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Prevention of Urinary Tract Infections in Pregnancy

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Abstract: ***Physiological changes in pregnancy affects genitourinary to become more vulnerable to urinary tract infection (UTI). UTI is defined as the presence of at least 100, 000 organisms per milliliter of urine in an asymptomatic patient or as more than 100 organisms/mL of urine with accompanying pyuria (> 7 white blood cells [WBCs]/mL. Pyelonephritis is the most common medical condition and could impact maternal and fetal morbidity. Prevention methods for UTI in pregnancy including behavioral methods and management for asymptomatic bacteriuria to lower the risk of pyelonephritis, preterm delivery, and low birth weight. Treatment of asymptomatic bacteriuria in pregnancy usually 5 - 7 days using oral antibiotics.***

Keywords: antibiotics for UTI, prevention of UTI, UTI in pregnancy

1. Introduction

Physiological changes of the genitourinary and immune systemduringgravidas a risk factor havingurinary tract infection. Several changes occur during gravida is the ureter and renal calycesdilatated; caused smooth muscle relaxation byhormonal effect related progesterone - related and ureteral compression from the gravid uterus. Decreased bladder capacity manifested frequently to urinate and there is vesicoureteral reflux. (Sheffield et al 2005).

Urinary tract infections (UTIs) are commonly reported cases in gravida conditions. UTI is defined as the presence of at least 100, 000 organisms per milliliter of urine in an asymptomatic patient or as more than 100 organisms/mL of urine with accompanying pyuria (> 7 white blood cells [WBCs]/mL). In the asymptomatic patient, UTIs in gravidais mostly with good conditions at the end of. Pyelonephritis is the most common urinary tract complication in pregnant women, occurring in approximately 0.5 - 2% of all pregnancies. Pyelonephritis is the most common medical condition and could impact maternal and fetal morbidity (Gazmararian et al, 2002; Gilstrap et al, 2001; Sheffield et al 2005). These changes increase the risk of urinary tract infections. Due to special conditions in pregnancy, awareness to prevent and proper evaluation of patients is essential for an early diagnosis and timely definitive treatment to decrease the morbidity and mortality

Epidemiology
UTIs is most of causes serious infection in the pregnant population. One research reported, 3.5% of antepartum were admitted to the hospital due to UTI. Pyelonephritis is majority causes of septic shock in gravida condition. The rate of asymptomatic bacteriuria in pregnancy varies 2% to 7%, almost similar witha non - pregnant populationof 5% to 6% (Gazmararian et al, 2002; Gilstrap et al, 2001).

Etiopathogenesis
During gravida, urinary tract infection is prevalent and associated with increased risk women having UTI. Ureteral dilation is seen due to compression of the ureters from the gravid uterus. Hormonal effects changing and causes smooth muscle relaxation due to progesterone leading to dilation and urinary stasis, and vesicoureteral reflux increases. Besides changes in the hormone, pregnancy is one of the immunocompromised conditions. An altered immune system leading susceptibility may UTIs.

Etiology UTI in gravidaissimilar in non - gravida populations. uropathogens have proteins on the surface of uropathogenic that may enhance bacterial adhesion andhaving virulence. (Gazmararian et al, 2002; Gilstrap et al, 2001; Sheffield et al 2005).

Risk Factors of UTI in Pregnancy
Gravid uterus compresses ureters leading to ureteral dilatation which make pregnant women more vulnerable to UTI. High level of progesterone also may cause smooth muscle relaxation which lead to ureteral dilatation and urinary stasis. This condition increased the risk of vesicoureteral reflux that could develop to UTI. Immunocompromised state related to pregnancy also may increase the risk of UTI in pregnant women. Urinary catheterization performed during labor process also may increase the risk of UTI due to bacteria entry into urinary tract. Changes in urinary bladder such as sensitivity and overdistention may predispose to UTI in puerperium period. Other risk factors contribute to complicated UTI in pregnancy include the following: (Wing, Fassett & Getahun, 2014; Habak & Griggs, 2021) .

- Pre - existing diabetes
- Sickle cell anemia
- Neurogenic bladder
- Recurrent or persistent UTI before pregnancy
- Tobacco use
- Age < 20 years
- Late presentation for prenatal care
- Increased parity

Evaluation of UTI
Diagnosis and evaluation of UTI is primarily determined by positive culture for a uropathogen (Kalinderi et al., 2018) . Additional laboratory studies may include blood studies and urine studies such as urinalysis, dipstick testing, urine cytology, and sulfosalicylic acid testing. Imaging studies include ultrasonography and intravenous pyelography (Platte & Reynolds, 2021) . Blood cultures and a lactic acid assay can be performed in pregnant women with sign of sepsis.

