Case study

Incarcerated bladder hernia as a cause of septic shock: A clinical case report

Abstract

The incidence / prevalence ?~~presence~~ of the bladder within the hernial sac in inguinal hernias is uncommon, being found in 1-4% of cases. Normally these patients present with few or no symptoms. We present the case of a 61-year-old male who presented with septic shock, of urinary origin and renal failure~~, a~~An abdominopelvic tomography was performed which showed the presence of an inguinoscrotal hernia on the left side in whose sac is visible more than 50% of the urinary bladder, as well as the left ureter, with the presence of significant dilation of the ipsilateral pyelocalyceal system. Reason for adding management of general surgery and urology departments.

Key words: Bladder hernia, Obstructive uropathy, Septic shock.

IntroductionTOO LONG

Globally, more than 20 million inguinal hernia repairs are performed annually. Between 10 and 15% of the world population has or will have an abdominal wall hernia; of these, the most frequent (approximately 60%) will be in the inguinal region, predominantly in men, with a ratio of 3-4:1 compared to women (1). The mechanisms involved in the formation of inguinal hernias are multifactorial. There are biological, anatomical and physiological or mechanical factors. Biological factors include disorders in collagen synthesis, either due to genetic factors such as Marfan or Ehlers-Danlos syndrome (2), among others, or acquired (malnutrition, obesity, etc.) and increased degradation of collagen, as occurs in smoking (2). There are some anatomical factors that have shown a predisposition in the appearance of inguinal hernias, they are: the persistence of the peritoneum-vaginal duct in men, or the Nuck duct in women, the increase in the dimensions of Hesselbach's triangle, the absence of the aponeurotic fibers of the transversus abdominis muscle in its lateral portion or in the entire inguinal floor, as well as the high insertion of the internal oblique and transversus abdominis, both at their junction at the lateral edge of the rectus and at the inguinal ligament, enlarging the dimensions of the inguinal floor(1). Regarding physiological or mechanical factors, they are: a deficient occlusion of the internal inguinal orifice and inguinal floor in the descent of the minor oblique and the transverse on the inguinal ligament, asynchrony between the increase in intra-abdominal pressure and the simultaneous contraction of the abdominal wall, or, chronic increases in intra-abdominal pressure, as occurs in patients with chronic obstructive pulmonary disease (COPD), cirrhosis, prostatic hyperplasiaor~~,~~ multiple pregnancies, among others(1). The presence of the bladder within the hernial sac in inguinal hernias is uncommon, being found in 0.5-5% of cases (4,7-11)being found in 1-4% of cases*(see abstract).* Normally these patients present with few or no symptoms, in addition to the presence of a mass in the inguinal region (4,6,8-10), being diagnosed in most cases during the intraoperative period (6-8,14). The presence of obstructive

uropathy is very rare in these cases (11), the association of renal failure and sepsis is even less common.

Presentation of the caseTOO LONG (BORING; ***Iapologize myself for that word, but it is suitable***)

A 61-year-old male, with a personal history of smoking and chronic alcoholism, systemic arterial hypertension of more than 10 years of diagnosis, currently under treatment with Losartan 50mg/day, as well as previous hospitalization 16 years ago for varicose ulcers in the pelvic limbs, with treatment based on pentoxifylline 400mg/day, who was admitted to the emergency department on ~~July 27, 2020~~**(a specific date is a clue for identity)**due to a 6-day evolution process characterized by general malaise, asthenia, adynamia, fever of up to 40 °C in addition to dysuria, for which he sought out a general practitioner who started treatment with moxifloxacin (dose unknown) on suspicion of urinary tract infection. However, as he did not present improvement, he went to the emergency unit of our hospital, being admitted by internal medicine with a diagnosis of sepsis of urinary origin.

