

Inflammation and infection

Renoalimentary fistula: Case report of a renoduodenal fistula and systematic literature review

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Introduction

Fistulae between the renal and gastrointestinal (GI) systems are rare, constituting less than one percent of all fistulous connections between the urinary and intestinal tracts.¹ We present a patient with a two-month history of flank pain and fevers who was found on imaging to have a right renal calculus and emphysematous pyelonephritis associated with a renoduodenal fistula. We also present a systematic literature review of the etiologies and frequencies of renalimentary fistulae.

Case presentation

Our patient is a 76-year-old female with anemia, hypertension, diabetes mellitus, coronary artery disease, atrial fibrillation, and cerebrovascular accident who was transferred to the emergency department (ED) from her nursing home for concerns of sepsis. In the ED, she reported intermittent right flank pain and subjective fevers for the past two months. On physical examination, she was febrile to 102 °F with a heart rate of 122 and blood pressure of 131/

55. Her physical exam was non-focal, with no localizing tenderness. Initial laboratory studies were significant for leukocytosis (white blood cell count 19,000; 82% neutrophils) and a urinalysis suspicious for infection. The patient was started on empiric ceftriaxone for urosepsis and admitted for antibiotic treatment.

An abdominal ultrasound was performed, showing echogenic foci within the right renal collecting system and parenchyma concerning for emphysematous pyelonephritis. A subsequent abdominal computed tomography (CT) scan revealed a staghorn calculus in the right kidney complicated by emphysematous pyelonephritis and a 22 × 9 × 5 cm retroperitoneal abscess (Fig. 1). A nephrostomy catheter was then placed into the right renal pelvis by interventional radiology. During the procedure, an antegrade nephrostogram revealed a fistulous connection between the right collecting system and the small bowel. Six days later, after medical optimization, the patient underwent a combined right nephrectomy, retroperitoneal abscess drainage, separation of fistulous tract, and primary duodenal repair (Fig. 2).

An upper gastrointestinal study on post-operative day 5 showed no extravasation from the duodenal repair. The patient was discharged on postoperative day 23 with no significant complications and in stable condition. On her three-week follow-up, she was clinically stable and recovering well.

Discussion

A systematic literature review was performed in PubMed to identify cases of fistulous connections between the kidney and gastrointestinal tract extending from duodenum to colon. Case reports unavailable or inaccessible through PubMed were excluded. A total of 158 cases were identified. Table 1 shows the different locations and causes of renalimentary fistulae described in the reports. 93 (58.9%) were renocolic, 55 (34.8%) renoduodenal, and the rest (6.3%) renojejunal or renoileal. Of the renoduodenal cases, 14 (25.5%) were due to complicated pyonephrosis, 10 (18.2%) to complicated nephrolithiasis, 6 (10.9%) to iatrogenic causes, 5 (9.1%) each to malignancy and GI causes, 4 (7.3%) each to infectious disease and trauma, and 3 (5.5%) to xanthogranulomatous pyelonephritis (XGP). There was no identifiable cause in 4 (7.3%) of the cases.

Fistulous tracts can occur in the setting of chronic inflammation,

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Fig. 1. Coronal and axial views of abdominal CT scans showing a staghorn calculus in the right kidney complicated by emphysematous pyelonephritis and a retroperitoneal abscess.

ischemia, or necrosis.² While renoalimentary fistulae are rare, they generally follow this pattern, with most resulting from an acute or chronic process in the kidney such as infection, malignancy, or obstruction.² The most common location of renoalimentary fistulae is renocolic, followed by renoduodenal. Renojejunal and renoileal connections are exceedingly uncommon, with only ten cases reported in the literature. Complicated nephrolithiasis, as in the case of our patient, is the most frequent cause overall. However, complicated pyonephrosis is the most cited among renoduodenal fistulae.

Complicated pyonephrosis, iatrogenic injury, and XGP are also relatively frequent causes of all renoalimentary fistulae, although XGP has only been reported as the cause of a renoduodenal fistula three times. Less common causes of any renoalimentary fistula, and specifically renoduodenal fistulae, are infectious disease (tuberculosis being the most frequent), trauma (either external, as from a gunshot wound, or internal, as from a swallowed toothpick), GI disease (ranging from ulcers to pancreatic or diverticular inflammation), and various renal malignancies. Spontaneous fistula formation with no clear cause is also rare.

