

Blood Flow Restriction Training for the Rotator Cuff: A Randomized Controlled Trial

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INTRODUCTION

Blood flow restriction (BFR) training utilizes a tourniquet to occlude blood flow during exercise.

Low-load exercise with BFR can increase strength and muscular cross-sectional area (CSA) similar to training at a higher intensity (1).



Figure 1. Sidelying ER Exercise with Proximal Application of BFR Cuff

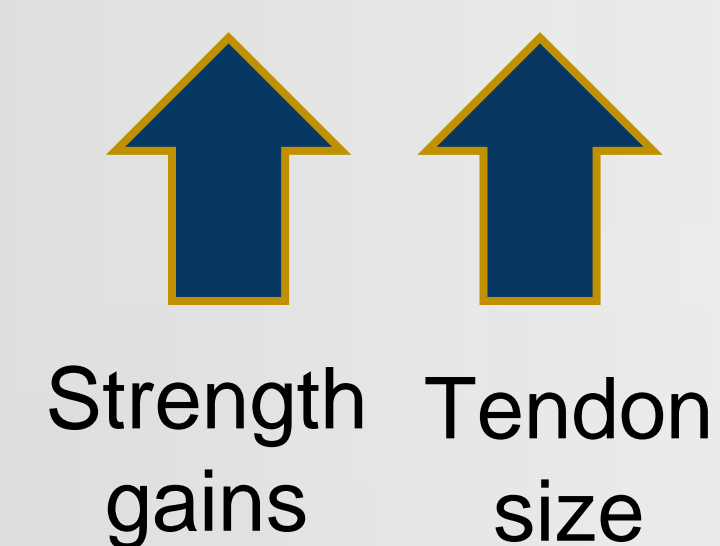
Gains in strength and CSA have also been seen in muscles proximal to BFR cuff application (2,3).

However, the benefits of applying BFR to the proximal upper extremity (UE) when performing an exercise for the rotator cuff is unknown.

PURPOSE

To compare strength gains of the supraspinatus and external rotators, and changes in tendon size of the supraspinatus after performing sidelying external rotation (ER) exercise with or without BFR.

Hypothesis:
BFR will have:



MATERIALS & METHODS

46 healthy subjects (mean age 25.0 ± 2.2)

Exclusion criteria:

- > under age of 18
- > current neck/shoulder pathology
- > current thoracic spine pathology
- > shoulder surgery within last 12 months
- > cervical/thoracic surgery during prior year
- > contraindications for BFR training

BFR
(LOP 50%)
n=24

Non- BFR
n=22

1RM
(0.033reps)
RepWt + Rep
Wt. (4).

MMT Test-
retest reliability
SS = 0.985
ER = 0.942

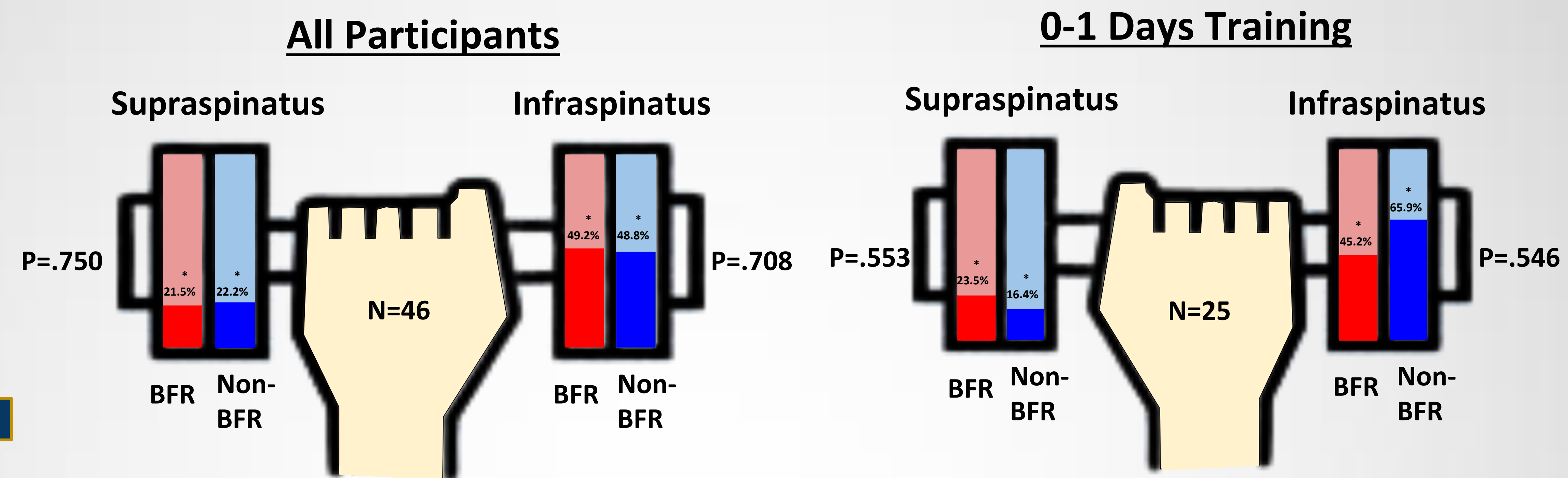
Ultrasound

Training Protocol:

