Management of Urinary Tract Infection in Pregnancy: A Review

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Abstract:
Medicines Urinary tract infection (UTI) is the most common bacterial infection in pregnancy and poses a great risk of serious complications in both the mother and her child, increasing the risk of maternal and neonatal morbidity and mortality. Three common clinical manifestations of UTIs in pregnancy are: asymptomatic bacteriuria, acute cystitis and acute pyelonephritis. Without treatment, asymptomatic bacteriuria in pregnancy is associated with preterm delivery, intrauterine growth retardation, low birth weight, maternal hypertension and pre-eclampsia. Acute pyelonephritis can lead to maternal sepsis. All pregnant mothers should be screened for UTI in pregnancy. Urine culture and sensitivity is the gold standard in the diagnosis of UTI.

Keywords: Asymptomatic bacteriuria, acute cystitis, acute pyelonephritis.

Introduction:
Urinary Tract Infection (UTI) is the most common bacterial infection in pregnancy. 15% of women will have one episode of UTI at some time during their life. The incidence of UTI reported among pregnant mothers is about 8%. (1)

Physiological Changes in Pregnancy:
At around 6th week of pregnancy, due to the physiological changes of pregnancy the ureters begin to dilate. This is also known as "Hydronephrosis of Pregnancy", which peaks at 22-26 weeks and continues to persist until delivery. Both progesterone and estrogens levels increase during pregnancy and these will lead to decrease ureteral and bladder tone. Increased plasma volume during pregnancy leads to decreased urine concentration and increased bladder volume. The combination of all these factors lead to urinary stasis and uretero-vesical reflux. Women are more likely than men to get UTI because the urethra is shorter in a woman than in a man. In women, the bacteria can reach the bladder more easily. Bacteria from infected urethra and bladder may travel to the upper urinary tract, the ureters and the kidneys, causing infection. Upper UTI called pyelonephritis. Upper UTI is more severe than lower UTI. Three common clinical manifestations of UTI in pregnancy are: (A) Asymptomatic bacteriuria, (B) Acute cystitis and (C) Acute pyelonephritis. Most urinary tract
Infections Start in the Lower Urinary Tract (Luti) From the Urethra and Bladder as Cystitis.

Etiological Agents:

Escherichia Coli (E. coli) Causing Uti Accounts For Up To 90% of Cases. (1) Proteus Mirabilis And Klebsiella Pneumonia Are Less Frequent Offenders. Less Commonly, Enterococci (Gardnerella Vaginalis And Ureaplasma Ureolyticum), Gram-Positive Organisms Are Even Less Common (Group B Streptococcus, Staphylococcus Saprophyticus And Haemolyticus).

Consequences of Uti in Pregnancy:

Asymptomatic Bacteriuria (Asb) Is Defined As A Finding Of More Than $10^5$ Colony-Forming Units’ Bacteria Per MI (Cfu/MI) Of Urine In A Clinically Asymptomatic Person. The Prevalence Of Asymptomatic Bacteriuria In Pregnancy Is About 10%. If Untreated, Up To 30 % Of Mothers May Develop Acute Cystitis And Up To 50 % Acute Pyelonephritis. (1—2)

Maternal and Fetal Complications Associated With Asb in Pregnancy Are; (3)

<table>
<thead>
<tr>
<th>Maternal Complications</th>
<th>Fetal Complications</th>
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<tbody>
<tr>
<td>Hypertension</td>
<td>Iugr</td>
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<tr>
<td>Pre-Eclampsia</td>
<td>Intrauterine Death</td>
</tr>
<tr>
<td>Anemia</td>
<td>Low Birth Weight</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>Prematurity/Preterm Delivery</td>
</tr>
<tr>
<td>Symptomatic Cystitis, Acute Pyelonephritis</td>
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</tbody>
</table>

Symptomatic Urinary Tract Infection:

The Serious Maternal Consequence Of Untreated Asb In Pregnant Women Is Acute Pyelonephritis In Later Pregnancy (30–40% Vs. 3–4% In Treated Patients). About 15–20% Of Women With Pyelonephritis May Develop Various Complications, Such As Acute Kidney Injury, Anemia, Hypertension, Preeclampsia, Septic Shock, Hemolysis And Thrombocytopenia, Particularly If Treatment Is Initiated Too Late. (4)

Besides Asb, The Other Risk Factors Of Acute Pyelonephritis Include: Mother's Age, Sickle Cell Anemia, Diabetes, Nephrolithiasis, Illicit Drug Use, History Of Pyelonephritis And Maternal Urinary Tract Defects. (2)

Screening:

The National Institute For Health And Care Excellence (Nice) Recommends Women Should Be Screened For Asymptomatic Bacteriuria (Asb) By Midstream Urine Culture (Msu) At Booking. Confirm The Presence Of Bacteriuria In Urine With A Second Urine Culture, If Positive, Patient Should Be Treated With Antibiotics For 7 Days Even Though The Mother Has No Clinical Symptoms And Repeat Msu Culture 7 Days After Completion Of Antibiotics. (5)

Diagnosis of Different Forms of Uti in Pregnancy:

Cystitis/Urethritis:

The Diagnosis Is Made On Symptoms (Cloudy Urine, Dysuria, Frequency, Urgency, Abdominal/Suprapubic Pain) and the Presence Of Bacterial Colony Counts ($\geq 10^3$ Cfu/MI). (6)

In Most Cases Of Lower Uti (Acute Cystitis) The Treatment Is Similar To That Used In Asb And Should Be Guided By Antimicrobial Susceptibility Testing.

