CPI Pediatric Radiology Module 2016

Self-Assessment Module

Image-Related Questions

1. A voiding cystourethrogram was performed in a 21-month-old girl with recurrent urinary tract infections. What is the **MOST** likely cause of the findings on this frontal view of the bladder (Figure 1-1)?

A. Pelvic mass

B. Bilateral Hutch diverticula

C. Left vesicoureteral reflux

D. Bladder ears

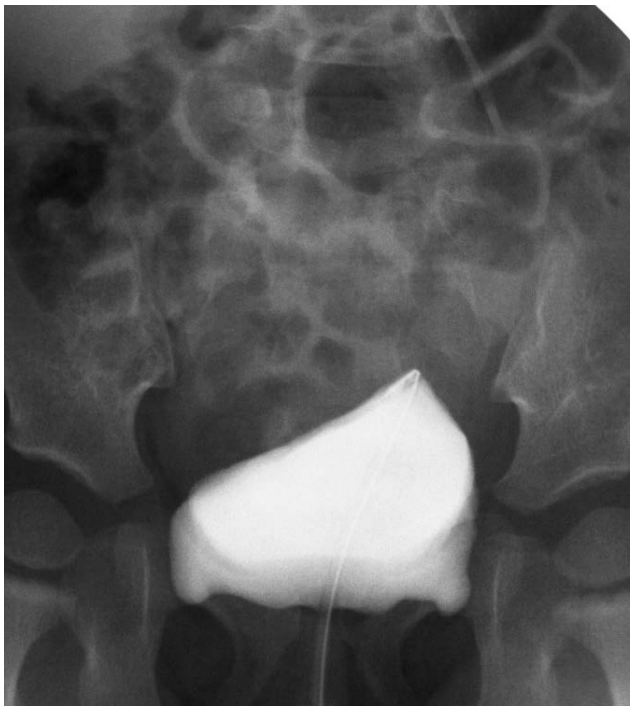

Fig 1-1. Bladder. Voiding cystourethrogram. Frontal view.

2. A renal and bladder ultrasound (Figures 2-1 and 2-2) was performed in a 12-year-old girl with symptoms of urinary frequency and urgency. Which *one* of the following is the **MOST** likely diagnosis?

A. Ovarian cyst

B. Ovarian torsion

C. Hematocolpos

D. Giant ureterocele

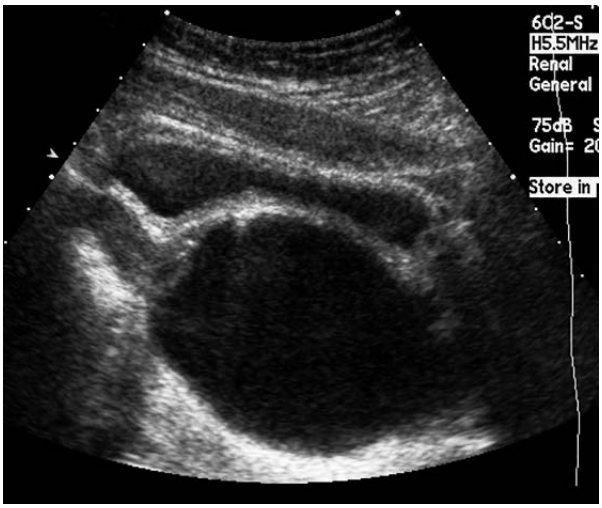

Fig 2-1. Pelvis. Ultrasound. Sagittal plane. Midline.

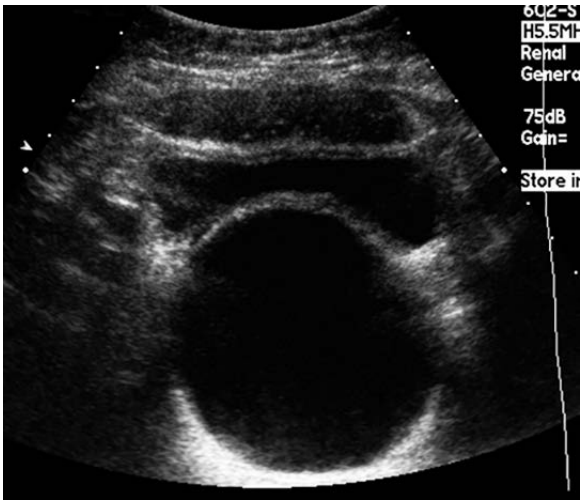

Fig 2-2. Pelvis. Ultrasound. Transverse plane.

3. A pelvis radiograph was performed in an afebrile 8-year-old boy with hip pain and a normal white blood cell count. Based on this radiograph (Figure 3-1), what is the **MOST** likely diagnosis?

A. Osteogenic sarcoma

B. Healing fracture

C. Normal ischiopubic synchondrosis

D. Chronic osteomyelitis

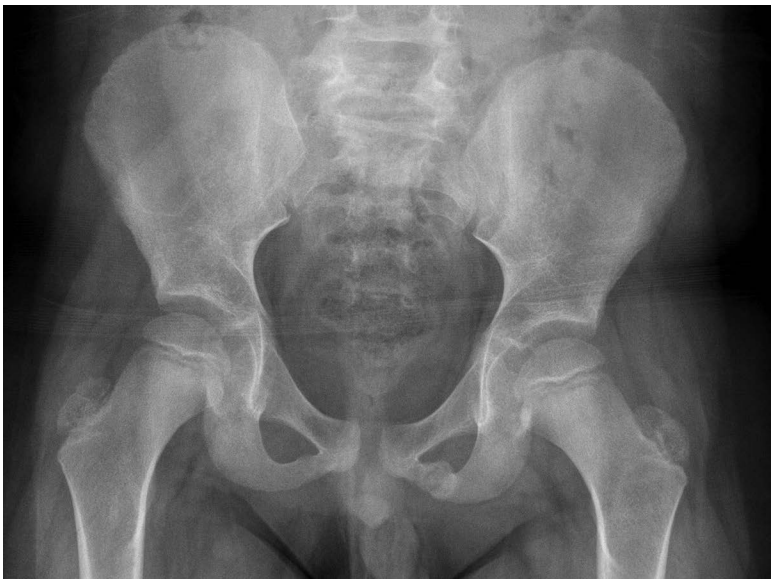

Fig 3-1. Pelvis. Radiograph. Frontal view.

