CLINICAL VIGNETTE

Urinoma as Cause of Abdominal Mass in a Child

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A 3-year-old, previously healthy, female presented to the emergency department with an enlarging abdominal mass.

The patient's mother noticed progressive protrusion of the patient's left abdomen over the last several days. On the day of presentation, the mother palpated the patient's abdomen and felt a "hard spot," prompting her to bring the child for evaluation. The patient had recently been admitted to an outside hospital for monitoring after a motor vehicle accident (MVA).

The mother described the MVA as severe and resulting in several intra-abdominal injuries. Review of medical records from her prior hospitalization revealed that the patient had been diagnosed with a splenic laceration, left kidney injury, and a possible liver laceration. The patient was hospitalized for 9 days, and discharged in stable condition after conservative management with supportive care and observation. Since discharge, the patient denied abdominal or flank pain, nausea, vomiting, diarrhea, fevers, and weight loss. She reported good appetite and normal elimination without hematuria or constipation. The patient did note recent intermittent "burning" sensation in her left, upper, medial thigh on a few occasions, though the sensation was not sustained. The mother denied known trauma or falls, outside of the recent MVA. The patient had been discharged home with plans for outpatient follow-up with her primary care provider and general surgery, but had difficulty accessing care due to financial challenges.

On presentation to the emergency department, the patient was in no acute distress with normal vital signs for age. Physical exam was remarkable for significant abdominal distension of the left, upper abdomen, with palpable large, firm, nontender mass extending from the left subcostal area to the pelvis. There was no bruising, guarding, or peritoneal signs, The exam was otherwise unremarkable. Basic laboratory tests, including a complete blood count and complete metabolic panel were within normal limits for age, and urinalysis was negative for hematuria. A CT of the abdomen and pelvis with contrast revealed a grade IV kidney laceration on the inferior pole of the left kidney with a communicating 13.5 cm, homogenous, fluid collection (Figure 1). Urology was consulted and agreed that the fluid-filled collection was likely the result of a post-traumatic complication of the patient's prior injuries and consistent with either a urinoma or a hematoma. The patient was admitted and percutaneous drainage was performed by interventional radiology, with bland clear drainage. An abdominal drain was left in place after the procedure. The collected fluid demonstrated a creatinine of 2.37, six-fold higher than serum creatinine of 0.38, confirming the diagnosis of urinoma. Due to continued high abdominal drain output, the patient underwent cystoscopy, retrograde pyelogram, and ureteral stent placement one week later. The patient was discharged home in stable condition with outpatient follow up. The external drain was left in place for 1 month and was removed once drainage had ceased. Repeat retrograde pyelogram 2 months after discharge revealed a normal ureter and collecting system without extravasation of contrast and no evidence of hydroureteronephrosis, and her ureteral stent was removed. She completely recovered without further intervention.

Discussion

Abdominal Mass in Children

The differential for an abdominal mass in children is broad, including congenital and acquired benign and malignant conditions. The location, as well as associated symptoms and history, can help elucidate the etiology. Most abdominal masses in children originate from one of the abdominal organs, most commonly the kidney, but also the hepatobiliary organs, adrenal glands, gastrointestinal tract, and, less commonly, the pancreas, spleen, and genital organs.[1] Masses originating in the kidney are most often structural. Examples include: hydronephrosis due to vesicoureteral reflux or ureteropelvic junction obstruction, multicystic dysplastic kidneys, or autosomal recessive polycystic kidney disease. They also include neoplastic conditions including congenital mesoblastic nephroma, most common in infancy, Wilms' tumor or nephroblastoma which is most common in childhood, and clear cell sarcoma the second most common in childhood. History may identify hypertension or hematuria, which can be helpful in differentiating these diagnoses. For right-sided abdominal masses, liver hemangiomas, especially in infancy, hepatoblastomas, and hepatocellular carcinomas especially in children with a history of liver disease should be included in the differential. Neuroblastomas originating from the adrenal glands may present with a range of associated symptoms, depending on metastasis or associated paraneoplastic syndromes.[2] Masses originating from the gastrointestinal tract include gastrointestinal duplication cysts or

bezoars, but constipation is far more common, especially in a school-aged child. Post-traumatic etiologies should be considered and may include hematoma of the spleen, kidney, or liver. In our patient the recent MVA with abdominal injuries, damaged the urinary collecting system and resulted in her presentation. The most common masses resulting from traumatic injuries are related to blood extravasation rather than the accumulation of other bodily fluids. Urine extravasation into the kidney capsule is a far more rare post-traumatic complication than bleeding. The composition of the fluid collection on imaging may narrow the differential diagnosis. The CT imaging demonstrated a homogenous fluid collection, which is more consistent with extravasated urine than the typically more heterogenous appearance of extravasated blood.