Acute Pyelonephritis:

Acute Pyelonephritis Is Most Common In Late Pregnancy. With 80–90% Of Cases Occurring In The Second And Third Trimester. It Is Usually A Consequence Of Undiagnosed Or Inappropriately Treated Lower Uti. All Suspected Cases Of Pyelonephritis Should Be Hospitalized At Least For The Initial 48 Hours Of Treatment. Out-Patient Treatment Can Be Offered If Strict Medical Follow-Up Is Possible. (7)

Treatment of Uti in Pregnancy:

The Antibiotic of Choice Should Be Safe For both Mother and Baby.
Antibiotics for Asymptomatic Bacteriuria (Asb) and Luti (Acute Cystitis / Urethritis). (2)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Duration Asb / Luti</th>
<th>Fda Pregnancy Risk Category</th>
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</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>3-7 Days / 7 Days</td>
<td>B</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>3-7 Days / 7 Days</td>
<td>B</td>
</tr>
<tr>
<td>Augmentin</td>
<td>3-7 Days / 7 Days</td>
<td>B</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>3-7 Days / 7 Days</td>
<td>B</td>
</tr>
<tr>
<td>Nitrofurantoin*</td>
<td>5-7 Days / 7 Days</td>
<td>B</td>
</tr>
<tr>
<td>Septran ( Tmt+Smth)**</td>
<td>5 Days / 7 Days</td>
<td>C</td>
</tr>
</tbody>
</table>

*Used In 2nd And 3rd Trimester except Last Two Weeks

**Avoid In 3rd Trimester, It Compete Bilirubin Binding and Causes Neonatal Jaundice

In All Symptomatic Patients (Acute Pyelonephritis), Regardless Of Whether They Are Hospitalized or Not, Antibiotics Should Be Given Parenterally For At Least The First 48 Hours (Until The Resolution Of Fever). Usually The Treatment Is Initiated Empirically And Verified After Obtaining The Microbial Sensitivity Test Results. Treatment May Be Switched To The Oral Route After 48 Hours Of Symptoms Improvement. (8)

**| Mild To Moderate Pyelonephritis | Severe Pyelonephritis |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Ceftriaxone 1 Gm Every 24 Hours</td>
<td>Piperacillin With Tazobactam 3.37 Gm Every 6 Hours</td>
</tr>
<tr>
<td>Augmentin 1.2 Gm Every 12 Hours</td>
<td>Meropenem 0.5-1 Gm Every 8 Hours</td>
</tr>
<tr>
<td>Aztreonam 1 Gm Every 8-12 Hours</td>
<td>Ertapenem 1 Gm Every 24 Hours</td>
</tr>
<tr>
<td>Ticracillin-Clavulanic Acid 3 Gm Every 6 Hours</td>
<td>Doripenem 0.5-1 Gm Every 8 Hours</td>
</tr>
</tbody>
</table>

Recurrent Uti:

Uti Recur In 4-5% Of Pregnancies Especially When The Initial Infection Is Inadequately Treated.

Patients With Recurrences Associated With Sexual Activity May Be Offered Postcoital Prophylaxis A Single Antibiotic Dose (E.G. Nitrofurantoin 50–100 Mg Or Cephalexin 250–500 Mg). (6)

Conclusion:


Key Recommendations: (1)

1. Screening For Asymptomatic Bacteriuria Should Be Performed At Booking Ideally At 12- 16 Weeks Gestation On All Women.
2. Take A Single Sample For Urine Culture Before Empiric Treatment Is Started.
3. Women With Symptomatic Bacteriuria With Systemic Signs Of Infection Should Be Admitted For Empirical Parenteral Antibiotics Until The Result Of Blood And Urine Cultures.
4. When Choosing An Antimicrobial Regimen It Is Important To Consider Issues Of Teratogenicity And Absorption.
5. A Repeat Urine Culture Should Be Sent A Week After The Antimicrobial Treatment Is Finished, To Ensure That The Bacteriuria Has Cleared.

6. Nitrofurantoin Can Be Used For Prophylaxis But Should Be Avoided Near Term Or When Delivery Is Imminent Because Of The Risk Of Neonatal Hemolysis.

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