4. A 7-year-old boy presented with a temperature of 103.8°F, elevated C-reactive protein, refusal to bear weight, and pelvic pain radiating to the left leg. A hip ultrasound revealed no hip joint effusion, and plain radiographs of the hips were performed. Based on the provided information and the hip radiograph (Figure 4-1), what is the **MOST** appropriate *next* step?

A. Low-dose computed tomography (CT) scan of the pelvis

B. Technetium Tc 99m methylene diphosphonate bone scintigraphy

C. Magnetic resonance imaging (MRI) of the pelvis

D. Follow-up radiographs in 48 to 72 hours

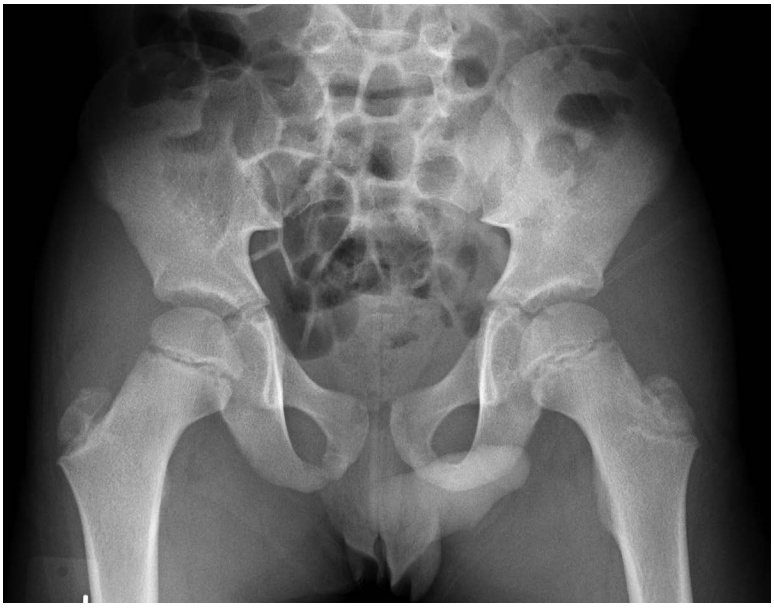

Fig 4-1. Pelvis. Radiograph. Frontal view.

Nonimage-Related Questions

29. Regarding renal masses in children, which *one* of the following statements is **TRUE**?

A. Fifty percent of palpable renal masses in the perinatal period are true neoplasms.

B. The most common neoplasm in the perinatal period is rhabdoid tumor.

C. Wilms tumor is the most common abdominal malignancy in childhood.

D. Clear cell sarcoma is associated with sporadic aniridia.

30. Regarding clear cell sarcoma of the kidney, which *one* of the following statements is **CORRECT**?

A. The most common site of metastasis is the liver.

B. Bilateral renal involvement occurs in approximately 25% of patients.

C. It is seen almost exclusively in patients with sickle cell trait or hemoglobin SC disease.

D. It is not associated with nephroblastomatosis or hemihypertrophy.

31. Which *one* of the following statements regarding ectopic ureteroceles is **CORRECT**?

A. They are typically associated with a single (rather than a duplicated) collecting system.

B. They are more commonly seen in the lower moiety of a duplicated collecting system than in the upper.

C. They are almost invariably bilateral.

D. Upper-pole ectopic ureteroceles are associated with ipsilateral lower-pole vesicoureteral reflux.

32. A previously healthy 12-year-old boy presents with flank pain and hematuria. Which *one* of the following would be the **MOST** appropriate initial imaging test?

A. X-ray intravenous urography

B. Kidney and bladder ultrasound

C. CT of the abdomen and pelvis with and without intravenous contrast

D. Abdomen and pelvis MRI without intravenous contrast

33. During a follow-up renal ultrasound in a 6-year-old girl with a history of prior ureteropelvic junction obstruction repair, a small-bowel intussusception is identified. What is the **MOST** appropriate *next* step?

A. Call the referring physician and recommend pneumatic intussusception reduction.

B. Recommend a CT scan to identify a lead point for intussusception.

C. Scan the liver and spleen for evidence of lymphoma, as bowel involvement in lymphoma is a common lead point for intussusception.

D. Rescan the area of involvement to confirm the persistence of the intussusception.

Answer Key

CPI Pediatric Radiology Module 2016

1. D
2. C
3. C
4. C
5. C
6. D
7. A
8. C
9. A
10. C
11. D
12. B
13. C
14. A
15. A
16. B
17. D
18. B
19. C
20. C
21. A
22. D
23. A
24. A
25. D
26. D
27. B
28. C
29. C
30. D
31. D
32. B
33. D
34. A
35. C
36. D
37. B
38. D
39. C
40. C
41. C
42. C
43. A
44. C
45. A
46. D
47. A
48. A
49. C
50. A

Rationales and References

Answer 1 is D.

The spot image from the voiding cystourethrogram demonstrates bilateral inferior protrusions from the inferolateral aspect of the bladder (Figure 1-1). These were most pronounced with straining and were not visualized when the test patient stopped straining (Figure 1-2). There was no vesicoureteral reflux seen during the entire procedure.

