

**FASCIA AS AN ORGAN AND ITS IMPORTANCE
IN MANUAL OSTEOPATHY**

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INTRODUCTION

On the dissection of a human cadaver just below the subcutaneous layer there exists a glistening tissue that is slippery, tensile, and humid. This layer is expansive and covers the whole body just like a glove. Without the presence of this wrapping the muscles would not have any orientation, nor would the bones be aligned. The nerves and blood vessels would run haphazardly and the organs would fall from their locations. This tissue is known as the FASCIA.

HISTORICAL PERSPECTIVES

For Dr. Andrew Taylor Still (1828-1917) medicine was a profession that brought much sadness to his life, as he could not prevent the demise of his three children afflicted of meningitis. Even then as a preacher and a physician he continued on his profession by serving the humanity in the western frontier regions of the USA. As the medical professionals usually are he was highly observant of this tissue that was not so important during dissection. He decided to make this tissue the cornerstone of his profession. He wrote the following comments about this tissue:

- 1) “ The soul of man, with all the streams of pure living water, seems to dwell in the fascia of his body”.
- 2) “ The connecting substance must be free at all parts to receive and discharge all fluids, and then use them in sustaining animal life, and eject all impurities, that health may not be impaired by dead or poisonous fluids”.
- 3) “ By its action we live and by its failure we die”.

As the founder of the Osteopathic philosophy Dr. Still made some primary correlations of general anatomy and fascia and these were as follows:

- a) That fascia envelops and extends from hand to toe, front to back surrounding every blood vessel, every nerve, every bone and every muscle.
- b) That fascia changes its thickness as it travels from one portion of the body to another.
- c) All nerves terminate in this system.

In the times of Dr. Still the medical science was very much based upon Anatomy, and not so oriented towards Biochemistry and Pharmacology. “ By 1892 at the age of 64 Dr. Still started teaching formally. His initial intention was to enhance the study of medicine, surgery and obstetrics. He was not in favor of drugs, as most of the pharmacologic agents of the day were toxic and ineffective.” (1)

The forward thinking of this anatomical concept is only now coming to greater relevance, because the Scientists, Osteopathic practitioners and the DO physicians, are focusing in on the physiological, architectural and pathological aspects of this membrane as an organ system.

IMPORTANCE TO OSTEOPATHY

Microscopical analysis of the fascia reveals that this layer is composed of elastic tissue formed of collagen and elastin. These compounds are arranged in a micro tubular fashion that acts as scaffold for the blood vessels along with other substances such as the ground substance (Hyaluronon) and interstitial fluids. These microtubules transport fluid from one section to another. If there is a traumatic interruption of the fascia the healing responses fibrose the normal structure thereby twisting and bending the collagen matrix. This forms an injury pattern and the normal exchange of fluids is interrupted and this in turn forms a compartment syndrome. As this tissue is known to have a major number of sensory and proprioceptive nerve endings, the pain stimulus of the accumulated fluids in the compartment syndrome is transmitted along the fascial planes. This phenomenon is known as the fascial drag. This has been the basis of myofascial trigger points and the treatment method of myofascial release.

This concept fulfills the osteopathic view that the “human body is unity of functions” and that the osteopathic methods of treatment are based upon the mentioned premise. Osteopathic treatments unravel these fascial strains, re-establishing the fluid continuity throughout the body; and by doing so comply with the third comment of Dr. Still.

TENSEGRITY THEORY

The fascia is also an important concept to the architecture of the human body by the tensegrity or the biotensegrity model, which states the following:

“model states that the cells, tissues and other biological structures at smaller and larger size scales in the hierarchy of life gain their shape stability and their ability to exhibit integrated mechanical behavior through use of structural principle of tensegrity architecture”. (2)

The same original author Ingber was again quoted regarding how the cells might sense the microgravity, of which computer animated studies provide direct support and they are the following:

- ***Physical forces (e.g. gravity), hemodynamic stresses and movement, play a critical role in tissue development and remodeling.***
- ***Using tensegrity architecture, cell sense and transduce mechanical signals into chemical responses.***
- ***Hardwired cytoskeletal filament networks allow immediate cell response to external mechanical stresses- mechanically coupling cell surface receptors (Integrin) to nuclear matrix scaffold, mechanochemical and mechano-electrical transducing molecules.***
- ***Changes in cytoskeletal tension (prestress) may also play a role in signal amplification and adaptation.*** (3)

This tensegrity is like the state of structural and functional continuity between all of the body's hard and soft tissues, with the fascia being the ubiquitous elastic, plastic, gluey component that invests, supports and separates, connects and divides, wraps and gives cohesion, to the rest of the body. Any tendency to think of a local dysfunction to be an isolated incident is erroneous because the fascia forms a complex, interrelated, symbiotically functioning assortment of tissues comprising of skin, muscles, ligaments, tendons and bones as well as the neural structures, blood and lymph channels and vessels that bisect and invests these tissues; thereby giving them shape, form and functional ability. (4)

The above mentioned was proven by the article of the study done by Garfin et al in 1981; here the effect of fasciotomy on muscle tension on thirteen dogs hind limbs were measured with recorded 50% decrease in force. This also furthermore raised questions about the merits of performing fasciotomy for athletes with compartment syndromes, and possibly enhancing the arguments of myofascial release techniques of Osteopathy. (5)

The biotensegrity factor is also applicable in the measure of stress and strain thresholds of the human fascia, and this has been observed in the study cited herein, where collagen bundles (Fascia) did not significantly differ from the corresponding values for the isolated tendons and tendon –bone preparation.(6)

This study demonstrated the fascial tissue being resilient against stress and strain but due to the high number of sensory nerve ending terminating within it this; the stress and strain is also the etiological factor of the cause of trigger points and pain foci.

MYOFASCIAL THEORY

The structural formation of the fascia is that the “ subcutaneous tissue divides into two the superficial and the deep fibro-adipose layers by the superficial fascia, and the deep fascia which envelops the muscles of the body, showing different regional characteristics. Under the deep fascia is the epimysium mainly occurring in the limbs and the trunk. The skin ligaments connect the superficial fascia to the skin and also to the deep fascia forming a three-dimensional network among the fat lobules. The typical features of the superficial and deep fascia and their relationship to the nerves, vessels and muscles”. This may highlight the possible role of the deep fascia in proprioception and peripheral motor coordination. The cited article includes imaging techniques and this knowledge may contribute to the osteopathic practitioner an understanding of the myofascial system and the role that the deep fascia may play in the musculoskeletal dysfunctions such as in trauma. (7)

The dysfunction, which is the disrupted collagen and elastin framework, is noted by palpation of the tissue. The scar formation may be considered active if at least one of the layers does not move in harmony with the rest i.e. if resistance to passive movement in at least one direction can be palpated.

CONCLUSION

The multifaceted characteristic of the fascia is lost on the anatomical dissection table by the use of the scalpel and the hurry to discover the muscles, bones, organs etc. “ Fascia is a connective tissue organized as a three dimensional network that surrounds, supports, suspends, protects, connects and divides the muscular, skeletal, and visceral components of the body. Studies suggest that fascia reorganizes itself along the lines of tension imposed or expressed in the body and in the ways that may cause restriction that are body wide. This may potentially create stress on any structure enveloped by fascia itself, with consequent mechanical and physiological effects. From an osteopathic perspective, fascial techniques aim to release such tensions, decrease pain, and restore function”. The efficacy and the importance of the fascial component of osteopathic assessment and treatment utilizing mechanism of fascial technique is based on various studies as seen in this article that have looked into the plastic, viscoelastic and piezoelectric properties of this connective tissue. (8)

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