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PILOT STUDY

Effect of myofascial induction therapy on post-c-section scars, more than one and a half years old. Pilot study

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Summary Myofascial Induction Therapy (MIT) is a manually-applied method used in physiotherapy and focused on restoring altered fascial tissue. In a healthy body, the fascial system maintains elasticity and coordination of movements. However, injuries and their aftereffects, such as scars, may reduce this tissue role, causing a dysfunction.

The aim of this study is to ascertain the effect of MIT on scars which have completed the repair process in healthy individuals without any associated pathology that might affect the healing process.

In all 10 cases studied, changes were observed after applying MIT on the structure of the scar fold, both at deep (shown by ultrasound) and at superficial (shown by scar fold measurement) levels. Eight weekly MIT sessions were applied, establishing this number as a reference for future studies. Functional improvement was determined using Schober's Test and patient

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quality of life was measured with a specific questionnaire. These outcomes lay the groundwork for future research.

Background

Most common pathologies treated by physiotherapists are caused by changes in tissue structure or mechanical alteration. Their aetiology and resulting clinical response are the result of an abnormal behaviour of cells and tissues exposed to mechanical stress (Ingber, 2003).

The healing of a wound results in the alteration of tissue dynamics, as the area's mechanical tension is modified compared to that of the adjacent region (Tomasek et al., 2002). Remodelling of connective tissue is not only conditioned by the tissue injury, but is also a response to the fluctuating levels of the mechanical forces to which the area is subjected, implicating biochemical alterations, i.e. mechanotransduction (Bouffard et al., 2008; Franz, 2008; Ingber 2003, 2008; Langevin et al., 2004; Pilat, 2003). Ingber proved that molecules, cells, tissues, organs and our body as a whole use *tensegrity* (tensional integrity) in order to mechanically stabilize their shape and straightforwardly integrate structure and function at all levels (Ingber, 1998).

This system, which is based on structure, provides a mechanical base to explain how applying physiotherapy might affect tissue and cell physiology, even in terms of growth and differentiation (Bouffard et al., 2008; Eyden, 2008; Ingber 2003, 2008; Lewit and Olsanska, 2004; Schleip et al., 2012; Tomasek et al., 2002). Applying forces at a macro-scale also causes alterations in the extracellular matrix and in the mechanics of the cytoskeleton — micro-scale (Bouffard et al., 2008; Ingber 2003, 2008). Bouffard and Benjamin (Benjamin et al., 2008; Bouffard et al., 2008) suggest that external mechanical forces may be used to reduce deposits of collagen during tissue repair and scar formation, and that a regulated mechanical load of moderate intensity may be beneficial for reducing inflammation, fibrosis and improving tissue remodelling.

Given its abdominopelvic location, the surgical scar resulting from a Pfannenstiel incision tends to be linked to different organs and systems that impact the patient's quality of life. The digestive, urinary, reproductive and locomotive (mainly the spine and pelvis) systems can potentially be affected by the presence of a scar in such a nearby location and, if so, its treatment could entail a clinical improvement of such impact. This type of scar was chosen based on its high prevalence in Spain (Taberner et al., 2005), along with post-c-section scars in order to homogenize the sample, to the maximum extent possible, in terms of patient age and sex. Furthermore, we also included scars aged over one and a half years whose remodelation phase was practically complete (Teller and White, 2009), hence, spontaneous changes should not be relevant during the course of the study.

There are several different treatment techniques used in the field of physiotherapy: laser, cryotherapy, scar massaging … Costa proposes the use of pressure to treat burn scars in order to favour the reorganization of fibrin and elastin fibres, as well as a decrease in the number of cells, similar to that observed in the final phases of normal healing processes in which fibroblasts and vascular cells are eliminated by apoptosis (Costa et al., 1999). In a bibliographic review on the role of massaging in the treatment of scars, Shin did not find clear evidence on its benefits, although its efficacy seems to be greater in postsurgical scars, the results are difficult to interpret and no evidence-based recommendations can be made (Shin and Bordeaux, 2012). In a case of cleft lip, Mc Kay found that the use of massaging techniques improved muscle strength and reduced adherences (McKay, 2014). Wilk used tensegrity massage therapy in patients who had undergone a mastectomy. He gradually worked on tissue in direct and indirect contact with the scar, improving its mobility and achieving a better location of the pain (Wilk et al., 2015).

This pilot study provides a basis for a new line of work and methods for assessing surgical scars which have completed the remodelling process. In conjunction with studies concerning myofascial injuries in urological and pelvic floor syndromes, as well as in the soft tissue of the locomotive system (FitzGerald et al., 2012; Martínez & Galán del Rio, 2013), it provides more information and aids to improve the treatment of connective tissue disorders.

MIT is a manually-applied treatment used in physiotherapy and aimed at restoring altered fascial tissue function. This method aims to remodel connective tissue through the application of different mechanical techniques. It is suggested that the quality of the extracellular matrix of the connective tissue is remodelled. Consequently, the movement dynamics of collagenous components become improved, resulting in freeing of restriction and improved motion characteristics (Pilat, 2003). Furthermore, it also causes a biochemical effect on the tissue (mechanotransduction) which aids in the remodelling process, improves elasticity (elastin) and reduces excess collagen and miofibroblasts in the keloid or hypertrophic scar area (Bouffard et al., 2008; Ingber, 2003; Pilat, 2003).

This study aims to demonstrate that the application of MIT in long-term scars results in a decrease in the thickness of the scar fold both at a deep and superficial level, as well as in an improvement of the functional activity and quality of life. To this end, it is necessary to determine the parameters that measure scar changes, the time elapsed until their onset and the techniques to be used. The authors also wish to determine which parameters used in scar ultrasounds demonstrate the existence of changes in tissue structure and how many sessions are required to prove the existence of significant changes in order to obtain relevant data for future research.

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