

3st Edition of the Clinical Cases Contest related to the non-surgical clinical management of renal lithiasis

Title:

UNUSUAL CASE OF RENAL VEIN AND VENA CAVA SECUNARY TO PYELONEPHRITIS DUE TO URETERAL OBSTRUCTIVE LITHIASIS CAUSED BY KLEBSIELLA PNEUMONIAE.

Keywords (between 3 and 6):

Thrombosis of the renal vein; pyelonephritis; ureteral lithiasis; Klebsiella pneumoniae.

1. Summary (under 150 words)

Thrombosis of the renal vein after acute pyelonephritis is an extremely rare process. Clinical case report of a patient who presented with septic shock due to ureteral lithiasis and hydronephrosis, with vena cava and renal vein thrombosis due to multisensitive Klebsiella pneumoniae, which required an urgent nephrectomy, treatment with antibiotics and anticoagulants. Later the patient suffered an obstructive lithiasis in the contralateral ureter, requiring ureteroscopy and stone fragmentation. After a renal metabolic study that showed no alterations, Lit-control pH balance® was prescribed, a drug with phytates and magnesium, substances that have demonstrated their ability to stop crystallization and formation of oxalate kidney stones, which also protects kidneys from oxidative stress without affecting urinary pH.

2. Introduction

Venous thrombosis associated with acute pyelonephritis is a rare process. After reviewing the literature, we have found only thirteen reported cases, four of which were caused by *Klebsiella pneumoniae*. (1-13) Clinical case report of renal vein and vena cava thrombosis in a diabetic patient with septic shock due to acute pyelonephritis caused by ureteral lithiasis.

3. Description of the clinical case:

a. Relevant medical history

A 56-year-old woman with a medical history of untreated high blood pressure and type II diabetes mellitus, but the patient did not want to assist to follow-up appointments.

On January 2, 2014, she presented with abdominal pain and fever. After losing consciousness and having three seizures during her transfer to the hospital on ambulance, she is admitted to the hospital's emergency department, showing a Glasgow coma scale score of 5 (1+1+3). Pupillary miosis. Signs of hypoperfusion. Tendency to hypotension. Kussmaul breathing.

Blood tests showed: 34570 leukocytes/l, neutrophils 94% Protombin 1.45. Glycemia 1134 mg/dl. Creatinine 1.79 mg/dl Lactic acid 41.4 mg/dl. C-reactive protein 6.97 mg/dl. Osmolarity 401 mOsm/kg. Chloride 91.8 mEq/l, Phosphorus 6.9 mg/dl. Ionic calcium 5.6 mg/dl.

The patient was classified as a patient with metabolic ketoacidosis, hyperosmolar coma with seizures and septic shock with high infectious parameters.

b. Diagnostic support studies and results

Computed tomography (CT) scan of the skull showed diffuse cerebral atrophy.

Abdominal CT scan showed an enlarged left kidney with areas of diffuse nephritis and some abscessed areas, with thrombosis of the left renal vein extending to the vena cava above the entrance of the renal vein (Image 1). As well as renal lithiasis in the lower calyx of the left kidney of 1 cm in diameter. A 7 cm long lithiasis is in the terminal ureter, 5 cm from the left ureteral meatus, with a small amount of contrast passing to the bladder (Image 2).

c. Diagnosis

Given the hemodynamic shock that requires fluid therapy and vasopressor drugs with norepinephrine and broad-spectrum antibiotic therapy, with poor clinical response, the patient is admitted to the intensive care unit.

d. Treatment

On the same day that the patient was admitted to the intensive care unit, it was decided to perform a left radical nephrectomy through a subcostal abdominal incision. Referring thrombus for histological and bacteriological study.

Anticoagulation therapy with enoxaparin, fluid therapy and insulin were administered for metabolic ketoacidosis.

A combination of meropenem and fluconazole was also prescribed empirically.

Urine culture and renal vein thrombus culture were positive for multisensitive *Klebsiella pneumoniae*. No germs were isolated in blood cultures.

The antibiotic regimen was de-escalated to ciprofloxacin for a total of six weeks.

Electroencephalogram showed a discreet slowing of the base rhythm, compatible with encephalopathy, without evidence of epileptic seizures. However, treatment with sodium valproate was initiated.

The patient remained in the intensive care unit for eleven days, presenting with a dry necrosis of the toes of both lower extremities due to microangiopathy and high doses of norepinephrine.