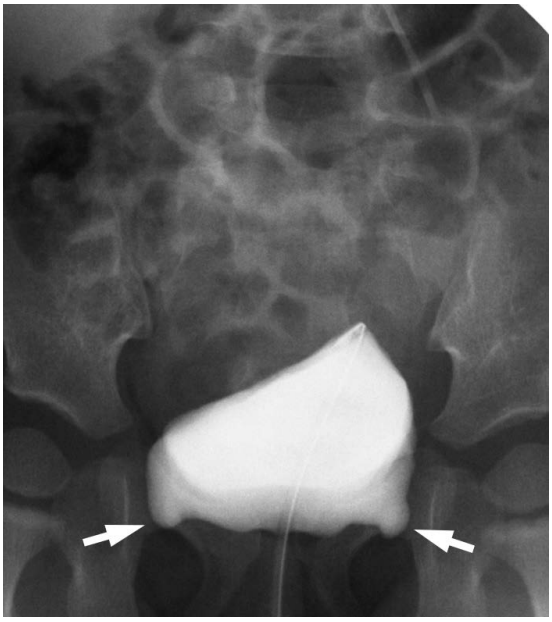

Fig 1-1. Bladder ears. Bladder. Annotated. Voiding cystourethrogram (VCUG). Frontal view. Symmetric inferior protrusions (arrows) at the bladder base are present. They were seen when the 21-month-old patient was straining.

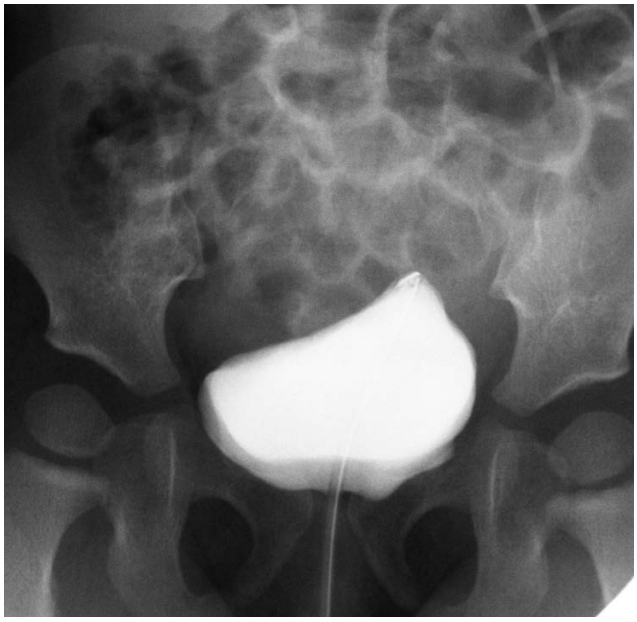

Fig 1-2. Bladder ear disappearance. Bladder. VCUG. Frontal view. The bladder ears disappeared when the test patient stopped straining.

"Bladder ears" are inferolateral protrusions of the bladder through the internal inguinal rings and into the inguinal canals. This normal variant occurs almost exclusively in infants because the bladder has a more abdominal position in infants compared to the more pelvic position that it develops in older children and adults as the pelvis grows. The relative underdevelopment of the infant's pelvis places the bladder in closer proximity to the internal inguinal ring. Bladder ears have no clinical significance and resolve spontaneously as the pelvis matures.

Option A is not correct.

Although there is a right-sided superolateral impression on the partially filled bladder, this is a commonly seen normal impression from the adjacent sigmoid colon. Therefore, a pelvic mass is not the most likely diagnosis.

Option B is not correct.

Bladder diverticula are herniations of mucosa through the bladder musculature. Hutch diverticula are bladder diverticula that occur at the ureterovesical junction (UVJ). They are often associated with vesicoureteral reflux because they can distort the UVJ. Although Hutch diverticula can occur at the bladder base, they are typically located more laterally (Figures 1-3 and 1-4) than the more inferior protrusion seen with bladder ears as in the test case (Figure 1-1).

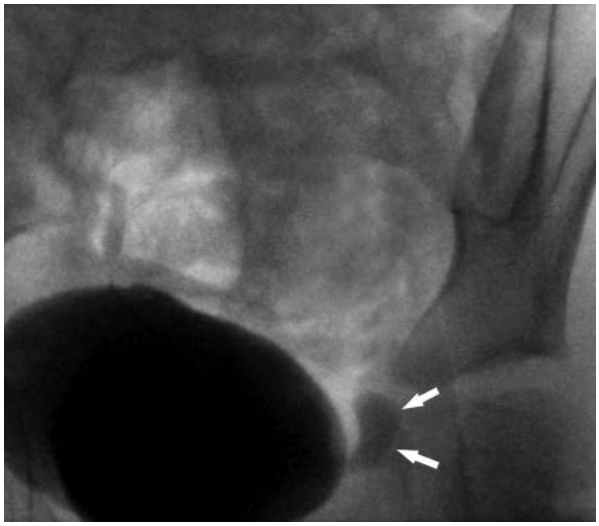

Fig 1-3. Hutch diverticulum. Bladder. VCUG. Right posterior oblique view. A Hutch diverticulum (arrows) is seen near the expected site of insertion of the left ureter into the bladder.

