Are Nephroenteric Fistulas Only a Surgical Trouble?

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Abstract Nephroenteric fistulas can be secondary to different etiologies, the most common of which are pyelocolic fistulas. The absence of pathognomonic symptoms and the heterogeneity of presentation can sometimes result in a delay in diagnosis. We report on three cases: a pyelo-duodenal fistula secondary to kidney stones and subsequent pyonephrosis, a pyelocolic fistula due to inveterate ureteral stones with hydropyonephrosis, and a rare case of posttraumatic pyelocolic fistula. All patients were treated with radical nephrectomy and resection of the involved intestinal tract. Fistulas of the kidney with the gastrointestinal tract are complex not only for the surgical treatment, which is mandatory in the majority of cases, but also for clinical and instrumental diagnosis. Severe infection is a major concern due to the admixture of the enteric bacterial flora with the urinary tract. Nephroenteric fistulas require skilled surgical procedures, close control of the septic risk, management of patient's overall medical condition, and balance between invasive and conservative approach.

Keywords Nephroenteric fistulas · Urinoma · Infection · Surgical treatment

Introduction

Fistulas of the upper urinary tract with the gastrointestinal system are rare conditions causing continuous or occasional admixture of enteric content and urines between the upper urinary tract and alimentary canal, respectively.

Pyelocolic fistulas account for about 60 % of the uroenteric fistulas of the upper urinary tract, followed by pyelo-duodenal forms, renal gastric, and finally renojejunal [1–3].

They are divided into traumatic and spontaneous forms. In spontaneous fistulas the primary disease process is, in most cases, of urologic origin: infected kidney stones, pyonephrosis, xanthogranulomatous pyelonephritis, renal tumors, and infected renal cysts [4–8].

Urinary tuberculosis is rarely responsible for this complication, except for cases associated with infected stones [9].

Only exceptionally, fistulas are caused by a primitive pathological process, inflammatory or neoplastic, of the gastrointestinal tract [1, 10].

Among traumatic cases, in addition to penetrating abdominal injuries, fistulas secondary to improper boluses piercing the duodenal curve and penetrating in the right urinary tract must be considered [3, 11–13]. Ultimately, they can derive from an injury from endoscopic procedures and minimally invasive treatments for kidney and colon cancers and for anatomical proximity of the kidney with the duodenal C and the colon [14–18].

We present a case of pyelo-duodenal fistula from kidney stones and infection, a case of pyelocolic fistula from inveterate ureteral stones with hydropyonephrosis and finally a rarer case of posttraumatic pyelocolic fistula.

Case Series

Case 1

A 78-year-old woman had had a history of asymptomatic right renal staghorn stones for about 20 years. For several years, she had been suffering from nonspecific dyspeptic symptoms. She first came to our attention for the spontaneous evacuation of a purulent collection of the right lumbar region. After 4 months,

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she was hospitalized for an acute abdominal syndrome secondary to duodenal perforation treated with laparotomy intervention. One year later, a lumbar phlegmon with spontaneous evacuation recurred. The patient was readmitted to our department for the recurrence of an acute abdominal syndrome characterized by epigastric pain and septic state which subsequently resolved with a third evacuation of the purulent collection. Urography confirmed the known staghorn stones and noted a functional silence of the right kidney. The fistulography found a lumbar-reno-duodenal fistula (Fig. 1). We then proceeded to an 11th transcostal right flank incision with transperitoneal approach. A granulomatous mass encompassing a pyonephrotic kidney adhering to the ascending colon and the transverse mesocolon was removed in toto, and the duodenal perforation was sutured in a double layer and subsequently protected with omental interposition. Radiological control after surgery showed a good channeling of the duodenum.

The patient died after 2 months for the appearance of a thrombotic complication of the mesenteric artery which was not connected to the events described.

Case 2

A 37-year-old patient came to our observation for recurrence of left renal colic. Ultrasound showed the left kidney with a hydronephrosis of second degree.

Urography showed two radiopaque images of the distal ureter compatible with ureteral stones and failed to display the left urinary tract.

