# **CASE STUDY: MANAGEMENT OF URINARY TRACT INFECTION IN PREGNANCY** *RPA/Canterbury ANSC: Educational Case Study Series - July 2023*

Urinary tract infections (UTI) occur commonly during pregnancy with approximately 5-10% of women experiencing a symptomatic UTI in pregnancy. The term UTIs encompasses a spectrum including asymptomatic bacteremia, acute cystitis and pyelonephritis. Asymptomatic bacteremia is defined as isolation of > 100, 000 organisms/mL, in the absence of urinary symptoms. Up to 20-40% of pregnant women with asymptomatic bacteriuria may developed pyelonephritis in later pregnancy. Acute cystitis is bacteremia with associated lower urinary tract symptoms such as dysuria, frequent or urgency. Pyelonephritis refers to infection of the upper urinary tract with patients presenting with systemic features of infection.

Samantha is a 24-year old female, Gravida 1 Parity 0. She presents to her GP following a positive urine pregnancy test at 6+2 weeks gestation. She is a fit and healthy young woman with no other significant past medical history. She is on prenatal supplements but no regular medications.

## Should urine microscopy and screening be included in first trimester screening?

Pregnant women are at greater risk of developing urinary tract infections due to physiological and immunological changes that occur in pregnancy and promote urinary retention and stasis. These changes include:

- Progesterone related smooth muscle relaxation leading to decreased bladder and ureteral tones, dilation of the renal calcyes and ureters, increased bladder volume and vesicoureteric reflux
- Compression from the gravid uterus on the bladder and ureters
- Increased plasma volume during pregnancy leading to a decrease in urine concentration and increase in bladder volume
- Decreased immune response from pregnancy induced immunosuppression

UTIs have been associated with pregnancy complications, including:

- Low birthweight
- Preterm birth
- Preeclampsia
- Sepsis
- Acute kidney injury

Routine antenatal screening with a urine microscopy and culture should be undertaken at the first antenatal visit with booking in bloods, ideally before 16 weeks gestation. *Escherichia coli* is the most common uropathogen isolated. Other less common organisms include *Klebisella pneumoniae*, *Staphylococcus, Streptococcus, Proteus* and *Enterococcus* species. Women with Group B *Streptococcus* on urine culture should receive treatment for asymptomatic bacteremia during their pregnancy as well as IV antibiotics in labour to prevent neonatal sepsis.

Samantha's urine culture returns positive for *E.coli* which is pan-sensitive. She is asymptomatic.

### Should treatment be considered?

A finding of asymptomatic bacteriuria outside of pregnancy does not always require antibiotic treatment. However, pregnant women with asymptomatic bacteremia should be considered for treatment with appropriate oral antibiotic therapy, due to the increase the risk of developing subsequent acute cystitis and pyelonephritis.

Asymptomatic bacteriuria in a pregnancy is defined as the presence of concentrations > 100 000 CFU/mL of the same bacterial strain, cultured on two consecutive, correctly collected midstream urine specimens.

The choice of antibiotics should be guided by organism sensitivities, which reflects local resistance patterns. A five day course of appropriate oral antibiotics for pregnant women with asymptomatic bacteremia or acute uncomplicated cystitis is generally sufficient. Repeat urine microscopy and culture should be performed 1-2 weeks following antibiotic treatment to ensure infection has been cleared.

Pregnant women with pyelonephritis should be admitted to hospital and commenced on IV antibiotics for a minimum of 48 hours. Treatment duration should continue for at least 10-14 days (IV+oral).

# **Group-B Streptococcus Infection**

GBS infection is associated with significant neonatal morbidity and mortality.

If a woman presents without symptoms of a urinary tract infection at any time during pregnancy and GBS is detected in her urine, in concentrations >100 000 CFU/mL, antibiotics should be administered.

In symptomatic patients with colony counts < 100 000 CFU/mL antibiotics should be administered.

In asymptomatic patients with colony counts < 100 000 CFU/mL antibiotics are not recommendation as this reflects maternal anogenital colonization. Overuse of antibiotics in this population may lead to increased antibiotic resistance.

There are often concerns regarding the safety of antibiotics in pregnancy. Treatment of urinary tract infection must take into consideration organism sensitivities as well as local treatment guidelines that reflect bacterial resistance patterns. Below are common antibiotics used in pregnancy, their safety profile and dosages.