Urinomas in Children

Urinomas in childhood are rare. The literature includes a few cases of urinomas in children with the majority diagnosed in the setting of an underlying congenital renal abnormality.[3,4] It has been proposed that urinomas in children develop as a "pop-off valve," due to high pressures in the genitourinary tract secondary to anatomic anomalies.[4] In the adult literature, urinomas, along with delayed bleeding and hypertension, are recognized complications following kidney injury that require follow-up and management. Urinomas occur after 1-7% of renal injuries, with the majority of these cases (75%-85%) resolving spontaneously.[5]

Urinoma Management

The initial management of urinomas depends on the degree of fluid collection. More recently, there has been a shift towards non-operative management. Studies demonstrate conservative management can be effective and safe, even in the case of Grade IV-V kidney injury.[6,7] If drainage is required, this may be the only needed intervention. However, if the fluid collection continues to accumulate, stenting may redirect urine into the ureter and prevent urine from continuing to leak into the kidney capsule. In some clinical scenarios, open surgical evacuation and repair may be necessary.[7] In our patient, initial percutaneous drainage was necessary, and she eventually required stent placement due to sustained high volume urine output from the drain. Fortunately, she did not require further surgical intervention and demonstrated full resolution of her urinary leak and urinoma with conservative measures, consistent with the most recent literature.

Conclusion

This 3-year-old patient with the uncommon diagnosis of pediatric urinoma requiring interventional radiology-guided drainage and stent placement in a 3-year-old female patient one month after an MVA and grade IV renal laceration. Although the differential for abdominal mass in children is broad, this case illustrates the importance of the clinical history when evaluating pediatric abdominal masses. Pediatric urinoma should be included on the differential for any large fluid collections arising from the urinary collecting system, especially in the setting of post-traumatic presentations.

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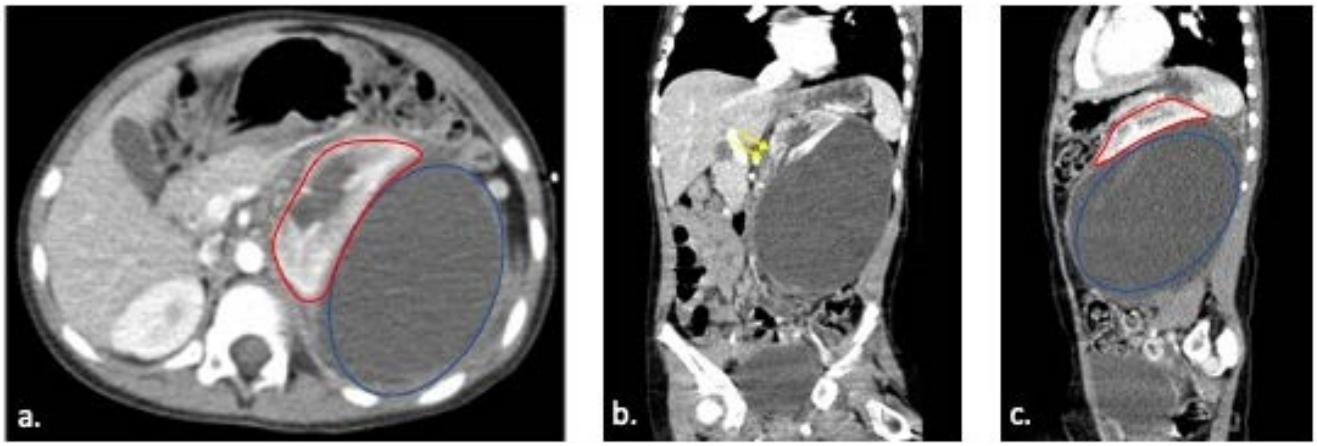

Figure 1. a) *Axial image*: A large homogenous hypodense fluid collection (*blue circle*) consistent with a urinoma or extravasated urine is directly adjacent to the left kidney (*red outline*). b) *Coronal image*: Direct connection between the renal pelvis and the fluid collection is visualized at the inferior pole of the left kidney (*yellow arrows*). Mass effect observed on the upper abdominal organs with displacement of the bowel loops to the right and lower abdomen. No definite evidence of splenic laceration. c) *Sagittal image*: Urinoma (*blue circle*) causing mass effect and displacement superiorly of the adjacent left kidney (*red outline*).

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