

Foresee Your Next Patient

Enterovesical Fistula as a Complication of Orthotopic Neobladder

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A 59-year-old man presented to the emergency department for acute-onset diffuse abdominal pain for the past 2 days, which he described as moderate to severe, sharp, and nonradiating. The pain was associated with nausea, vomiting, and diarrhea. He denied fever, chills, weight change, cough, dyspnea, chest pain, hematochezia, melena, dysuria, hematuria, urinary urgency, numbness, and tingling.

History. His past medical history was significant for prostate cancer, which had been managed with radical prostatectomy approximately 2 years prior to presentation, and invasive, high-grade urinary bladder urothelial carcinoma, which had been managed with transurethral

resection of the tumor and subsequent radical cystectomy and neobladder formation approximately 2 months prior to presentation. The more recent procedure had been complicated by small-bowel obstruction 1 month postoperatively, requiring hospital readmission.

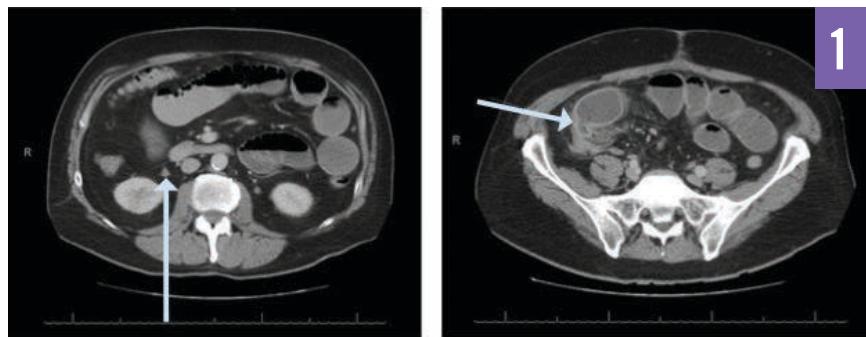
Additional past medical history included hypertension and gastroesophageal reflux disease. He had quit smoking 45 years ago, he drinks alcohol socially, and he denied illicit drug use. His family history included stroke and hypertension in his mother and stomach cancer in his father. He had an extensive home medication list, and no known drug allergies.

Physical examination. At presentation, the man's vital signs were within

normal limits. He was alert and oriented to person, place, and time, and was in no apparent distress. Findings on cardiac and respiratory examination were within normal limits. His abdomen was soft and nontender, with bowel sounds in all 4 quadrants. No palpable masses were identified. His skin color was normal, and neurologic examination findings were normal.

Diagnostic tests. Computed tomography (CT) scanning with intravenous contrast was performed, the results of which depicted a fleck of extraluminal gas adjacent to the anastomotic sutures in the right lower quadrant with surrounding inflammatory changes, findings that were suspicious for dehiscence or viscus perforation and mild small-bowel obstruction (Figure 1). Air was visible bilaterally in the renal collecting system (Figure 2), and diffuse fatty infiltration of the liver was seen. Correlating the air in the renal collecting system with the potential viscus perforation, a fistula was suspected.

Discussion. Bladder cancer is a common cancer in the United States, and it has the highest recurrence rate among all cancers.¹ Urothelial (transitional cell) carcinoma accounts for more than 90% of all bladder cancers and is distinguished clinically based on the extent of tumor invasion into underlying tissue.¹ Superficial urothelial carcinoma is identified in approximately 70% of bladder cancer cases and is characterized by either no invasion or superficial invasion of the lamina propria.¹ These tumors can be treated by intravesical chemotherapy or immunotherapy. Of superficial tumors, 80% recur and 30% exhibit progression to the invasive type. In the remaining 30% of patients with urothelial carcinoma, the invasive type is diagnosed at onset, is



Transverse CT scan views showed air in the renal collecting system (left arrow) and an area suspicious for fistula formation (right arrow).

characterized by invasion of the detrusor muscle, and is considered highly aggressive.¹ In these cases, radical cystoprostatectomy for men or anterior pelvic exenteration for women is the current standard of care.¹

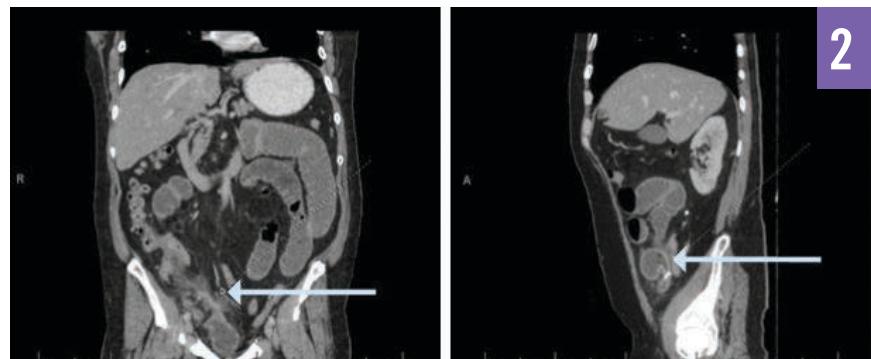
Although an ileal conduit, an incontinent form of urinary diversion, has been the standard of therapy after radical cystectomy due to bladder cancer, neobladder creation is becoming an increasingly popular therapeutic choice.² Contraindications to urinary diversion in general include the presence of multiple comorbidities, chronic renal or hepatic insufficiencies, and advanced disease stage.

