

BACTERIA IN THE BLADDER WALL OF WOMEN WITH LOWER URINARY TRACT SYMPTOMS: AN INTERESTING FINDING

Hypothesis / aims of study

Overactive bladder has a multifactorial aetiology. An interesting hypothesis has recently emerged linking OAB and bacterial infection but this has been criticised as the infection could be contamination of the urine samples[1,2]. The incidence of bacteruria in women with lower urinary tract symptoms (LUTS) ranges from 29%-39% when lower thresholds of 10^2 CFU/ml or 10^3 CFU/ml is employed for diagnosis but has also been found in women with no symptoms in a lower proportion. This makes it controversial about whether the cultured organisms are contamination present in the urine. However by culturing bladder biopsies obtained during cystoscopy in sterile conditions, this should minimise the risk of contamination.

Therefore the first objective of this study is to investigate if bacteria are present in the bladder wall and are they associated with a positive urine culture. The second objective is to determine if the bacteria in the bladder wall are associated with lower urinary tract symptoms or recurrent urinary tract infections.

Study design, materials and methods

Women undergoing cystoscopy with and without lower urinary tract symptoms were included in the study. The study participants completed a three day bladder diary. The women with lower urinary tract symptoms underwent urodynamic studies. A catheter sample of urine was collected in theatre before the cystoscopy was performed and sent for microscopy, culture and sensitivity. A rigid cystoscopy was performed using a Ch22 cystoscope under sterile condition and bladder biopsies were taken with cold cup biopsy forceps. The biopsies are obtained from women with lower urinary tract symptoms, bladder disorders and asymptomatic women. One of the bladder specimens was sent for histopathological analysis and the other was transported in normal saline to the laboratory for microscopy, culture and sensitivity. For microbiological assessment the sample was macerated and then direct and enrichment culture [Brain heart infusion] methods were used for bacterial isolation at 48 hrs and 5 days. The results of urine and bladder tissue culture were compared using a Chi square test (SPSS version 19.0).

Results

In total 204 women were recruited. The mean age was 51 years [range 20-86]. Thirty-eight percent of women had a history of recurrent urinary tract infection and 42% of the women reported bladder pain. Sixty-two percent of the women underwent urodynamics and 49% had detrusor overactivity; 14% had urodynamic stress urinary incontinence, 17% had both stress and urgency urinary incontinence and 20% of subjects had inconclusive urodynamics.

Fifteen [7.34%] patients were found to have positive urine culture. The organisms detected were *Escherichia coli*, enterococcus, streptococcus and proteus mirabilis. Of the 15 women with a positive urine infection only 73% (11/15) were found to have positive bladder biopsy cultures. Of the 105 patients who had a positive bladder biopsy culture 86% had a negative urine culture. Eighty-four percent of the women (n=171) had evidence of nonspecific inflammation on histopathology of the bladder biopsy.

In fifty-one percent [n=105] of subjects, bacterial organisms were isolated on culture of bladder biopsies [see table 1]. The common organisms isolated were staphylococcus, streptococcus, lactobacillus, enterococcus, *E. coli*, micrococcus, proteus and corynebacterium. Some of the less commonly isolated organisms were anaerobes, candida, klebsiella, gardnerella, morganelle etc.

Table 1: Type of bacteria grown from macerated bladder biopsy

Organism isolated on culture of bladder biopsy	Total number (n=204)
No growth	99
Staphylococcus	27
Streptococcus	14
Lactobacillus	16
Enterococcus	11
E. Coli	6
Micrococcus	7
Corynebacterium	5
Proteus	3
Other organisms	22

There was no significant relationship between positive bladder cultures and presence of OAB symptoms, bladder pain or history of recurrent urinary tract infections, ($p > 0.05$). Interestingly there was no significant relationship between the positive urine cultures and history of recurrent urinary tract infections, ($p > 0.05$).

However when comparing women with no urinary symptoms (n=12) with women with lower urinary tract symptoms (n=192), there was a significant number with a bladder wall infection in the symptomatic group, Chi-square 5.667, $p=0.02$, Table 2.

Table 2: Symptomatic and asymptomatic women and bladder biopsy culture result.

Bladder biopsy	No LUTS	LUTS	Chi-square
Culture negative	10	92	5.667
Culture positive	2	100	P=0.02
Total	12	192	204

Interpretation of results

There were significantly more positive bacterial cultures from bladder biopsies in women with LUTS than asymptomatic women. Positive bladder biopsies were not replicated by catheter specimen of urine cultures. There was no significant association between those women with recurrent urinary tract infections and positive bladder biopsy cultures but this may relate to the heterogenous groups being studied.

Concluding message

This is the first study exploring the presence of bacteria in bladder biopsies of women with and without LUTS. The results of our study support a link between LUTS and bacterial infection in the bladder wall not the urine.

References

1. J Urol 2010;183 (5):1843-1847.
2. Int Urogynecol 2011 ;J 22 (10):1267-1272.

Disclosures

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