

Asymptomatic bacteriuria in pregnancy

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Introduction

Urinary tract infection (UTI) is common during pregnancy. It could be either symptomatic or asymptomatic which complicates the diagnostic process. It has been reported that 6% of pregnant women have asymptomatic bacteriuria¹. Untreated asymptomatic bacteriuria is associated with adverse maternal and perinatal morbidity and mortality.

Significant bacteriuria may exist in asymptomatic patients. Significant bacteriuria is traditionally defined as $>10^5$ colony forming units or bacteria/ml of urine as at this level a chance of contamination from distal urethra is less than 1%.

At concentrations of $10^3 - 10^4$ bacteria/ml, there is a 50% chance that contamination is responsible² for a positive culture and in such instances most laboratories would request a repeat testing with a midstream sample of urine. Isolation of the same organism in the second sample is more indicative of significant bacteriuria

Pathogenesis

The relatively acidic pH, high osmolality and high urea concentration in urine is generally bacteriostatic to most bacteria. Furthermore, in an anatomically normal urinary tract, infection is prevented by unobstructed antegrade flow of urine.

The physiological changes, both hormonal and mechanical that occur in the urogenital tract during pregnancy, increases the potential for colonization by pathogenic bacteria. During pregnancy the bladder volume increases and detrusor tone decreases. Additionally, progesterone relaxes ureteric smooth muscle causing dilatation of ureters which is further aggravated due to pressure from the expanding uterus.

All these factors lead to urinary stasis, dysfunctional ureteric valves and vesicoureteric reflux which facilitates bacterial colonization and ascending infection. Seventy percent of pregnant women develop glycosuria and this in combination with the physiological lowering of urine osmolality will further facilitate bacterial colonization³.

Maternal immunity is modified during pregnancy to favour implantation and development of the embryo. Research suggests that the immune response is modulated from a predominantly cell mediated response to a predominantly humoral immune response⁴. Humoral responses are less efficient as cell surface major histocompatibility receptors are not necessarily recognized during the response. Therefore this may result in less efficient recognition of bacterial cell surface proteins which prevents removal of bacteria facilitating colonization and infection by bacteria. Although the effect of immune system status during pregnancy in infectious pathology remains controversial, its role in facilitating infection by uropathogens cannot be disregarded.

Diabetes mellitus, gestational diabetes and pre-pregnancy UTI are other risk factors that predispose to UTI during pregnancy. Finally it is important to understand that prevalence of UTI increases with age and in low socioeconomic groups² and medical interventions such as catheterization predisposes to ascending bacteriuria.

Bacteriology

The organisms that cause UTI during pregnancy are the same as those found in non pregnant patients. *Escherichia coli* accounts for 80-90% of infections⁵. Other Gram negative rods such as *Proteus mirabilis* and *Klebsiella pneumoniae* can also be cultured. Gram positive cocci such as *Staphylococcus saprophyticus*, other coagulase negative staphylococci and group B streptococci are less common causes of UTI, although infections by group B streptococci have important implications for management of pregnancy. Less common organisms that may cause UTI include enterococci, *Gardenerella vaginalis*, *Chlamydia spp*, *Ureaplasma spp* and *Candida albicans*. Although vaginal colonisation with Group B streptococci is strongly

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associated with preterm rupture of membranes, labour and delivery and causes neonatal sepsis, evidence relating group B streptococcal bacteriuria with similar consequences is less well established⁶.

Clinical significance

Asymptomatic significant bacteriuria is associated with adverse maternal outcomes. These include symptomatic cystitis in approximately 30% of patients, development of pyelonephritis (in up to 50%) and preterm labour and delivery. Pyelonephritis in the pregnant patient leads to septicaemia in 10 - 20% of cases and acute respiratory distress syndrome in 2%. Associated adverse foetal outcomes include prematurity, low birth weight and increased perinatal mortality⁷. In addition there are increased maternal risks reported for pre-eclampsia, anaemia, chorioamnionitis and post partum endometritis in patients with significant bacteriuria. Fetal risks include fetal growth retardation, stillbirth, mental retardation and development delay. It is postulated that direct bacterial endotoxin damage is responsible.

