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Case Report

Lipiduria presenting following right hemicolectomy: A case presentation and brief review of the literature

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ABSTRACT

Lipiduria, also known as lipuria, refers to the presence of lipids within the urine. When lipids are present in macroscopic quantities, lipiduria can be visualized as a fat-fluid level on computed tomography imaging. Although the general differential diagnosis of lipiduria is broad, reported etiologies of lipiduria diagnosed by computed tomography have primarily included chyluria, urine-induced lipolysis, and trauma. We report a case of lipiduria occurring coincidentally with resolution of perivesical fat necrosis in a patient after partial right hemicolectomy for B cell lymphoma.

Case report

An 80-year-old patient initially presented to the hospital with several weeks of abdominal pain and was found to have a 7-cm cecal mass with associated small bowel obstruction, ascites, and pericecal adenopathy. She underwent a right hemicolectomy with pathology confirming diffuse large B cell lymphoma and was treated with adjuvant and maintenance chemotherapy. A staging positron emission tomography–computed tomography (CT) demonstrated an area of increased fluorodeoxyglucose (FDG) uptake adjacent to the ileocolonic anastomosis and urinary bladder, localizing to a predominantly fat-dense region (Fig. 1). Surveillance positron emission tomography–CT demonstrated evolution of perivesical fat necrosis (Figs. 2 and 3) with progressive decrease in FDG uptake. The patient then developed an intravesical fat-fluid level on an abdominopelvic CT approximately 8 months after her initial surgery, coincident with resolution of the fatty portion of the perivesical fat necrosis (Fig. 4).

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Fig. 1 – Changes of early fat necrosis (blue arrow) on the first post-operative CT scan 29/7/2013 with mass effect upon the urinary bladder.

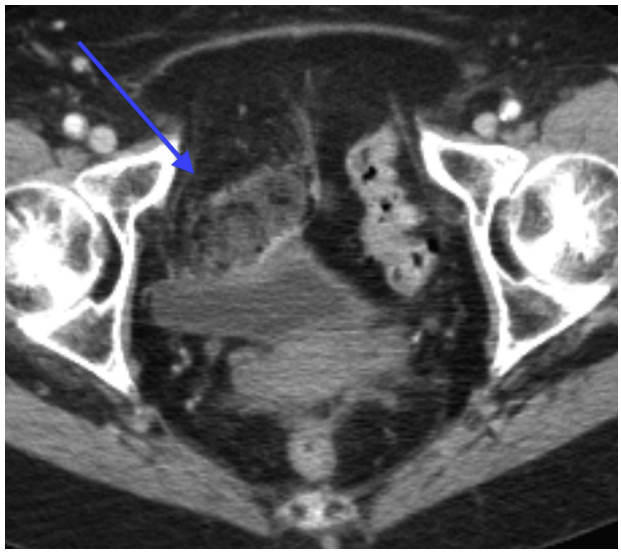

Fig. 2 – Evolution of fat necrosis anterior the bladder (blue arrow) approximately 6 weeks later (CT scan 10/9/2013).

Discussion

When visualized on CT, lipiduria presents as a fat-fluid level with "hydrophobic" fats within the nondependent position of the urinary bladder. A thin intravesical fat-fluid level should be distinguished from benign intramural bladder fat (the "fat triangle sign") [1]. Lipiduria should also not be mistaken for the more common intravesical air-fluid level related to instrumentation, trauma, fistulas, and infection. Air and lipids are typically easily differentiated either by using a pulmonary window (Fig. 5) or by attenuation measurement (Hounsfield units [HU]) with fat measuring between −20 and −180 HU and air far lower (on the order of −1000 HU) [2,3].

In radiologic literature, chyluria, trauma, and urine-induced lipolysis have demonstrated lipiduria detectable by CT (Table 1). Chyluria is the urinary colloidal suspension of fat in the form of chylomicrons because of an anomalous lymphatic connection [4,5]. It can rarely present clinically with grossly cloudy, white colored urine. Symptoms can include flank pain, dysuria, hematuria, hypoproteinemia, malnutrition, and cachexia [2,4], but patients are often asymptomatic.

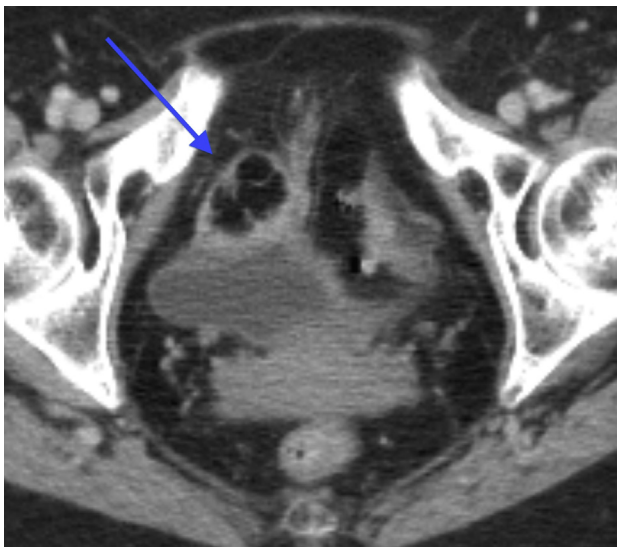

Fig. 3 – Appearance of fat necrosis (blue arrow) approximately 3.5 months after the first post-operative CT scan.