Increased lactic acid levels related with adverse maternal outcomes in presumed sepsis (Albright et al., 2015) .

Screening for UTI in Pregnancy

Universal screening is recommended for pregnant women as they are more vulnerable to UTI, specifically for asymptomatic bacteriuria. Untreated asymptomatic bacteriuria related to worse prognosis and potentially develop to pyelonephritis during pregnancy. Identification of asymptomatic bacteriuria with urinalysis and urine culture should be performed at 12 - 16 weeks of gestation or the first prenatal visit. These tests also help to identify other possible disease such as glucosuria (Lin & Fajardo, in press; Platte & Reynolds, 2021) .

Urine culture is accepted as standard diagnostic method for UTI screening during pregnancy. Furthermore, urine culture results can be used to identify specific microorganism and ensure antibiotic sensitivity although it requires longer times. Several indications for urine culture examination performed as following (Platte & Reynolds, 2021) :

- New onset of cystitis symptoms with positive dipstick testing or urinalysis
- Recurrent UTI
- Pyelonephritis
- Failure to respond to initial treatment regimens
- History of recent instrumentation
- Hospital admission

Dipstick testing also can be used as screening tool to evaluate asymptomatic bacteriuria because it is simple and cost - effective. This test identify bacteriuria by using urine dip for nitrites and leukocyte esterase with sensitivity ranges from 50 - 92% and specificity from 86 - 97%. A positive nitrite test indicate to bacteriuria but negative result does not exclude bacteriuria (Kodikara et al., 2009) .

Prevention and Treatment of UTI in Pregnancy

Prevention methods for UTI in pregnancy including behavioral methods and management for asymptomatic bacteriuria to lower the risk of pyelonephritis, preterm delivery, and low birth weight. Treatment of asymptomatic bacteriuria in pregnancy is importantand oral antibiotics become initiation of the treatment (Gilstrap III & Ramin, 2001; Matuszkiewicz - Rowińska, Małyszko & Wieliczko, 2015) .

Behavioral methods can be used to avoid recurrent infection by good hygiene to reduce bacterial contamination of the urethral meatus. Several behavioral methods including (Platte & Reynolds, 2021) :

- Avoid baths
- Wipe front - to - back after urinating or defecating
- Wash hands before using the toilet
- Use washcloths to clean the perineum
- Use liquid soap to prevent colonization from bar soap
- Clean the urethral meatus first when bathing

Treatment of asymptomatic bacteriuria in pregnancy usually 5 - 7 days using oral antibiotics. Although there is no sufficient data to recommend any specific antibiotics regimen to treat UTI in pregnancy, antibiotics treatment is considered effective to increase cure rates and decrease adverse outcomes (Table 1) Recurrent UTI occurs in approximately 4 - 5% of pregnancies. A single, postcoital dose or daily suppression with cephalexin or nitrofurantoin in patients with recurrent UTIs is effective preventive therapy, but not recommended in first trimester of pregnancy (Vazquez & Abalos, 2011; Kazemier et al., 2015; Widmer et al., 2015) . Some antibiotics should be avoided to use in pregnant women because of their effects to fetal outcomes. These include the following:

- Tetracyclines (adverse effects on fetal teeth and bones)
- Aminoglycosides (ototoxicity following prolonged fetal exposure)
- Fluoroquinolones; avoid during pregnancy and lactation (toxic to developing cartilage)
- Trimethoprim - sulfamethoxazole; avoid during first and third trimester

Table 1: Antibiotics choice for asymptomatic bacteriuria (Matuszkiewicz - Rowińska, Małyszko & Wieliczko, 2015)

First line treatment	Amoxicillin 500 mg every 8 - 12 h for 3 - 7 days Cephalexin 500 mg every 12/6 h for 3 - 7 days
FDA category B	Amoxicillin/clavulanic acid 500 mg every 12 h for 3 - 7 days Nitrofurantoin 100 mg every 12 h for 5 - 7 days Cefuroxime 250 mg every 12 h for 3 - 7 days Cefpodoxime 100 mg every 12 h
FDA category C	Trimethoprim with sulfamethoxazole (Cotrimoxazole) 960 mg every 12 h for 5 days

2. Conclusion

Prevention of UTI in pregnancy is important because it is related to decrease of pregnancy complications in maternal and fetal outcomes. Treatment of asymptomatic bacteriuria also help to prevent pyelonephritis. This including behavioral methods and the use of recommended antibiotics.

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