

## **“LOW-COUNT” BACTERIURIA IS MORE PREVALENT AMONG WOMEN WITH BLADDER OVERSENSITIVITY COMPARED TO DETRUSOR OVERACTIVITY AND URODYNAMIC STRESS INCONTINENCE.**

### **Hypothesis / aims of study**

Previous work has demonstrated a 10% incidence of urinary tract infection (UTI) in women attending for cystometry [1]. Another large study found UTI was more prevalent among women with detrusor overactivity (DO; 6%) compared to those with urodynamic stress incontinence (USI, 1%) [2]. All published studies on this issue have used an older microbiological threshold of  $\geq 10^5$  CFU/ml.

$10^5$  CFU/ml is now considered an insensitive threshold in women with lower urinary tract symptoms. Recent expert guidelines support the inclusion of “low-count” bacteriuria ( $10^3 - 10^5$  CFU/ml) in the microbiological assessment of acutely dysuric women [3]. The importance of “low-count” bacteriuria in women with urinary incontinence remains unclear. We aimed to document the incidence of “low-count” bacteriuria in women with urinary incontinence attending for routine urodynamic studies and to test the hypothesis that “low-count” bacteriuria is more prevalent among women with DO compared to those without urge (i.e. urodynamic stress incontinence).

### **Study design, materials and methods**

A retrospective observational study to determine the incidence of “low-count” bacteriuria in adult women with urinary incontinence. All women attending our unit for urodynamic testing have a catheter specimen of urine (CSU) taken prior to filling cystometry. This CSU was immediately refrigerated at 4°C, transported to the laboratory within 2 hours and, in collaboration with a senior microbiologist, cultured at the  $10^3$  CFU/ml threshold. Bacteriuria  $< 10^3$  CFU/ml was not considered significant.

The ICS term “bladder oversensitivity” was used at urodynamics to describe women with an early first desire to void ( $< 200$ ml) and a low maximum cystometric capacity ( $< 400$ ml), in the absence of objective DO. Historical risk factors, including age, menopausal status, sexual activity, diabetes, and history of recurrent UTI were recorded for all study participants. In addition, degree of cystocele was noted on physical examination. All peri- and post-menopausal women in our unit are treated with topical vaginal estrogen cream. Exclusion criteria were: voiding dysfunction ( $Q_{max} < 15$ ml/s and post-void residual  $\geq 100$ ml), neurogenic DO and antibiotic use within the preceding 4 weeks.

Pyuria was determined using haemocytometer counts on uncentrifuged urine specimens, with counts of  $> 10$  white blood cells (WBC)/mm<sup>3</sup> considered significant. Categorical data were analysed using Fisher’s exact test. Two-tailed p values were used throughout and the 5% level was considered significant. Preliminary sample size calculations estimated that 102 women would be required in both the DO and USI groups to achieve 80% power assuming  $\alpha = 0.05$ . Statistical analysis was performed using Statsdirect statistical package 2.7.2 (Statsdirect Ltd, Cheshire, UK).

### **Results**

Between August 2009 and March 2010, 68 eligible women with urinary incontinence were recruited. The median age of study participants was 60 years (inter-quartile range [IQR] 48-67 years). The overall incidence of “low-count” bacteriuria on CSU was 10% (7/68, *Figure 1*). The incidence of “traditional” bacteriuria ( $> 10^5$  CFU/ml) was 2% (1/68). The incidence of “low-count” bacteriuria was highest among women with bladder oversensitivity (33%, 3/9). The incidence of “low-count” bacteriuria was significantly higher in bladder oversensitivity compared to women with either pure DO ( $p = 0.0356$ ) or any DO ( $p = 0.0471$ ). There was a trend towards increased “low-count” bacteriuria in women with bladder oversensitivity compared to USI ( $p = 0.1432$ ) although numbers were too small to reach statistical significance. No significant differences in the incidence of low bacterial counts were found among women with USI (9%) compared to either “pure” DO (0%,  $p = 0.49$ ) or “any DO” (6%,  $p = 0.64$ ).

