



Images in Hospital Medicine

Reno-Duodenal Fistula Caused by Metastatic Lung Cancer

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Abstract

Reno-duodenal fistulas are an extremely rare complication of radiotherapy in patients with metastatic lung cancer. Here we describe the case of a 60-year-old man with metastatic non-small cell lung cancer treated with chemoradiation who presented with fever, chills, and flank pain and was found to have septic shock with polymicrobial bacteremia and fungemia. Subsequent imaging showed evidence of a reno-duodenal fistula. After a failed attempt at endoscopic closure, the patient was not deemed a surgical candidate due to poor performance status and advanced metastatic disease and was transitioned to home hospice care. This report highlights the importance of considering reno-alimentary fistulization in the differential diagnosis of emphysematous pyelonephritis, especially in the setting of radiation therapy and malignancy.

A 60-year-old man with hypertension, hyperlipidemia, tobacco use disorder with a 30-pack-year smoking history, and non-small cell lung cancer (diagnosed in December 2020) presented to the emergency department (ED) due to high fever, chills, and right-sided flank pain of one day's duration. Family members also reported lethargy and word-finding difficulty for the past week. The patient initially received concurrent chemoradiation, followed by durvalumab maintenance immunotherapy. In October 2021, a new renal mass was detected on surveillance imaging, and biopsy was consistent with metastatic NSCLC. He was treated with docetaxel from December 2021 to March 2022. Palliative radiotherapy was initiated in August 2022 due to the changes in his right renal lesion. He subsequently developed a reno-duodenal fistula secondary to radiation and progressive disease involving the upper pole of the right kidney in 2024.

On presentation to the ED, he was febrile (39.8 °C), hypotensive (blood pressure 70/50 mm Hg), tachycardic (121/min), and hypoxic with an oxygen saturation of 87% on room air. Physical examination revealed an ill-appearing, tachypneic man who was oriented only to person and had evidence of the right costovertebral angle tenderness. He was resuscitated with intravenous fluids, oxygen, and pan cultures were ordered and started on broad-spectrum antibiotics with Vancomycin and Meropenem. Given his flank pain and costovertebral angle tenderness, a computed tomography (CT) scan of the

abdomen and pelvis without contrast was performed, which showed a necrotic mass in the upper pole of the right kidney and profound perinephric inflammation. The mass had invaded through the anterior renal fascia and infiltrated the right psoas muscle, inferior right hepatic lobe, right adrenal gland, and inferior vena cava (IVC). Multiple locules of gas were visualized within the right kidney with extension into the renal venous system and IVC. Fistulization of the anterior right kidney with the adjacent duodenal C-loop was observed. (**Figure 1**) There was also evidence of significant progression of metastatic disease within the thorax.

Esophagogastroduodenoscopy confirmed the presence of a large fistulous opening in the duodenum extending into the kidney. Closure of the fistula was attempted endoscopically without success. The patient's blood pressure and tachycardia only transiently improved with fluid resuscitation and antibiotics. Urine culture was sterile. Meanwhile, Blood cultures grew several atypical organisms, both bacteria and fungi. The bacteria isolated included *Lactobacillus acidophilus*, *Streptococcus anginosus*, and *Leuconostoc mesenteroides*, and the fungal pathogens were *Saccharomyces cerevisiae* and *Candida albicans*. The presence of polymicrobial sepsis was suggestive of an enteric etiology of infection, which was corroborated by the radiological findings. Additionally, due to the patient's word finding difficulty, a non-contrast CT scan of the head was obtained and revealed a round, hypodense lesion in the left parietotemporal region. A