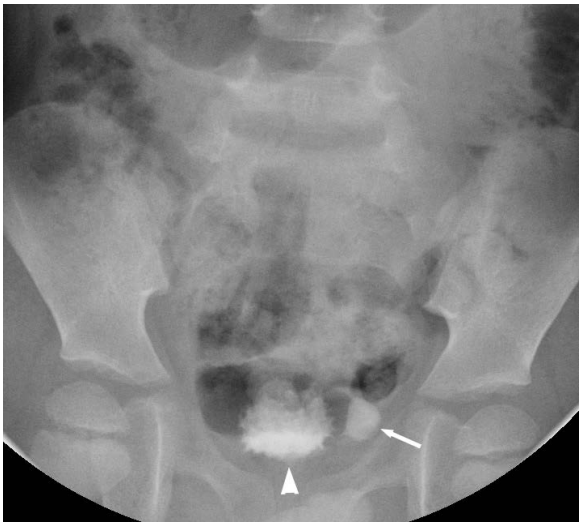

Fig 1-4. Hutch diverticulum. Bladder. VCUG. Frontal view. Same patient as in Figure 1-3. Residual contrast in the diverticulum (arrow) and the bladder (arrowhead) after voiding.

Option C is not correct.

There is no evidence of reflux of contrast into either distal ureter.

Reference(s):

Allen RP, Condon VR. Transitory extraperitoneal hernia of the bladder in infants (bladder ears). *Radiology.* 1961;77:979-983.

Answer 2 is C.

The ultrasound (Figures 2-1 and 2-2) reveals a fluid-filled structure posterior to the bladder in the expected location of the vagina. This structure is round on the transverse view (Figure 2-2) and oval-shaped on the sagittal view (Figure 2-1) and contains a small amount of dependent debris. The uterus is seen superior to the fluid-filled vagina on the sagittal view and does not have fluid within its lumen.

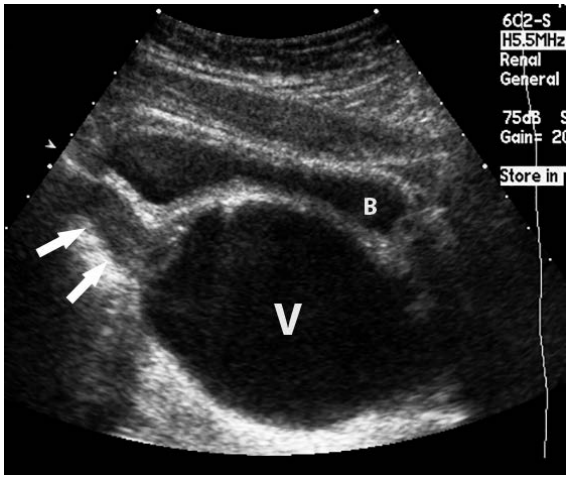

Fig 2-1. Hematocolpos. Annotated. Pelvis. Ultrasound. Sagittal plane. Midline. The vagina (V) is distended and fluid filled. It is posterior to (and compresses) the bladder (B). The uterus (arrows) is superior to the vagina and does not have a distended lumen.

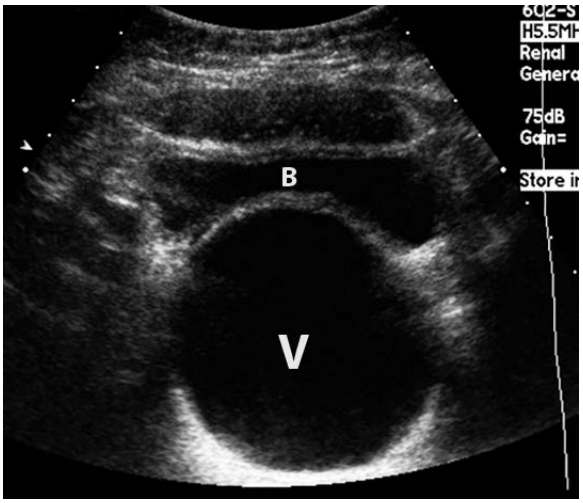

Fig 2-2. Hematocolpos. Annotated. Pelvis. Ultrasound. Transverse plane. The fluid-filled and distended vagina (V) compresses the anterior bladder (B). A small amount of contained dependent echogenicity in the vagina is consistent with hemorrhagic (versus proteinaceous or infectious) debris.

Hydrocolpos refers to the accumulation of secretions in the vagina, and the term *hydrometrocolpos* is used when the secretions collect in the lumen of both the vagina (colpos) and the uterus (metro). These conditions often occur in the newborn period as a consequence of maternal estrogen stimulation. If patients do not present in the newborn period, they usually present at puberty when menstruation leads to accumulation of blood products in the vagina (hematocolpos) or the vagina and the uterus (hematometrocolpos). Both in the neonatal period and at puberty, the accumulation of secretions or blood indicate the presence of an intact imperforate hymen, a vaginal membrane, or vaginal atresia.

In patients with hematocolpos presenting at the time of puberty, typical symptoms can include abdominal pain (often cyclical with menses), amenorrhea, and urinary urgency or frequency. In this patient at an age expected for puberty with symptoms of urinary frequency and urgency and a dilated and fluid-filled vagina (without distension of the uterus), hematocolpos is the best answer.

Option A is not correct.

The structure behind the bladder is midline and more compatible with a dilated vagina than an ovarian cyst. Nevertheless, a large ovarian cyst could insinuate itself behind the bladder and mimic a dilated vagina. The appearance of the sagittal view (Figure 2-1), however, confirms that the fluid-containing structure is the vagina as it is in anatomic continuity with the uterus.

Option B is not correct.

A torsed ovary would typically present as an enlarged solid ovary, often with peripheral follicles. Absent or decreased blood flow may be noted in the ovary on Doppler imaging. Abnormal Doppler flow, however, is not always the case. An enlarged, torsed ovary could insinuate itself behind the bladder in a similar location to the fluid-distended vagina in the test case (Figure 2-3). The fluid-filled nature of the mass in the test case and its continuity with the uterus suggest that hematocolpos is a better answer. A chronically torsed ovary could undergo infarction and appear as a fluid- or debris-filled shell, but it would not appear contiguous with the uterus.

