

A 5-year-old girl with chronic renal insufficiency is brought to the physician for a follow-up visit. Since birth, she has had multiple episodes of urinary tract infections, for which she takes trimethoprim-sulfamethoxazole daily for prophylaxis. She has a history of poor growth and mild hypertension but is otherwise developmentally normal. Her mother lost custody of the girl 3 years ago due to failure to comply with recommended treatment and prophylaxis of her infections. The girl has since lived with her grandmother. Examination shows mild bilateral lower-extremity edema but no other abnormalities. Urinalysis shows mild proteinuria but no white blood cells or bacteria. Renal scintigraphy with dimercaptosuccinic acid shows bilateral focal parenchymal scarring and blunted calyces. Which of the following is the most likely predisposing factor for this patient's recurrent infections?

- ☐ A. Common variable immunodeficiency
- ☐ B. Neurogenic bladder
- ☐ C. Posterior urethral valves
- ☐ D. Polycystic kidney disease
- ☐ E. Recurrent sexual abuse
- ☐ F. Unilateral renal agenesis
- ☐ G. Vesicoureteral reflux



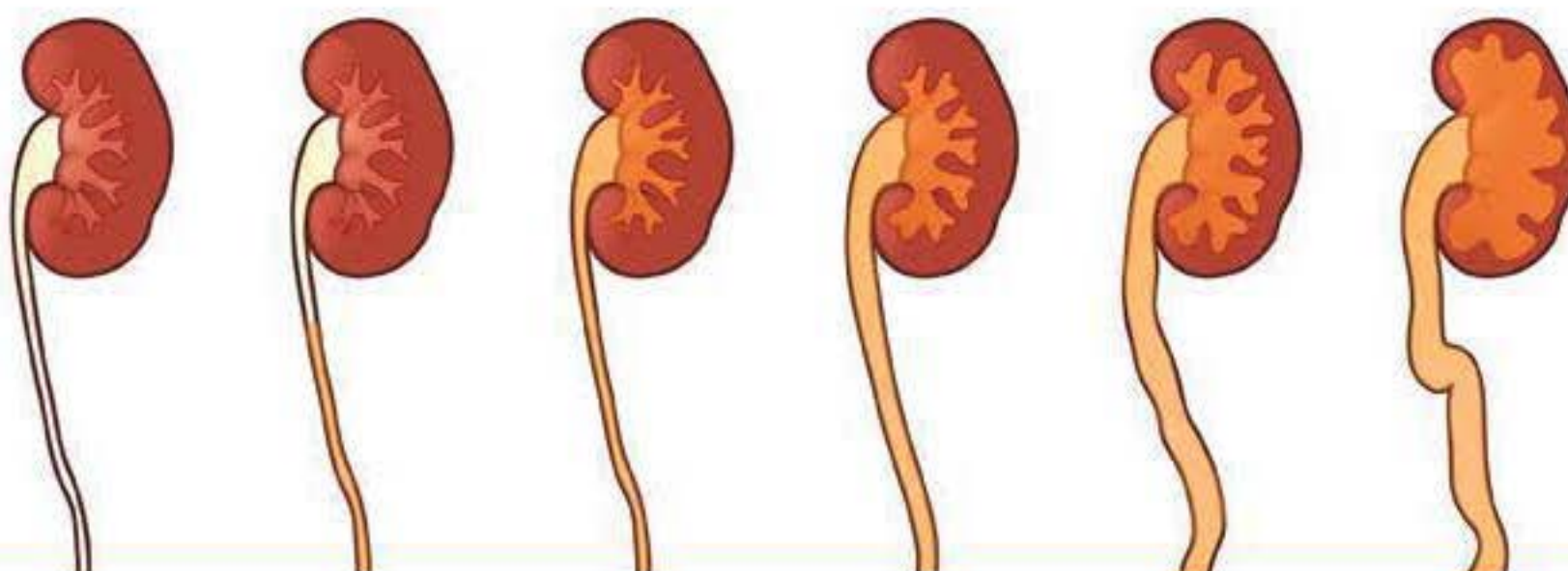
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- ☐ A. Common variable immunodeficiency [1%]
- ☐ B. Neurogenic bladder [0%]
- ☐ C. Posterior urethral valves [11%]
- ☐ D. Polycystic kidney disease [5%]
- ☐ E. Recurrent sexual abuse [0%]
- ☐ F. Unilateral renal agenesis [0%]
- ☒ G. Vesicoureteral reflux [82%]

