Urinary tract infection in gynaecology and obstetrics

Nevine ID te West

Kate H Moore

Abstract

Cystitis is a common problem in the general population affecting 50% of women in their lifetime. Pregnant women are prone to asymptomatic bacteriuria and screening and treatment is important, due to the risk of neonatal complications. Gynaecological patients are at greater risk of developing urinary tract infections, because of concomitant prolapse, vaginal atrophy, voiding dysfunction and incontinence. Recurrent UTI is a substantial problem in this group.

Dipstick testing is efficient and cost effective in the primary healthcare, but this is not recommended in obstetrics and gynaecology, where precise sensitivities must be used to ensure complete treatment. Nitrofurantoin is the antimicrobial agent of choice, because of minimal adverse effects and low resistance rates, in particular, now that antibiotic resistance is an increasing concern. Recent studies have demonstrated that refractory overactive bladder is associated with low count bacteriuria ($<10^5$ CFU/ml); antibiotic randomised trials are in progress.

Keywords antibiotic resistance; asymptomatic bacteriuria; nitrofurantoin; overactive bladder; prophylactic antibiotics; recurrent UTI; urinary tract infection

Introduction

Traditionally, acute urinary tract infection (UTI) is treated by the general practitioner, but the Obstetrician/Gynaecologist often encounters such patients, thus knowledge of this subject is important. Gynaecological problems, such as cystocele and postoperative voiding difficulties, may also lead to recurrent UTI, which can be difficult to treat. In the last decade, antibiotic resistance is an increasing concern. Thus, a review of this important subject is timely.

Classification

UTIs are classified according to their location, clinical symptoms and microbiological findings. Infection of the upper tract (pyelonephritis) comprises infection of the renal parenchyma and may be associated with systemic sepsis, in contrast to infection of the lower tract (cystitis) that is located in the bladder alone.

Complicated UTIs are related to underlying anatomical or functional abnormality (e.g. renal calculi, fistula, renal transplants) and need referral to the Urologist. They usually take longer to respond to treatment and if the underlying cause is not removed they are likely to re-occur. This may be within days, weeks or months from the original infection.

Uncomplicated UTI occur in women with a normal urinary tract and react quickly to therapy.

The problem of acute UTI in gynaecology and obstetrics

Cystitis describes inflammation of the bladder, usually in response to bacterial infection. Classically, the patient presents with typical symptoms of urgency, frequency, dysuria, suprapubic discomfort, and discoloured foul smelling urine caused by inflammation of the bladder in response to bacterial invasion. Cystitis is a common clinical diagnosis. Approximately 50% of all women experience a UTI at some time in their life. They account for 1–3% of general practitioner consultations in the UK and approximately 150 million cases per year worldwide. Risk factors for UTI are summarised in Box 1.

In the majority of cases, gram negative coliform bacilli (Enterobacteriaceae) account for the infection and *Escherichia Coli* remains the most prevalent uropathogen (77%). Infection is commonly preceded by colonisation of the perineum and periurethral area by rectal flora.

Diagnosis using urine dipsticks assessing nitrite, leucocyte esterase and erythrocytes are frequently used in the primary care setting. The presence of leucocytes implies inflammation of the urothelium. Nitrites are strongly suggestive of significant bacteriuria and empirical antimicrobial treatment should be commenced. Urine dipstick testing is convenient and has proven to be cost-effective in general practice. In most patients UTI is a single event and no further investigation is needed.

The natural history of cystitis is resolution of the symptoms within 4–7 days. In the GP setting, in fit healthy young women, delaying antibiotics by 48 hours to allow for resolution of symptoms reduces the use of antibiotics without significantly prolonging symptoms. There are several "self-help" measures patients can initiate themselves. Increasing fluid intake shortens the intervals between voids and achieves a high flow rate, therefore diluting and flushing out the microorganism. Urine alkalinising preparations, e.g. a teaspoon of bicarbonate of soda dissolved in water taken every few hours, provide symptomatic relief by reducing the acidity of the urine, thus reducing the stimuli to bladder afferent nerves.

However, in obstetrics and gynaecology we are looking at a different population. In this group, a reduction of symptoms to an average of 3 days with antibiotic treatment is to be predicted. A short course has been proven to be as effective as a long course in uncomplicated cystitis.

Microbiological culture remains the gold standard and is to be recommended in gynaecology patients. The type of bacteria isolated and their count are noted, as well as the antibiotic sensitivities and the red and white cell count. Bacteriuria without white cells and with large numbers of squamous epithelial cells is highly suggestive of contamination. Antimicrobial treatment will often be initiated prior to the urine culture and the empirical treatment subsequently altered according to the sensitivity results. Therefore, one should choose the drug that is most likely to eliminate the most common microorganism, which is *E. coli*.

