses, resulting in a response rate of 23.4%. Most of the respondents were men (87%). Approximately, 48% of the respondents had more than 20 years of experience, with 80% having completed an orthopedic surgery residency (Table 1). Most of the respondents worked in a private practice setting (52%), and 25% worked in an academic/university setting. Eighty-one percent of respondents had or previously had an active subspecialty certificate of the hand.

Of the respondents, 41.2% typically recommended steroid injections for the treatment of CTS, with the majority

**Table 1. Surgeon Demographic Characteristics**

Characteristics	No. (%)
Age (y)	
<35	35 (4.6)
35–40	147 (19.1)
41–45	89 (11.6)
46–50	82 (10.7)
51–55	96 (12.5)
56–60	96 (12.5)
61–65	82 (10.7)
66–70	70 (9.1)
>70	73 (9.5)
Gender	
Men	668 (86.8)
Women	98 (12.7)
Other	4 (0.5)
Residency training	
Orthopedic surgery	634 (79.9)
Plastic surgery	102 (12.9)
General surgery	58 (7.3)
Years in practice	
<2	67 (8.7)
3–5	94 (12.2)
6–10	88 (11.4)
11–20	154 (20.0)
>20	366 (47.6)
ASSH member status	
Active	582 (76.0)
Candidate	137 (17.9)
Other	47 (6.1)
Active subspecialty certification of the hand	
Yes	574 (74.9)
No	143 (18.7)
Previously, but did not recertify	49 (6.4)
Surgical practice	
Private practice (nonacademic)	400 (52.2)
Academic (university)	188 (24.5)
Hospital-owned	94 (12.3)
Other*	84 (11.0)

\*Includes hybrid private practice with academic affiliation, military, health maintenance organization, and a government practice.

(67.5%) performing only one steroid injection before recommending a release (Table 2). However, 561 (72.9%) ASSH members always, usually, or sometimes encounter patients with more than two steroid injections for CTS before hand surgeon evaluation. Figure 1 describes how often hand surgeons provide feedback to referring providers about the lack of long-term benefit of two or more steroid injections.

The majority (81.3%) of ASSH members do not believe oral steroids are efficacious or are only slightly efficacious for the treatment of CTS. Moreover, 578 (79.0%) of the respondents never use oral steroids (Table 2). Of

**Table 2. Hand Surgeon Nonsurgical Practice Patterns**

Nonsurgical Modality	No. (%)
Use of steroid injections	317 (41.2)
No. steroid injections*	
One	210 (67.5)
Two	77 (24.8)
Three	15 (4.9)
More than three	9 (2.9)
Use of oral steroids	
Usually	6 (0.8)
About half the time	1 (0.1)
Sometimes	147 (20.1)
Never	578 (79.0)
Use of gabapentinoids	28 (3.6)

\*Only participants who selected “yes” to using steroid injections answered this question.

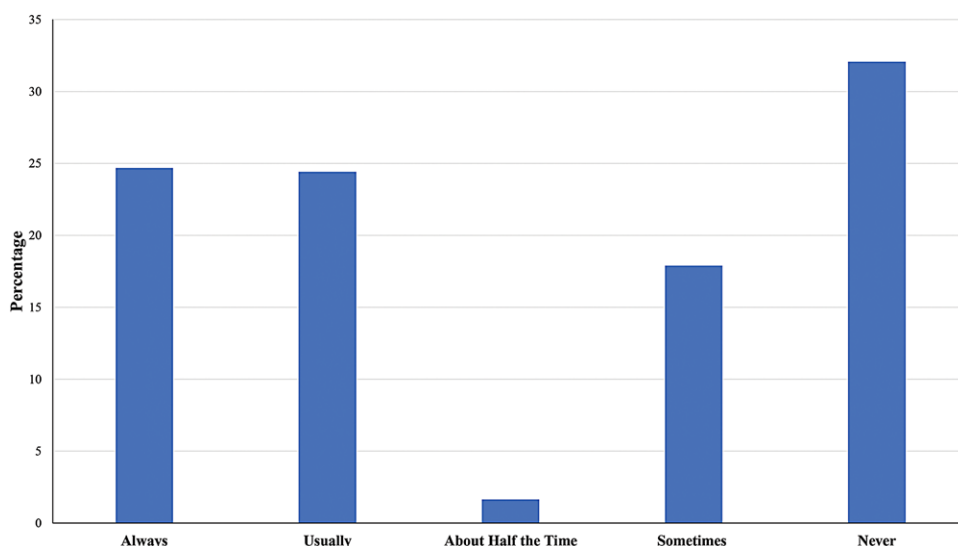
the respondents who use oral steroids for the treatment of CTS, 49.4% use oral steroids for patients receiving conservative management.

