A critical appraisal of "Ultrasound treatment for treating the carpal tunnel syndrome: randomized 'sham' controlled trial"

By

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In partial fulfillment of the

requirements for the course:

PT 7240 Evidence-Based Practice in Physical Therapy

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November 2, 2022

Abstract

This critical appraisal looks at a 1998 article published by the Department of Physical Medicine and Rehabilitation at the University of Vienna. The article is a randomized clinical trial aiming to investigate the clinical efficacy of pulsed ultrasound in the treatment of idiopathic carpal tunnel syndrome. An introduction explaining the purpose behind this critical appraisal is provided before describing the methods of my research. The results section of this paper breaks down my analysis of the article's introduction, methods, results, and discussion. To close out my analysis, the discussion describes the possible implementation of ultrasound intervention on physical therapy patients.

Key words: Carpal Tunnel Syndrome (CTS), Ultrasound Therapy, Physical Therapy

Introduction

As a Doctor of Physical Therapy student, I spend hours typing and writing notes every day. Overuse of the wrist in a flexed position can be a contributing factor to carpal tunnel syndrome. Common interventions for carpal tunnel syndrome are surgery, steroid injection, and oral medications. However, not many studies have looked into ultrasound therapy as a possible non-surgical intervention. For this reason, my clinical question was the following: In patients with carpal tunnel syndrome, is ultrasound therapy an effective way to improve strength and reduce inflammation? I aim to appraise an article relating to my clinical question using the knowledge I have obtained as a first-year Doctor of Physical Therapy student at Angelo State University.

Methods

To begin my research, I used two main databases: PubMed and Physiotherapy Evidence Database. For both websites, I used carpal tunnel syndrome and ultrasound therapy as my search terms. I placed three limits on my search to narrow down my hits to 68 final results on PubMed. A full-text limitation was applied to eliminate articles containing only an abstract. For my assignment, I limited results to clinical trials, thus excluding systemic reviews and meta-analyses. Lastly, I restricted articles to 1998 and newer, since technology is constantly evolving in physical therapy. I included studies with people of any gender and age to not further reduce my search results.

After I narrowed my search down to three articles pertaining to my clinical question, I chose to appraise “Ultrasound treatment for treating the carpal tunnel syndrome: randomized ‘sham’ controlled trial.” The author of this article is Dr. Gerold Ebenbichler and other

contributors. It was published in 1998 by the Department of Physical Medicine and Rehabilitation at the University of Vienna. This study was conducted in a university department of physical medicine outpatient clinic in Vienna, Austria. I chose this article for a comprehensive critical appraisal because it applies well to my clinical question and is double-blinded.

Results

Summary of the study

This article describes a randomized clinical trial conducted to investigate the effectiveness of ultrasound treatment on patients with carpal tunnel syndrome. There were two groups: one that received treatment and one that was a "sham" and did not receive treatment. The intervention, pulsed ultrasound, was given for 15 minutes using the same frequency and intensity every time. By using a randomization list, neither the researchers nor the participants were aware of which group they were placed into, hence the study was double-blind. After exclusions and patients dropping out of the study, 34 participants were separated into two groups. The results showed that finger grip strength, symptoms, and motor distal latency all improved in the active treatment group more than in the sham group. Concluding the study, the researchers found that ultrasound therapy was an effective way to facilitate recovery without being invasive.

Appraisal of the study introduction

The introduction to the study covers both the background on carpal tunnel syndrome and the use of ultrasound to regenerate nerves. The rationalization for the study was provided and it was noted that few studies report the benefit of ultrasound on carpal tunnel syndrome, despite the

numerous studies into both independently. The authors discussed the critical variables thoroughly in the introduction and throughout the paper.

A critique of the introduction is the lack of information on the causative factors of carpal tunnel syndrome or the groups most affected by this syndrome. Also, readers may benefit from a detailed description of what ultrasound treatment is. The information in the introduction is short and to the point, however, readers without previous knowledge of ultrasound treatment may not fully understand the study.