Literature review demonstrates that most patients with renoalimentary fistulae report a history of chronic complaints, typically involving the renal and GI systems, such as flank or epigastric pain, dyspepsia, fever, a palpable abdominal mass, voiding problems, and

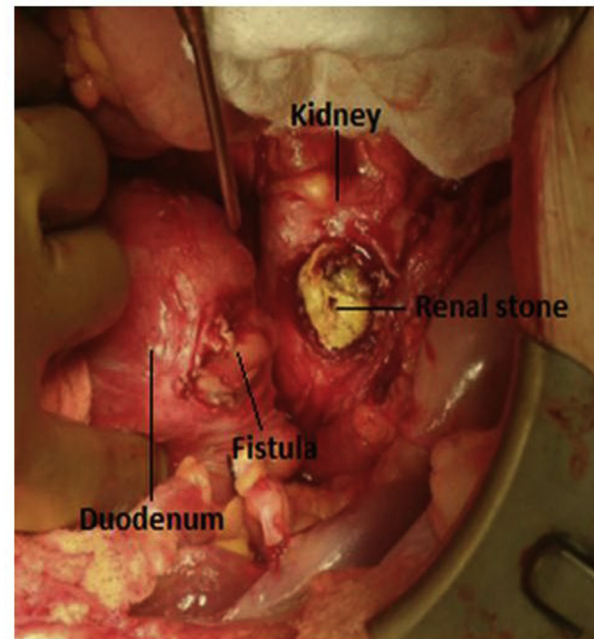


Fig. 2. Intraoperative photograph of kidney, renal stone, and renoduodenal fistula.

nausea/vomiting.^{1,3,4} Less frequent symptoms include weakness/malaise, weight loss, diarrhea or constipation, and GI bleeding.^{1,3,4} Laboratory investigation typically reveals an elevated white blood cell count, anemia, pyuria, and occasionally renal insufficiency.³ Similarly, our patient acknowledged a history of vague flank pain for the preceding two months, and had laboratory results consistent with leukocytosis and urinary tract infection.

Diagnosis of renoalimentary fistulae most commonly occurs by radiologic imaging of the urinary system, with retrograde or anterograde (as was performed in our patient) pyelography most accurately identifying the fistulous connections.^{3,4} Use of upper GI studies has also been reported.^{3,4} Most renoduodenal fistulae involve the second part of the duodenum due to its relative immobility, lack of posterior peritoneal covering, and close contact with the anterior kidney.^{3–5} Treatment traditionally involves radical nephrectomy, particularly if the affected kidney is non-functioning, and primary closure of the fistula or resection of the involved bowel segment.^{1,3,4}

The prognosis of renoalimentary fistulae depends on disease etiology, length of time the fistula has been present, and the general health of the patient, including his or her degree of renal insufficiency.² Given our patient's extensive medical history and presumed lengthy duration that she had her fistula, her clinical outcome was considerably successful. Since renoalimentary fistulae are potentially lethal, patients should receive timely and definitive management in order to optimize outcomes.

Conclusion

Renoalimentary fistulae most commonly develop renocolic, followed by renoduodenal, connections. Complicated nephrolithiasis is the most frequent cause of these fistulae overall, but complicated pyonephrosis is the most common among renoduodenal fistulae. Patients typically present with flank/abdominal

Table 1

Summary of the etiologies and frequencies (in a descending order) of renoalimentary fistulae in current literature.

| Etiology of Renoalimentary Fistulas | Number of reports | Notes |
|-------------------------------------|-------------------|--|
| Complicated nephrolithiasis | 33 | |
| Complicated pyonephrosis | 28 | |
| Xanthogranulomatous pyelonephritis | 27 | |
| Iatrogenic | 21 | Cryoablation, radiofrequency ablation, transcatheter embolization, nephrostomy tube, gastrostomy, percutaneous nephrolithotomy |
| Infectious disease | 13 | Actinomycosis, typhoid, tuberculosis, schistosomiasis |
| Trauma/foreign body | 12 | Gunshot wound, toothpick, bobby pin |
| GI origin | 11 | Duodenal ulcer, peptic ulcer, pancreatitis, colonic diverticulitis, colon carcinoma |
| Spontaneous/idiopathic | 7 | |
| Malignancy | 6 | Renal cell carcinoma, renal squamous cell carcinoma |

tenderness, fever, and voiding problems, as well as leukocytosis and pyuria. Diagnosis usually occurs via pyelography, and treatment involves radical nephrectomy and primary fistula closure or resection of involved bowel.

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