

THE HISTOLOGIC CHARACTERIZATION OF LEVATOR ANI MUSCLE IN WOMEN WITH PELVIC ORGAN PROLAPSE

Hypothesis / aims of study

To determine slow twitch muscle fiber (STF) and fast twitch muscle fiber (FTF) composition of the levator ani muscle (LAM) in women with different stages of pelvic organ prolapse.

Study design, materials and methods

This was a cross-sectional study sampling women presenting for surgery in the division of Female Pelvic Medicine and Reconstructive Surgery with varying stages of prolapse from July 2013 to December 2015. A 3-dimensional endovaginal ultrasound was performed and two ultrasound guided LAM biopsies were taken in the operating room prior to the planned surgical procedure. All samples underwent chemostaining to identify FTF and STF per a previously-derived protocol. Under microscopic examination, a survey of the entire specimen was performed and two areas with the most muscle dense areas visualized were identified and the muscle bodies were manually counted (Figure 1). The primary endpoints were the average number of FTF and STF per high powered field. The secondary endpoints were the total number of all muscle fibers and the ratio of STF to FTF. Continuous variables were compared with t-tests; categorical variables were compared using chi-square or Fisher's exact test as appropriate. Ordinal data was compared using the Mantel-Haenszel test. An ANOVA or non-parametric Kruskal-Wallis test was used to make comparisons for the continuous variables if there were more than two groups.

Results

A total of sixty patients were consented and enrolled in this study. The mean age of the patients was 57 years (SD \pm 12.4) with mean BMI of 28.7 kg/m² (SD \pm 5.6). Seventy-two percent of participants were post-menopausal, and 17% were receiving some form of hormone replacement therapy. The age of the patients differed significantly by the stage of prolapse (p = <0.0001). Additionally, there was a significant difference noted between stage of prolapse and menopausal status (p = 0.01).

A total of 114 individual muscle specimens were reviewed microscopically, 58 samples from the left and 56 samples from the right. Thirteen samples on the left and twenty-five samples on the right contained no muscle bodies and were given a score of zero. There was no significant difference found between FTF counts, STF counts, total muscle fiber counts and the stage of prolapse. A paired t-test showed no significant difference between the right and left side of muscle in regards to the FTF, STF, and total muscle body counts (p = 0.75, 0.70, and 0.96, respectively). The muscle types were then evaluated by comparing the number of STF to the number of FTF. The overall mean ratio for all the samples was 4.92. There was no significant difference between the mean values of the ratio of STF to FTF by stage of prolapse (p = 0.30).

Interpretation of results

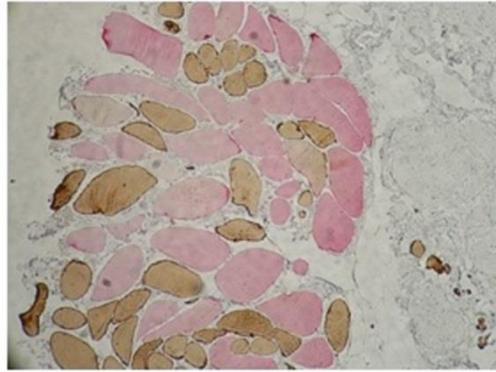
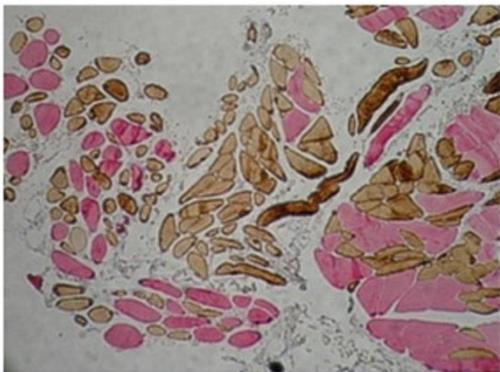
In this study population, there was no difference in the muscle fiber composition by stage of prolapse.

Concluding message

There was not difference in muscle fiber counts in patients with different stages of prolapse. Histologic slides can be analyzed in a many ways and alternative method may lead to a differing results.

Figure 1a and b: Examples of LA muscles stained for FT and ST muscle. FTF are stained pink and STF are stained brown.

A) Muscle of a patient with stage 0 prolapse. B) Muscle of patient with stage 4 prolapse.



Disclosures

Funding: None **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** Internal Review Board **Helsinki:** Yes **Informed Consent:** Yes