Only 3.6% of ASSH members typically prescribe gabapentinoids for the treatment of CTS (Table 2). Among all respondents, 45.8% of respondents believed gabapentin to not be helpful, 49.4% believed gabapentin to be slightly helpful, 4.5% believed gabapentin to be moderately helpful, and 0.3% believed gabapentin to be very helpful. Similarly, the majority of respondents believed pregabalin to be not helpful at all or only slightly helpful (48.1% and 47.9%, respectively). Moreover, 192 respondents (24.9%) believed that the patients who would benefit from gabapentinoids were those receiving conservative management for treatment of CTS (Table 3). Of the respondents who typically prescribe gabapentinoids, most (85.2%) sometimes prescribe only gabapentinoids, whereas 7.4% prescribe these medications for most of their patients. Figure 2 describes how often hand surgeons provide feedback to referring providers about the lack of evidence supporting use of gabapentinoids for the treatment of CTS, with the majority (53.8%) never providing feedback. Moreover, only 33.2% of respondents always ask about the reason for gabapentinoid use when seeing a patient in consultation for CTS (Table 4). Table 4 illustrates how ASSH members handle the management of gabapentinoids before a carpal tunnel release, with 30.8% asking the patient to discuss weaning with their prescribing provider and 30.0% allowing the patient and prescriber to make the decision regarding weaning, thus taking a more passive role.

## DISCUSSION

In this cross-sectional national survey of ASSH members, we found that the use of nonsurgical treatments for CTS is varied and at times inconsistent with the AAOS CPG for CTS. Of the respondents, 41.2% typically recommend steroid injections for the treatment of CTS, 81.3% did not believe that oral steroids are beneficial for the treatment of CTS, and 3.6% typically prescribe gabapentinoids for the treatment of CTS. Many of these nonsurgical modalities are used in patients who are not surgical candidates. Lastly, there is a lack of feedback to referring providers when nonsurgical care is provided for patients with CTS that is guideline discordant or lacks long-term benefit based on best evidence. Collectively, these findings highlight the importance for better implementation strategies for evidence-based nonsurgical management of CTS.

The nonsurgical treatment of CTS is quite varied. In regard to steroid injections, Atroshi et al conducted a randomized controlled comparing steroid injections to placebo and found improvement in CTS symptom severity at 10 weeks. However, there were no differences in symptoms at 1 year.<sup>7</sup> Moreover, in another randomized study comparing one steroid injection with two steroid injections, symptom severity, electrodiagnostic study findings, and function were similar between the two groups.<sup>8</sup> Our study of ASSH members' practice patterns reflect this evidence. Approximately 41% of ASSH members typically recommend steroid injections for the treatment of CTS, with the majority performing only one steroid injection



**Fig. 1.** Feedback regarding the ineffectiveness of more than two steroid injections for the treatment of carpal tunnel syndrome. Y-axis represents the percentage of hand surgeons.