	Any DO		Pure USI	Bladder Oversens.	Total (%)
	Pure DO	Mixed (DO + USI)			
"Low-count" bacteriuria (10 <sup>3</sup> – 10 <sup>5</sup> CFU/ml)	0	2	2	3	7 (10)
"Traditional" bacteriuria (>10 <sup>5</sup> CFU/ml)	1	0	0	0	1 (2)
Sterile	19	14	21	6	60 (88)
<b>Total</b>	<b>20</b>	<b>16</b>	<b>23</b>	<b>9</b>	<b>68</b>

**Figure 1: Incidence of "low-count" bacteriuria by urodynamic diagnosis**

In total, 13% of women were diabetic and 19% had a history of recurrent UTI. On univariate analysis, these women were not more likely to have "low-count" bacteriuria than incontinent women without this history ( $p=0.23$  and  $p>0.99$  respectively). 67% of women were post-menopausal and 54% were sexually active. On examination, 50% of women had anterior compartment prolapse to or beyond the introitus ( $\geq$  Grade 2). Neither menopausal status ( $p=0.45$ ), sexual activity ( $p=0.69$ ) nor a cystocele  $\geq 2$  ( $p=0.43$ ) had any impact on the incidence of low-count bacteriuria in the present study.

With one exception, all women with positive CSU cultures grew *E. coli*. The remaining case cultured *Staphylococci aureus*. Of specimens positive for "low-count" bacteriuria ( $n=7$ ), 86% (6/7) did not show organisms present on routine urine microscopy. 43% (3/7) of specimens with low-bacterial counts manifested significant pyuria.

### **Interpretation of results**

"Low-count" bacteriuria is common among women with urinary incontinence, affecting 10% of women attending for urodynamic testing in the present study. Bladder oversensitivity is a controversial diagnosis at cystometry and we were very interested to find a significantly higher incidence of "low-count" bacteriuria in women with bladder oversensitivity compared to those with either USI or DO. Low bacterial counts may contribute to the increased bladder sensation in these women. Previously reported risk factors, including diabetes, menopausal status and degree of cystocele did not impact on the incidence of "low-count" bacteriuria in our study.

### **Concluding message**

"Low-count" bacteriuria affects 10% of women attending for urodynamic studies and is more prevalent among women with bladder oversensitivity compared to DO, urodynamic stress or mixed incontinence. "Low-count" bacteriuria may contribute to the increased bladder sensation in cases of bladder oversensitivity. Low bacterial counts should be incorporated into the routine microbiological assessment of women with urinary incontinence.

### **References**

1. Wong HF, Lee LC, Han HC. Cost-effective screening for urinary tract infections. *Int Urogynecol J* 2008;19:671–676
2. Moore KH, Simons A, Mukerjee C, Lynch W. The relative incidence of detrusor instability and bacterial cystitis detected on the urodynamic-test day. *BJU Int* 2000;85:786-92.
3. Grabe M, Bishop MC, Bjerklund-Johansen TE et al. Guidelines on urological infections. European Association of Urology. 2009.

<b>Specify source of funding or grant</b>	<b>This study was funded by a 2010 IUGA Research Grant</b>
<b>Is this a clinical trial?</b>	<b>Yes</b>
<b>Is this study registered in a public clinical trials registry?</b>	<b>No</b>
<b>Is this a Randomised Controlled Trial (RCT)?</b>	<b>No</b>
<b>What were the subjects in the study?</b>	<b>HUMAN</b>
<b>Was this study approved by an ethics committee?</b>	<b>Yes</b>
<b>Specify Name of Ethics Committee</b>	<b>Human Research and Ethics Committee, Central Network, Sydney.</b>
<b>Was the Declaration of Helsinki followed?</b>	<b>Yes</b>
<b>Was informed consent obtained from the patients?</b>	<b>Yes</b>