Upon admission, a sleepy, diaphoretic patient was found in a state of stage III shock with a Blood Pressure (BP) of 80/40 mmHg, Heart Rate (HR) 100 beats per minute, Respiratory Rate (RR) 23 breaths per minute, Saturation of oxygen (SatO2) 92% Temperature 39.8 °C. On physical examination, the patient was of apparent chronological age, obese, tachypneic and diaphoretic with adequate integument coloration, neck without alterations, rhythmic heart sounds increased in frequency with clear lung fields without alterations, globose abdomen due to adipose panniculus, soft, depressible without signs of peritoneal irritation with peristalsis present without alterations. Extremities without alterations. Upon admission, blood tests were carried out, in which a leukocytosis of 34 thousand/uL stands out. Neutrophils 83% Lymphocytes 7% Monocytes 5% Bands 5%. Hemoglobin 14.5 Hematocrit 40.5%, Platelets 181 thousand. Glucose 96 mg/dl Urea 181 BUN 84.8 mg/dL Creatinine 4.53 mg/dL C-Reactive Protein (CRP) 43.4 mg/dL Sodium 131 mEq/L, Potassium 4.2 mEq/L, Chlorine 104 mEq/L, Calcium 8.5 mEq/L . In arterial blood gases pH 7.36 pCO2 17 mmHg pO2 59 mmHg HCO3 9.6 mmol/L SatO2 98% Lactate 4.1 mmol/L. In the urinalysis, turbid urine stands out with leukocyte esterase of 500 cells/µL, negative nitrites, proteins 75 mg/dL, Erythrocytes 8-10 per field, in the sediment leukocytes +++ Scarce epithelial cells, Bacteria +++.

He was managed by the internal medicine/nephrology department who began management with crystalloids, meropenem 500mg IV every 8 hours, as well as norepinephrine at 0.04 mcg/kg/min, reversing the state of shock. ~~By July 30~~**(same reason),**we found a conscious patient, with a tendency to drowsiness, vital signs showed BP 110/60 mmHg HR 78x' RR 18X' SatO2 96% continuing with cardiorespiratory support with vasopressor and Positive Bipressure System (BPAP, for its acronym in English).~~).~~

Four days after his admission ~~(July 31)~~he is afebrile, consciously oriented in time, space and person, superior functions preserved. Cardiorespiratory with decreased breath sounds. Important restrictive component. BP 130/70 mmHg HR 102x' SatO2 92% with BPAP requiring

management with norepinephrine at 0.07mcg/kg/min. Uresis of 1810ml in 24hrs, Urinary index of 0.9ml/kg/hr Cr 3.4mg/dl BUN 107mg/dl Na 145mEq/L K 4.8mEq/L, Cl 121mEq/L. Hb 11.3 g/dl Leukocytes 36 thousand/uL, neutrophils 79%, bands 5%.

Patient remained in critical condition, with septic shock, dependent on amines, with stage III acute kidney injury. An abdominopelvic tomography was performed, showing the presence of an inguinoscrotal hernia on the left side, in whose sac the presence of more than 50% of the urinary bladder was appreciated, as well as the left ureter, with the presence of significant dilatation of the pyelocalyceal system on said side. (Figure 1-5), so it can be deduced that the renal damage has an obstructive component, patient was evaluated by the general surgery/urology service, who corroborated the presence of an incarcerated left inguinal hernia, he was intervened in conjunction with the urology service on August 7. Finding the presence of the left ureter and part of the urinary bladder in the hernial sac during the operation, both structures without color changes, or other data suggestive of ischemia, for which it was decided to reduce them and Bassini-type inguinal plasty was performed and later during the same surgical time cystoscopy and placement of a JJ catheter. The patient continued with a torpid evolution, presenting deterioration of alertness two days after the surgical intervention, in addition to fever, diaphoresis and changes in the respiratory pattern, he was transferred to the emergency hospitalization area of the present hospital due to the fact that The Intensive Care Unit was not available because it was an area designated for patients with COVID-19, continuing its management in conjunction with the internal medicine/nephrology services, urine and blood cultures were taken, gasometry which reports pH 7.11 PO2 75mmHg HCO3 24.1 mmol /L SatO2 89% EB-7 Lac 1.9 mmol/L, start ventilatory support with Continuous Positive Airway Pressure (CPAP), continue with meropenem 500mg IV every 8hrs and add vancomycin 1g IV every 12 hrs. ~~On August 12~~, he continued with a poor respiratory pattern, requiring orotracheal intubation, presenting cardiorespiratory arrest during the procedure, requiring two cycles of advanced cardiopulmonary resuscitation, after which he presented ventricular fibrillation, requiring defibrillation, subsequently needing to increase the infusion of norepinephrine at 0.1mcg/kg/min and adding vasopressin at 0.03 U/min. maintaining a HR 88x' and BP 115/80 mmHg with impaired renal function with creatinine of 4 mg/dl, Uric Ac 15.6 mg/dl, BUN 10 mg/dl, hyperkalemia of 6 mEq/L, hypernatremia of 162 mEq/L, He persisted febrile with leukocytosis of 13 thousand/uL PCR 90 mg/L with positive surgical wound culture for multidrug-resistant Acinetobacter baumanii, colistin was added by the infectious disease department. The patient continued with septic shock and multiple organ failure, presenting cardiac arrest without response to resuscitation maneuvers, dying ~~on August 17~~, 20 days after his admission.