The first urinary diversion was performed in 1851 by Simon, who connected the ureters to the rectum.³ Almost 50 years later, Gersuny in 1898 created the first rectal bladder by forming a colostomy and taking the rectal stump as the new bladder.³ Another 50 years after that, Bricker in the 1950s pioneered the ileal loop, which took a portion of the small bowel and connected it to a stoma to drain the ureters. This technique was improved by surgeons at Indiana University who in 1987 created a continent stoma using the ileocecal valve called the Indiana pouch.⁴

The first orthotopic diversion, or neobladder, was performed by Camey in 1959, and the technique has been gaining in popularity since the 1980s, with variations on its shape such as the Camey 1 and Camey 2 (U shape); the modified Camey 2 (Z shape); the Kock, T-pouch, and Studer neobladders (sagittally folded U shapes); and the Hautmann neobladder and the Abol-Enein and Ghoneim modification (W shapes).⁵

Continent diversion is performed for patients with invasive bladder carcinoma who require a radical cystectomy, for patients with neurogenic bladder affecting renal function, for patients with radiation injury, and for female patients with intractable incontinence. The 3 types of continent diversion are ureterosigmoidostomy, catheterizable diversion, and orthotopic neobladder formation.³

Ureterosigmoidostomy is the surgical



Coronal (left) and sagittal (right) CT scan views, with arrows pointing to the area suspicious for fistula formation on the coronal view and the neobladder on sagittal view.

connection of the ureters to the sigmoid colon, with a functional anal sphincter providing the means for continence. Due to its associated complications, including diarrhea, nephritis due to reflux of urine into the ureters, and uremia due to reabsorption of urea in the colon, it has become the least-performed procedure.

Catheterizable diversion introduces an internal urinary storage device with a one-way-valved stoma through the abdominal wall that is drained periodically via catheter insertion. The one-way valve allows the patient to maintain urinary continence between catheterizations.

In orthotopic neobladder diversion, a portion of bowel (most commonly the ileum or a combination of the terminal ileum and ascending colon) is used to create a low-pressure reservoir, which is then connected to the ureters and urethra, obviating the need for a stoma. To avoid reflux nephropathy, the tubular structure of the bowel segments used to make the reservoir are first reconstructed into a spherical shape, which reduces the luminal pressure 3- to 4-fold. Continence is maintained via the native urethral sphincter and is thus required for neobladder formation to be performed.⁶ The urge to void is absent due to the loss of neural conduction between the neobladder and central nervous system, so voiding occurs through conscious relaxation of pelvic floor musculature, bearing down, and occasional external pressure applied to the abdomen.

Enterovesical fistulas are more com-

monly seen in inflammatory conditions (eg, Crohn disease, ulcerative colitis, pelvic inflammatory disease) and trauma (eg, penetrating injury, postoperative).⁷ Diagnosis requires urinalysis, the results of which can indicate infection or fecaluria, although 50% of patients do not have these signs.⁸

As in our patient's case, CT imaging can be a useful diagnostic study, although it is not positive in all cases of suspected enterovesical fistula.⁸ Alternative imaging modalities include cystoscopy, endoscopy, and barium enema. More recently, CT enterography has been used when the aforementioned methods have failed to detect fistulas.⁷ CT enterography had been previously used for suspected small-bowel neoplasms and inflammatory diseases. Intraoperatively, methylene blue can be used to detect the extravasation of urine and to test the patency of the ureters.

Postoperative complications of neobladder formation are varied; among the most common are infections and complications related to wounds, the gastrointestinal tract, and the genitourinary tract. More specifically, in one study focusing on the complications after neobladder creation,² urinary tract infections occurred most frequently, followed by ileus, superficial wound infections, and hydronephrosis. Of these complications, 12% of patients required surgical, radiologic, or endoscopic reintervention, but fistula formation was not seen.

Neobladder-vaginal fistulas have been

reported as a rare complication of neobladder formation, with an incidence of 3% to 5%^{9,10}; however, enteroneovesical fistulas have been rarely reported.

Patients with complications of urinary diversions often appear acutely ill, with classic signs including easy fatigability, weakness, anorexia, polydipsia, and as seen in our patient, nausea, vomiting, and diarrhea. Bacteremia or septicemia is also common, although it was absent in our patient's case. Patients may also exhibit metabolic disturbances secondary to diarrhea, including hyponatremia, hypochloremia, hyperkalemia, and metabolic acidosis.

Outcome of the case. A trial of non-surgical management of the enteroneovesical fistula failed in our patient, and the decision for surgical repair was made. Total parenteral nutrition was initiated due to persistent intolerance to oral intake. The patient underwent an exploratory laparotomy, lysis of adhe-

sions, resection of the terminal ileum and right colon with ileocolostomy, repair of fistula, and subsequent intravenous pyelography to visualize the ureters before being transferred to the intensive care unit for postoperative management.

Due to blood loss during surgery and the dilutive effects of intravenous fluid administration postoperatively, 2 units of packed red blood cells were transfused. The remainder of his postoperative course was uneventful. The patient demonstrated adequate urine output immediately. Bowel function resumed 3 days postoperatively, and advancement to regular diet with concurrent weaning of total parenteral nutrition was well tolerated. The patient eventually was transferred out of the intensive care unit and exhibited no further complications. ■

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