Fascial Waves Transmit Forces to Distant Points

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BACKGROUND  Pain over the distal tibia was relieved by massage of the proximal anterior tibialis muscle with a FAKTR instrument. Waves move in a sinusoidal pattern through air, liquid, and solids[1]. Hypothesis: Fascial waves are transmitted to pain receptors in distant fascia and periosteum.

Methods

METHODS  Ex vivo: The circumferential dense fascia of the calf of a dead chicken was dissected and suspended between two binder clips. It was connected by a balloon filled with water to a liquid-to-electrical transducer. The membrane secured to screws was placed in an electrical switch container; the transducer balloon was placed under the membrane at the distal end. Waves were induced in this dense fascial membrane using a two millimeter extension of a tire tread gauge. Waves were induced in this dense fascial membrane at one centimeter increments from the transducer balloon. Pressure (Force/Area) applied by an arrow vector (the end of a one-dimensional line) can be transmitted to a membrane covector (a two-dimensional plane) and then from the membrane to the balloon receptor to the electrical signal transducer. The waves reach the receptor with variability secondary to the input depression and the amplitude, position, and time that the sine wave contacts the balloon by the wave equation:  

\[ y(x,t) = A \sin(kx + wt) \]  

Results

RESULTS  (1) Depression of the fascia transmitted a wave to the transducer balloon to create a wave on the oscilloscope. (2) The amplitude of the wave decreased with distance from the balloon (n = 23, 1 cm: 19 +/- SD 2.3, 2 cm: 13.2 +/- SD 2.3, 3 cm: 8.9 +/- SD 2.1). (3) Increasing the tension on the fascia decreased the amplitude of the wave (n=8, baseline: 26.1 cm +/- 3.3; n=8, tension: 16.5cm +/- 3.2).

Conclusion

CONCLUSIONS  (1) Waves are transmitted in fascia to distant points. (2) Dense fascia has a greater tensile strength than muscle to transmit waves. (3) Pain receptors in fascia may be stimulated at a distance by the waves [2]. (4) The waves may be transmitted from the fascia of the muscle to the fascia of the bone by interfascial connections [3].

References