Comparing Trigger Point Dry Needling and Manual Pressure Technique for the Management of Myofascial Neck/Shoulder Pain: A Randomized Clinical Trial

Kayleigh E. De Meulemeester, MSc, Birgit Castelein, MSc, Iris Coppieters, MSc, Tom Barbe, MSc, PT, Ann Cools, PT, PhD, and Barbara Cagnie, PT, PhD

Abstract

Objective: The aim of this study was to investigate short-term and long-term treatment effects of dry needling (DN) and manual pressure (MP) technique with the primary goal of determining if DN has better effects on disability, pain, and muscle characteristics in treating myofascial neck/shoulder pain in women.

Methods: In this randomized clinical trial, 42 female office workers with myofascial neck/shoulder pain were randomly allocated to either a DN or MP group and received 4 treatments. They were evaluated with the Neck Disability Index, general numeric rating scale, pressure pain threshold, and muscle characteristics before and after treatment. For each outcome parameter, a linear mixed-model analysis was applied to reveal group-by-time interaction effects or main effects for the factor "time."

Results: No significant differences were found between DN and MP. In both groups, significant improvement in the Neck Disability Index was observed after 4 treatments and 3 months ($P < .001$); the general numerical rating scale also significantly decreased after 3 months. After the 4-week treatment program, there was a significant improvement in pain pressure threshold, muscle elasticity, and stiffness.

Conclusion: Both treatment techniques lead to short-term and long-term treatment effects. Dry needling was found to be no more effective than MP in the treatment of myofascial neck/shoulder pain. (J Manipulative Physiol Ther 2017;40:11-20)

Key Indexing Terms: *Neck Pain; Trigger Points; Myofascial Pain Syndromes*

Introduction

Neck/shoulder pain is a common musculoskeletal complaint that is more frequent in women [1-5] and affects 45% to 54% of the general population. [1] Jobs involving prolonged static postures and/or repetitive upper limb movements, such as office work, may lead to the development of myofascial neck pain. [6-9]

Myofascial pain can be diagnosed by the presence of one or more myofascial trigger points (MTrPs), defined as a hyperirritable spot in a palpable taut band of skeletal muscle fibers. [10-12] Myofascial trigger points can be clinically classified as active or latent. An active MTrP causes spontaneous pain or pain during movement, stretch, or compression, whereas latent MTrPs are usually asymptomatic, with pain or discomfort provoked by compression only. [10-12] The pathophysiology of MTrPs is poorly understood, but it is hypothesized that sustained postures and/or repetitive low-level tasks lead to the development of MTrPs. [8,13,14] Typical symptoms associated with MTrPs are local and referred pain, muscle weakness, and restricted range of motion. [10] A combination of these symptoms could have a large impact on the quality of life, mood, and health status. [15]

Treatment of myofascial pain is based on inactivating the MTrPs, mostly by a manual pressure (MP) technique or dry needling (DN). [16-18] In the MP technique, the physiotherapist applies increasing pressure directly on the MTrP. [19] There are two types of DN: superficial DN, which penetrates only the skin and superficial muscle, and deep DN, which involves the insertion of a solid filiform needle directly into the MTrP. [20-23] Precise needling of the MTrP provokes a local twitch response (LTR), a brief muscle contraction, which should be elicited for successful therapy. [24] The needle is moved up and down with or without withdrawal from the muscle tissue to elicit LTRs. [25]

Department of Rehabilitation Sciences and Physiotherapy, Ghent University, Ghent, Belgium.

Corresponding author: Kayleigh E. De Meulemeester, MSc, De Pintelaan, 185, 9000 Ghent, Belgium. Tel.: +32 93321219. (e-mail: *Kayleigh.demeulemeester@ugent.be*).

Paper submitted December 23, 2015; in revised form June 13, 2016; accepted September 14, 2016.

