

A 4-year-old boy is brought to the physician for painful urination and fever. For the past 2 days, the child has had pain with urination and has urinated more frequently than usual. The patient's parents say that he awoke twice overnight to urinate and woke up this morning with a fever. He has a history of a urinary tract infection at age 23 months, and a renal ultrasound at that time was normal. Temperature is 38.9 C (102 F), blood pressure is 102/48 mm Hg, and pulse is 104/min. The patient's abdominal examination shows mild suprapubic tenderness with no rebound or guarding.

Urinalysis results are as follows:

Specific gravity	1.016
pH	6.9
Protein	None
Blood	Trace
Glucose	Negative
Ketones	Negative
Leukocyte esterase	Positive
Nitrites	Positive
Bacteria	Few
White blood cells	20-30/hpf

A voiding cystourethrogram demonstrates moderate (Grade III) vesicoureteral reflux. His symptoms improve with antibiotic therapy. What is the most likely long-term complication of this patient's vesicoureteral reflux if left untreated?

- ☐ A. Bladder cancer
- ☐ B. Renal abscess
- ☐ C. Renal calculi
- ☐ D. Renal cell carcinoma
- ☐ E. Renal scarring

Submit

A 4-year-old boy is brought to the physician for painful urination and fever. For the past 2 days, the child has had pain with urination and has urinated more frequently than usual. The patient's parents say that he awoke twice overnight to urinate and woke up this morning with a fever. He has a history of a urinary tract infection at age 23 months, and a renal ultrasound at that time was normal. Temperature is 38.9 C (102 F), blood pressure is 102/48 mm Hg, and pulse is 104/min. The patient's abdominal examination shows mild suprapubic tenderness with no rebound or guarding.

Urinalysis results are as follows:

Specific gravity	1.016
pH	6.9
Protein	None
Blood	Trace
Glucose	Negative
Ketones	Negative
Leukocyte esterase	Positive
Nitrites	Positive
Bacteria	Few
White blood cells	20-30/hpf

A voiding cystourethrogram demonstrates moderate (Grade III) vesicoureteral reflux. His symptoms improve with antibiotic therapy. What is the most likely long-term complication of this patient's vesicoureteral reflux if left untreated?

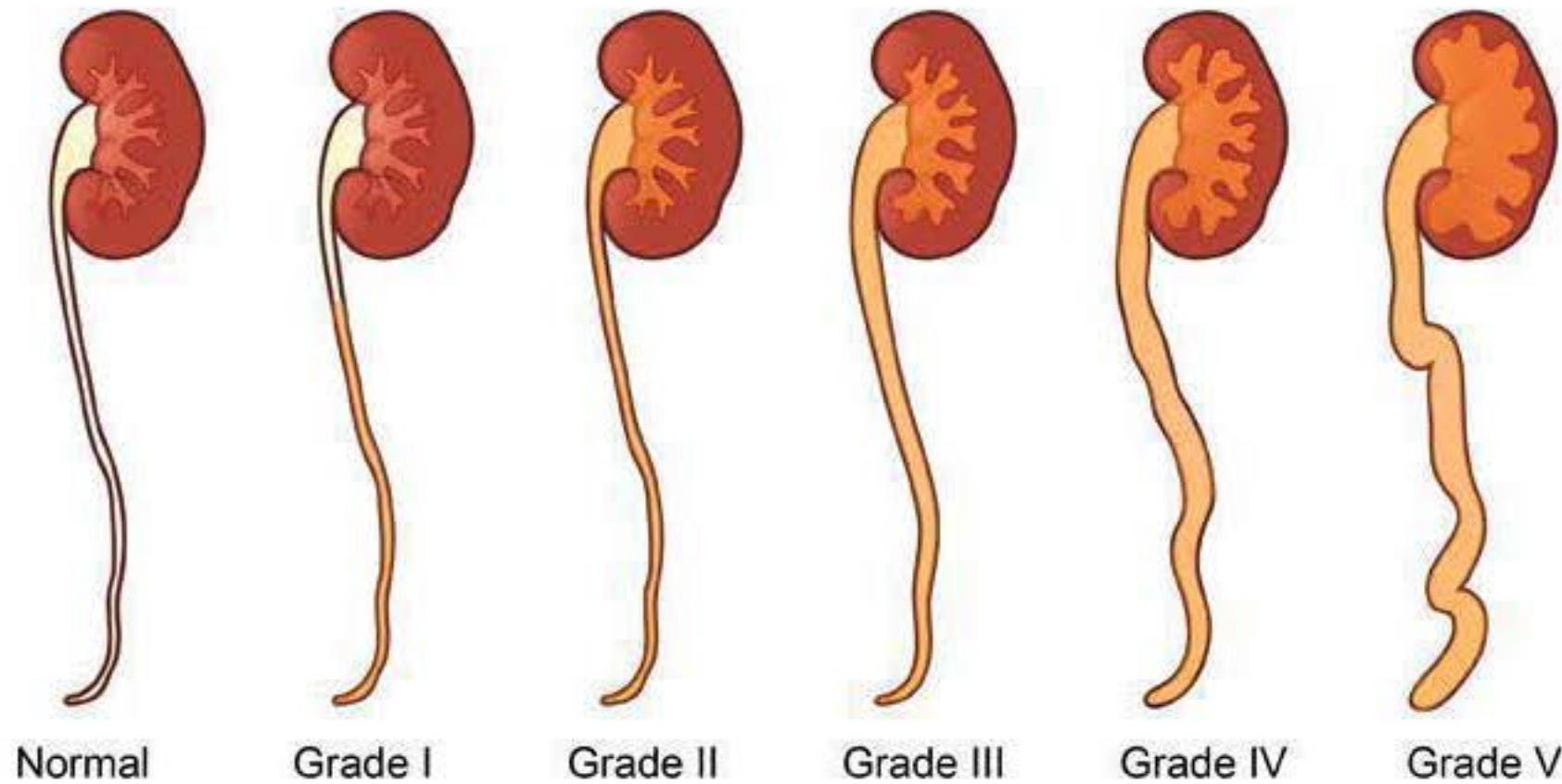
- ☐ A. Bladder cancer [1%]
- ☐ B. Renal abscess [8%]
- ☐ C. Renal calculi [4%]
- ☐ D. Renal cell carcinoma [1%]
- ☒ E. Renal scarring [86%]