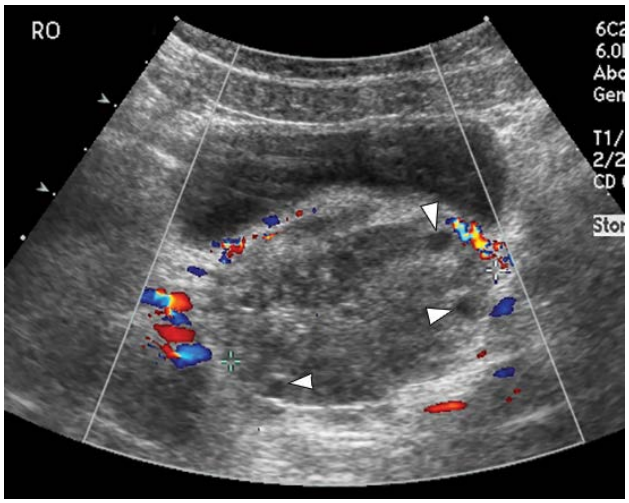

Fig 2-3. Ovarian torsion. Pelvis. Color Doppler ultrasound. Transverse plane. Region of the bladder. A solid avascular mass with peripheral follicles (arrowheads), characteristic of ovarian torsion (particularly in older children and adolescents), is seen posterior to the bladder.

Option D is not correct.

A ureterocele is a distended distal ureter that herniates into the bladder. The fact that the cystic structure in this case is extrinsic to the bladder and continuous with the uterus on the sagittal view argues for hematocolpos rather than a ureterocele in this girl at the age of puberty.

Reference(s):

Cohen HL, Raju AD. Abnormalities of the female genital tract. In: Coley B, ed. *Caffey's Pediatric Diagnostic Imaging.* 12th ed. Philadelphia, PA: Elsevier Saunders; 2013:1318-1324.

Wilson DA, Stacy TM, Smith EI. Ultrasound diagnosis of hydrocolpos and hydrometrocolpos. *Radiology.* 1978;128:451-454.

Answer 3 is C.

The radiograph (Figure 3-1) demonstrates a rounded area of expansion of the bone with adjacent sclerosis at the site of the left ischiopubic synchondrosis. The right ischiopubic synchondrosis has fused, and the bone in this region appears normal.

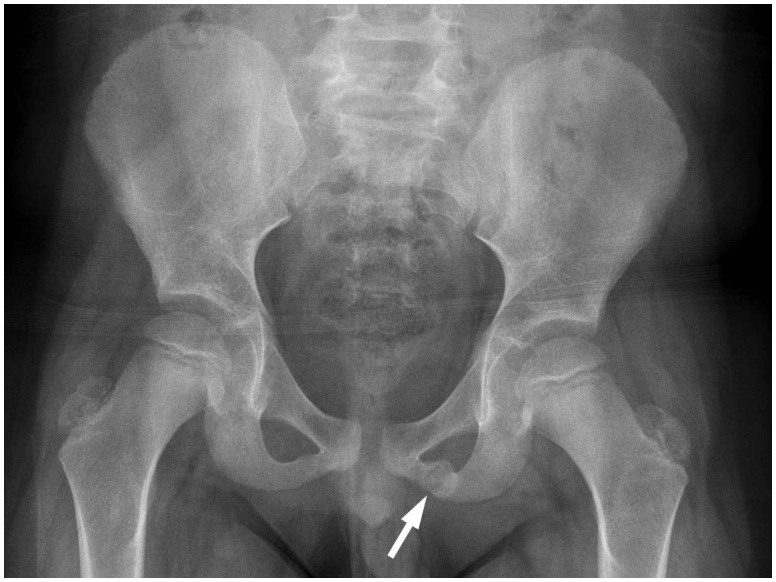

Fig 3-1. Normal closing ischiopubic synchondrosis. Annotated. Pelvis. Radiograph. Frontal view. Expansion of the bone (arrow) is present at the site of the fusing left ischiopubic synchondrosis.

The ischiopubic synchondrosis can normally have an enlarged, bulbous appearance just prior to closure in older children (Figure 3-2).

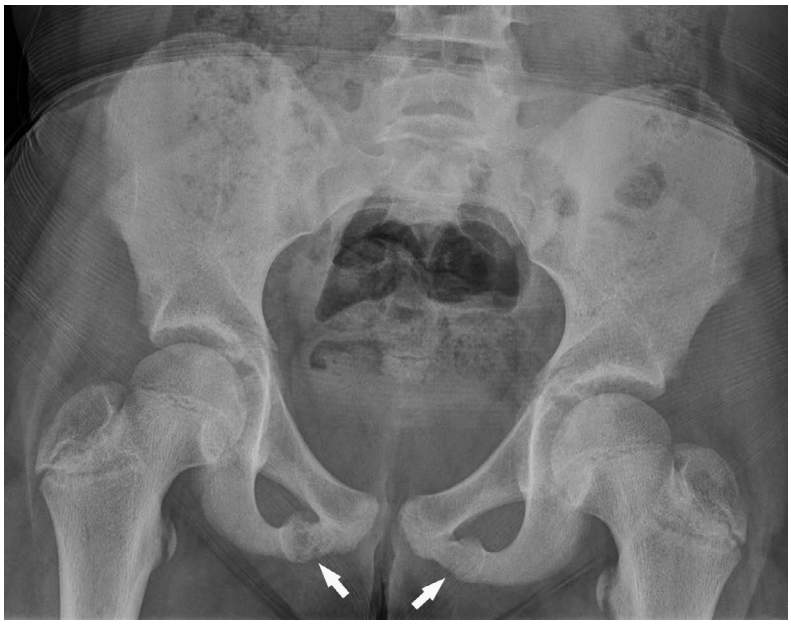

Fig 3-2. Normal closing ischiopubic synchondroses. Pelvis. Radiograph. Frontal view. Different patient than the test case in Figure 3-1. A bulbous appearance of the closing synchondroses is seen bilaterally (arrows) but is more prominent in this image on the right side compared to the left side.