before recommending surgical intervention. However, the AAOS CPG for CTS do not explicitly state the ineffectiveness of multiple steroid injections for the nonsurgical management of CTS; therefore, more explicit guideline recommendations are needed to improve the care of CTS patients. For oral steroids, a study comparing oral steroids to placebo revealed that oral steroids decreased baseline CTS symptoms.<sup>9</sup> Therefore, the AAOS CPG guidelines state that oral steroids could be used to improve patient-reported CTS symptoms.<sup>5</sup> In this study of ASSH members, over 80% do not believe that oral steroids are beneficial in the treatment of CTS. However, the data are less compelling for gabapentinoids for the treatment of CTS. A randomized controlled study by Hui et al showed no efficacy of gabapentinoids over placebo for the treatment of CTS.<sup>10</sup> Moreover, data have shown the detrimental effects of gabapentinoids used before carpal tunnel releases in leading to long-term opioid use postoperatively.<sup>11</sup> Additionally, data have shown that gabapentinoids are associated with respiratory depression and long-term misuse and addiction.<sup>12-14</sup> These concerns have led the U.S. Food and Drug Administration to issue a warning regarding the side effects and potential adverse outcomes of gabapentinoid

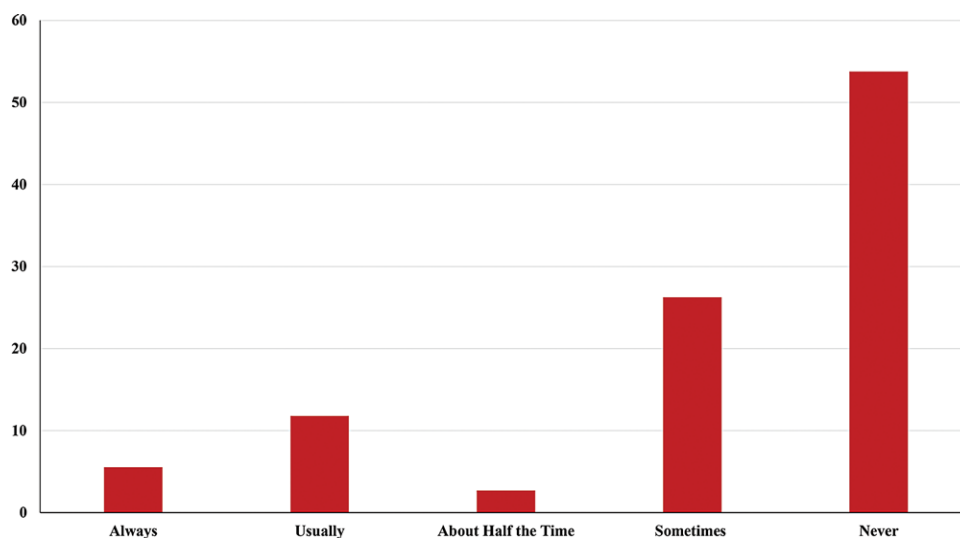
use.<sup>15</sup> Despite the lack of benefit of gabapentinoids and potentially harmful consequences, some ASSH members still prescribe gabapentinoids for the treatment of CTS, specifically in patients who are not undergoing surgical treatment. Given the wide variety of nonsurgical treatments for CTS and the mixed efficacy of these treatments, clearer guidelines are needed indicating which clinical scenarios and patients would benefit from specific treatment modalities.

The nonsurgical management of CTS may occur by multiple different providers, including primary care physicians, physiatrists, neurologists, and surgeons, thus creating the opportunity for nonevidence-based care. However, there is no clear consensus on the practice of providing constructive feedback to referring providers.<sup>16</sup> In a qualitative study, specialists believed that explicit feedback to referring providers was ideal; however, the specialists reported that they rarely engage in such feedback.<sup>17</sup> Barriers to providing feedback included structural barriers such as lack of time or contact information, and psychological barriers such as discomfort and fear of conflict.<sup>17</sup> Our study corroborates these findings, with the majority of ASSH members not providing feedback regarding the ineffectiveness of multiple steroid injections or the potentially negative consequences of gabapentinoids to referring providers. Many institutions have enacted policies to create a culture of patient safety. However, many of these initiatives are within single hospital systems, and policies are lacking to facilitate feedback between hospital systems. Additionally, more research is needed to understand the reasoning behind the reluctance of hand surgeons to provide feedback to referring providers, as it may give insight into the barriers to promote evidence-based treatment. Therefore, hand surgeons should attempt to create opportunities to give feedback to referring providers or help disseminate the evidence-based guidelines to referring providers to help promote optimal evidence-based patient care.