Blood tests showed moderate leukocytosis, and urine culture was positive for *Escherichia coli* in the absence of fever or dysuria. Therefore, a retrograde pyelography and endoscopic removal of the ureteral stones were planned. A reddened lesion

to the left bladder trigone, then subjected to biopsy, was present at cystoscopy examination. Pyelography showed a leakage of the medium contrast at the level of the upper calyx in a pseudocystic cavity. Urine samples were also taken from the left kidney to perform urine culture and cytology examination which were negative for tumor, while microbiological results showed an infection by *Schistosoma hematobium*, subsequently treated with therapy. The following computed tomography (CT) showed an excluded left kidney, confirming the ureteral lithiasis and the presence of air bubbles inside the calyceal cavities, indicating a renal colic fistula.

The next control with barium enema and gastrograffin confirmed the presence of a low flow fistula between the proximal portion of the descending colon and the renal pelvis (Fig. 2). The patient underwent a left nephrectomy and resection of the left colic flexure with subsequent restoration of intestinal continuity. The postoperative course was regular without complications.

Case 3

The third patient is an 86-year-old bearer of a Bricker's cutaneous ureteroileostomy after a radical cystectomy for bladder cancer. Seven years before, he had undergone a left hemicolectomy for adenocarcinoma. He came to our observation for a right lumbar trauma associated with a blunt head trauma.

At the moment of admission, the patient presented with gross hematuria and a right flank pain, associated with an increase in renal function indices, anemia, and hemodynamic stability. The CT scan showed an organized hematoma ($65 \times 86 \times 82$ mm) at the level of the right kidney with active bleeding and a marked hydronephrosis.

The patient underwent embolization of an injured artery of the upper third of the kidney with apparently satisfactory results.

Fig. 1 Lumbar fistulography with the reflux of the contrast in the right kidney and in the duodenum

Fig. 2 The CT scan with barium enema shows the connection between the left colon and the omolateral kidney

On the next day, for the occurrence of an acute abdominal syndrome, it was necessary to perform a further tomography clarification which revealed a dilatation of the right colon associated with signs of parietal pneumatosis, compatible with colonic perforation. A subsequent exploratory laparotomy had allowed the identification of a bridge which bents the colon between the abdominal wall and the ileal conduit. A lysis of the bridge and a temporary colostomy on the transverse colon were performed. A leakage of fecal material from the cutaneous urostomy after 10 days had required a CT with the absence of any uroenteric fistulas at the simultaneous contrast injection in the ileal conduit. A further radiological control pointed out the stabilization of the perirenal collection with the appearance of a fistula between the ascending colon and the kidney. A colonoscopy confirmed the fistulous orifice at the level of the hepatic flexure. A new exploratory laparotomy had to be carried out, and a colectomy with terminal ileostomy and nephrectomy were performed.

Afterwards, a fistula tract between the gallbladder and the urinoma into the lumbar cavity (Fig. 3) developed. A conservative approach with the insertion of a biliary endoprosthesis was programmed. After 2 weeks, a CT scan revealed the resolution of the urinoma without evidence of a fistula tract.

Discussion

Frequently, symptoms can be correctly interpreted only after diagnosis is established. The relationship between the clinical manifestations of gastrointestinal tract (dyspepsia, weight loss, diarrhea, and nausea) and of the urinary system (fever, flank pain, dysuria) can be neglected until the onset of pathognomonic symptoms, which very rarely occur in the setting of upper urinary tract fistulas (fecaluria, pneumaturia). Often, the

diseased kidney undergoes a functional abolition preventing the occurrence of these [19–21].

In case of fistulas of traumatic origin, the symptoms of both gastrointestinal and peritoneal origin dominate the clinical picture [11, 12, 14].