Proceed to Next Item

Explanation:

User Id: [redacted]

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

©UWorld

Vesicoureteral reflux (VUR) is defined as the **retrograde flow of urine** from the bladder up into the ureter and renal pelvis. VUR is the most common pediatric urologic problem and is present in ~30%-45% of children with urinary tract infections (UTI). It is a risk factor for **recurrent UTIs**, which in turn place a patient at significant risk for **renal scarring**. The growing kidney is particularly prone to scarring, renal insufficiency, and end-stage renal disease.

V

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

©UWorld

Vesicoureteral reflux (VUR) is defined as the **retrograde flow of urine** from the bladder up into the ureter and renal pelvis. VUR is the most common pediatric urologic problem and is present in ~30%-45% of children with urinary tract infections (UTI). It is a risk factor for **recurrent UTIs**, which in turn place a patient at significant risk for **renal scarring**. The growing kidney is particularly prone to scarring, renal insufficiency, and end-stage renal disease.

The gold standard modality for diagnosing VUR is a **voiding cystourethrogram** (VCUG). The American Academy of Pediatrics recommends that children with a first UTI at age 2-24 months undergo **renal and bladder ultrasound** to evaluate for any anatomic abnormalities that might predispose to VUR. Routine VCUGs after a first UTI are not usually recommended, as a normal renal ultrasound is generally reassuring. However, VCUGs are recommended in patients with recurrent UTIs, such as this patient, as a renal ultrasound is less sensitive in detecting VUR.

(Choice A) VUR is not associated with bladder cancer.

(Choice B) Renal abscesses are a short-term complication of acute pyelonephritis, which also increase the risk of permanent renal scarring.

(Choice C) The development of renal calculi is not associated with VUR. Rather, risk factors for renal calculi include a diet that is high in animal protein and sodium and low in calcium and fluid.

(Choice D) Risk factors for the development of renal cell carcinoma include cigarette smoking, hypertension, and diabetes mellitus. VUR does not increase the risk for renal cell carcinoma.

Educational objective:

Vesicoureteral reflux (VUR) is a risk factor for recurrent urinary tract infections (UTIs), which can lead to progressive renal scarring. As such, all children with a first febrile UTI at age 2-24 months should undergo a renal ultrasound to evaluate for anatomic abnormalities. Those with recurrent UTIs should also undergo a voiding cystourethrogram to evaluate for VUR.

References:

1. [Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months.](#)

Vesicoureteral reflux (VUR) is defined as the **retrograde flow of urine** from the bladder up into the ureter and renal pelvis. VUR is the most common pediatric urologic problem and is present in ~30%-45% of children with urinary tract infections (UTI). It is a risk factor for **recurrent UTIs**, which in turn place a patient at significant risk for **renal scarring**. The growing kidney is particularly prone to scarring, renal insufficiency, and end-stage renal disease.

The gold standard modality for diagnosing VUR is a **voiding cystourethrogram** (VCUG). The American Academy of Pediatrics recommends that children with a first UTI at age 2-24 months undergo **renal and bladder ultrasound** to evaluate for any anatomic abnormalities that might predispose to VUR. Routine VCUGs after a first UTI are not usually recommended, as a normal renal ultrasound is generally reassuring. However, VCUGs are recommended in patients with recurrent UTIs, such as this patient, as a renal ultrasound is less sensitive in detecting VUR.

(Choice A) VUR is not associated with bladder cancer.