**Table 3. Patients Who Benefit from Specific Nonsurgical Treatments for CTS**

Nonsurgical Treatment	Respondents (%)
Oral steroids*	
Surgical candidates	14 (9.1)
Patients receiving conservative management	76 (49.4)
None	61 (39.6)
Other	3 (2.0)
Gabapentinoids	
Surgical candidates	23 (3.0)
Conservative treatment	192 (24.9)
None	242 (31.4)
Other	313 (40.6)

\*Participants who selected they never use oral steroids were excluded from this question.



**Fig. 2.** Feedback regarding the ineffectiveness of gabapentinoids for the treatment of carpal tunnel syndrome. Y-axis represents the percentage of hand surgeons.

Unfortunately, the translation of evidence into practice takes time, and adherence to evidence-based guidelines is variable. The reasons behind nonadherence to CPGs are multifactorial and include lack of knowledge, large-scale systems issues, potential lack of agreement with the guidelines, and disagreement with the interpretation of the original data.<sup>18–21</sup> Moreover, efforts aimed to improve adherence to evidence-based guidelines may not be generalizable to all physicians, as the barriers are different among various physician groups,<sup>19</sup> thus complicating the large-scale implementation of guidelines. In our study, we found variation in the adherence to the AAOS CPG and best evidence for CTS nonsurgical treatment, highlighting the need for more research to identify the specific barriers to the implementation of these evidence-based practices. Some have advocated the incorporation of implementation scientists on CPG teams to help identify barriers early in the process and develop strategies to overcome these barriers.<sup>20</sup> Nonetheless, innovative implementation strategies are necessary as the passive diffusion of evidence through CPGs is unreliable.<sup>22</sup>

**Table 4. Gabapentinoids for Carpal Tunnel Syndrome**

Questions	Respondent No. (%)
Ask about reason for Gabapentinoid use	
Always	256 (33.2)
Most of the time	140 (18.2)
About half the time	22 (2.9)
Sometimes	157 (20.4)
Never	195 (25.3)
Management of Gabapentinoids before CTR*	
Continue until surgery and then wean	146 (17.3)
Ask patient to discuss weaning with prescriber	260 (30.8)
Allow patient and prescriber to make decision	253 (30.0)
Personally discuss weaning with prescriber	58 (6.9)
Wean yourself	63 (7.5)
Continue them	49 (5.8)
Other	15 (1.8)

\*Respondents permitted to select more than one.

This study has several limitations. First, this is a cross-sectional study where respondents' practice patterns may be evolving over time, which cannot be captured in this survey. Additionally, this is a survey of ASSH members who are not the only physicians who care for CTS patients. CTS patients may be treated by other non-ASSH member surgeons, primary care physicians, neurosurgeons, neurologists, and physiatrists who offer nonsurgical modalities for CTS. However, we believe that the study sample is a reasonable national representation of surgeons who care for a large proportion of patients with CTS. The survey did not ask if providers suggest nonsurgical treatment initially, how many nonsurgical modalities they recommend before offering surgical intervention, and if they stratify nonsurgical treatment by patient factors such as age, symptom duration, severity of discomfort, and duration of symptomatic improvement, which may influence practice patterns. Additionally, we did not ask about the specific steroid medication typically used for injections, which could potentially affect the longevity of symptomatic relief. Lastly, our survey had a response rate of 23%, which may be associated with some response bias. However, similar response rates have been reported for online surveys distributed through a professional society.<sup>23–25</sup> Nonetheless, we were able to characterize the nonsurgical CTS treatment patterns for 770 hand surgeons from a representative national sample.

Despite these limitations, there is variation in ASSH members' use of nonsurgical modalities for the treatment of CTS. However, at times, the nonsurgical modalities used are inconsistent with the recommendations by the AAOS CPG and findings from other level I studies, particularly as it relates to performing multiple steroid injections and use of gabapentinoids. Additionally, there is a lack of feedback to referring providers regarding nonsurgical treatment of CTS that is inconsistent with best evidence, potentially compromising patient care. Our findings highlight the importance of better implementation strategies

to improve the adherence to evidence-based nonsurgical treatment recommendations for CTS.

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