

A 3-year-old girl is brought to the physician with dysuria. Her parents say that she has been crying with urination, even though "a small amount comes out at a time." She has no vomiting, nausea, or fever. In the past year, the girl had 3 bladder infections that were treated with antibiotics; the last infection was 2 months ago. She also has a history of constipation since starting cow's milk at age 1 and takes a laxative as needed to help with bowel movements. Her temperature is 37.2 C (99 F), blood pressure is 80/50 mm Hg, and pulse is 110/min. Examination shows suprapubic tenderness and small anal fissures at 12 o'clock and 2 o'clock. Rectal examination shows normal anal wink and tone; hard stool is palpated in the rectal vault. Urinalysis shows positive leukocyte esterase, positive nitrites, and white blood cells 60/hpf. Urine culture shows 100,000 colonies of *Escherichia coli*. Renal ultrasound and voiding cystoureterogram are normal. Which of the following is the most likely mechanism for this patient's infection?

- ☐ A. Inadequate treatment of prior infection
- ☐ B. Neurologic impairment
- ☐ C. Renal insufficiency
- ☐ D. Sexual abuse
- ☐ E. Urinary reflux
- ☐ F. Urinary stasis

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- ☐ A. Inadequate treatment of prior infection [5%]
- ☐ B. Neurologic impairment [7%]
- ☐ C. Renal insufficiency [1%]
- ☐ D. Sexual abuse [14%]
- ☐ E. Urinary reflux [15%]
- ☒ F. Urinary stasis [58%]

Proceed to Next Item

Explanation:

User Id: [redacted]

Constipation in children	
Risk factors	<ul style="list-style-type: none"> • Initiation of solid food & cow's milk • Toilet training • School entry
Clinical presentation	<ul style="list-style-type: none"> • Straining with passage of hard stools • Crampy abdominal pain • ≤2 defecations/week
	<ul style="list-style-type: none"> • Anal fissures

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Constipation in children	
Risk factors	<ul style="list-style-type: none">• Initiation of solid food & cow's milk• Toilet training• School entry
Clinical presentation	<ul style="list-style-type: none">• Straining with passage of hard stools• Crampy abdominal pain• ≤ 2 defecations/week
Complications	<ul style="list-style-type: none">• Anal fissures• Hemorrhoids• Encopresis• Enuresis/urinary tract infections• Vomiting
Treatment	<ul style="list-style-type: none">• Increase dietary fiber• Limit cow's milk intake to <24 oz• Laxative• +/- Suppositories, enema

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This child has recurrent cystitis, which is characterized by **suprapubic pain**, **dysuria**, **pyuria**, and **bacteriuria**. Recurrent cystitis in toddlers is often caused by **constipation** as **fecal retention** can cause rectal distension, which in turn **compresses the bladder** and prevents complete voiding. The residual urine is a potential breeding ground for bacteria that ascend to the urethra from the perineum.

Risk factors of constipation include dietary changes, such as transition from breast milk to cow's milk and solid foods. Signs of constipation include straining or pain with defecation, passage of firm **pellet-like stools**, and anal fissures and hemorrhoids. Prevention and treatment of recurrent cystitis requires adequate treatment of constipation.

(Choice A) Inadequate treatment of a prior infection is unlikely due to the 2-month gap between the current and last illness.

(Choice B) Spina bifida and Hirschsprung disease (congenital aganglionic megacolon)

Risk factors of constipation include dietary changes, such as transition from breast milk to cow's milk and solid foods. Signs of constipation include straining or pain with defecation, passage of firm **pellet-like stools**, and anal fissures and hemorrhoids. Prevention and treatment of recurrent cystitis requires adequate treatment of constipation.

(Choice A) Inadequate treatment of a prior infection is unlikely due to the 2-month gap between the current and last illness.

(Choice B) Spina bifida and Hirschsprung disease (congenital aganglionic megacolon) are associated with neurologic impairment. These are unlikely in this patient with an otherwise normal examination and constipation onset correlating with dietary changes.

(Choice C) Renal insufficiency is a potential complication of recurrent pyelonephritis (urinary tract infection involving the kidney) and can manifest as poor urine output, malnutrition, poor growth, hypertension, and anemia. It is not a direct cause of recurrent cystitis.

(Choice D) Sexual activity is associated with recurrent cystitis in women, but it is rarely the cause in children. The absence of vaginal pain, behavioral changes, and genital, perineal, or anal injury makes this diagnosis unlikely. Anal fissures are a common manifestation of chronic constipation.

