

Intravesical Fat-Fluid Level Secondary to Silent Bladder Perforation After Transurethral Resection of Urothelial Carcinoma

Nivel líquido-grasa intravesical secundario a perforación vesical silente tras resección transuretral de carcinoma urotelial

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Summary

Non-muscle-invasive bladder tumours are defined as papillary lesions limited to the bladder mucosa or invading the lamina propria, in addition to flat morphology and high-grade tumors limited to the mucosa (carcinoma in situ [CIS]). Diagnostic confirmation occurs after histological analysis of the sample obtained in the transurethral resection of the bladder (TURB), which in Ta-T1 tumours requires complete resection of all lesions, including part of the detrusor muscle, being in these cases also the therapeutic method. In the case of CIS, which may simulate inflammation or not be visible in cystoscopy, multiple random bladder biopsies are necessary (2). Iatrogenic bladder perforation is the second most frequent adverse event of this procedure; This solution of continuity in the wall can lead to the migration of fat into the bladder, which in imaging tests results in the formation of an intravesical fat-fluid level, a rare finding, which in turn has a broad differential diagnosis that covers primary, infectious and traumatic causes, but not previously described as a complication of TURB. We report the case of an asymptomatic patient with presence of intravesical fat-fluid, secondary to extra-peritoneal bladder perforation, after transurethral resection of a non-muscle-invasive urothelial carcinoma in the bladder dome.

Resumen

Los tumores vesicales no músculo-invasivos se definen como lesiones papilares limitadas a la mucosa vesical o que invaden la lámina propia, además de los tumores de morfología plana y alto grado limitados a la mucosa (carcinoma *in situ* [CIS]). La confirmación diagnóstica se produce tras el análisis histológico de la muestra obtenida en la resección transuretral (RTU) de vejiga, que en los tumores Ta-T1 requiere la resección completa de todas las lesiones, incluyendo parte del músculo detrusor, lo que constituye, también, el método terapéutico. En el caso del CIS, que puede simular inflamación o no ser visible en la cistoscopia, son necesarias múltiples biopsias aleatorias de la vejiga. La perforación iatrogénica de la vejiga es el segundo evento adverso más frecuente del mencionado procedimiento; esta solución de continuidad en la pared puede dar lugar a la migración de grasa hacia el interior de la vejiga, que en las pruebas de imagen se traduce en la formación de un nivel líquido-grasa intravesical, hallazgo infrecuente, que a su vez posee un amplio diagnóstico diferencial, que abarca causas primarias, infecciosas y traumáticas, pero no previamente descrito como una complicación de la RTU. Se presenta el caso de un paciente asintomático con un nivel líquido-grasa intravesical secundario a perforación extraperitoneal de vejiga, tras la resección transuretral de un carcinoma urotelial no músculo-invasivo en la cúpula vesical.

Acronyms

CIS (Carcinoma in situ), TURB (Transurethral resection of the bladder), CT (Computerized tomography)

Introduction

According to the TNM classification (1), non-muscular-invasive urothelial bladder carcinoma is defined as a papillary tumor limited to the bladder

mucosa (Ta) or invading the lamina propria (T1), in addition to flat morphology and high-grade tumors limited to the mucosa (carcinoma in situ [CIS]). The diagnostic confirmation is produced by the histological

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analysis of the sample obtained in the transurethral resection of the bladder (TURB) -which in Ta-T1 tumors requires the complete resection of all lesions, including part of the detrusor muscle- while in the case of CIS -which can simulate inflammation or not be visible in the cystoscopy- multiple random biopsies of the bladder are needed (2). Among the complications of TURB are hematuria (2.8%) and bladder perforation (1.3%) (3). Most of these perforations are extraperitoneal and, when they are symptomatic, they usually resolve with bladder probing and antibiotic prophylaxis; on the contrary, when the rupture extends into the intraperitoneal space it requires surgical repair (4). In exceptional cases, an undiagnosed bladder rupture can persist over time and be detected later-in incidental fashion, in imaging tests-as in the patient in this case, who during a control imaging study was identified as intravesical liquid-fat and a small herniation of fatty tissue through a solution of continuity in the bladder wall.

Case description

A 79-year-old man who, as a history of interest, had three episodes of TURB: in 1999 for a Ta urothelial carcinoma, in 2007 for a recurrence of T1 urothelial carcinoma, and in 2018 for a CIS located in the bladder dome. A few days after the last TURB, he was admitted for dysuria, pollakiuria and fever, accompanied by general malaise and discomfort in the suprapubic region, which evolved favorably with antibiotic treatment. He was discharged and has remained asymptomatic ever since.

Six months later, in the first control ultrasound scan, a reverberation artifact was detected in the hypogastrium next to the anterior region of the bladder, which did not allow the complete assessment of the walls of the bladder, initially interpreted as intestinal gas.