- 1) Cephalexin
  - Category A drug
  - Cephalosporins are considered safe to use in all trimesters of pregnancy
  - Dosage: 500mg BD for 5 days
- 2) Nitrofurantoin
  - Category A drug
  - Should be avoided after 36 weeks' gestation due to the risk of developing haemolytic anameia of the newborn and subsequent jaundice in neonates with glucose-6-phosphate dehydrogenase deficiency
  - Dosage: 100mg every 6 hourly for 5 days
- 3) Trimethoprim
  - Category B3 drug
  - Should be avoided in the first trimester because of folic acid antagonism which may increase risks of neural tube defects

- Dosage: 300mg OD for 3 days
- 4) Amoxicillin
  - Category A drug
  - Amoxicillin is considered safe to use in all trimesters of pregnancy
  - Dosage: 500mg TDS for 5 days
  - \*Note: Caution should be given to the use of Amoxicillin + Clavulanic acid in women after 20 weeks gestation, due to increased risk of necrotizing enterocolitis in neonates

Samantha received a 5-day course of amoxicillin. She re-visits your practice at 28 weeks' gestation complaining of dysuria and urinary frequency. You repeat her urine and it returns positive for *E.coli* which is resistant to amoxicillin. You decide to treat her with a 5-day course of cephalexin. Samantha returns 14 days later for a test of cure which is negative.

## What can you do to reduce the risk of repeated infection?

Recurrent UTIs are diagnosed when pregnant women have two or more infections in pregnancy. For these women a repeat urine microscopy and culture should be performed at each visit. Sensitives for the urine culture should be traced and the infection treated with appropriate antibiotics. In circumstances where the same organism is repeatedly cultured, an alternative sensitive antibiotic may be trialed and renal tract ultrasound should be performed to exclude urinary tract anomalies. At current there is no evidence to recommend prophylactic antibiotics over vigilant screening for women with recurrent UTIs. Consideration of the commencement of prophylactic antibiotics should be considered in women with additional risk factors including diabetes, immunosuppression or abnormalities of the urinary tract.

#### References

- Department of Heatlh and Wellbeing Government of South Australia, South Australian Perinetal Practice Guidelines: Urinary Tract Infection in Pregnancy, Version 4, 2021.
- Delzell JE Jr, Lefevre ML. Urinary tract infections during pregnancy. Am Fam Physician. 2000 Feb 1;61(3):713-21. Erratum in: Am Fam Physician 2000 Jun 15;61(12):3567. PMID: 10695584.
- Gupta, K. Urinary tract infections and asymptomatic bacteriuria in pregnancy. UpToDate (2022)
- Habak PJ, Griggs, Jr RP. Urinary Tract Infection In Pregnancy. [Updated 2022 Jul 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537047/
- Kallirhoe Kalinderi, Dimitrios Delkos, Michail Kalinderis, Apostolos Athanasiadis & Ioannis Kalogiannidis (2018) Urinary tract infection during pregnancy: current concepts on a common multifaceted problem, Journal of Obstetrics and Gynaecology, 38:4, 448-453, DOI: 10.1080/01443615.2017.1370579
- Michelim L, Bosi GR, Comparsi E (2016) Urinary Tract Infection in Pregnancy: Review of Clinical Management. J Clin Nephrol Res 3(1): 1030
- MIMS Australia. (2023). MIMS Online. http://www.mimsonline.com.au
- Puopolo, K., Madoff, L. Group B streptococcal infection in pregnant individuals. UpToDate (2022) Schneeberger C, Geerlings SE, Middleton P, Crowther CA. Interventions for preventing recurrent urinary tract infection during pregnancy. Cochrane Database of Systematic Reviews 2015, Issue 7. Art. No.: CD009279. DOI: 10.1002/14651858.CD009279.pub3

Smaill FM, Vazquez JC. Antibiotics for asymptomatic bacteriuria in pregnancy. Cochrane Database of Systematic Reviews 2019, Issue 11. Art. No.: CD000490

Wiles, K., Chappell, L., Clark, K. et al. Clinical practice guideline on pregnancy and renal disease. BMC Nephrol 20, 401 (2019).