The Effect of Therapeutic Ultrasound and Instrument Assisted Soft Tissue Mobilization on Muscle Contraction of the Lumbar Multifidi Measured by Ultrasound Imaging

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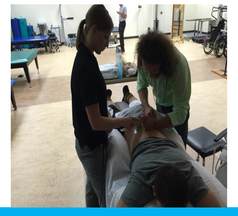
INTRODUCTION

Therapeutic ultrasound (US) and Instrument Assisted Soft Tissue Mobilization (IASTM) are respected modalities within the physical therapy community. Therapeutic US has been used for nearly a decade and has gained popularity world wide (Morrisette et al. 2004). According to the Graston Technique website, IASTM is a relatively new modality rapidly becoming accepted by numerous therapist. Both of these modalities have been used to treat a variety of pathologies in conjunction with other types of treatments. However, to our knowledge neither one has tested the immediate effects on the contractibility of the lumbar multifidus muscles.



PURPOSE

To use diagnostic ultrasound imaging to measure the height, width, cross-sectional area, and circumference of the L5 multifidus before and after therapeutic ultrasound and IASTM treatment.

PARTICIPANTS

25 healthy individuals (11 male, 14 female) ages 18-45 years. No history of current of previous episodes of low back pain, no prior spinal surgeries, and no history of spinal deformities, neuromuscular conditions, joint disease, malignant tissue, or current pregnancy.

Gender	Age					
	18-24	25-29	30-34	35-49	40-45	46+
Male	5	5	1	0	0	0
Female	7	5	0	1	1	0

METHODS

Study Design

- Quasi Experimental Design

Intervention

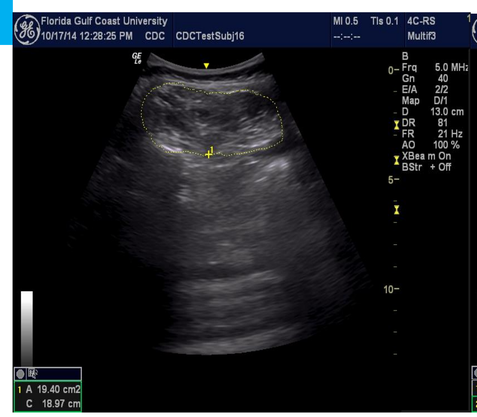
- Participants were treated with 10 minutes of therapeutic ultrasound on the right L5 multifidus with the following parameters: 1-MHz continuous ultrasound at an intensity of 2.0 W/cm2. During the final 2 minutes of US, participants were also treated with Graston on the left L5 multifidus.

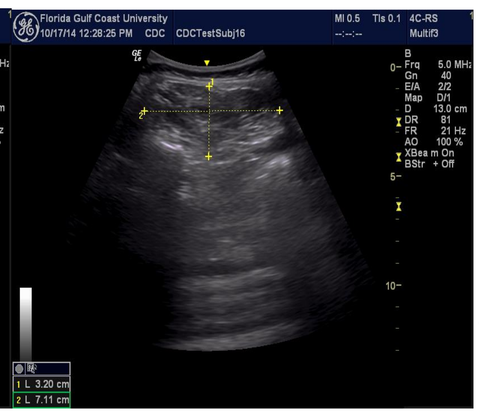
Main Outcome Measures

- Height, width, cross-sectional area, and circumference of the left and right L5 multifidi were measured in both a relaxed and contracted state prior to and following treatment. Three images were taken in each state and the averages were used for data analysis.

DATA ANALYSIS

- Data was analyzed using the IBM SPSS Statistics Software
- Paired t-tests were performed to determine the statistical significance of the difference in measurements before and after US and IASTM treatment.
- Reliability tests were performed to determine the intra-rater repeated measure reliability.





RESULTS

Significance level was set at 0.05 with a 95% CI and there was no significant difference between the pre and post height, width, cross-sectional area, and circumference in the relaxed or contracted states.

Intra-rater Repeated Single Measures Intraclass Correlation Coefficient Pretreatment and Post Treatment Ranges

	Height	Width	Cross-sectional Area	Circumference
Relaxed Therapeutic US	0.910-0.927	0.870-0.898	0.952-0.971	0.915-0.961
Contracted Therapeutic US	0.894-0.952	0.810-0.887	0.945-0.974	0.916-0.939
Relaxed IASTM	0.905-0.931	0.888-0.924	0.963-0.964	0.929-0.939
Contracted IASTM	0.902-0.936	0.867-0.901	0.962-0.967	0.934-0.959

Intraclass correlation coefficient ranged from 0.810 to 0.974

DISCUSSION

- This study found that when using diagnostic US, one can reliably measure the height, width, circumference, and cross-sectional area of the lumbar multifidus muscles.
- No significant difference in cross-sectional area was found when comparing pretreatment and immediate post treatment measures at the L5 multifidus for either treatment. This is clinically important as it demonstrates that there are no significant immediate benefits to either of these treatments.
- More research is needed to look at long term effects over various amounts of time and multiple treatment sessions.
- Limitations: small sample size, limited representation of general population, no control group.