After being transferred to the hospitalization floor, she presented dyspnea, so pulmonary infarcts and pulmonary atelectasis were observed in the thoracic CT scan, the patient was diagnosed with pulmonary thromboembolism, and was treated with enoxaparin.

On February 12, 2014, a bilateral transmetatarsal amputation and a scarectomy for both heels were performed.

The patient continued rehabilitation and recovery care in a socio-health center, replacing insulin therapy with oral antidiabetics, (metformin and glycazide). The patient was discharged on May 6, 2014.

She continued anticoagulant treatment with dicoumarin for six months.

e. Progress and monitoring

The histological study showed a marked acute tubulo-interstitial inflammation with abundant intraparenchymal abscesses. Marked acute inflammation and fibrosis of the perirenal adipose tissue.

Hilar vessels with abundant fibrine-leukocyte material. Lymph node with reactive lymphadenitis with thrombosis of the renal vein due to fibrin-leukocyte material and hemorrhage.

An abdominal magnetic resonance imaging (MRI) was performed in June 2014. After suffering an allergic reaction to the iodinated contrast, the patient did not show the presence of thrombosis in the vena cava (Image 3).

She was readmitted 6 months later, due to pollakiuria and dysuria, being diagnosed with a urinary tract infection. The urine culture was positive to *Escherichia coli* producer of extended spectrum beta-lactamases, being treated with ertapenem 1gr. every 24 hours for 10 days.

The patient attended follow-ups through outpatient urology consultations for median calix lithiasis of around 5 mm in size in the right kidney. With repeatedly negative urine cultures.

On June 21, 2021, the patient went to the emergency room presenting with right renal colic.

The blood test showed creatinine levels of 2.56 mg/dl.

The simple abdominal X-ray showed a calcium image in the lower pelvis compatible with right juxtavesical lithiasis (Image 4).

Renal and bladder ultrasound revealed a right ureterohydronephrosis with lithiasis of 2.3 mm in the intramural ureter (Images 5 and 6).

On June 22, 2021, a right ureterorhenoscopy was performed to remove the lithiasis and place a double J ureteral catheter that was removed 10 days after the procedure.

The spectroscopic analysis of ureteral lithiasis was reported as calcium oxalate monohydrate lithiasis in columnar arrangement (Image 7).

A 24-hour blood and urine lithiatic metabolic study was performed. Uric acid, calcium and phosphorus and parathyroid hormone (PTH) blood levels were normal. No hypercalciuria, hyperoxaluria, hypocitraturia, hypomagnesuria or hyperuricosuria were observed.

f. Clinical results

Treatment was initiated with Lit control ph balance[®], a food supplement consisting of the following ingredients: rice bran extract (calcium magnesium phytate), magnesium oxide, grape seed polyphenolic extract (*Vitis vinifera* L.) zinc gluconate, vitamins.

A. As excipients: magnesium stearate (fluidifying agent), silicon dioxide (anti-caking agent). The capsule: Hydroxypropylmethylcellulose (coating agent), titanium dioxide (dye). One capsule every 12 hours, which the patient is currently taking.

The patient attended outpatient consultation our center in October 2022, she has no urinary symptoms, and remains without recurrence of lithiasis.

4. Discussion

Renal vein thrombosis occurs mainly in states of hypercoagulability, the most frequent cause is nephrotic syndrome due to the loss of anticoagulant proteins. Other prothrombotic disorders related to renal vein thrombosis include hyperhomocysteinemia, antiphospholipid syndrome, paroxysmal nocturnal hemoglobinuria, renal cell carcinoma or other neoplasms, renal transplantation, trauma, use of contraceptives, postpartum, sepsis or xanthogranulomatous pyelonephritis. Only thirteen cases of renal vein thrombosis associated to acute pyelonephritis have been described. (1-13)

The potential mechanism of renal vein thrombosis in cases of acute pyelonephritis may be mediated by bacterial endotoxins that produce a state of hypercoagulability, causing damage to the endothelial surface which is produced by a procoagulant molecule. (1, 2, 10) In the case of our patient it was possible to identify the germ within the renal vein thrombus, which may lead us to assume that *Klebsiella pneumoniae* and its endotoxins could be the causes of the thrombosis.