Appraisal of the study methods

The methods section describes this study as a longitudinal and prospective study. Participants were broken down into two groups, one being experimental and one being controlled. The study was double-blind, which conceals the group assignments from the researchers and participants. Another benefit of this study design was that the ultrasound clinician delivering the intervention was also blinded to group allocation. To be included in this study participants had to have a similar prognosis, mild or moderate pain levels, no previous surgical treatment, and no secondary entrapment neuropathy. The authors eliminated many variables that may have negatively impacted the study.

Overall, the methods for this study were well thought out. The main downside was subject attrition and the small number of participants. The researchers originally recruited 45 participants, but attrition brought the final number down to 34. Most subject attrition was due to not keeping up with appointments since this study was very time-consuming. Although intervention methods were described in detail, no outcome measures listed mentioned reliability or validity.

Appraisal of the study results

Information in the study's results section is well organized and straightforward. All outcome measures are clearly stated in the same order as presented in the methods section. Also, all figures included provide adequate information such as units of measurement and figure captions. For this study, the authors included their p-value threshold for statistical significance as 0.05 and a confidence interval of 95%. The statistically significant information, all of which are clinically relevant, is discussed and shown in tables.

Despite many strong points from the results section, the authors did not provide information on the minimal clinically important difference (MCID) or the number needed to treat (NNT). Addressing these two important statistics would provide more insight to readers on the benefit and impact this intervention may have on patients. In the table of outcome measures, p-values were included, but bolding the clinically significant measures would aid aesthetics and be easier on the reader.

Appraisal of the study discussion

In the discussion, the authors indicated the usefulness of their study and how it can impact the future of non-surgical intervention for carpal tunnel syndrome. By tying their findings into previous research, the authors were able to provide support to their findings of ultrasound therapy effectiveness. Later in the discussion, study limitations are provided including the time-consuming nature of ultrasound therapy and high subject attrition. The authors discussed future studies into carpal tunnel syndrome and ultrasound therapy that build upon their research. Suggested future research from the authors looks into an optimal treatment schedule, which non-surgical treatments work best in combination, and the effects of early compression on

neurological effects. To make it easier for the reader, there is a box on the final page for key messages that pinpoint the clinical significance of the study. The discussion was thorough and the authors did not over-conclude their findings.

The discussion section would benefit from acknowledging the potential errors involved in subjective symptom ratings. Even though patients were blind to whether or not they were in the treatment or control group, they may be subconsciously reporting symptom improvement. People often try and please medical professionals and report what they think a clinician will want to hear. A further acknowledgment of the validity issues involved in subjective symptom ratings would be beneficial for the discussion.

Discussion

The clinical significance of this study for my clinical question was to show that ultrasound therapy may be an effective way to reduce symptoms and improve strength. This is applicable to physical therapists who are looking for alternate ways to improve carpal tunnel symptoms without invasive interventions. Also, patients who are elderly may shy away from more aggressive interventions and could benefit from this research.

Taking into consideration the minimal amount of research into the effectiveness of ultrasound therapy on carpal tunnel syndrome, I would refer to other interventions first. In the clinic, patients could potentially benefit by having reduced inflammation, improved symptoms, and improved strength. The main benefit is the ability of physical therapists to implement this intervention in the clinic and the non-invasive nature. It is unlikely that this intervention will have any negative effects on a patient, however, it takes out a large portion of treatment time.

Using the basis of evidence-based practice, there are not yet enough statistics in favor of the use of ultrasound therapy for carpal tunnel syndrome.

Upon my appraisal, I would consider using this intervention on my patient if they were against other interventions backed by more research. Later in my career, if I had an elderly patient who did not want steroid injections or surgical intervention, I would consider implementing ultrasound treatment given that the current research backs it up. Fortunately, ultrasound therapy can be implemented safely in a clinical setting by technicians and therapists with minimal risk.

In conclusion, the research article by Dr. Gerold Ebenbichler and others provides a concise look at the effectiveness of ultrasound therapy for carpal tunnel syndrome. Although the study had few participants and high subject attrition, it is a well-controlled clinical trial. The authors provided adequate evidence and reference to back their claims. Their findings support the idea that ultrasound therapy may be a beneficial intervention, however, further research should be done investigating treatment scheduling and modalities used in conjunction.