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MAXIMUM URETHRAL CLOSURE PRESSURE IN CONTINENT AND INCONTINENT WOMEN: ANALYSIS OF 8,987 CASES

Hypothesis / aims of study:
Urinary continence requires a competent urethral closure mechanism at rest. For stress incontinence to occur, any increase in intra-abdominal pressure has to overcome the urethral closure mechanism. At present, data suggest there is considerable overlap between urethral closure pressures in continent and incontinent women [1]. Our aim was to study maximum urethral closure pressure (MUCP) in different urodynamically proven conditions i.e.urodynamic stress incontinence (USI), detrusor overactivity incontinence (DOI), USI+DOI and normal studies, and to determine the effects of age on MUCP in these study groups.

Study design, materials and methods:
Retrospective review of 8,987 women aged 20 years or more who had urodynamics for the above, non-neurological conditions between 1995 and 2006. Urethral pressure profilometry was done by the technique described by Brown and Wickham [2]. Mean and confidence intervals are reported where appropriate. Chi-square tests were used where indicated with Yates' correction. ANOVA was used to analyse the difference between groups.

Results:
We identified 3,214 women with urodynamic stress incontinence (USI), 2,738 women with detrusor overactivity-incontinence (DOI), 1,884 women with both USI and DOI, and 1,151 women with a normal study. Women with normal studies were slightly younger (49 years) than women with other diagnoses (52-54 years). The population studied was predominantly white.
Maximum urethral closure pressure (MUCP) at rest was significantly lower in women with USI (48, 95% CI 47-49) and a combined diagnosis of USI and DOI (51, 95% CI 50-52) than women with DOI (64, 95% CI 63-65) and women with normal studies (67, 95% CI 65-68) (ANOVA, P=0.000, R-Squared=0.1086).
We stratified MUCP with regards to age in all four study groups (table1). There were significant differences in MUCP between the USI (P=0.000), USI+DOI group (P=0.0097) versus the DOI alone and continent women groups, across all age ranges (ANOVA,R-squared=0.3447). The highest difference in MUCP was 20 cm H2O in younger women (20-39 years) and 10 cmH2O in older women (70+ years).
We analysed the prevalence of MUCP ≤20 cm H2O in the study groups. MUCP ≤20 cm H2O was found in 5.8% of women with USI, 3.8% of women with USI+DOI, 2.2% of women with DOI alone, and 1.4% of normal continent women. MUCP ≤20 cm H2O occurred four times more frequently in women with USI (OR4.42 95%CI 2.64-7.40, P<0.001) and twice more commonly in women with USI +DOI (OR=2.82, 95% CI 1.63-4.89, P<0.001), than in women with normal urodynamic studies.
To study the influence of lower urethral closure pressure on voiding, we looked at the detrusor pressure at maximum flow (Pdet Qmax). This was again lower in women with USI (19, 95% CI 18-19.00) and combined USI and DOI (19.82, 95% CI 19.32-20.32) than women with DOI (28.63, 95% CI 28.06-29.20) and women with normal studies (25.16, 95% CI 24.48-25.85).

Table1. MUCP by age stratification

Age (years)	**USI** (n=3215)		**USI +DOI** (n=1,884)		**DOI** (n=2,738)		**CONTINENT** (n=1,155)	
	Mean 95%CI	*Median (SD)*	*Mean 95%CI*	*Median (SD)*	*Mean 95%CI*	*Median (SD)*	*Mean 95%CI*	*Median (SD)*
20-29	**71** (63-79)	68 (23)	**68** (59-77)	67 (20)	**91** (87-96)	88 (28)	**92** (86-99)	88 (31)
30-39	**61** (59-63)	61 (21)	**65** (62-68)	63 (23)	**84** (81-87)	82 (26)	**80** (77-84)	78 (24)
40-49	**54** (53-56)	44 (19)	**57** (55-59)	56 (19)	**73** (72-75)	71 (25)	**72** (69-74)	70 (23)
50-59	**48** (47-49)	46 (18)	**51** (50-53)	50 (18)	**63** (60-65)	60 (23)	**60** (58-62)	58 (20)
60-69	**39** (38-40)	38 (15)	**42** (41-44)	41 (15)	**53** (51-54)	50 (21)	**53** (50-56)	52 (19)
70-79	**32** (31-34)	31 (13)	**34** (32-36)	33 (13)	**43** (41-44)	41 (17)	**41** (38-45)	40 (15)
80-	**27** (23-30)	27 (13)	**35** (31-40)	34 (16)	**39** (35-43)	37 (17)	**40** (31-49)	35 (18)

Interpretation of results:
In our study, the MUCP was significantly lower in women with USI and USI+DOI in every decade of life beyond 20 years of age. This may reflect a pathological process independent of age. However, there was an age-related decline in MUCP in all four groups. Since the detrusor pressure during voiding indirectly reflects the bladder outlet resistance, we analysed the Pdet Qmax in all the groups. Women with USI and combined USI and DOI had lower detrusor voiding pressures compared to women with DOI alone and continent women. Our data suggest that women with USI and combined USI and DOI may have a weakness in the urethral closure mechanism at rest that predisposes them to stress leakage.

Concluding message:
In our review of nearly 9,000 women, MUCP was significantly lower in women with USI and women with USI+DOI compared with women with DOI alone and women with normal studies. This difference persisted in each decade of life.

References
1. Obstet Gynecol Surv 2001;56:720-35.
2. Br J Urol 1969;41:211-7.

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Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**
This study did not require eithics committee approval because	**It involved retrospective analysis of urodynamic studies from a database**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**