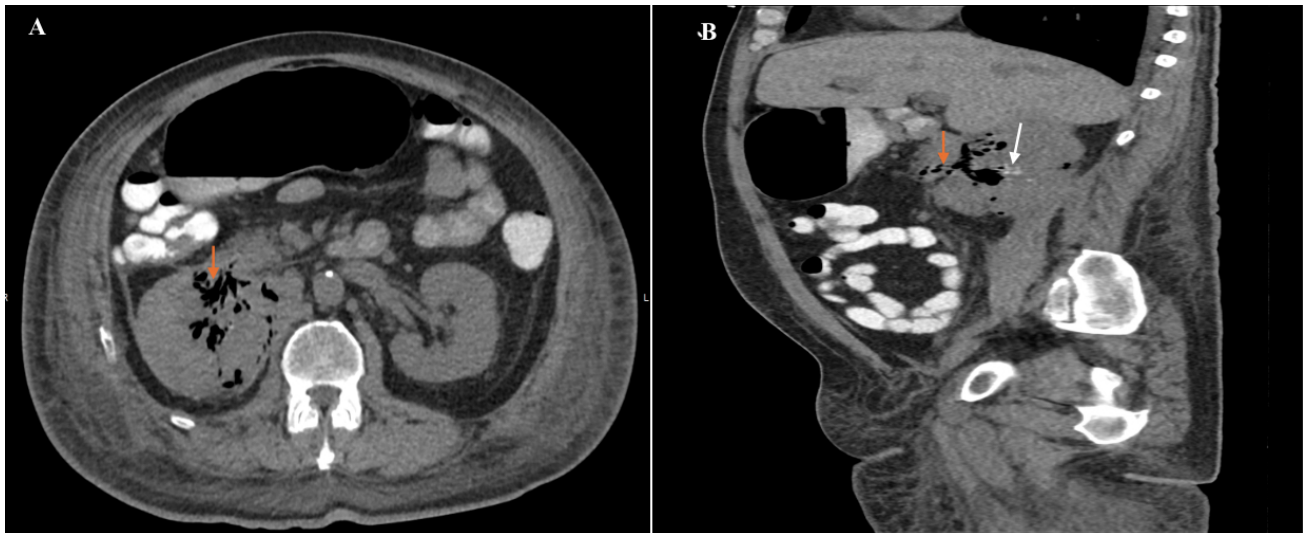


Figure 1. (A) Axial view of contrast-enhanced computerized tomography (CT) scan of the abdomen showing right renal mass with emphysema in the right kidney (orange arrow) communicating with the duodenum. (B) Sagittal view showing fistulization with duodenum (orange arrow) and the focus of oral contrast within the kidney (white arrow), confirming fistulization.

subsequent magnetic resonance image of the brain with and without contrast further characterized the lesion as a 3.3 cm parietotemporal mass with associated vasogenic edema, representing metastatic involvement. Vancomycin and Meropenem continued, and intravenous fluconazole were added, given fungemia. Transthoracic and trans esophageal echocardiograms did not show any evidence of vegetation. Urology and GI surgery were consulted for further surgical management. However, due to the patient's advanced metastatic cancer and poor performance status, he was not deemed to be a surgical candidate. Following shared decision-making with the patient's family and palliative care team, he was transitioned to home hospice care with comfort measures at the time of discharge.

Reno-alimentary fistulas are extremely rare complications that mostly occur in the setting of chronic kidney inflammation. They lead to a bidirectional flow of contents between the gastrointestinal (GI) and genitourinary tracts. Most cases of reno-alimentary fistulas reported in the literature are due to complicated nephrolithiasis, pyonephrosis, or iatrogenic causes leading to fistulization.¹ Among reno-alimentary fistulas, reno-duodenal fistulas constitute fewer than 1% of cases.² Very rarely, reno-alimentary fistulas may occur due to renal malignancy. These fistulas can lead to severe sepsis related to translocation of enteric bacteria and can be fatal unless immediately identified and managed.^{2,3} The first documented case of a reno-duodenal fistula was in 1839, involving a 45-year-old woman with a tender right-sided swelling that decreased after vomiting malodorous, urine-like material. Fistulous communication was found on autopsy.⁴ Since then, cases of spontaneous reno-duodenal fistulas have been reported primarily about ongoing chronic inflammatory conditions, such as tuberculosis of the genital tract, staghorn calculi complicated by perinephric abscess, and very rarely, underlying neoplastic processes.⁵

In a systematic review of 25 cases of reno-duodenal fistulas, Spanggaard et al. report trauma as the etiology in only 15%, the vast majority (85%) of which were related to nephrolithiasis complicated by pyonephrosis⁶

Reno-duodenal fistulas can very infrequently develop in the setting of malignancy. The reno-duodenal fistulas reported in association with malignancy are related to either locally advanced right-sided colon cancer or an advanced renal cell cancer infiltrating the adjacent duodenal wall, forming a fistula.^{7,8} To our knowledge, our report is the first in the literature to describe metastatic lung cancer creating a reno-duodenal fistula after radiation therapy. In this case, the fistula is likely related to progressive invasion by the metastatic lesion, which is further accentuated by the local inflammatory milieu induced by radiotherapy. Most patients with reno-duodenal fistulas present with fever and flank pain, mimicking pyelonephritis.⁹ Polymicrobial growth, including both bacterial and fungal organisms, should raise suspicion that the source is the GI tract. CT scans will reveal air within the kidney, and most cases of reno-alimentary fistulas were diagnosed with CT urography or antegrade pyelography.⁶ Endoscopic visualization of the fistulous tract will aid further delineation of the tract and anatomic assessment for potential endoscopic closure, though there are no standard guidelines, given the rarity of the condition. Early imaging and prompt endoscopic ligation or surgical closure, in conjunction with nephrectomy, would be lifesaving.⁹

We report the index case of a reno-duodenal fistula secondary to metastatic NSCLC and radiation, presenting with polymicrobial septicemia. Prompt identification may allow for surgical intervention, consisting of nephrectomy and duodenal repair. In poor surgical candidates, endoscopy should be prioritized with an attempt to close the fistula if possible. Diminished performance

status, diffuse metastatic disease, and hemodynamic instability excluded the surgical treatment options for our patient.

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Author Contributions

All authors have reviewed the final manuscript prior to submission. All the authors have contributed significantly to the manuscript, per the International Committee of Medical Journal Editors criteria of authorship.

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND

- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Disclosures/Conflicts of Interest

The authors declare they have no conflicts of interest

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