Furthermore, the process of closure may be asymmetric, creating a unilateral bulbous appearance (as in this patient) that may lead to the incorrect presumption of an aggressive lesion. Some suggest that the asymmetric closure is related to its delay on 1 side secondary to mechanical stress in this "temporary joint." A recent study showed that in 9 children with asymmetric closure of the ischiopubic synchondroses, the side of the delayed closure was always on the side of the nondominant leg. The authors theorized that the nondominant leg is the weight-bearing leg during kicking in sporting activities and therefore undergoes more stress, leading to delayed closure.

Option A is not correct.

Although the closing ischiopubic synchondrosis can be expansile with heterogeneous radiodensity and surrounding sclerosis, suggesting an aggressive process, the location and appearance in this case is characteristic for normal closure of the synchondroses. Knowledge of this normal variation is important because if magnetic resonance imaging (MRI) is performed, the MR appearance can also suggest an aggressive process and lead to further confusion. In fact, the histologic appearance could also suggest a neoplastic process if the "lesion" were biopsied.

Option B is not correct.

Although a healing fracture could conceivably cause a similar appearance, the characteristic location and appearance in this case is pathognomonic for normal closure of the synchondroses, which in the test patient is occurring asymmetrically.

Option D is not correct.

Although osteomyelitis could also cause expansion of the bone and heterogeneous density with surrounding sclerosis, the characteristic location and appearance suggest normal asymmetric closure of the synchondroses. Furthermore, the lack of fever or an abnormal white blood cell count would argue against infection.

Reference(s):

Herneth AM, Philipp MO, Pretterklieber ML, Balassy C, Winkelbauer FW, Beaulieu CF. Asymmetric closure of ischiopubic synchondrosis in pediatric patients: correlation with foot dominance. *AJR Am J Roentgenol*. 2004;182:361-365.

Answer 4 is C.

The plain radiograph of the hips (Figure 4-1) is normal.

With the history of pain, refusal to bear weight, fever, and elevation of C-reactive protein (CRP), an inflammatory marker, an infectious process is the leading diagnosis. Considerations include osteomyelitis, septic arthritis, and infectious myositis. The absence of effusion on hip ultrasound excludes septic arthritis. The next appropriate imaging study should be MRI to evaluate for osteomyelitis or myositis.

MRI of the pelvis with intravenous contrast (Figures 4-2 and 4-3) was performed and demonstrated pyomyositis of the left obturator internus muscle.

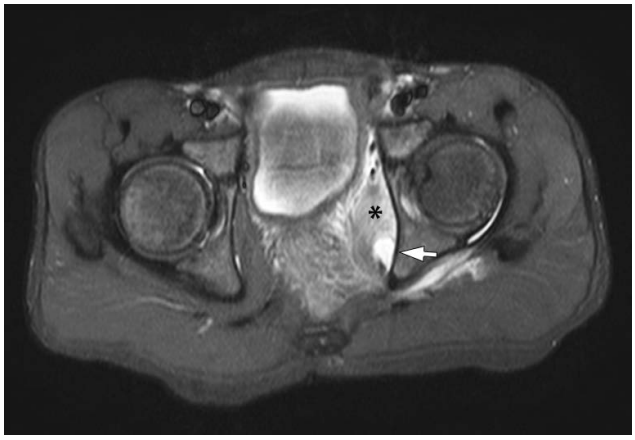

Fig 4-2. Pyomyositis of the obturator internus muscle. Bilateral hips. MRI. Short tau inversion recovery (STIR). Axial plane. Level of the femoral heads. There is enlargement of the left obturator internus muscle (*) with generalized increased signal and a focal area of more pronounced increased signal intensity (arrow).

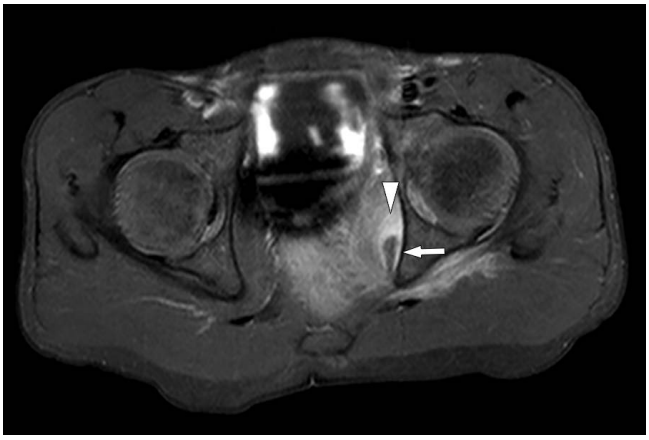

Fig 4-3. Pyomyositis of the obturator internus muscle. Bilateral hips. MRI. T1 weighted. Contrast enhancement. Axial plane. Level of the femoral heads (same level as Figure 4-2). There is enhancement in the obturator internus muscle (arrowhead). Decreased signal is seen in the area of intense high signal noted on the STIR image in Figure 4-2 (arrow), confirming that this represents fluid (and therefore an abscess in this clinical setting).

