

3-D ULTRASOUND OF THE PELVIC FLOOR: EFFECTS OF AGE ON THE LEVATOR ANI MUSCLE OF NULLIPAROUS WOMEN

Hypothesis / aims of study

To determine if changes in levator ani on 3-D endovaginal ultrasound are associated with aging in nulliparous women.

Study design, materials and methods

Eighty community-dwelling nulliparous females, ages 21-70, were recruited through campus advertising in this IRB approved study. Exclusion criteria included previous urinary incontinence or pelvic organ prolapse surgery, diagnosis of reproductive tract abnormality, and history of previous pelvic floor radiation. A standardized examination was performed, including height, weight, and pelvic floor support assessment by using the pelvic organ prolapse quantification system (POP-Q). BMI was calculated. All participants underwent a 3-D endovaginal ultrasound (3D EVUS) (BK Medical Peabody, MA) at the study visit. The 3D EVUS technique has been described previously by our group, showing excellent interrater reliability. A scoring system was previously developed according to the morphology and clarity of the each subdivision's origin-insertion points. Subdivisions of interest included the puboperinealis, puboanalis, pubococcygeous, puborectalis and ileococcygeous muscles. Levator ani muscle defects were graded as: no muscle damage (0), mild abnormality of muscle (1), moderate abnormality of muscle (2), and complete muscle loss (3). Ultrasound images were read by two independent reviewers blinded to patient age (LHQ and SAS) and other clinical variables. Assuming an alpha of .05, beta of .20 we estimated a 30% difference when comparing younger to older women requires 38 subjects in each group. To account for possible subject dropouts, we recruited a total of 40 subjects in each group. Participants were further categorized into levator ani abnormality (ALA) or "normal" levator ani (NLA) by ultrasound measurement. T-tests, Chi square or Fisher exact test, were performed where appropriate. Logistic regression was performed to evaluate variables associated with increased odds of worse levator ani scores.

Results

Mean age was 44.6 + 13.5 years. Women in the NLA group were significantly younger than those in the ALA group (p=0.001). Univariate analysis showed no significant differences between groups pertaining to menopausal status, hormone replacement, smoking, BMI, race or medical history. POP-Q did not differ between groups. Unadjusted logistic regression showed increased odds of having abnormal anatomy with increasing age (OR 1.06, 95% CI 1.022, 1.102); In this analysis, menopausal status doubled the odds of having abnormal levator ani anatomy on 3D EVUS (OR 2.802, 95% CI 1.005, 7.810). When age and age by menopause were incorporated in the logistic regression model, age remained a significant predictor of having abnormal anatomy on 3D EVUS (likelihood ratio 0.06, 95% CI 0.012, 0.113). No other factors were associated with increasing odds of having abnormal levator ani anatomy as assessed by 3D EVUS.

Interpretation of results

Age was weakly associated with increased odds of having an abnormality of the levator ani on 3D EVUS. Race, BMI, smoking, hormone replacement and medical history were not associated with worse levator ani scores in our study.

Concluding message

This study emphasized the importance assessing and improving modifiable risk factors contributing to levator ani abnormalities.

Specify source of funding or grant	OU College of Medicine Alumni Association Research Scholar Grant
Is this a clinical trial?	Yes
Is this study registered in a public clinical trials registry?	No
Is this a Randomised Controlled Trial (RCT)?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	OUHSC Institutional Review Board
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes