Urogynaecological complications in pregnancy: an overview

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Abstract

The urinary tract, as with all other organ systems, undergoes numerous physiological adaptions in response to pregnancy. These normal adaptions can increase the risk of complications, such as acute infection and urinary retention, which in turn increase the risk of poor outcomes for the pregnancy. Other urogynaecological complications, for example urological injury at caesarean section, can significantly increase long term morbidity. Therefore it is important that Obstetricians are aware of the potential complications that can occur. This article aims to give a general overview of urogynaecological complications that can arise in pregnancy and how to manage them.

Keywords pregnancy; urinary retention; urinary tract infection; urolithiasis; urological cancer; urological injury

Physiological changes to the urinary tract during pregnancy

Renal plasma flow increases in pregnancy by 60–80%, leading to increased glomerular filtration rate, creatinine clearance and protein excretion. There is also widespread dilatation of the collecting system, thought to be secondary to the progestogenic effect on ureteral smooth muscle in combination with mechanical obstruction from the gravid uterus. This results in dilatation of the upper ureter and renal pelvis. This physiological hydronephrosis is present in up to 90% of pregnant women. It is seen more commonly in the right than the left kidney. The bladder is not spared, with detrusor tone decreasing, leading to increased capacity and incomplete emptying. The net effect is of increased stasis of urine, increased risk of vesicoureteric reflux and subsequent ascending infection leading to pyelonephritis.

Urinary tract infection in pregnancy

Urinary tract infection (UTI) is extremely common in pregnancy, with an overall incidence of up to 8%. It can be symptomatic or asymptomatic and is associated with an increased risk of preterm prelabour rupture of membranes, preterm labour and fetal growth restriction. Increased bladder capacity, incomplete emptying and stasis of urine in combination with dilated ureters all facilitate the migration of bacteria to the upper urinary tract. Urine is normally bacteriostatic. In pregnancy however, the osmolality of urine is decreased and it becomes relatively alkali. Therefore part of the defence system against bacterial proliferation is lost. Box 1 shows other risk factors for developing a UTI in pregnancy.

UTI is diagnosed when there are bacterial counts $> \times 100^5$ Colony Forming Units (CFU)/ml and a single strain of pathogen is identified on culture. When urine flows over the perineum it can be contaminated with bowel commensals, hence the need for a mid stream sample. It is important that staff inform women clearly how to obtain a mid stream sample.

UTI is split in to three subgroups: Asymptomatic Bacteriuria, Acute Cystitis and Pyelonephritis.

Asymptomatic bacteriuria (ASB)

ASB is diagnosed when there is clinically significant numbers of bacteria in the urine but the patient is asymptomatic and remains clinically well. Significant bacteriuria is defined as two voided urine samples with greater than $\times 10^5$ CFU/ml of a single organism. It affects between 4 and 7% of pregnant women, and of these significant numbers will go on to develop acute cystitis and pyelonephritis. Therefore it is a common problem which must be identified and treated in order to prevent these potentially serious sequaelae. ASB is most commonly seen in early pregnancy, with only small numbers of women developing it in later pregnancy. In recognition of this, it is standard antenatal practice to send a urine sample for microscopy and culture at the initial booking appointment in order to highlight any women with ASB.

The most common organism found in women with ASB is *E. Coli*, being responsible for up to 90% of all cases. The next most frequently observed pathogens are *Proteus mirabilis*, *Klebsiella pneumoniae* and *Enterococcus*, all of which are gram negative bacteria. However, gram positive pathogens, such as *Staphylococcus aureus* and Group B Streptococcus can also underly ASB.

The treatment of ASB should ideally be based on the sensitivities of a urine culture, with penicillins and cephalosporins being safe choices during pregnancy. A recent Cochrane review analysed five randomized control trials comparing different antibiotic regimes from classes safe in pregnancy in a total of 1140 women with ASB. It concluded that there was no definite advantage of any of the antibiotics studied. There is still debate as to how long antibiotics should be prescribed for, although it is generally accepted that a 5–7 day course will effectively treat ASB. Once treatment has been completed, it is advisable to repeat a urine culture as a test of cure. If there is a recurrence or persistent bacteriuria on urinary cultures it is indication for commencing long term suppressive antimicrobial prophylaxis.

Risk factors for developing a UTI in pregnancy

Risk factors

- Sexual activity
- Low socioeconomic status
- Increasing age
- Urinary tract abnormalities (congenital and acquired)
- Diabetes mellitus
- Sickle cell disease

Box 1

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Low dose nitrofurantoin or beta lactam antimicrobials, such as penicillin or cephalosporins, are safe choices during pregnancy. There is a documented risk with nitrofurantoin of haemolysis in babies affected by glucose-6-phosphate dehydrogenase (G6PD) deficiency, and therefore it must be used with caution in the third trimester. Trimethoprim, a folate antagonist, is also an option for treatment of UTI in the second and third trimester. It is not an option in the first trimester as it increases the risk of miscarriage.

