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FASCIA SCIENCE AND CLINICAL APPLICATIONS: RANDOMIZED CONTROLLED COMPARATIVE STUDY

Conservative treatment of carpal tunnel syndrome: Comparison between laser therapy and fascial manipulation[®]



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Summary The etiopathogenesis of Carpal Tunnel Syndrome (CTS) is multifactorial and most cases are classified as idiopathic (Thurston 2013). A randomized controlled trial was performed to compare the effectiveness of Fascial Manipulation[®] (FM) and Low-Level Laser Therapy (LLLT) for CTS. This prospective trial included 42 patients (70 hands with symptoms) with clinical and electroneuromyographic diagnosis of CTS. The patients were randomly assigned to receive multiple sessions of FM or multiple session of LLLT. The Visual Analogic Scale (VAS) and Boston Carpal Tunnel Questionnaire (BCTQ) were performed at baseline, end of treatment and after three months.

The group that received FM showed a significant reduction in subjective pain perception and an increased function assessed by BCTQ at the end of the treatment and follow-up. The group that received LLLT showed an improvement in the BCTQ at the end of the treatment but the improvement level was not sustained at the three month follow-up. FM is a valid alternative treatment for CTS.

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Introduction

Carpal Tunnel Syndrome (CTS) is the most common compression neuropathy and is due to compression of the median nerve (Ibrahim et al., 2012). The main symptoms are pain and paresthesia in the first, second and third fingers along the innervations of the median nerve. The etiopathogenesis of the CTS is multifactorial and in most cases idiopathic (Marshall, 2001).

Trauma (including previous fractures of the wrist or joint deformity), arthritis and arthrosis may increase the chance of developing this syndrome (Mahoney and Dagum, 1992). Other causes are mechanical such as: deformation of median nerve (Hunter, 1991), stiffness and fibrosis of the transverse carpal ligament (Nakamichi and Tachibana, 1995), hypertrophy of thenar eminence with increased pressure into the carpal tunnel (Nakamichi and Tachibana, 1995; Rojviroj et al., 1990) and fibrosis that reduces median nerve mobility (Phalen, 1970).

Due to the high incidence and prevalence of this disability and its economic consequences, CTS remains a challenge for health systems worldwide. Currently, there is inadequate scientific evidence regarding conservative treatments. The benefits and risks related to the use of night time orthotic (Page et al., 2012a,b,c), exercises and mobilization (,,), therapeutic ultrasound (,,) and equipment, such as ergonomic computer keyboards (O'Connor et al., 2003), are not known. The injection of corticosteroids is effective in reducing edema and local inflammation (Marshall et al., 2007; Marshall, 2001). However, the beneficial effects are inconsistent and not devoid of collateral effects (for instance, reduced synthesis of collagen and proteoglycans with consequent tissue atrophy) (Tsai et al., 2003; Scutt et al., 2006). Low intensity laser therapy (LLLT) seems to be able to decrease the pain and associated symptoms and to increase the strength and function while also stimulating the proliferation of fibroblasts, the microcirculation and acetylcholinesterase activity (Kujawa et al., 2003) in mild cases of CTS (Chang et al., 2008; Dakowicz et al., 2011; Yagci et al., 2009; Elwakil et al., 2007).

Evidence based on the use of selected manual therapies appears to be more promising, for example relief of median nerve compression by chiropractic manipulation and manual therapy. Valente and Gibson, 1994; Maddali et al., 2013. A study carried out on a small group of patients affected by CTS, subjected to myofascial therapy and stretching, evaluating patients before and after treatment with nuclear magnetic resonance, demonstrated an increase in the size of the antero-posterior and transverse carpal tunnel (Sucher, 1994, 1993). The same author showed in cadavers that osteopathic manipulation was able to elongate the carpal tunnel ligament and suggested that such techniques may be of use in nonsurgical relief of pressure on the median nerve in patients with CTS (Sucher, 1993). Several other studies have shown that Fascial Manipulation® (FM) was able to decrease pain, restore the movement and muscle strength in a case of patellar tendinopathy (Pedrelli et al., 2009), post traumatic sub-acute neck pain (Picelli et al., 2011), chronic shoulder pain (Day et al., 2009) chronic ankle instability (Stecco et al., 2011)

and temporomandibular disorders (Guarda-Nardini et al., 2012).

FM (Stecco., 2004) is a manual therapy that focuses on deep muscular fascia. This technique considers the fascia as a three-dimensional continuum. The mainstay of this manual technique lies in the identification and treatment of specific, localized areas of fascia. Fascia is formed by undulated collagen fibers and elastic fibers arranged in distinct layers, and within each layer the fibers are aligned in different directions. In FM the body is divided into 14 segments: head, neck, thorax, lumbar, pelvis, scapula, shoulder, elbow, forearm, hand, hip, knee, ankle and feet. Each body segment is served by six myofascial units (MFU). A MFU consists of monoarticular and biarticular muscle fibers and its surrounding deep fascia. Movement evaluation in FM is based on testing in spatial directions and are defined as: antemotion (AN), retromotion (RE), lateromotion (LA), mediomotion (ME), intrarotation (IR), extrarotation (ER).

Each of the 6 MFUs of every segment has specific locations in the deep fascia termed Centres of Coordination (CCs). Every CC is located at the point of convergence of the vectorial forces of the muscles involved in a specific movement.

The biarticular muscles join together the unidirectional MFU to form myofascial sequences (MFS) (Stecco et al., 2009, 2007). A sequence controls the movement of the different segments (i.e., shoulder, elbow, wrist) in one direction in the three planes of movement. Two sequences of the same plane for example, the sagittal (flexion/extension), frontal (medial/lateral), and the horizontal (internal/external) are reciprocal antagonists. These MFU/sequences are evaluated for CCs especially since they are involved in the alignment of the trunk and limbs. Other points termed Centers of Fusion (CFs) are localized in the intermuscular septa, retinacula controlling movements along intermediate directions, between different planes (Stecco, 2004; Ercole et al., 2010).

The purpose of our study was to compare the effectiveness of a manual therapy technique called Fascial Manipulation to Low-Level Laser Therapy in carpal tunnel syndrome.

Methods

Forty-two patients (29 women and 13 men) were enrolled in the study. They had a mean age of 54.2 years (range 38–74 years) and among them were 70 symptomatic hands. The criteria for diagnosing CTS were clinical (Phalen and Tinel test positive) and electromyographic (positive EMG showing a decrease in nerve conduction within the last six months). The patients agreed to maintain their usual oral medical therapies during the period of this study. The exclusion criteria were: congenital coagulopathies, use of oral anti-coagulant therapy, previous treatments that ended in less than 3 months, only weakness symptoms, concomitant tumors and systemic neurological and rheumatological pathologies. The patients were recruited consecutively in the out-patient office of Physical Medicine and Rehabilitation Department at the Recovery and Rehabilitation Agency AOU

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