[Proceed to Next Item](#)**Explanation:**

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### Vesicoureteral reflux

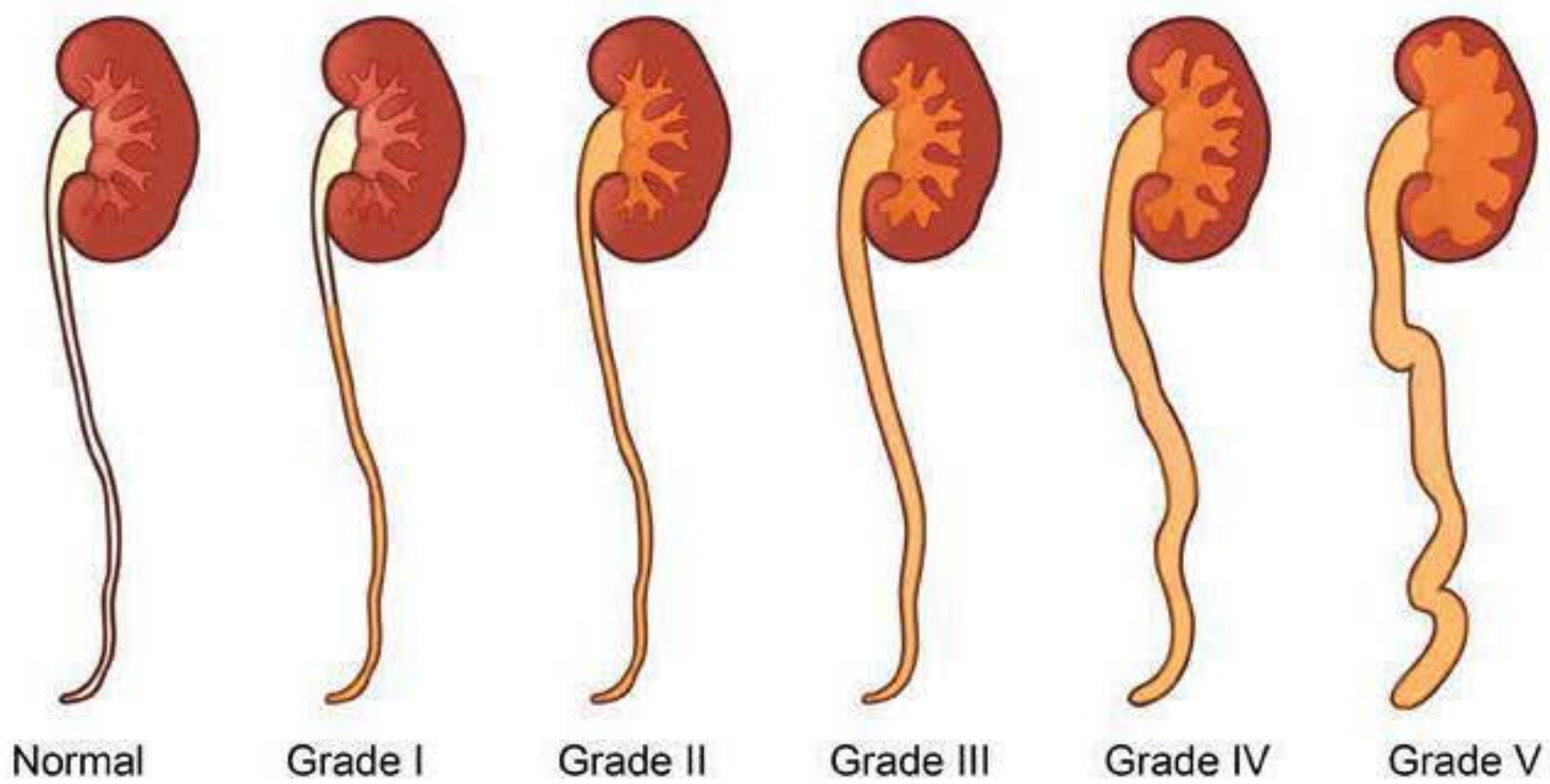




Explanation:

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### 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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**Recurrent urinary tract infections (UTIs)** in infants and children are a serious problem as they often involve the kidney and signify a congenital urinary tract anomaly. One of the most common abnormalities is primary **vesicoureteral reflux (VUR)**. Normal urine should have unidirectional flow from the kidneys, ureters, bladder, and out the urethra. Patients with severe VUR have urinary reflux from the bladder into the kidney, and the



V

Gross dilation of the ureter, pelvis &amp; calyces; loss of papillary impressions; ureteral tortuosity

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**Recurrent urinary tract infections** (UTIs) in infants and children are a serious problem as they often involve the kidney and signify a congenital urinary tract anomaly. One of the most common abnormalities is primary **vesicoureteral reflux** (VUR). Normal urine should have unidirectional flow from the kidneys, ureters, bladder, and out the urethra. Patients with severe VUR have urinary reflux from the bladder into the kidney, and the regurgitant urine causes dilation of the ureters (hydroureter) and kidneys (hydronephrosis).

The definitive diagnosis of VUR is made by contrast **voiding cystourethrogram**. Renal ultrasound is performed to screen for hydronephrosis. Recurrent and/or chronic pyelonephritis can lead to blunting of calices (calyceal clubbing) and focal parenchymal scarring. Renal scintigraphy with dimercaptosuccinic acid is the preferred modality for long-term evaluation for renal scarring. Renal function should be followed by serial creatinine. Patients should be monitored closely for complications of **chronic renal insufficiency**, such as hypertension and anemia.

**(Choice A)** Patients with common variable immunodeficiency typically have recurrent sinopulmonary or gastrointestinal infections.

**(Choice B)** Neurogenic bladder can cause recurrent UTIs due to urine stasis and secondary reflux from inadequate voiding. It is unlikely due to lack of other neurologic deficits in this patient.