Management

A Cochrane review⁸ established that, treatment of significant bacteriuria reduces the risk of pyelonephritis in pregnancy and consequently, the risks of preterm delivery and low birth weight. The American College of Obstetrics and Gynaecology recommends that a urine culture be done at the first antenatal visit. Cost benefit analysis shows that screening is cost effective with a bacteriuria prevalence of >2% in the antenatal population. Rapid testing reagent strips for screening for asymptomatic bacteriuria show lower sensitivity (50%) when compared to traditional culture hence not recommended⁹.

Treatment should be directed by the culture and sensitivity testing as antibiotic sensitivity pattern of the implicated organisms varies markedly from one population to another. Additionally it is important to use an antibiotic with an established safety profile. The appropriate antibiotic should be continued for at least 7 days as a review of short courses of antimicrobials found insufficient evidence to confirm treatment efficacy with shorter schedules of therapy¹⁰.

It is important to do a 'test of cure' urine culture 1-2 weeks after completion of antimicrobial therapy. If the 'test of cure' culture is positive a repeat course of antibiotics is recommended based on urine culture and sensitivity report and suppressive therapy (eg Nitrofurantoin 50 mg / day) is recommended after a negative 'test of cure' urine culture. It is recommended

that patients with two or more episodes of bacteriuria are followed up with monthly repeat cultures until delivery, to ensure urine sterility¹¹.

Key points:

- Asymptomatic significant bacteriuria in pregnancy is associated with significant maternal and perinatal mortality.
- All women should be screened for asymptomatic bacteriuria during early pregnancy
- The gold standard for detecting bacteriuria is by culture of a midstream specimen of urine.
- Antibiotic therapy should be continued for 7 days as shorter courses are less effective during pregnancy.
- A 'test of cure' urine culture after completion of treatment is required to ensure response to therapy.
- Two or more episodes of significant bacteriuria warrant suppressive therapy

References

1. Kass EH. Maternal urinary tract infection. *New York State Journal of Medicine* 1962; 2822-6.
2. McCormick T, Ashe RG, Kearney PM. Urinary tract infection in pregnancy. *The Obstetrician and Gynaecologist* 2008; **10**: 156-62.
3. Asscher AW, Sussman M, Waters WE, Davis RH, Chick S. Urine as a medium for bacterial growth. *The Lancet* 1966; **2**: 1037-41.
4. Wegmann TG, Lin H, Guilbert L, Mosmann TR. Bidirectional cytokine interactions in the maternal-foetal relationship: is successful pregnancy a TH2 phenomenon? *Immunology Today* 1993; **14**: 353- 6.
5. Polk BF. Urinary tract infection in pregnancy. *Clinical Obstetrics and Gynaecology* 1979; **22**: 285-92.
6. Moller M, Thomsen AC, Borch K, Dinesen K, Zdravkovic M. Rupture of foetal membranes and premature delivery associated with group B streptococci in urine of pregnant women. *The Lancet* 1984; **2**: 69 - 70.
7. Mittendorf R, Williams MA, Kass EH. Prevention of preterm delivery and low birth weight associated with asymptomatic bacteriuria. *Clinical Infectious Disease* 1992; **14**: 927-32.
8. Smaill F. Antibiotics for asymptomatic bacteriuria in pregnancy. Cochrane Database of Systematic Reviews 2001; **2**: CD000491.
9. National Collaborating Centre for Women's and Children's Health. Antenatal care. Routine Care for Healthy Pregnant Women. London. RCOG Press 2003.
10. Harris RE, Gilstrap LC, Pretty A. Single dose antimicrobial therapy for asymptomatic bacteriuria in pregnancy. *Obstetrics and Gynaecology* 1982; **59**: 546-9.
11. Chen KT. UTI in pregnancy: 6 questions to guide therapy. *OBG Management* 2004; **16**(11): 36-54.