The diagnosis of renal vein thrombosis will be made using imaging studies such as ultrasound, CT scans or MRI. (1-13)

The treatment should be based on two aspects: a broad-spectrum antibiotic treatment for several weeks combined with an anticoagulant therapy, using low molecular weight heparins that can last between three and six months. (1-13)

In cases of circumscribed renal abscesses, a percutaneous drainage directed by ultrasonography or CT could be used. (1-13)

In two out of the thirteen reported cases, a percutaneous thrombectomy was performed. (1,9)

In patients who cannot be treated conservatively, as in our case, a nephrectomy should be performed while attempting to remove the thrombus from the renal vein. (3, 11)

Patients with kidney stones should undergo a metabolic study, to detect the cause of the formation of the stone and, thus, to be able to administer, if possible, a preventive or lysis treatment of kidney stones.

When the lithiasis metabolic study shows no alterations, the pH is neutral and if the stones are composed of calcium oxalate, Lit-control pH balance® can be used, this medication is composed of phytates and magnesium, substances that have shown their ability to stop the crystallization and formation of oxalate kidney stones, that also protect the kidney from oxidative stress without affecting urinary pH. (14)

5. Conclusions and recommendations

Renal vein thrombosis in patients with acute pyelonephritis is an uncommon and potentially serious complication. The treatment that should be used in these cases is broad-spectrum antibiotic therapy and anticoagulant therapy, mainly using low molecular weight heparin. Surgical treatment by nephrectomy should be performed in those cases where the patient's progress is not satisfactory with the previously proposed approach. It is important to perform a metabolic study in patients with recurrent calcium oxalate renal lithiasis to prevent their recurrence.

6. Bibliographic references (*of special interest, **of extraordinary interest)

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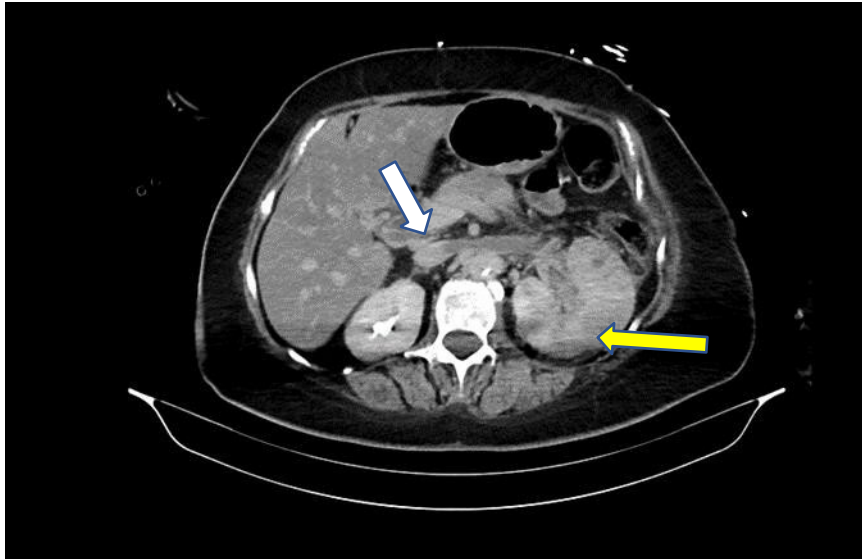


Image 1. Abdominal CT. Enlarged left kidney with diffuse nephritis areas along some abscessed areas (yellow arrow), with thrombosis of the left renal vein that extends to the vena cava (white arrow).

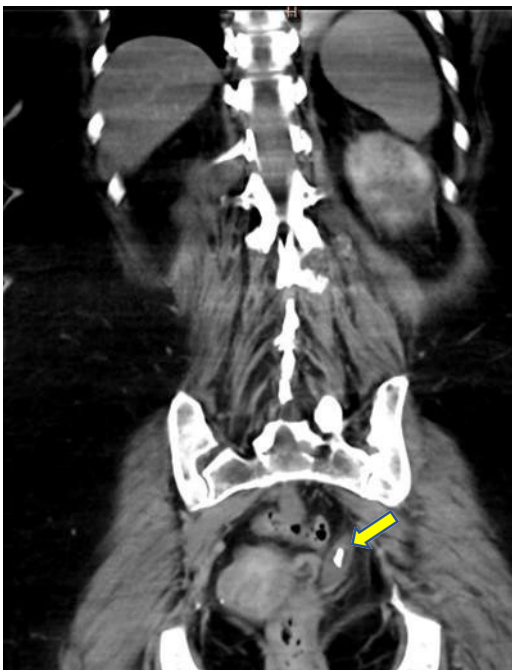


Image 2 Abdominal CT. Localized listiasis at the level of the left terminal ureter (Arrow).