Children with pelvic myositis or pyomyositis near the sciatic nerve can present with clinical signs and symptoms mimicking other infectious processes, such as septic arthritis and pelvic osteomyelitis. These patients frequently present with pain and inability to walk that is attributed to the proximity of the involved muscles to the sciatic plexus and sciatic nerve. Frequently involved perisciatic muscles in these patients include the obturator internus, the piriformis, and the gemelli. Initial imaging workup in patients with fever and laboratory evidence of infection (elevated white blood cell count, erythrocyte sedimentation rate, or

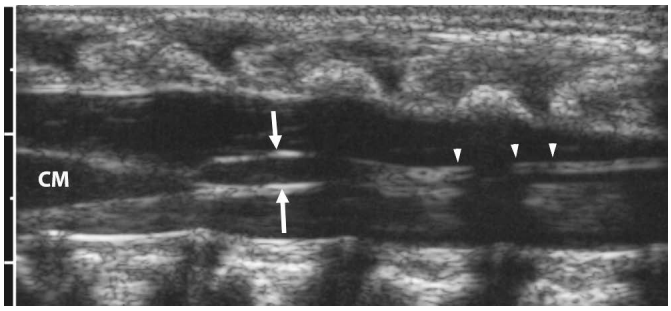

Fig 28-4. Filar cyst. Spinal canal. Ultrasound. Longitudinal plane. Midline. Level of the filum terminale. There is a cyst (arrows) within the dorsal aspect of the upper portion of the filum (arrowheads). The filar cyst is seen just below the conus medullaris (CM).

Reference(s):

Guillerman RP. Infant craniospinal ultrasonography: beyond hemorrhage and hydrocephalus. *Semin Ultrasound CT MR*. 2010;31:71-85.

Rufener SL, Ibrahim M, Raybaud CA, Parmar HA. Congenital spine and spinal cord malformations—pictorial review. *AJR Am J Roentgenol*. 2010;194:S26-S37.

Savage JJ, Casey JN, McNeill IT, Sherman JH. Neurenteric cysts of the spine. *J Craniovertebr Junction Spine*. 2010;1:58-63.

Answer 29 is C.

A Wilms tumor is the most common childhood abdominal malignancy. It arises from persistent embryonal tissue. Eighty percent of patients present between 1 and 5 years of age. The peak incidence is between 3 and 4 years of age. There are approximately 400 to 500 newly diagnosed cases per year. A Wilms tumor may be seen in association with coexisting congenital anomalies such as genitourinary anomalies (cryptorchidism, hypospadias, horseshoe kidney, multicystic dysplastic kidney, and nephroblastomatosis) as well as hemihypertrophy and sporadic aniridia.

Option A is not correct.

The most common renal masses in the perinatal period are nonneoplastic masses such as hydronephrosis and multicystic dysplastic kidney. Only 20% of renal masses in the first year of life are true neoplasms. A large multicenter study reviewing 750 patients diagnosed with renal neoplasms in the first 7 months of life revealed that a majority (58%) of tumors were Wilms tumor, though congenital mesoblastic nephroma was the most common tumor in the first 2 months of life.

Option B is not correct.

Congenital mesoblastic nephroma is the most common tumor in the first 2 months of life. Rhabdoid tumor of the kidney is an extremely aggressive renal neoplasm that accounts for only 2% to 3% of all renal malignancies in children. Most patients present in the first year of life.

Option D is not correct.

Originally classified as an aggressive Wilms variant, clear cell sarcoma is now recognized as a distinct tumor that has a tendency to metastasize to bone. The peak incidence of this neoplasm is similar to Wilms tumor (3

to 5 years of age). However, unlike Wilms tumor, it is not associated with sporadic aniridia, hemihypertrophy, or nephroblastomatosis.

Reference(s):

Geller E, Kochan PS. Renal neoplasms of childhood. *Radiol Clin North Am.* 2011;49:689-709.

van den Heuvel-Eibrink MM, Grundy P, Graf N, et al. Characteristics and survival of 750 children diagnosed with a renal tumor in the first seven months of life: a collaborative study by the SIOP/GPOH/SFOP, NWTSG, and UKCCSG Wilms tumor study groups. *Pediatr Blood Cancer.* 2008;50:1130-1134.

Answer 30 is D.

Clear cell sarcoma of the kidney (CCSK) was initially considered a variant of Wilms tumor that was highly aggressive and had a propensity to metastasize to bone. It is now considered a distinct tumor based on its clinical and histopathologic characteristics. Unlike Wilms tumor, CCSK has not been reported in association with nephroblastomatosis, sporadic aniridia, or hemihypertrophy. The renal imaging features of CCSK are not distinct from those of Wilms tumor other than the fact that there is a lower incidence of CCSK extending into the renal vein compared with Wilms tumor. Ultrasound, CT, and MRI demonstrate a heterogeneous mass, which may contain areas of necrosis, arising from the kidney. The tumor classically enhances with contrast.

Option A is not correct.
Although the predominant location of metastatic disease in CCSK has historically has been considered to be bone (as well as the lungs and local lymph nodes), more recent studies suggest that metastatic disease to the brain may be even more common than to bone. Metastases to liver are uncommon in CCSK.

Option B is not correct.
There have been no reports of bilateral tumors in CCSK.

Option C is not correct.
Renal medullary carcinoma, not CCSK, is seen almost exclusively in patients with sickle cell trait or hemoglobin SC disease (a milder form of sickle cell disease) but not in classic homozygous sickle cell anemia.

Reference(s):

Geller E, Kochan PS. Renal neoplasms of childhood. *Radiol Clin North Am.* 2011;49:689-709.

Answer 31 is D.