DiscussionTOO LONG

Bladder herniation was first described by Levine in 1951 as “scrotal cystocele”. Although there are historical references from 1363 attributed to Guy de Chauliac and Félix Platter and Domico Scala in the 16th century. (1-3). Urinary bladder herniation is a rare pathological entity, with a frequency ranging from 0.5 to 5% of all inguinal hernias in adults (1,4-8) and can reach up to 10% in patients older than 50 years of age (3.9-12). Up until 2018, around 120 cases have been reported, of which 70% are characterized by obese male patients older than 50 years

(1,4,11,13). The risk factors involved in the pathogenesis of bladder hernias are, in addition to those typical of inguinal hernias, bladder wall weakness and low urinary flow obstruction (3,8,9,12), which cause an increase in intravesical pressure, so its association with prostatic hyperplasia is very frequent (2,10), although dyspnoea and cough conditions have been described, as well as urethral stenosis (2,11).

The hernial sac in the case of inguinal hernias usually contains preperitoneal fat, greater omentum or small intestine and rarely organs such as the cecal appendix (Amyand's hernia), Meckel's diverticulum (Littre's hernia), ovary with Fallopian tube, colonsigmoid or urinary bladder (4). Inguinoscrotal herniation of the bladder is a clinically rare entity, especially associated with herniation of the ureter. (4). It is associated within a 75% to an inguinal hernia, 23% to femoral hernia and 2% to other types of abdominal wall hernias (2) among which are: obturator, perineal, umbilical (11) rectus abdominis (ofGironcoli) and of Spiegel (3). Within inguinal bladder hernias, 60% of these are direct hernias on the right side. (1,4,5,11).

Due to the relation with the peritoneum, bladder hernias are anatomically classified as: paraperitoneal, extraperitoneal and intraperitoneal (2,5,14). Paraperitoneal bladder hernias are the most frequent (60%), in these, the peritoneum covers its external wall and can be direct or indirect. Extraperitoneal hernias are the second most frequent (32%) and are characterized by the fact that the peritoneum does not cover them and they are usually small. The intraperitoneal ones are the least frequent (4-8%). In them, the peritoneum covers the entire herniated bladder portion, they are always indirect and are usually easily reduced (3,11,13). In this type of hernia, the trigone usually remains fixed in its normal anatomical position, even in massive bladder hernias. Incarceration and strangulation are rare (2,5,10). In children, involvement of the ureteral meatus associated with vesicoureteral reflux and sometimes with complete ureteral obstruction is more frequent (2).
A massive inguinoscrotal bladder hernia is a very rare entity and this is when more than 50% of the bladder is involved (10). Bladder herniation is mostly diagnosed incidentally, since most patients are asymptomatic (1,3,5-7) or with non-specific symptoms such as increased urinary frequency, presence of scrotal mass, dysuria and urinary urgency (4,10,12). Renal colic may occur due to ureter entrapment and hematuria (3,8) On rare occasions, due to urinary obstruction, it can be related to acute renal failure (1), presenting herniation of the trigone with consequent ureteral retraction and angulation that conditions obstructive uropathy (3.7). The characteristic clinical finding is urinary voiding in two acts, which is known as Mery's sign (1-3,7-11). In which the urine in the abdominal part of the bladder is emptied first, followed by urine present in the herniated portion, which usually requires manual compression (4). In most cases, bladder herniation is diagnosed during surgical repair of an inguinal hernia (3-5,11). On other occasions, it is diagnosed in the postoperative period mainly due to complications secondary to inadvertent injuries to the bladder, such as the presence of urine leakage through the surgical wound (4). Watson demonstrated that less than 7% of bladder hernias are diagnosed preoperatively (1,4-6,9,10) and around 16% are diagnosed postoperatively due to complications (4,5). A preoperative diagnosis may allow placement of a urethral catheter with the goal of decompressing the bladder prior to surgery and filling the bladder with a combination of saline and methylene blue to facilitate bladder dissection and identification of a probable injury to it,

