PM R 8 (2016) 161-168

www.pmrjournal.org

Narrative Review

Fascial Disorders: Implications for Treatment

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Abstract

In the past 15 years, multiple articles have appeared that target fascia as an important component of treatment in the field of physical medicine and rehabilitation. To better understand the possible actions of fascial treatments, there is a need to clarify the definition of fascia and how it interacts with various other structures: muscles, nerves, vessels, organs. Fascia is a tissue that occurs throughout the body. However, different kinds of fascia exist. In this narrative review, we demonstrate that symptoms related to dysfunction of the lymphatic system, superficial vein system, and thermoregulation are closely related to dysfunction involving superficial fascia. Dysfunction involving alterations in mechanical coordination, proprioception, balance, myofascial pain, and cramps are more related to deep fascia and the epimysium. Superficial fascia is obviously more superficial than the other types and contains more elastic tissue. Consequently, effective treatment can probably be achieved with light massage or with treatment modalities that use large surfaces that spread the friction in the first layers of the subcutis. The deep fasciae and the epymisium require treatment that generates enough pressure to reach the surface of muscles. For this reason, the use of small surface tools and manual deep friction with the knuckles or elbows are indicated. Due to different anatomical locations and to the qualities of the fascial tissue, it is important to recognize that different modalities of approach have to be taken into consideration when considering treatment options.

Introduction

In the past 15 years, multiple articles have appeared that target fascia as an important component of treatment in the field of physical medicine and rehabilitation [1,2]. The current research was performed on PubMed databases using keywords that contain the word "fascia" related to various noninvasive treatments. The research included articles published between 2000 and 2015 (Table 1). A total of 79 articles were surveyed. These studies varied immensely in quality. Moreover, there were no clear indications for relating symptoms to specific fascial treatment modalities. This is a very important issue that demands clarification, for the sake of the clinical specialty, for patients, and for practitioners.

The purpose of this narrative review is to clarify the physiology of fascia and its disorders to better correlate fascial symptoms with specific therapeutic approaches. The review includes articles, found in the PubMed databases in the last decade, with a clear focus in fascial anatomy and pathology. This review will facilitate discussions between clinicians and also between clinicians and the individuals who perform research in fascial treatments.

Fascia is a tissue that occurs throughout the body. However, different kinds of fasciae exist (Table 2). In any general classification system, it is important to recognize a superficial fascia, a deep (or muscular) fascia, and a visceral fascia (Figures 1-3). Numerous authors [3-5] recognize, in addition, the existence of the epimysium and perimysium within deep fasciae. Each category of fascia has specific anatomical and histological features that interact with the aforementioned structures in a very precise manner. These must be separated from each other and compared.

Literature Search Strategy

The current research was performed by A.S. on articles available only in PubMed databases using keywords that contain the word "fascia." Key words are listed in Table 1. Articles involved various noninvasive treatments with a level of evidence of II-3 or above. The research included articles published between 2000 and 2015 (Table 1). A total of 79 articles were surveyed.

1934-1482/$ - see front matter
http://dx.doi.org/10.1016/j.pmrj.2015.06.006

Table 1
Key words used and numbers of PubMed articles surveyed

Key Words	Articles (n)
Fascia treatment	2
Fascial treatment	2
Fascia therapy	7
Fascial therapy	2
Fascia technique	0
Fascial technique	2
Fascia method	0
Fascial method	2
Fascia manipulation	2
Fascial manipulation	3
Fascia relase	0
Fascial release	4
Myofascial therapy	18
Myofascial treatment	16
Myofascial release	19
Total	79

Fascial Anatomy

Superficial Fascia

According to the Italian and German schools of thought, the "superficial fascia" is a fibrous layer that divides the subcutis into a superficial and deep, loosely organized adipose-rich layer. It is formed by loosely packed interwoven collagen fibers admixed with abundant elastic fibers. Superficial fascia is present throughout the body and, according to Abu-Hijleh et al [6], has arrangements and thickness that vary according to the region of the body, to the body surface, and also to differences that exist between genders. It is thicker in the lower than in the upper extremities, on the posterior than on the anterior aspect of the body, and in females compared with males. Macroscopically, the superficial fascia appears as a well-defined membrane and can be dissected with scalpels. Microscopically, its structure is better described as multi-lamellar, or like a tightly packed honeycomb. The superficial fascia is tightly connected with superficial veins and with lymphatic vessels. Inside the superficial fascia, the subcutaneous plexus is present, which functions in thermoregulation.

Deep Fascia

The term "deep fascia" refers to all of the well-organized, dense, fibrous layers that interpenetrate and surround muscles, bones, nerves and blood vessels, binding all of these structures together into a firm, compact, continuous mass. Over bones it is termed the periosteum; around tendons it forms the paratendon; and around vessels and nerves it forms the neurovascular sheath. Around joints it strengthens the capsules and ligaments. So, we can consider the paratendon, the neurovascular sheath, and the periosteum as particular specializations of deep fascia, not only because they are in continuity with deep fascia but also because they have the same histological features. It is possible to distinguish 2 major types of muscular fascia, according to their thickness and to their relationships with underlying muscles: the aponeurotic fasciae and the epimysial fasciae. The aponeurotic fasciae contain collagen fiber bundles that are aligned all along the main axis of the limbs. Consequently, in both longitudinal and oblique directions, the deep fasciae function like a tendon, allowing force transmission along the limbs. Another important characteristic of the aponeurotic fascia is its ability to adapt to volume variations of the underlying muscles during contraction. In the transverse direction, collagen fiber bundles are less compact and, due to the presence of loose connective tissue, are easily separated from each other. This increased motion of the collagen fiber bundles allows the aponeurotic fasciae to adapt to the volume variations of the underlying muscles, particularly since they contain so few elastic fibers.

It is apparent that the adaptability of aponeurotic fascia is based on its unique relationship with loose connective tissue. Several studies demonstrate that the aponeurotic fasciae are richly innervated (mean volume fraction, 1.2%). Abundant free and encapsulated nerve endings (including Ruffini and Pacinian corpuscles) have been found in the thoracolumbar fascia, the bicipital aponeurosis, and the various retinacula [7-12]. Nerve fibers, particularly numerous around blood vessels, are

Table 2
Description of different fascia types

Fascia Type	Anatomy	Neural Properties	Depth	Load Transmission	Treatment Profile
Superficial	Loosely packed, interwoven collagen fibers admixed with abundant elastic fibers	Pacini Rufini corpuscle and free ending nerves	From a few millimeters below the skin to the middle of the hypodermal	Low effect	Light massage with a large surface
Deep	Well-organized, dense, fibrous layers	Pacini Rufini corpuscle and free ending nerves	Inferior to the hypodermal over the epimysium	High effect	Deep manipulation with a small surface for a limited amount of gliding
Epimysial	Fibrous laminae composed of type I and III collagen fibers and elastic fibers	Relation with muscle spindles	Over the muscles	High effect in combination with the adherent muscle	Deep manipulation with a small surface for a limit amount of gliding