Nevine I D te West *MD MRCOG is a Senior Research Fellow in Urogynaecology at St. George Hospital, Kogarah NSW, Sydney, Australia. Conflicts of interest: none declared.*

Kate H Moore *MBBS MD FRCOG FRANZCOG CU is Professor of Obstetrics and Gynaecology at the University of New South Wales and Head of Department of Urogynaecologyat St George Hospital, Kogarah NSW, Sydney, Australia. Conflicts of interest: none declared.*

Risk factors UTI

- Female sex
- Instrumentation of urinary tract (catheters, cystoscope)
- Voiding dysfunction
- Sexually active
- Pregnancy
- Increasing age
- Reduced oestrogen levels
- Diabetes

Box 1

Although trimethoprim is commonly prescribed as a first line drug for UTI, its increasing resistance makes it less suitable. Nitrofurantoin has the lowest likelihood of organism resistance (0–4%) and there has been no rise in resistance despite its extensive use for more than 5 decades. Due to its bladder-specificity, nitrofurantoin attains high urine levels making it an efficacious treatment for cystitis. The serum concentrations are low, therefore it cannot be used to treat pyelonephritis or UTI induced sepsis. Nitrofurantoin is effective against most common uropathogens, ie. *E. coli*, enterococci, Klebsiella, and Enterobacter, but does not treat Pseudomonas or Proteus. It does not alter intestinal or introital flora, generally avoiding vaginal monilia. Therapeutic urinary concentrations are higher when nitrofurantoin is taken on a full stomach. It should not be taken with urine alkalising preparations, as the absorption of nitrofurantoin is better in an acidic environment.

The macrocrystalline formation (Macrodantin) has additional benefits as it slows absorption prolonging urinary excretion, and it has less side effects such as nausea and vomiting, making it more tolerable for the patient. It is also one of the few oral drugs that is effective against uropathogens that produce extended spectrum beta-lactamase (ESBL). In the last 2 decades, gram negative bacteria that possess plasmid-mediated ESBL genes (which confer resistance to penicillin with clavulanate or sulbactam and 3rd generation cephalosporins) are becoming an increasingly worrisome problem. The altered genetic factors can be spread between species making antibiotic treatment more difficult.

Asymptomatic and symptomatic bacteriuria in pregnancy

Bacteriuria is defined as the presence of bacteria in urine and may be either symptomatic or asymptomatic. Physical and physiological changes in pregnancy, including decreased urine osmolality, glycosuria and the progesterone dilation effects upon the ureteric smooth muscle, favour bacterial colonisation, making asymptomatic bacteriuria (ABU) a common finding. In "healthy" women the prevalence varies between 1 and 9%, but in pregnancy this doubles to 2–15%. Asymptomatic bacteriuria in the non-pregnant female does not usually require treatment. However, in obstetric patients treatment is important, due to the risk of neonatal complications.

The risk of ABU progressing to pyelonephritis in pregnancy is also increased due to compression of the ureters at the pelvic rim, causing upwards reflux of urine. Screening, by routine urine culture in early pregnancy, is recommended by the RCOG. *E. coli* is the most frequently found microorganism (up to 86%), although *Klebsiella pneumoniae*, *Proteus mirabilis* and Staphylococcus may also be cultured. *Gardnerella vaginalis* and *Ureaplasma ureolyticum* may be found, in contrast to the non-pregnant population. *Streptococcus agalatiae* (Group B streptococcus (GBS)) is clinically important due to its association with obstetric complications such as chorioamnionitis, intrapartum fever and early-onset neonatal GBS disease. Patients with diabetes gravidarum are also more likely to suffer from GBS asymptomatic bacteriuria. Growth greater than 10^5 CFU/ml requires treatment in pregnancy and intrapartum antibiotics according to the RCOG guidelines (www.rcog.org.uk Green-Top No. 36). Screening and targeted treatment significantly reduces the risk of pyelonephritis, premature delivery and low birth weight and has been proven cost-effective.

Additionally, 20–40% of ABU progress to symptomatic UTI, of which 20–50% are complicated by premature delivery. Cystitis itself is the most frequent medical diagnosis in pregnancy, affecting 1% of women. Dipstick urinalysis is frequently used to allow prompt commencement of empirical antibiotics, but should be combined with MSU culture and sensitivity.

Nitrofurantoin is safe to use in pregnancy, except at term as it can cause neonatal haemolysis.

A 7–10 day course of antibiotics is required so as to eradicate the infection, as persistent infection may cause (premature) labour or progress to pyelonephritis. Patients known with recurrent UTI's are at increased risk and may use antibiotic prophylaxis during pregnancy, such as nitrofurantoin 50 mg up to 36 weeks or cephalexin 250 mg once daily.

Early onset-sepsis in the neonate caused by antibiotic-resistant microorganisms has been associated with maternal use of antibiotics during pregnancy and labour (of which 6% were prescribed for UTIs). Further studies have shown negative effects of antibiotics in pregnancy, such as cerebral palsy, sepsis, epilepsy and jaundice in the neonate. However, most of these studies have featured antibiotics that were prescribed for PROM and chorioamnionitis. More research is needed to confirm these findings.

Pyelonephritis in gynaecology and obstetrics

Patients with pyelonephritis may attend the emergency department and patients with abdominal or suprapubic pain are often triaged to gynaecology. Such women often complain of loin tenderness, suprapubic tenderness from the cystitis, fever, and are often generally unwell.

In pregnancy, patients presenting with symptoms and signs of pyelonephritis usually require admission for parenteral antibiotics as well as analgesia. These patients can rapidly become quite ill. A renal tract ultrasound should be performed to check for hydronephrosis. Generally, broad-spectrum antibiotics are commenced prior to the culture results and are subsequently narrowed when the culture results are available. If there is no clinical improvement within 24–48 hours, re-assessment of the woman and discussion with the microbiologist is needed. Antimicrobial treatment is continued for at least 10–14 days in pregnancy to reduce the risk of relapse. Caution is warranted when prescribing analgesia, due to the risks to the foetus; NSAIDs should be avoided in pregnancy. The risk of premature labour is substantial, particularly if tachycardia and pyrexia are