during the transoperative period and thus preserve the integrity of this organ (1,4,10). This type of hernia should be suspected in male patients over 50 years of age, carriers of inguinal hernia plus lower urinary tract obstructive symptoms. On physical examination, an inguinal or inguinoscrotal tumor can be observed that may or may not present positive transillumination and that varies in size with miction. (3.8)

Ureteral involvement should be suspected when an inguinal hernia is diagnosed concurrent with hydronephrosis, renal failure, and urinary tract infections with no known cause (1,4). Given this situation, we must make a differential diagnosis with communicating hydrocele, herniated mesenteric cyst, giant cord cyst (2), bladder diverticulum, pre or paravesical lipoma, and bladder duplication (3,9,14). When there is suspicion of the presence of the bladder or ureter in the hernial sac, a computed tomography should be performed since ultrasound has low sensitivity and specificity (1,4), with voiding cystourethrogram being the imaging test of choice (2,3, 5,10) Reardon and Lowman (2,3,7) described a characteristic urologic triad:

- Lateral displacement of one or both ureters.
- Small or asymmetrical bladder
- Incomplete visualization of the base of the bladder, associated with an inguinal hernia.

To complete the study of this type of patient, it is recommended to perform an ultrasound to assess the upper urinary tract(Why? You already have a computed tomography) as well as perform a digital rectal examination and take prostate specific antigen levels, due to the high association of prostate hyperplasia in these patients (2). Other associated urologic pathologies were: bilateral hydronephrosis, acute renal failure, urinary lithiasis in the herniated portion of the bladder, vesicoureteral reflux, bladder necrosis, and scrotal abscess (6). Until 2008, 8 cases of bilateral renal obstruction and 4 cases of renal failure have been reported (8). The treatment is strictly surgical, placing a Foley catheter prior to the procedure and passing through it a mixture of physiological solution and methylene blue (4). The repair is performed through an inguinal incision. Subsequently, the reduction of the bladder is performed while the hernial defect is repaired by means of the corresponding surgical technique of inguinal plasty (5). If a transurethral endoscopic procedure is indicated to correct the infravesical obstruction, it will be performed in a second surgical procedure (3). This is intended to avoid strangulation of the hernial neck, secondary to the elevation of intravesical pressure that occurs in said procedures. In case of presenting bladder lithiasis, the reduction of the hernia should be accompanied by cystolithotomy (9,11). In the case of bilateral renal obstruction, the initial objective of treatment will be to achieve normalization of renal function by performing a bilateral percutaneous nephrostomy and then repair of the hernial defect will be considered in a second stage (8,9). Although there is no consensus on the surgical management of the herniated portion of the bladder, it seems reasonable to opt for a conservative approach as far as possible, proceeding with bladder reduction. Partial cystotomy of the herniated portion is recommended only in cases of necrosis due to strangulation, herniated bladder tumor (8), herniated bladder diverticulum or hernial neck smaller than 5 mm (9-11,13). Orchiectomy may be necessary if the testis or cord structures are closely related to the hernial sac (5). The complications that can occur are, on one hand, those typical of hernia processes: during hernia repair, bladder injuries have been

reported in 12% of cases, which can lead to the presence of hematuria, urinary leakage, fistula formation and even sepsis (4,6); and on the other hand the specific urological ones such as: lithiasis, urinary infection, obstructive uropathy and neoplastic degeneration of the urothelium (7) due to the carcinogenic role of urine residue accumulated in the herniated portion (2,10). In a review, it was shown that, of 116 patients with bladder hernia, 13 of them (11.2%) presented some type of malignancy: 9 bladder carcinoma and 4 prostate carcinoma (4).