On the contrary, in the case of fistulas secondary to kidney disease, the clinical history is less uniform. In most cases, recurrent urinary infections, caused by the communication with intestinal bacterial flora, can be present [4, 22]. Sometimes extrarenal involvement (vegetative disorders, mechanical compression by phlegmon/perirenal urinoma) prevails over the urinary manifestations. Often, only phlegmon recurrence and severe vegetative disorders can lead to recognize an otherwise overlooked problem as illustrated in our first patient and by the case report on pyelo-duodenal fistula proposed by Leemans et al. [13], in which the clinical history was silent until the onset of an acute abdominal syndrome. Even when the clinical history and the association of symptoms suggest the hypothesis of a fistula, instrumental diagnostics are often very disappointing. The X-ray of the digestive tract rarely reveals the fistula (18 %) [3]. In the first of our clinical cases, the passage of the contrast medium from the flank to the duodenum has been diagnostic. In the aforementioned case by Leemans et al., a cystography was sufficient to show the fistula, while Desmond et al. reported a 64 % of diagnosis using retrograde pyelography [23].

In our second and third cases, the retrograde contrast examination of the urinary tract was not crucial in documenting the fistula. Only the CT scan with barium enema and the endoscopic examination of the enteric tract respectively revealed the orifice of the fistula.

Nowadays, CT is the best modality for demonstrating the nature, location, and extent of an underlying renal fistula. CT demonstrates perinephric inflammation extending to the colon, complex air–fluid collections within the kidney, or extension of renal contrast into the colon. CT and barium enema are complementary for the diagnosis of renocolic fistula [19, 24].

Regarding treatment, uroenteric fistulas can be divided into heterogeneous groups according to the symptoms, the etiology, as well as the general status of the patient.

The more the fistula is proximal to the alimentary canal, the greater the consequences for the electrolyte and nutritional profile. A wait-and-see therapeutic approach can be justified in the elderly and if troubles are negligible and not continuous.

A conservative treatment (nasogastric tube, total parenteral nutrition, complete bowel rest, ureteral stent, and drainage of the urinoma) aims mainly at controlling the extent of infection. However, we have to consider that the treatment of these fistulas heavily relies on the resolution of the underlying renal causes such as pyelonephritis or renal and perirenal abscess.

In fistulas secondary to suppurative processes of the kidney, nephrectomy is the only rational measure, although very difficult for the significant modifications in the anatomical planes and for impaired tissue viability [16, 21, 23, 25], as

Fig. 3 A CT scan revealing the presence of fistula tract between the gallbladder and the urinoma

confirmed in our own experience. Therefore, the first step is to prepare an adequate access. The second concerns the need to give priority, when possible, to maneuvers aiming at isolating the affected part of the intestinal canal, taking care to guarantee the best anatomical and vascular compliance. In these cases, removal of the kidney and the perirenal mass is difficult for the alteration of the cleavage with the great vessels, the muscular wall, and the adjacent organs. Instead, the lesion repair of the intestinal tract may require a simple suture, in one or more layers, resections, or extended reconstructions, with possible protection with the omentum [13, 26], as it was in our second and third cases. A considerable problem may be the particular microbiological aggressiveness that sometimes characterizes these processes. A paradigmatic case is presented by Abet et al. [27] who describe a pyonephrotic abscess fistulized spontaneously towards the wall, which led to nephrectomy and excision of the large tracts of the lumbar musculature. In this case, the multiple recurrences of the infection led to the appearance of a lumbar-reno-bronchial fistula. In our first case, the repeated lumbar abscesses led to the formation of a pyeloduodenal fistula. Even in the third patient, after nephrectomy and colectomy with toileting of the lumbar cavity, the persistence of the collection might have had a significant role in the development of a fistulous communication at the level of the gallbladder, subsequently corrected by biliary endoprosthesis. The relationship between the suppurative process and the complications reported by both patients is only questionable, given the advanced age and general condition, but cannot be excluded.

Conclusion

The analysis of the clinical course and evolution of the three cases presented here demonstrates that suppurative processes and perirenal urinary collections should be considered potentially very dangerous for severe infection and the evolution in fistulas with the alimentary canal. With respect to treatment, the balance between the risks of a wait-and-see approach and of complications from surgery must be taken into account.

Conflict of Interest The authors declare that they have no conflict of interest.

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