

## LEVATOR ANI MUSCLE STRUCTURE AND FUNCTION IN WOMEN WITH PROLAPSE COMPARED TO WOMEN WITH NORMAL SUPPORT

### Aims of Study

It has been hypothesized that damage to the levator ani muscles is associated with pelvic organ prolapse. The relative magnitude of this association and the degree of muscle damage and weakness, however, is unknown. This study was undertaken to test the null hypothesis that the levator ani muscles of women with symptomatic pelvic organ prolapse have the same 1) function and 2) structure as women with normal support (controls). In addition, we sought to evaluate whether the severity of levator ani muscle damage is different in the two groups.

### Methods

We recruited 2 groups of women who signed informed consent to participate in this IRB approved study. Cases (n=102) were women with symptomatic pelvic organ prolapse ("Prolapse") where the cervix or vaginal wall descended at least 1 cm *below* the hymenal ring using the POP-Q system. Controls (n=110) were asymptomatic women matched for age with no point of the vaginal wall or cervix lower than 1 cm *above* the hymen (Table). (N.B. Women with descent between these points were not included because experts differ in their opinion of whether they have prolapse or not.)

Women with prior surgery for pelvic floor dysfunction were excluded from the study. The increase in force generated by the levator muscle during maximum pelvic muscle contraction was recorded using an instrumented vaginal speculum in Newtons (N). Multiplanar proton density MRI scans at 5 mm intervals in the supine position were performed. The degree of muscle loss in the pubococcygeal portion of the levator ani muscle was quantified separately for the left and right muscle by examiners blinded to the subject's clinical findings. A scale from 0 to 3 was used for each muscle with 0 representing no muscle loss and 3 representing complete loss of the pubococcygeal portion of the levator ani muscle. Scores for the left and right muscle were summed resulting in a possible combined score from 0 to 6. The degree of muscle loss was classified as follows: 0 = none, 1 to 3 = minor, 4 to 6 = major.

### Results

Women with pelvic organ prolapse generated 43% less maximum levator ani force than controls ( $p < 0.05$ ) (Table). The graph shows the percentage of women in each group with no levator loss ("none"), minor loss and major loss. Women with prolapse were 2.5 times more likely to have major loss of the pubococcygeus than controls. The reverse was true for those with no damage. Women with minor loss were the same in both groups.

	<b>Prolapse</b> n=102	<b>Control</b> N=110
Mean (SD)		
Age in years	57.1 (12.5)	55.2 (12.7)
Parity	3.1 (1.8)	2.4 (1.5)
BMI	26.4 (5.0)	26.5 (4.8)
LA Force (N)	2.1 (1.5)	3.7* (2.3)

### Conclusion

Women with pelvic organ prolapse are 2.5 times more likely to have major levator ani muscle loss and generate 43% less force during a maximal pelvic muscle contraction than age matched women with normal support. Comment: Earlier studies have identified that this type of levator ani muscle damage occurs as a result of vaginal birth [1]. This report links this birth-related damage to pelvic organ prolapse.

### References

1. The appearance of levator ani muscle abnormalities in magnetic resonance images after vaginal delivery. *Obstet Gynecol* 2003;101:46-53.