However, a Cochrane review concluded there was no significant differences in the prevention of recurrent UTI when comparing long term suppressive treatment with nitrofurantoin and close surveillance of urinary cultures. Therefore the decision to commence long term antimicrobial prophylaxis must be made on careful evaluation of individual cases and agreement of the patient.

Acute cystitis

Acute cystitis is defined as having significant bacteriuria with a single organism on a urine culture associated with clinical symptoms, such as dysuria, urinary frequency, urgency, haematuria and suprapubic pain in the absence of systemic illness. It complicates 1% of all pregnancies and is more commonly seen in women with diabetes, on immunosuppressant medications and those who have had previous UTIs. As with ASB, the most commonly isolated organism responsible is *E. Coli*, followed by the previously mentioned bacteria. Nitrites are commonly found on urine dipstick, but this is not diagnostic of acute cystitis, with the gold standard being urine culture. However, the presence of nitrites in combination with clinical history and symptoms may prompt the clinician to initiate treatment. A 5–7 day course of antibiotic treatment is the accepted course to fully treat acute cystitis. A repeat urine culture should also be sent following treatment in order to test that the organism has been fully treated.

Pyelonpehritis

Pyelonpehritis is the most serious complication of UTI, with significant bacteriuria present in addition to systemic illness and clinical symptoms such as fever, rigors, abdominal pain, vomiting and headache. Ascending infection in the urinary tract results in inflammation of the kidney and renal pelvis, which left untreated can develop in to global kidney infection (pyonephrosis) and ultimately a perinephric abscess. It is associated with an increased risk of premature labour, premature rupture of the membranes and low birth weight. It also has serious implications for maternal health, causing complications such as septic shock and acute respiratory distress syndrome. Therefore it is of vital importance that pyelonephritis is diagnosed and treated as quickly as possible. It is most commonly caused by *E. Coli* (present in 80% of cases).

The diagnosis is clinical, based on clinical history of abdominal and flank pain with urinary symptoms, examination and results of blood tests. Urine culture should be sent, along with blood cultures if the patient is pyrexial or showing signs of sepsis. Pyelonephritis is mostly managed in hospital and is currently the second most common cause for hospitalisation not related to delivery. Outpatient management with oral antibiotics can be considered if the patient has few symptoms and there are no signs of sepsis. The majority will, however, require admission and intravenous (IV) broad spectrum antibiotics for at least 24 hours. Sepsis in pregnancy needs prompt treatment, requiring IV access and blood tests to include full blood count, inflammatory markers and urea and electrolytes. It is essential that patients receive IV antibiotics within 1 hour of being assessed. Dehydration should be corrected with IV fluids and paracetamol should be used for its analgesic and antipyretic properties. An Ultrasound Scan (USS) of the urinary tract should be performed in order to identify hydronephrosis, urinary stones or other urinary tract abnormalities that could be underlying the pyelonephritis. Once the episode of pyelonephritis has been successfully treated, it is essential to monitor for recurrence of bacteriuria by repeating urinary cultures throughout the rest of the pregnancy. The recurrence rate for pyelonephritis in the same pregnancy has been quoted to be as high as 10–18%, therefore there is an arguement for commencing long term suppressive antimicrobial prophylaxis for the remainder of the pregnancy.

Recurrent UTI

It is estimated that UTI will re-occur in 4–5% of cases and still incurs the same risk of developing pyelonephritis. It is not fully understood how reinfection occurs. Due to the afore discussed serious sequelae of UTI in pregnancy, women with recurrent infections should be commenced on low dose suppressive antimicrobial prophylaxis for the remainder of the pregnancy. In some women there is a clear trigger associated with sexual intercourse and they may benefit from a short course of postcoital antibiotics, but this depends on the frequency of coitus. For women who have a number of antenatal UTIs it is prudent to investigate postnatally for urinary tract structural abnormalities as these can be an underlying cause.

Urolithiasis

This is the second most common urological complication affecting pregnant women, complicating 1/200 to 1/2000 pregnancies. This incidence is no different from non pregnant women, leading to the conclusion that pregnancy does not increase a woman's risk of developing stone disease. However, a major complication of stone disease in pregnancy is preterm labour. Therefore it is an important diagnosis during pregnancy.

Urinary tract stones are seen more commonly in the ureter during pregnancy and they are mostly composed of calcium phosphate or calcium oxalate. Renal plasma flow increases dramatically during pregnancy, leading to increased filtration of both stone forming substances (calcium, sodium, uric acid and oxalate) and stone inhibiting substances (citrate, magnesium, glycosaminoglycans). This is thought to be the reason why the incidence of renal stones in pregnancy is the same as in the non pregnant population.

Symptomatic stone disease is seen most commonly in the second and third trimester, with the most common signs and symptoms being colicky flank pain and haematuria. Other symptoms include fever, nausea and vomiting and signs of UTI. The colicky pain is secondary to obstruction caused by the stone, leading to increased pressure and over distension of the collecting system. There may also be an element of infection complicating the renal stone, which can lead to pyelonephritis, pyonephrosis and reduced renal function. Initial investigations should include full blood count, CRP and urea and electrolytes. If