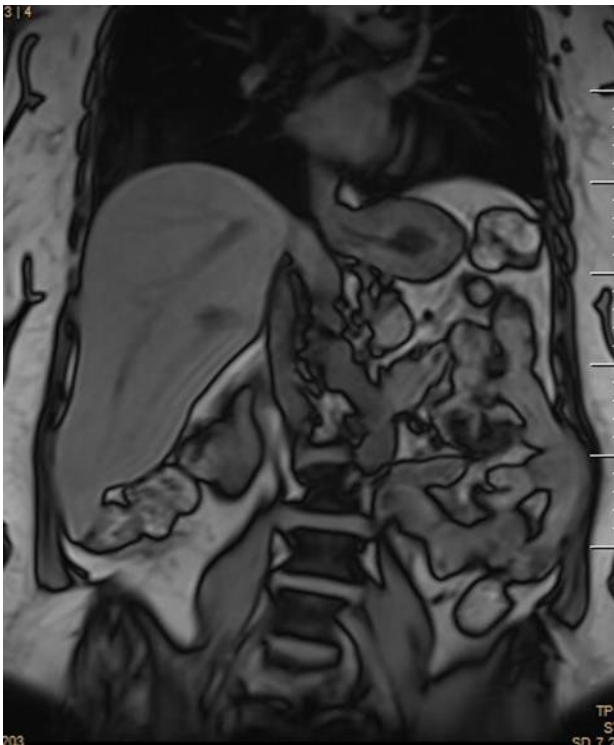


Figura 3. Abdominal MRI. No evidence of vena cava thrombosis during follow-up

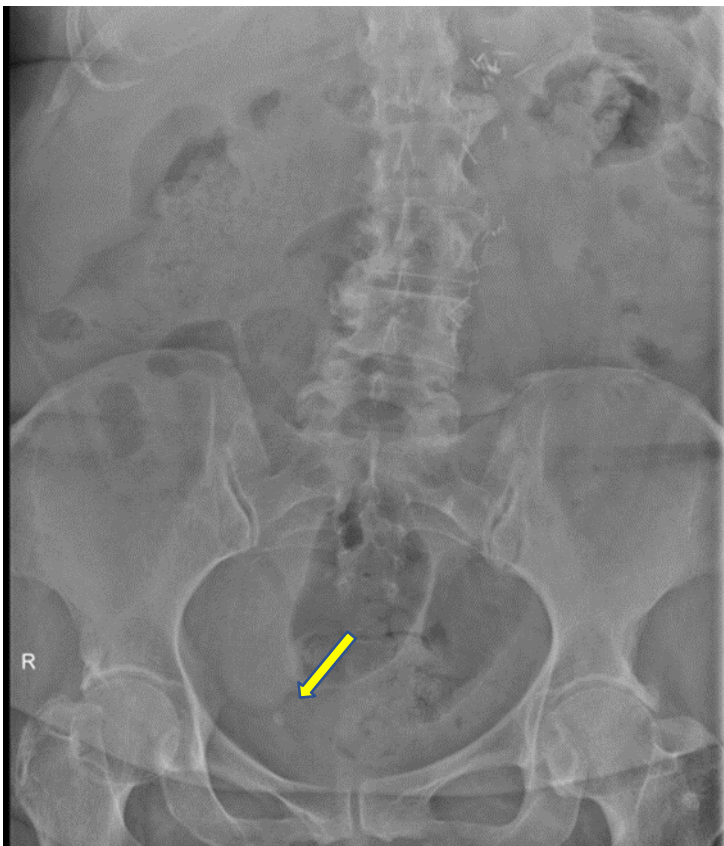


Image 4. Simple abdominal X-ray. There is a calcium image in the right minor pelvis which is suggestive of right juxtavesical lithiasis (arrow)



Image 5. Ultrasound. Hydronephrosis of the right kidney.



Image 6. Ultrasound. Lithiasis measuring 2.3 mm in the bladder intramural tract.



Image 7. Internal and external view of the ureteral calculus.