0161-4754

http://dx.doi.org/10.1016/j.jmpt.2016.10.008

Several recent studies[19,22,26-39] and a systematic review[40] reported evidence for the use of MP and DN in the treatment of patients with neck and shoulder pain. They reported a decrease in pain intensity,[26-33,40] a higher pressure pain threshold (PPT),[19,22,31-34,40,41] improvement in functionality,[30,32,35,36,40] increase in range of motion,[27,28,31,33,37,40] reduction of stiffness,[38] and improvement of muscle strength[19,28,39] after DN and/or MP. These studies often compared DN or MP with a placebo or other treatment techniques, but studies comparing treatment effects between DN and MP and evaluating effects in the long term for both treatment techniques are lacking.[40]

Therefore, the aim of this study was to investigate whether both treatment techniques lead to short-term and/or long-term treatment effects, with our primary goal to determine if DN has a better effect than MP on disability, pain intensity (primary outcome measures), PPT, and muscle characteristics which involve muscle tone, elasticity, and stiffness (secondary outcome measures) in female office workers with neck/shoulder pain of myofascial origin. We hypothesized that both treatment techniques will lead to short-term and long-term treatment effects, but with significantly larger effects in the DN group than in the MP group.

Methods

Study Population

Female office workers with neck and/or shoulder pain related to MTrPs in neck and shoulder muscles were recruited from several workplaces with predominantly computer-based tasks from September to November 2014. It was opted to include only women, as myofascial neck/shoulder pain is typically more prevalent among women and to avoid the influence of sex differences on outcome. They had to be performing at least 20 hours of computer work a week and had to have neck/shoulder complaints for at least 3 months and a Neck Disability Index (NDI) score ≥10/50 to be included. Subjects were excluded for the following reasons[1]: if they were diagnosed with neurologic problems, a systemic disease, or an injury caused by trauma[2]; if they were in therapy for their actual complaints at the time of the study; and[3] if they were pregnant. All subjects signed an informed consent, and the study was approved by the local ethics committee of Ghent University Hospital. This study was registered at ClinicalTrials.org PRS under Registration No. 2013/ 903 NCT02301468.

General Study Design

The general study design is illustrated in a flowchart (Fig 1). Before testing, participants had to complete an online questionnaire on demographic features, work, and current complaints together with the NDI. During the first meeting, subjects were asked to rate their general pain intensity on a numeric rating sale (NRS). In addition, a clinical examination of the neck and shoulder region was performed by an experienced physiotherapist to identify the 4 most painful MTrPs. Subjects were then evaluated for PPT and muscle characteristics at these MTrPs (see below). These measurements were repeated after the first treatment (post 1) and together with the NDI after 4 treatments (post 2). The NDI and general pain score were repeated again after 3 months (post 3). Subjects underwent 4 treatment sessions (once a week), consisting of MP or DN to the 4 MTrPs identified as most painful. During the 4-week treatment period, participants were not allowed to have any other treatment for their neck/shoulder complaints. Treatments were performed at the clinical practice of 1 of 2 experienced physiotherapists participating in this study. Outcome measures were evaluated before and after treatment by the same assessors, who were blinded to the treatment allocation. Statistical analysis was performed by an independent researcher.

Testing Protocol

Primary Outcome Measures

Disability. Disability was evaluated using the NDI. The NDI (Dutch-language version) is a valid questionnaire to measure self-reported neck pain-related disability.[42] A score between 5 and 14 represents a mild disability, whereas a score between 15 and 24 is interpreted as a moderate disability. Neck Disability Index scores >25 reflect a severe disability.[43]

General NRS. The NRS was used to measure general pain experience (neck/shoulder pain during the past week). Subjects had to score their pain on a scale from 0 (no pain) to 10 (worst pain).[44]

Secondary Outcome Measures

Pressure Pain Threshold. First, pressure pain sensitivity was determined by deep palpation of 6 anatomical MTrP locations on the left and right sides: upper and middle trapezius, levator scapulae, infraspinatus, and supraspinatus (medial and lateral MTrPs). After identification of a taut band, a pressure of 50 N was applied with the thumb to the most sensitive tender spot/nodule. Subjects were asked to rate their pain on an NRS from 0 to 10, for each MTrP location.

On the basis of this rating, the 4 most painful points were selected for evaluation of PPT using a Wagner FPX Digital Algometer. The examiner applied an increasing pressure of 1 N/s on the MTrPs until the patient indicated that the feeling of pressure changed into a feeling of pain. The pressure at that moment was determined as the PPT (expressed in N). Each of the selected MTrPs was evaluated consecutively, and this procedure was repeated 3 times with a 30-second break in between. The use of pressure algometry has been found to be a reliable technique for determining PPT.[45]

Muscle Characteristics. The MyotonPRO was used to measure muscular mechanical properties (tone, elasticity,