- o Sidelying ER exercise (Figure 1)
- o 4 sets (30/15/15/15 reps; 30 sec rest between sets, w/ or w/out BFR)
- o 2 times/week for 8 weeks
- o 30% of 1RM with dominant UE.

RESULTS

Percentage strength gains from pre to post-testing



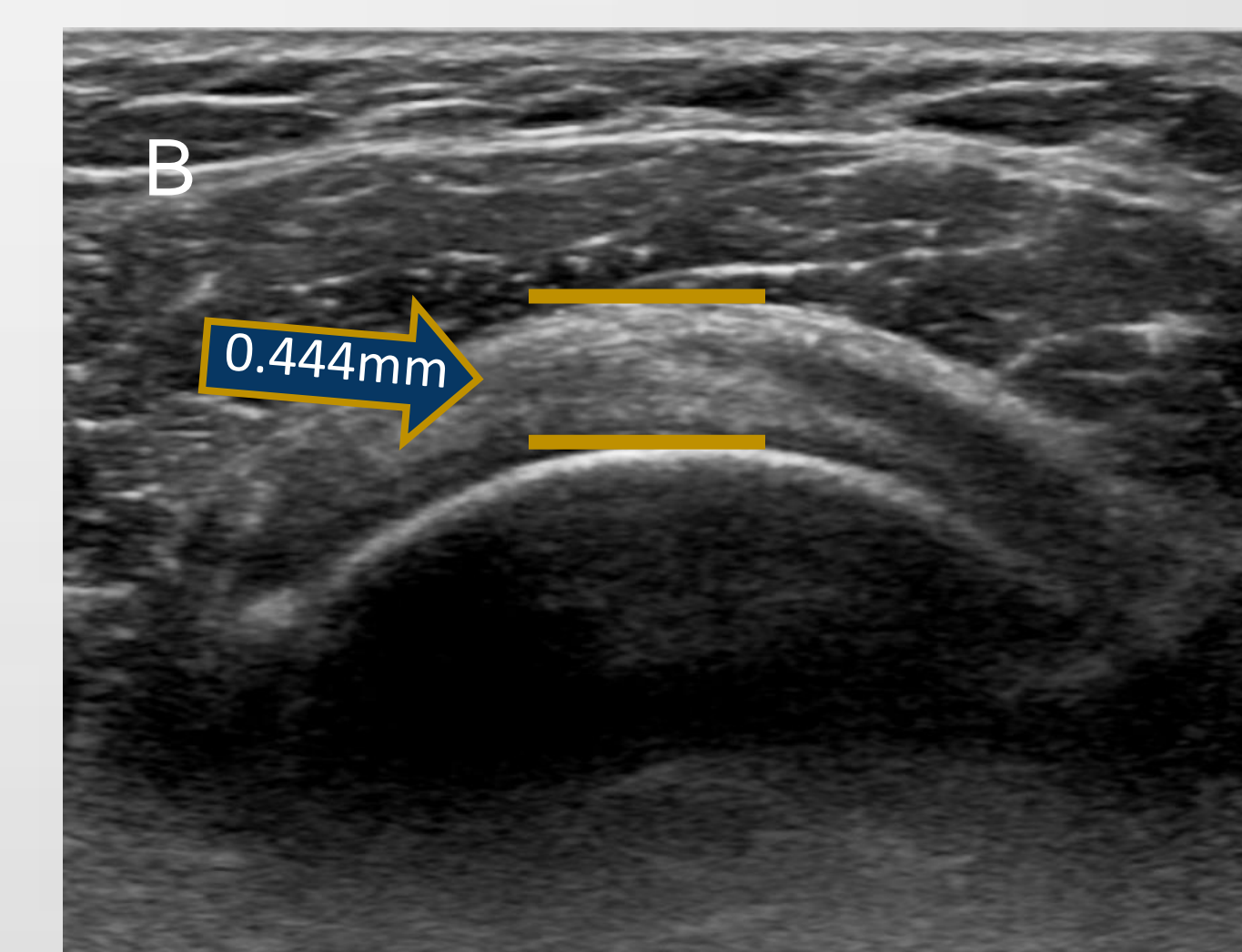
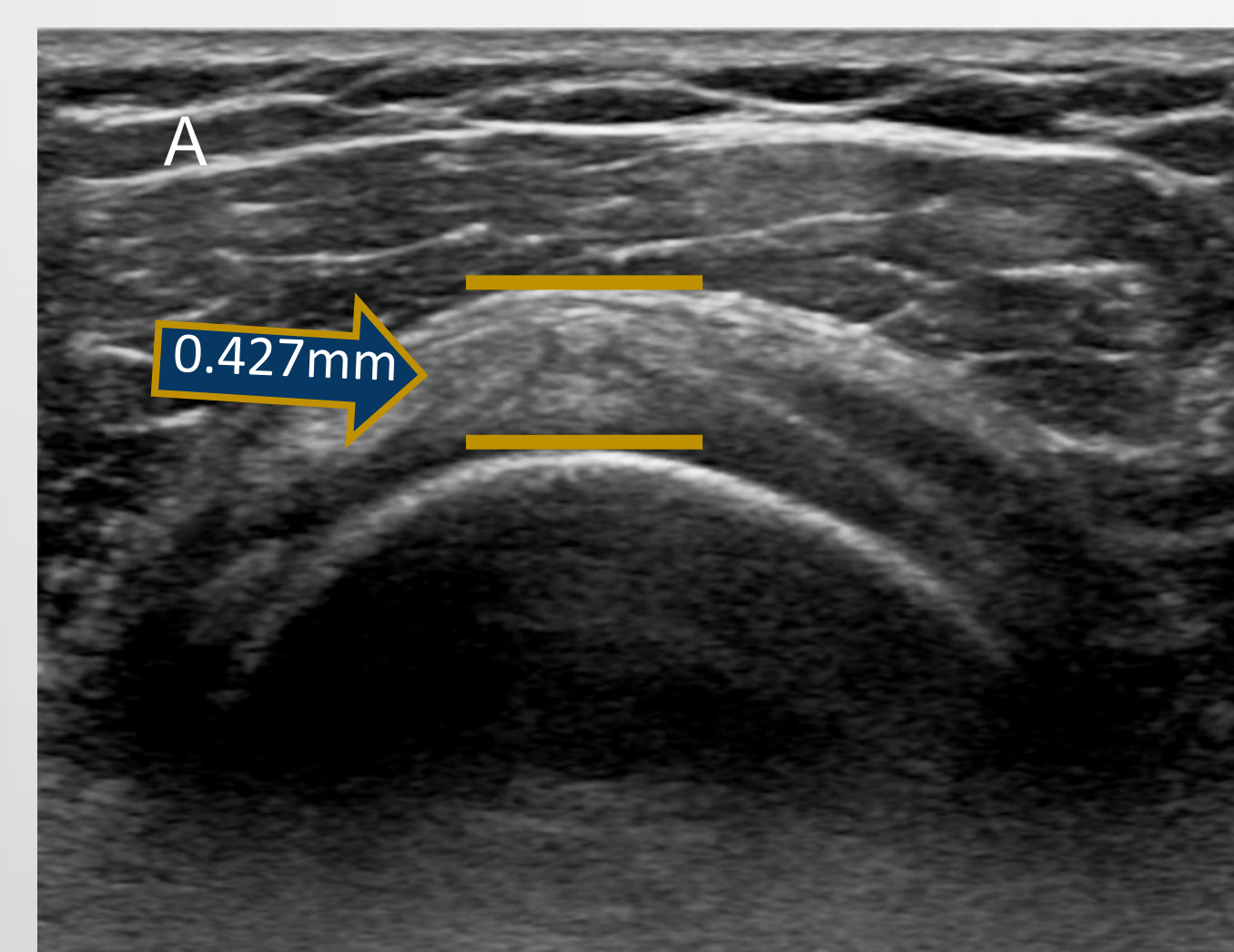
Increase in Supraspinatus tendon thickness Pre to Post-Testing

Within-group differences:

ER Only
P = 0.011*

BFR +ER
P = 0.041*

Between group difference:
P = 0.610



Figures 2A & 2B. A) Pretest US Image of Supraspinatus; B) Posttest US Image of Supraspinatus 23 year old female subject (BFR group)

RESULTS CONTINUED

- Both groups experienced significant strength gains (p = 0.000; p = 0.000) in the supraspinatus and the shoulder external rotators, but no difference between groups.
- Same relationship in subjects who infrequently performed shoulder exercises.
- Supraspinatus tendon size increased for both groups, but no difference between groups.

DISCUSSION/CONCLUSION

- No difference between groups for strength or tendon size.
- Proximal application of BFR did not augment gains.
- Results may be due to subject population (i.e., trained individuals) and/or proximal UE cuff application did not cause a systemic response.
- Take home message: BFR, just like any other intervention, is not applicable to every scenario

LITERATURE CITED

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