

A 16-year-old girl comes to the clinic with 2 days of a burning sensation with voiding. She had sexual intercourse last week and her partner used a condom. The patient says, "I always pee right after sex." She has no vaginal discharge and her vital signs are normal. Examination shows suprapubic tenderness. Urinalysis shows positive nitrites, positive leukocyte esterase, 50 white blood cells/high-power field, and many bacteria. Urine β -hCG is negative. Which of the following is the most likely cause of this patient's infection?

- ☐ A. Ascending infection
- ☐ B. Hematogenous spread of infection
- ☐ C. Lymphatic spread of infection
- ☐ D. Poor genital hygiene
- ☐ E. Sexually transmitted infection

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- ☒ A. **Ascending infection** [90%]
- ☐ B. Hematogenous spread of infection [0%]
- ☐ C. Lymphatic spread of infection [0%]
- ☐ D. Poor genital hygiene [8%]
- ☐ E. Sexually transmitted infection [2%]

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Explanation:

User Id: [redacted]

| Urinary tract infection | | |
|-------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Microbiology | <i>E coli</i> most common cause | |
| Clinical features | Cystitis | Dysuria, frequency, urgency, hematuria, suprapubic pain |
| | Pyelonephritis | Fever >38 C (100.4 F), chills, flank pain, costovertebral angle tenderness & nausea/vomiting, +/- cystitis symptoms |
| Diagnosis | Urinalysis & urine culture | |
| Treatment | Antibiotics | |

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This patient's clinical features (suprapubic pain, dysuria) and abnormal urinalysis (pyuria, bacteriuria) are highly suggestive of a urinary tract infection (UTI). The urethra and bladder are normally sterile; UTI is typically acquired when bacteria around the vaginal introitus **ascend the urethra** to the bladder. Compared to men, women are at increased risk for UTI due to a shorter urethra. Recent **sexual activity** (eg, honeymoon cystitis) is a common predisposing factor, as bacteria can be introduced to the introitus during intercourse. Enteric organisms, particularly coliforms such as *Escherichia coli*, are the most common causes of UTI. Bacterial infection of the bladder results in cystitis. Untreated cystitis can spread up the ureters to the kidneys, leading to pyelonephritis.

(Choices B and C) Bacteria can disseminate hematogenously to the kidneys via the renal artery. This mechanism is common in young infants but rare in older children and adults.

(Choice D) Poor vaginal hygiene (eg, wiping back to front, failure to change menstrual pads or tampons regularly, remaining in wet or sweaty undergarments) can increase the concentration of bacteria in the vaginal area and has been associated with increased UTI risk. However, UTI is common even in women with post-coital voiding and no evidence of poor vaginal hygiene, such as this patient.

(Choice E) All sexually active patients should be screened annually for sexually transmitted infection (STI). However, this patient's history of barrier protection, normal genital examination, and evidence of bacteriuria on urinalysis make a STI less likely as the cause of her symptoms.

Educational objective:

Urinary tract infection (UTI) most commonly arises by bacteria ascending into the bladder from the vaginal introitus. Sexual intercourse is an important risk factor for UTIs in women due to introduction of uropathogens into the urethra.

References:

1. [Urinary tract infection pathogenesis: host factors.](#)
2. [Diagnosis and treatment of acute uncomplicated cystitis.](#)