(Choice B) Renal abscesses are a short-term complication of acute pyelonephritis, which also increase the risk of permanent renal scarring.

(Choice C) The development of renal calculi is not associated with VUR. Rather, risk factors for renal calculi include a diet that is high in animal protein and sodium and low in calcium and fluid.

(Choice D) Risk factors for the development of renal cell carcinoma include cigarette smoking, hypertension, and diabetes mellitus. VUR does not increase the risk for renal cell carcinoma.

Educational objective:

Vesicoureteral reflux (VUR) is a risk factor for recurrent urinary tract infections (UTIs), which can lead to progressive renal scarring. As such, all children with a first febrile UTI at age 2-24 months should undergo a renal ultrasound to evaluate for anatomic abnormalities. Those with recurrent UTIs should also undergo a voiding cystourethrogram to evaluate for VUR.

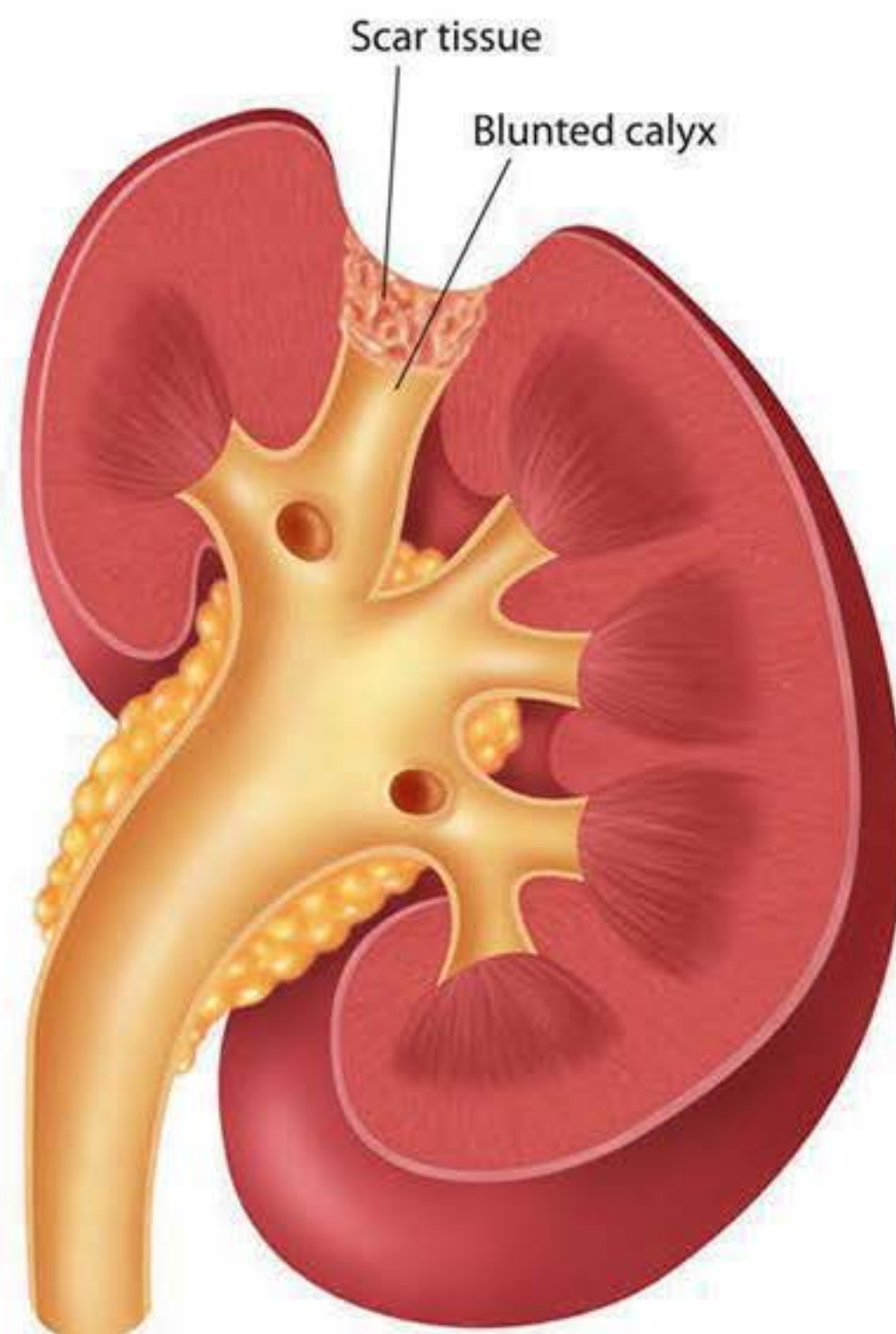
References:

1. [Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months.](#)
2. [Does this child have a urinary tract infection?](#)

Media Exhibit

Scarring

Chronic pyelonephritis of the kidney



USMLEWorld, LLC © 2011