Upper-pole ectopic ureteroceles are associated with ipsilateral lower-pole vesicoureteral reflux. Classification of ureteroceles can be confusing. A classification proposed by the Urology Section of the American Academy of Pediatrics suggested subdividing ureteroceles based on 3 criteria: (1) the number of ureters that drain the ipsilateral kidney; (2) the location and extent of the ureterocele; and (3) anatomic distortions resulting from ureterocele eversion, prolapse, or secondary incompetence or obstruction of other ureteral orifices or the bladder neck. A ureterocele in a duplex system almost invariably involves the upper-pole ureter, which typically inserts ectopically at a position distal to the normal ureterovesical junction. Ureteroceles can cause obstruction of the upper-pole ureter. Lower-pole ureters in patients with renal duplication often insert more laterally and have an increased likelihood of vesicoureteral reflux both because of the anomalous site of

insertion and because of the potential distortion of its insertion by an ipsilateral upper-pole ureterocele. Therefore, "upper-pole ectopic ureteroceles are associated with ipsilateral lower-pole vesicoureteral reflux" is the correct answer.

Option A is not correct.
Although ectopic insertion of ureteroceles associated with ureters of single-system kidneys can occur, it is much less common than with ureteroceles associated with upper-pole ureters of duplicated systems.

Option B is not correct.
Although there are rare reports of ureteroceles associated with lower-pole ureters of duplicated kidneys, ureteroceles are typically associated with the upper-pole ureters in duplicated systems.

Option C is not correct.
Patients with a duplicated collecting system will have a contralateral duplication in approximately 50% of cases. Therefore, the statement that ectopic ureteroceles are invariably bilateral is incorrect.

Reference(s):

Barnewolt CE, Paltiel HJ, Lebowitz RL, Kirks DR. Genitourinary tract. In: Kirks DR, ed. *Practical Pediatric Imaging: Diagnostic Radiology of Infants and Children.* 3rd ed. Philadelphia, PA: Lippincott-Raven; 1998:1009-1170.

Zerin JM, Baker DR, Casale JA. Single-system ureteroceles in infants and children: imaging features. *Pediatr Radiol.* 2000;30:139-146.

Answer 32 is B.

The American College of Radiology (ACR) Appropriateness Criteria® state that in children with pain and hematuria, CT of the abdomen and pelvis without intravenous contrast and ultrasound of the kidneys and bladder are alternative examinations. The report from the ACR Appropriateness Criteria committee explains that although CT without contrast is the most useful imaging examination for detecting renal stones, it is still reasonable to use ultrasound as a first-line imaging test even though a normal ultrasound examination does not exclude urinary tract stones. The standard further explains that "if ultrasound findings are negative, CT may be clinically indicated in some cases." The scores in the rating system employed by the ACR Appropriateness Criteria range from 1 to 9. Examinations receiving a score of 7 to 9 are deemed usually appropriate, those receiving a score of 4 to 6 may be appropriate, and imaging studies receiving a score of 1 to 3 are usually not appropriate. Both ultrasound and CT without contrast received an appropriateness rating of 8 in this clinical scenario. The recommendation stresses that if CT without contrast is performed either as the first-line imaging examination or as a follow-up to ultrasound, the radiation dose should be reduced as much as possible.

Option A is not correct.
X-ray intravenous urography is rarely performed in children for any indication. X-ray intravenous urography received a score of only 2 on the scale of appropriateness ranging from 1 to 9.

Option C is not correct.
Although CT without contrast is an appropriate initial imaging examination in children with pain and hematuria, there is no reason to perform CT both with and without contrast. The addition of a scan with

contrast adds the risk of intravenous contrast (although small, it is unnecessary) as well as unneeded radiation. CT with and without intravenous contrast received a score of only 2 on the scale of appropriateness ranging from 1 to 9.

Option D is not correct.
MR has low sensitivity in identifying calculi, is expensive, and may require sedation in young children. MR is not the most appropriate initial imaging test in this clinical scenario.

Reference(s):

Dillman JR, Coley BD, Karmazyn B, et al. American College of Radiology (ACR) Appropriateness Criteria® Hematuria – Child. https://acsearch.acr.org/docs/69440/Narrative. Accessed November 27, 2015.

Answer 33 is D.

Although some small-bowel intussusceptions cause symptoms and are not transient, most small-bowel intussusceptions (especially in asymptomatic patients) are idiopathic and transient. When a small-bowel intussusception is encountered on ultrasound, the region of the abnormality should be rescanned to confirm resolution. Ultrasound findings that are most prevalent in symptomatic patients with persistent small-bowel intussusceptions that require surgery (compared to patients with transient intussusception) include ascites, small-bowel obstruction, and intussusceptions of greater length. Intussusception lengths greater than 3.5 cm predicted the need for surgery with 93% sensitivity and 100% specificity in one series of 35 patients.

Option A is not correct.
The majority of small-bowel intussusceptions are transient, and an air or liquid contrast enema is unlikely to be therapeutic for those cases that persist.

Option B is not correct.
Most small-bowel intussusceptions are transient and need no further imaging besides rescanning the affected area to confirm spontaneous resolution of the intussusception. In rare cases where the intussusception persists, further imaging for a lead point may be considered. However, many of the patients with nontransient intussusceptions are symptomatic (often with small-bowel obstruction) and require surgery rather than further imaging.

Option C is not correct.
Although lymphoma with bowel involvement is a common cause of symptomatic intussusceptions, it would be unusual in an asymptomatic patient with an incidental small-bowel intussusception.

Reference(s):

Munden MM, Bruzzi JF, Coley BD, Munden RF. Sonography of pediatric small-bowel intussusception: differentiating surgical from nonsurgical cases. *AJR Am J Roentgenol.* 2007;188:275-279.

Strouse PJ, DiPietro MA, Saez F. Transient small-bowel intussusception in children on CT. *Pediatr Radiol.* 2003;33:316-320.