For that reason, a CT urography was performed (Figure 1), with the patient in apnea and with the Split bolus technique, which included an acquisition of the abdomen and pelvis without contrast medium and another combined acquisition (nephrographic and excretory phases) after the administration of intravenous contrast medium (initial injection of 60 mL at a speed of 3 mL/s, after 10 minutes an additional injection of 70 mL at 3 mL/s and, finally, obtaining the images 65 seconds later). Using this technique, it was proven that the ultrasound artifact was caused by intravesical fat, which formed a liquid fat level in the anterior region; in addition, extraperitoneal liquid laminar collections were identified in the perivesical space and a laceration in the bladder dome, through which herniation of a small amount of perivesical fat was observed.

A dynamic tomography cystography was then performed (Figure 2), after retrograde distension of the bladder with iodine contrast medium, which showed extravasation through the wall defect and into the perivesical space of the contrast medium, accompanied by small gas bubbles introduced during manipulation; this leakage was visible during Valsalva's maneuver and after urination, but not in the initial series with a full bladder, which was obtained before reaching maximum relaxation.

Additionally, a CT scan of the pelvis in prone position was performed (Figure 3), which showed how the intravesical fat component adopted a non-dependent position, as observed in the CT urography in supine position. Cystoscopy confirmed the existence of fat particles suspended inside the bladder, but did not allow visualization of the bladder rupture.

Discussion

Iatrogenic bladder perforation can be secondary to external trauma (obstetric, gynecological, general or urological procedures) or internal, as in the case of bladder TUR (4). It has a documented incidence of 2-13%; however, it has been described that its real incidence can reach 50-58%, as demonstrated by several studies in which cystoscopy or cystography was systematically performed after TUR (5), but most are asymptomatic. These perforations can be intraperitoneal, with an extravasation of fluid into the peritoneal cavity, around the intestinal loops, between the mesenteric layers and in the paracolic leaks; or extraperitoneal, in which the leakage is limited to the perivesical space or extends to other fascial planes and pelvic spaces (6).

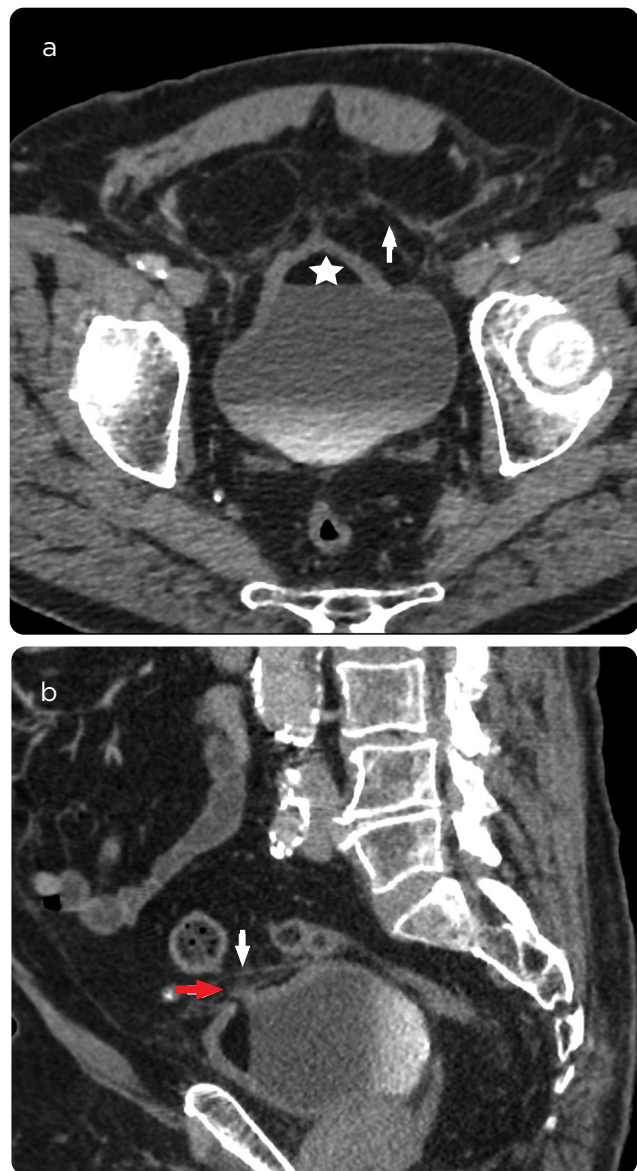


Figure 1. CT urogram. a) Axial and b) sagittal, in nephrographic and excretory phases. Intravesical fat (star), laminar liquid collections in the perivesical space (white arrow) and a laceration in the bladder dome (red arrow) are observed, through which a small amount of fat is herniated perivesical.

