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RESTORATION OF CONTINENCE BY PESSARIES - MRI ASSESSMENT OF MECHANISM OF ACTION

Hypothesis / aims of study: Incontinence pessaries restore continence by providing a backstop for the posterior urethra. This study's specific aim was to use dynamic Magnetic Resonance Imaging (MRI) to determine if pessaries which restore continence stabilize the posterior urethra during episodes of increased intra-abdominal pressure

Study design, materials and methods: Women with stress incontinence that subjectively improved with incontinence pessary use were eligible for study. Subjects who had stress urinary incontinence confirmed by urodynamic testing were candidates for MRI evaluation. MRI evaluation included imaging both with and without an incontinence dish pessary in place. Imaging was performed on a 1.5 Tesla MRI using static and dynamic T2 weighted imaging and a single shot gradient echo cine sequence performed during voluntary cough. Based on previous work [1] we calculated that to achieve 80% power with α =.05 using a paired t-test, nineteen subjects would be needed to detect a .35 cm change in distance of the bladder neck above the pubococcygeal line following pessary placement. In addition to MRI all patients also underwent urodynamic testing with and without an incontinence dish pessary in place.

Results: Fifteen women were enrolled in this study. The median age of the subjects was 52 years (range 31-65), median parity was two (range 0-6), and median BMI was 26 (range 20-49). All women had ≤ Stage II prolapse based on the Pelvic Organ Prolapse Quantitation (POP-Q) system. Although four women (27%) had previously had hysterectomies, only one (7%) had a prior incontinence procedure, and none had prior prolapse surgery.

In this group of women insertion of the incontinence dish pessary resulted in a decrease in the posterior urethro-vesical angle from 175±8 (SEM) to 130±6 degrees with Valsalva, P<.001. Pessary placement also increased the distance maintained by the bladder neck above the pubococcygeal line during Valsalva from -0.3 ± 0.3 cm to 0 .8± 0.3 cm, P<.001, and maintained greater total urethral length during Valsalva, 3.0±0.1 cm vs. 2.4 ±0.2 cm, P =.02. Funnelling of the bladder neck occurred with cough in the majority of patients without pessary use (14/15=93%), but in only 3/15 (20%) patients with the pessary in place, P=.001.

Urodynamic testing showed the mean maximal urine flow rate to decline from 31±4 to 19±2 cc/second, P=.001, after pessary placement. This was accompanied by a rise in detrusor pressure from 28±4 to 51±8 cm of water, P=.001.

Interpretation of results: Restoration of urinary continence by placement of an incontinence dish pessary is associated with diminished descent of the bladder neck, maintenance of urethral length, a decreased posterior urethro-vesical angle and elimination of funnelling during increased intra-abdominal pressure. The latter two findings are most supportive of the backstop theory of incontinence.

This does not exclude other mechanisms of continence restoration. For example, maintenance of elevation of the bladder neck with pessary placement is consistent with Enhorning's theory. Additionally, pessary related decreases in maximal urine flow rates and increases in detrusor pressures are evidence of increased resistance to urine flow that could be caused by the pessary applying non-physiologic extrinsic pressure upon the posterior urethra.

Concluding message: MRI findings following restoration of continence from incontinence dish pessary placement are consistent with the backstop theory of continence but do not exclude other potential mechanisms. Analysis of patients with continued incontinence despite pessary use may better determine whether stabilization of the urethra or increased resistance to urine flow is responsible for restoration of continence.

References: 1. Am J Obstet Gynecol. 2001(185):11-19

Illustrations:

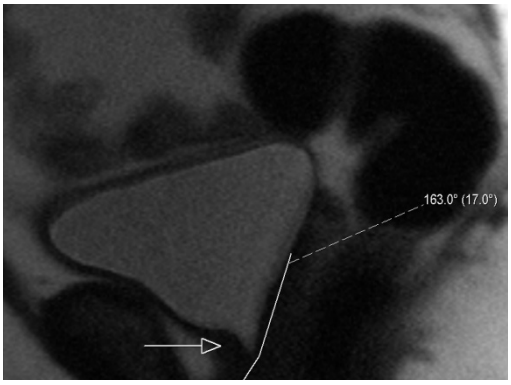

Figure 1A: Dynamic T2W MRI w/Valsalva without pessary. Posterior urethro-vesical angle measurement (arrow points to funneling)

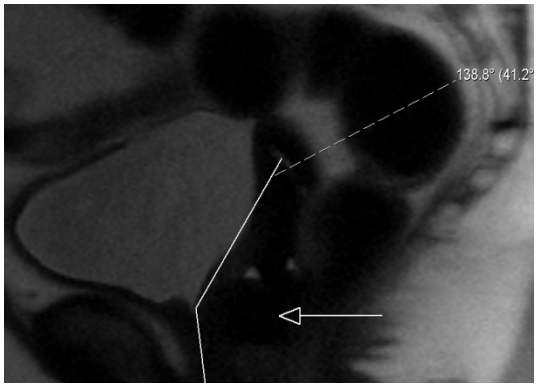

Figure 1B: Dynamic T2W MRI w/Valsalva with pessary (arrow points to knob) Posterior urethro-vesical angle measurement

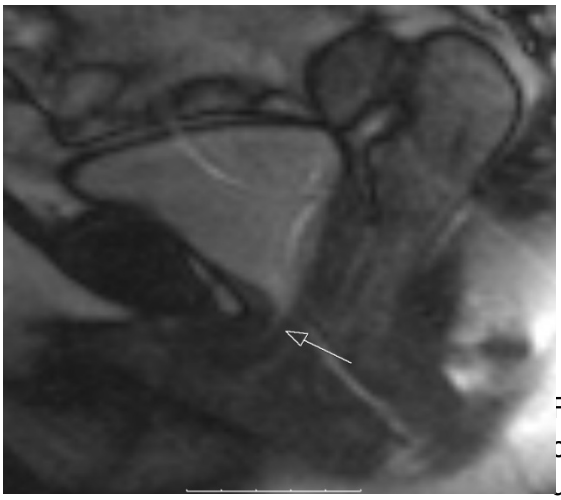

Figure 2A: Frame f
cough without pess
urine leakage & fur

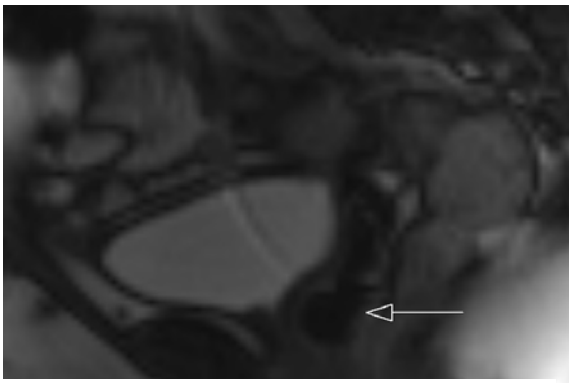

Figure 2B: Frame from cine MRI with cough with pessary (arrow points to pessary knob)

Figure 3: Incontinence Dish Pessaries (arrow = knob)

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HUMAN SUBJECTS: **This study was approved by the Univ of New Mexico Human Research Review Committee; #04-095 and followed the Declaration of Helsinki Informed consent was obtained from the patients.**