(Choice E) Renal ultrasound is performed to rule out hydronephrosis. **Voiding cystoureterogram** is the imaging study of choice to detect structural abnormalities (eg, **vesicoureteral reflux**). An underlying anatomical problem (eg, vesicoureteral reflux) is a common cause of recurrent urinary tract infections in infants. However, this child had normal imaging studies.

Educational objective:

Chronic constipation is a risk factor for recurrent cystitis in toddlers. Impacted stool can cause rectal distension, which in turn compresses the bladder, prevents complete voiding, and leads to urinary stasis.

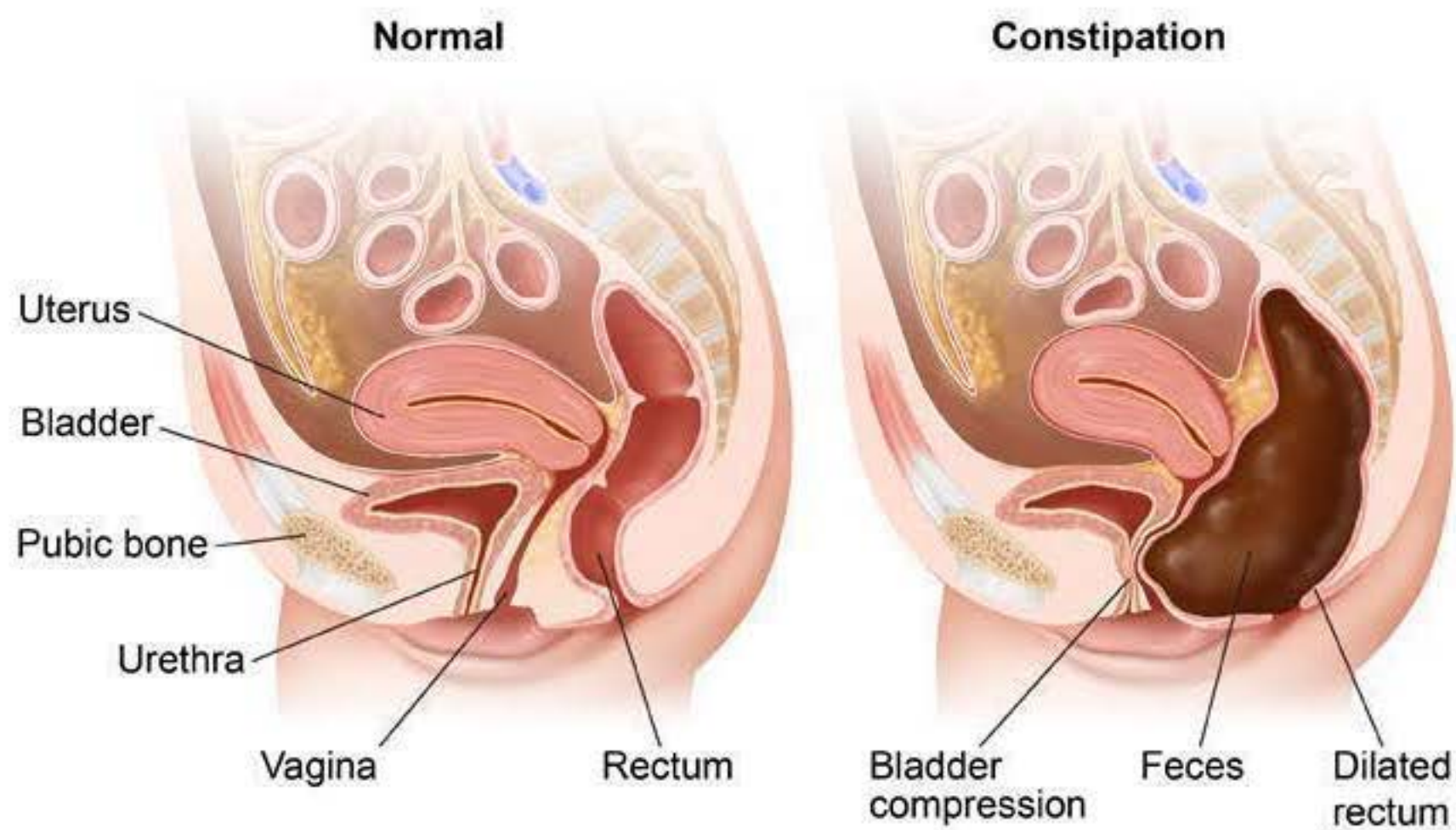
References:

1. **Antibiotics for acute pyelonephritis in children.**
2. **Randomised trial of oral versus sequential intravenous/oral cephalosporins in children with pyelonephritis.**
3. **Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months.**

Media Exhibit

c constipation

Chronic constipation



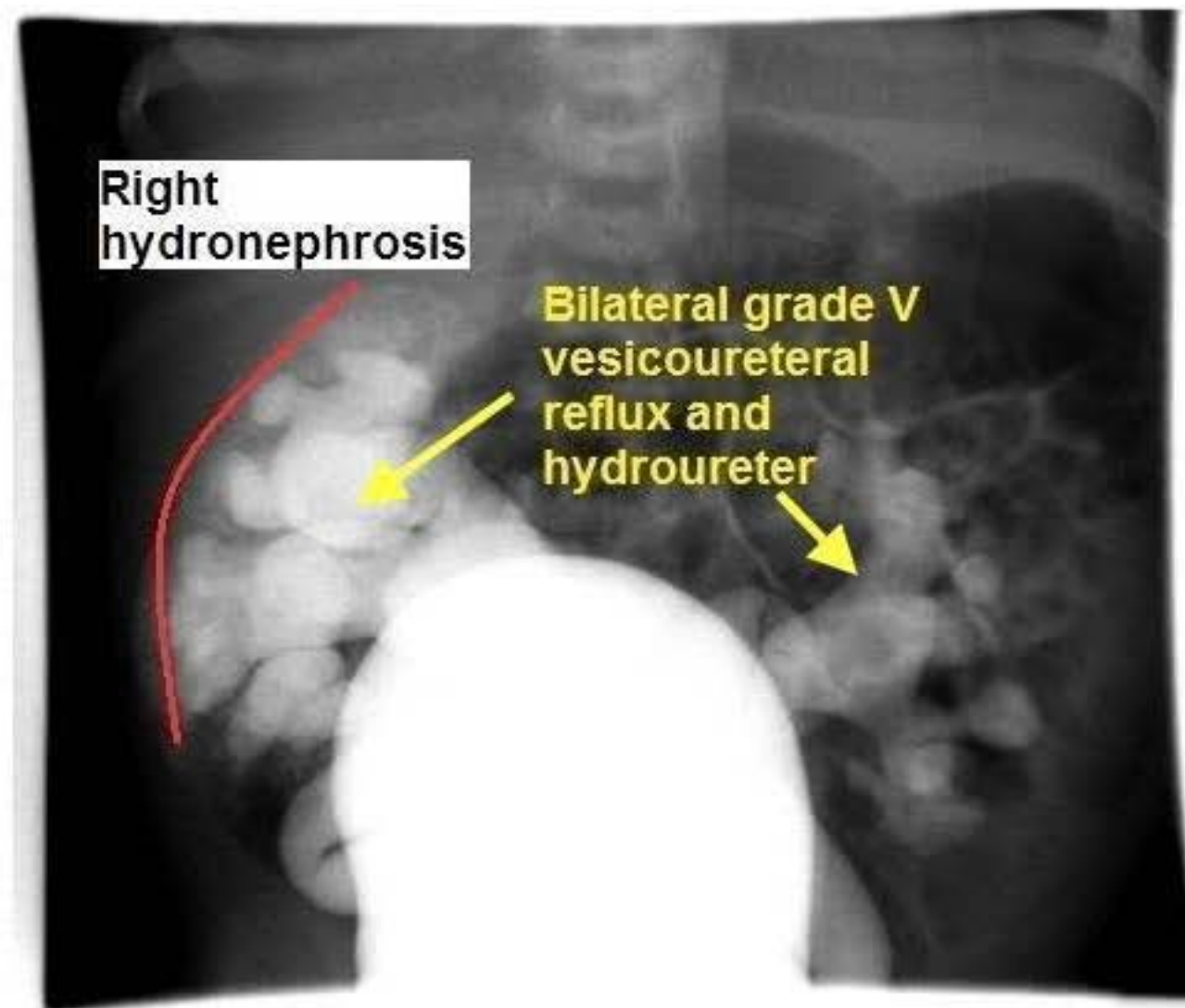
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Media Exhibit