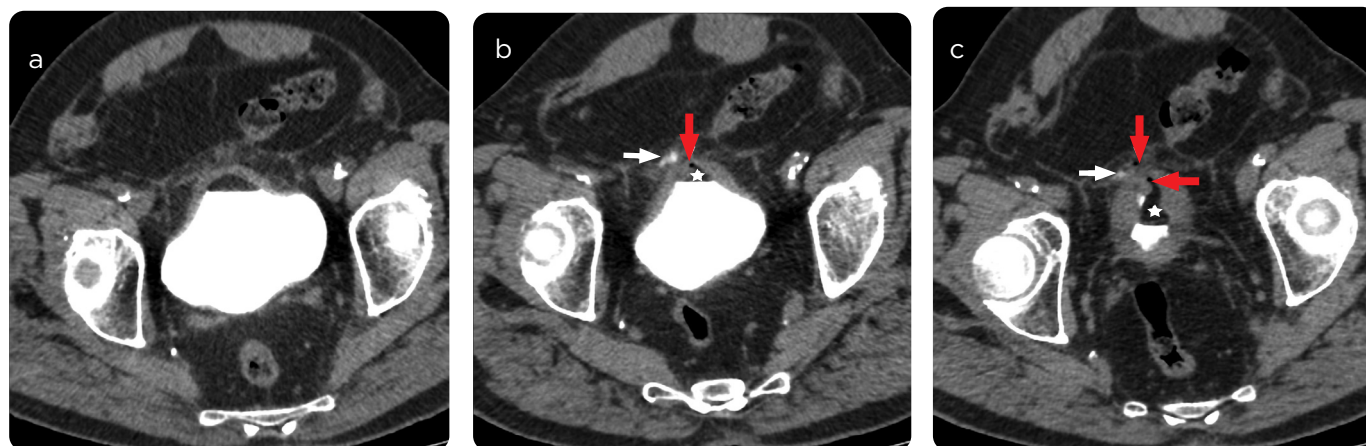


Figure 2. CT scan in supine position, a) axial with a full bladder, but not at maximum distension, without evidence of extravasation. b) Axial during Valsalva's maneuver and c) after urination: extravasation into the perivesical space of contrast medium (white arrow) and gas introduced during manipulation (red arrow) is identified. Intravesical fat (star) in anti-decay position.



Figure 3. Pelvic CT in prone, axial position: the intravesical fat component (star) moves with the patient's movements to an anti-slope position.

entre las capas mesentéricas y en las goteras paracólicas; o extra-peritoneales, en las que la fuga se limita al espacio perivesical o se extiende a otros planos fasciales y espacios pélvicos (6).

Unlike large bladder perforations, which are usually diagnosed during surgery, many minor injuries go unnoticed and are only detected in the postoperative period, when they give rise to clinical manifestations (hematuria, suprapubic pain, bladder emptying dysfunction, abdominal distension, ileus, peritonitis or sepsis), by means of cystoscopy or imaging tests (4). 74% of extraperitoneal perforations resolve with conservative measures in 10-14 days, and 85% in one month, while asymptomatic cases or those with a sub-clinical evolution, in which there is no spontaneous healing of the lesion due to perivesical fat herniation through it (7), usually have a late diagnosis, months or years later.

Although conventional cystography has been the technique of choice when iatrogenic bladder perforation is suspected (4), CT cystography with retrograde bladder distension has a diagnostic sensitivity

of approximately 100%, based on small case series (6), in addition to greater precision in defining the type of rupture, delimiting the anatomical areas affected, and detecting lesions in adjacent structures such as the intestinal tract, thanks in part to its multiplanar capacity (8). To avoid false negatives, it is essential to evaluate the bladder under pressure, with maximum distension (8); otherwise, it is recommended to acquire additional series during the Valsalva maneuver or after bladder emptying (post-voidal or with a Foley catheter).

CT urography with the Split bolus technique is characterized by dividing the intravenous contrast medium into two injections and acquiring the nephrographic and excretory phases simultaneously. It has the advantages of decreasing the radiation dose and allowing evaluation in a single series of the renal parenchyma and the excretory system, as well as the parenchyma of the other abdominal organs and venous structures; its main limitation is that it slightly increases the dose of iodized contrast medium that must be administered. Among its indications are the assessment of urinary tract lithiasis, renal disorders and urothelial tumors (9).

The intravesical fat, whose attenuation values between -80 and -100 Hounsfield units, is called lipiduria and leads to the formation of a liquid-fat level, in which the fat component moves with the patient's movements and always adopts a non-dependent position, as observed in the study in supine and prone position. This infrequent finding must be distinguished from an intravesical liquid-gas level by means of an appropriate adjustment of the visualization and measurement windows of the Hounsfield units, from the intramural fat deposit -which is a benign finding and can be focal or diffuse- and from a true lipoma, which consists of fat tissue encapsulated in the submucosa of the bladder wall.

There are other causes of intravesical fat that can be classified as 1) traumatic, as in the case of pelvic fractures, 2) post-surgical to partial nephrectomy, percutaneous ablation of kidney tumors, extracorporeal lithotripsy, hemicolectomy, esophagectomy, among others, 3) medical, such as lymphatic filariasis (by *Wuchereria bancrofti*, *Echinococcus*, *Cysticercosis*, malaria and ascariasis), granulomatous infections (TB), abscesses, pregnancy, massive mesenteric adenitis, glomerular disease, aortic aneurysm, neoplasms and malformations of the lymphatic system (10).

Conclusion

The finding of intravesical liquid-fat level in CT has multiple differential diagnoses, ranging from primary causes to traumatic and iatrogenic causes, without TUR of urothelial bladder carcinoma being previously described in the literature as one of them, so in this case it is shown that, in view of the precedent of such procedure, the option of iatrogenic bladder perforation should be assessed.

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