Conclusion

Inguinal hernias are one of the most frequent pathologies that we face as surgeons and although the presence of the urinary bladder within the hernial sac is a relatively uncommon entity, it is important to take this variant into account, especially in male patients over 50 years of age and who also present urinary symptoms. This particular case demonstrates how serious failure to reach a prompt and adequate diagnosis can be. That is why it is extremely important to take this type of pathology into account, so that it allows us to improve our surgical practice and therefore the health and well-being of our patients.

Consent

We as Authors declare that written informed consent was obtained from the patient for publication of this case report and accompanying images.

Ethicalapproval

The research was a retrospective study. Thus, not needing being examined nor approved by the hospital research and ethics committee.

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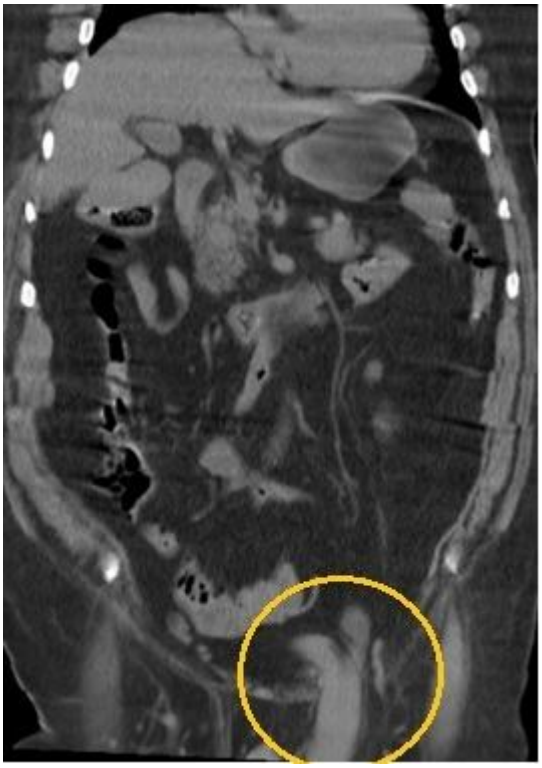

Fig 1. Non-contrast Abdominopelvic CT, with the presence of a left inguinal hernia, with evidence of protrusion of the urinary bladder and lower third of the ipsilateral ureter, located within the hernial sac

Fig.2 Coronal Non-contrast Abdominopelvic CT with visualization of grade V left hydronephrosis, secondary to protrusion of the distal third of the ureter through the inguinal hernia.

Fig. 3. Abdominopelvic tomography, with sagittal reconstruction, where it is possible to corroborate the presence of approximately 75% of the urinary bladder inside the left inquinal hernial sac.

Fig.4 Abdominal and pelvic tomography, in this section it is possible to demonstrate the site of bladder protrusion through the left hernial defect, in addition to visualizing the Foley catheter balloon inside the bladder portion that remains within the pelvic cavity.

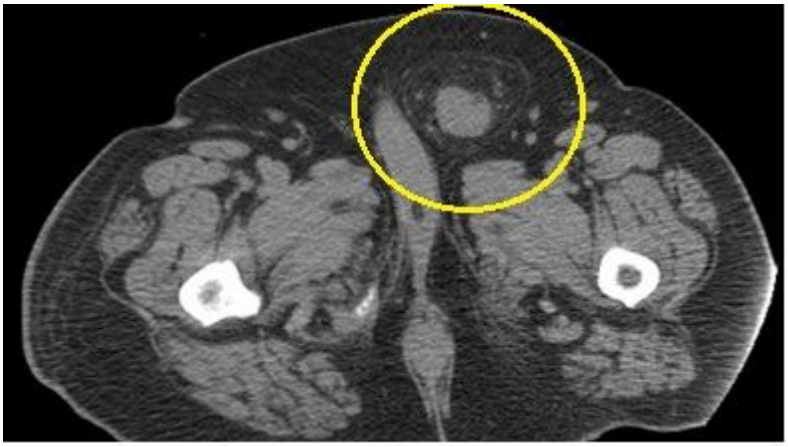

Fig. 5 Cross section of abdominal and pelvic tomography in simple phase appreciating left inguinal hernial sac with portion of urinary bladder and left ureter inside.