Media Exhibit

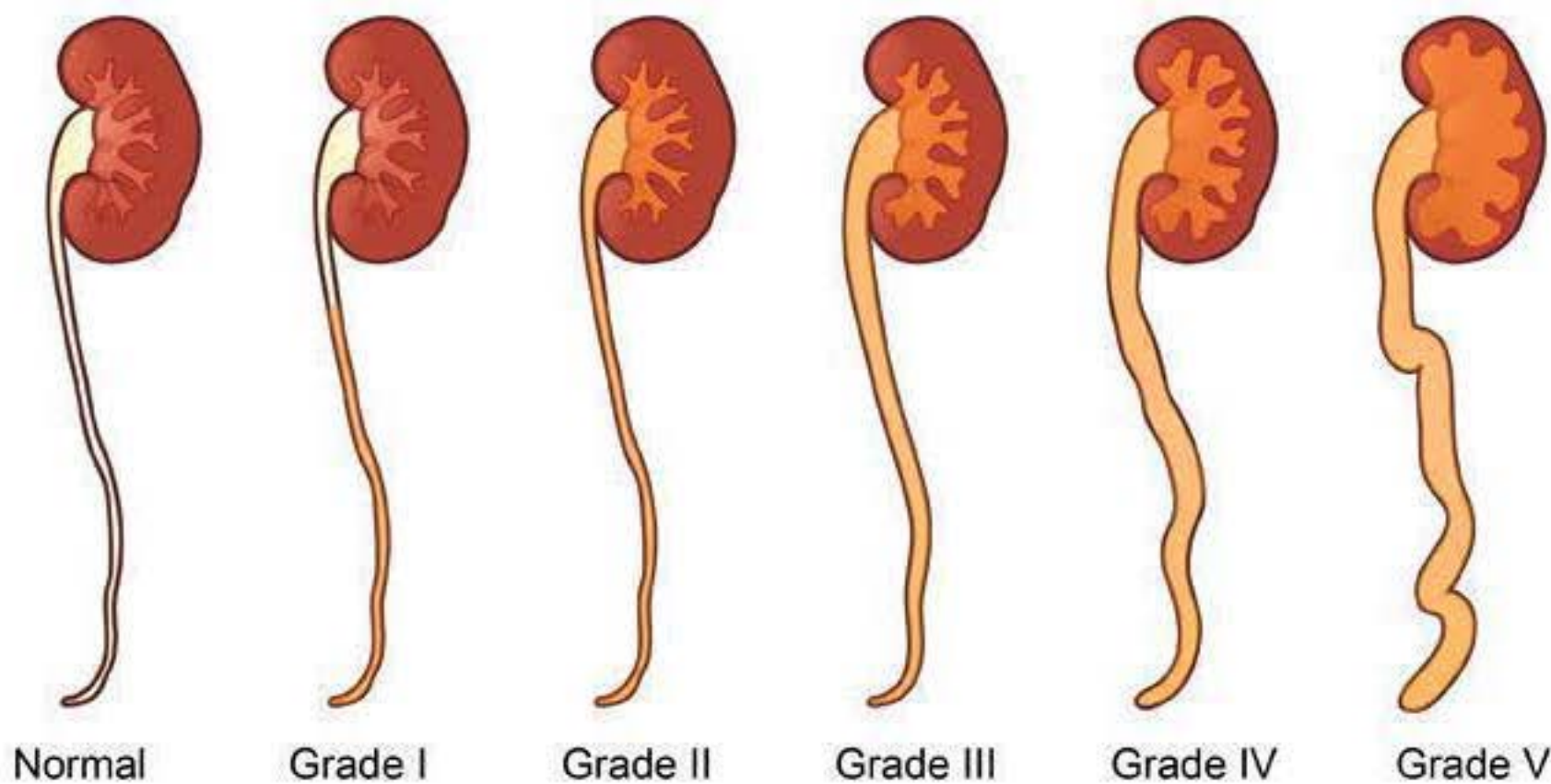
al vesicoureteral reflux



Media Exhibit

ureteral reflux

Vesicoureteral reflux



Grade	Description
I	Into a nondilated ureter
II	Into the pelvis & calyces without dilation
III	Mild to moderate dilation of the ureter, renal pelvis & calyces, with minimal blunting of the fornices
IV	Moderate ureteral tortuosity & dilation of the pelvis & calyces
V	Gross dilation of the ureter, pelvis & calyces; loss of papillary impressions; ureteral tortuosity

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