**(Choice C)** **Posterior urethral valves** are the most common cause of chronic renal insufficiency/failure in children. This distal urinary tract obstruction can cause secondary urinary reflux but the condition affects only boys.

**(Choice D)** Autosomal recessive polycystic kidney disease manifests in infancy as large flank masses, respiratory distress from pulmonary hypoplasia, and Potter faces (flattened ears/nose, micrognathia from oligohydramnios). Autosomal dominant polycystic kidney disease is usually asymptomatic in childhood.

**(Choice E)** Although frequent sexual intercourse is a risk factor for recurrent UTIs in women, urinary tract anomalies are the principal cause in infants and children.

**(Choice F)** Most patients with a solitary kidney are asymptomatic.

**Educational objective:**

Severe vesicoureteral reflux can cause recurrent or chronic pyelonephritis.

Complications include parenchymal scarring, hypertension, and renal insufficiency.

Definitive diagnosis is made by voiding cystourethrogram.



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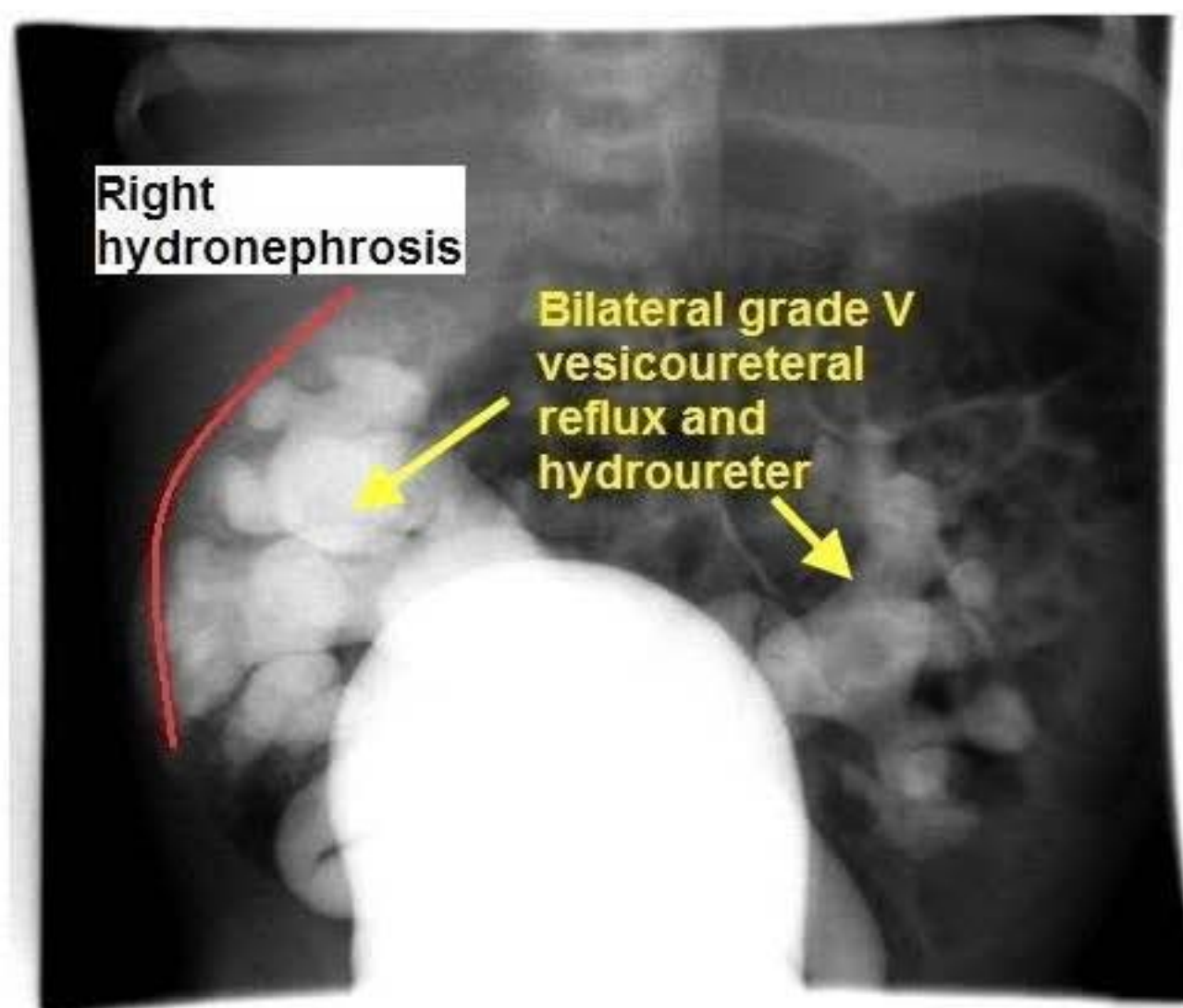
#### References:

1. **Summary of the AUA guideline on management of primary vesicoureteral reflux in children.**
2. **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

al vesicoureteral reflux



Media Exhibit

or urethral valves