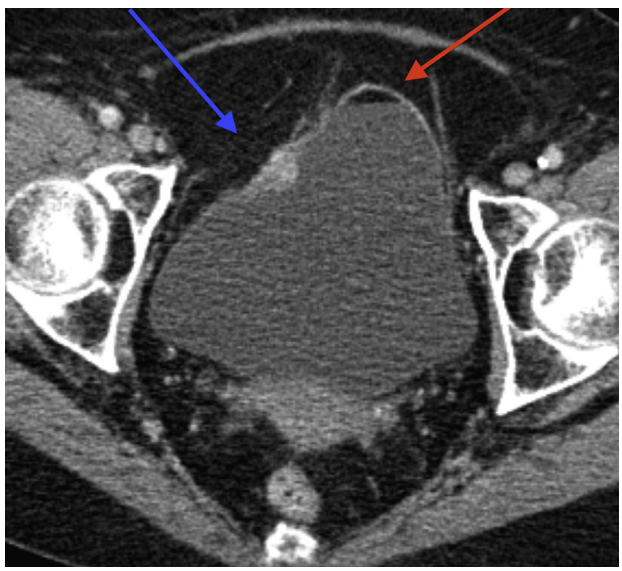

Fig. 4 – Development of an intravesical fat-fluid level (red arrow) and appearance of fat necrosis (blue arrow) approximately 8 months following the initial post-operative CT scan.

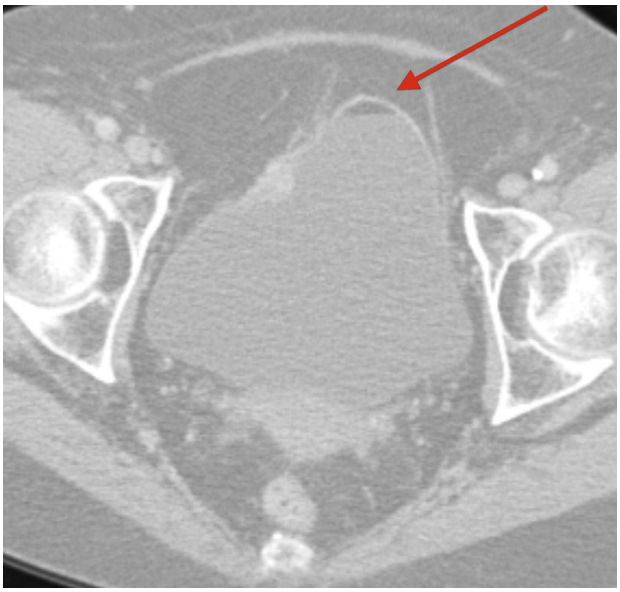

Fig. 5 – Demonstration of intravesical fat-fluid level (red arrow) using a pulmonary window. Density of the intravesical fat using region of interest analysis was Hounsfield value = −78.

Historical accounts of chyluria date to Hippocrates and Theophilus [4].

Chyluria can be classified as parasitic and nonparasitic [4]. Globally, the most common etiology of chyluria is infection and obstruction of the renal lymphatic vasculature by filariasis, the infestation of *Wucharia bancrofti* [6], but other parasitic etiologies include echinococcus, cysticercosis, malaria, and ascariasis [4,7]. In Western countries, nonparasitic etiologies predominate and include neoplasm, trauma, abscess, tuberculosis, pregnancy, congenital conditions, or postprocedure [8]. Lipiduria has been reported after radiofrequency ablation of renal tumors, partial nephrectomy, renal transplant, and rarely, extracorporeal shock wave lithotripsy [2,3,8,9].

Chyluria requires a fistulous connection with the urinary collecting system [8]. The location of lymphaticourinary fistula often occurs at the calyceal fornix in the renal pelvis, but can also occur at the level of the ureter or urinary bladder [10]. The lymphaticourinary fistula can be microscopic and therefore not readily visualized by CT. Therefore, CT often does not explicitly resolve either the communication between the perinephric lymphatics and the urinary collecting system, or subtle bladder microperforation, which can allow transmural migration of lipolyzed perivesical fat. However, CT provides evidence of these processes when sufficient lipids accumulate to form a fat-fluid level [3,11]. Lymphangiography or lymphoscintigraphy has also been attempted with limited success to identify the exact site of a chyle leak [4,12].

Urine-induced lipolysis is a rare complication in the setting of bladder or renal injury [1]. Lipiduria has been reported as a sign of bladder rupture on both traumatic and iatrogenic bases [2,3,8,9,11,13]. Martinez-Moya et al [11] speculated that small fatty drops from the extravesical compartment passed through the ruptured bladder wall after blunt abdominal wall trauma. Soussan et al report a case regarding fat-fluid levels in renal calyceal cavities after extravasation of urine in an obstructed kidney. The development of a fat-fluid level in their report was felt to be the result of lipolysis of perirenal fat followed by penetration of lipids into the renal calyces [10]. The specific pathophysiology regarding urine-induced lipase activation and lipolysis has not been well characterized, but osmotic pressure difference has been proposed as a possible mechanism [5].

In this case report, lipiduria occurred as the result of postoperative perivesical fat necrosis with transmural migration of lipids. To our knowledge, lipiduria has not been previously been published in this setting.

Table 1 – Intravesical fat-fluid level on CT: differential diagnosis.

Chyluria
Infectious/inflammatory: filariasis, echinococcus, cysticercosis, abscess, tuberculosis, malaria, ascaris lumbricoides
Neoplastic: lymphoma and metastatic disease
Trauma
Congenital: lymphangiomas of the kidney and bladder, lymphatic aneurysm, or stenosis
Other: pregnancy, venous stasis, aortic aneurysm
Urine-induced lipolysis
Other: exogenous (ie, urologic lubricant), iatrogenic

Learning Points

- Computed tomography may be the first clue to the diagnosis of lipiduria.
- Region of interest attenuation measurements and pulmonary windows can be used to detect or confirm an intravesical fat-fluid level with CT.
- Intravesical fat should not be confused with benign intramural fat or with intravesical air.

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