2nd Edition of the Contest of Clinical Cases related to the non-surgical clinical management of kidney stones

Title: Control of repeated lithiasis in young woman with oral citrate

Keywords:

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1. Introduction

Renal colic is the set of symptoms derived from acute obstruction of the upper urinary tract, being produced in most cases by kidney stones (1).

Calcium oxalate stones are the most frequent with approximately 65%, followed by infectious and uric acid stones, with approximately 15% each. In Spain, the average incidence of urolithiasis is 0.73%; with a mean prevalence of 5.06% (2).

It is one of the main reasons for urological emergency consultation, after acute urine retention and infectious pathology 20% of these patients require hospital admission for symptomatic and/or surgical treatment of their complications (2).

2. Description of the clinical case

Woman who consulted in 2006 at the age of 18 for right kidney stone crisis.

Physical examination: 160 cm, 59 kg. Apyretic. Depressible soft abdomen, negative Blumberg, pain in middle right ureteral points. Treatment with intramuscular diclofenac, intramuscular metamizole, oral omeprazole, oral tamsulosin, and oral paracetamol are indicated.

After 5 days of poor response to treatment, endoscopic lithotripsy of stones located in the right terminal ureter was performed: study of renal calculi: 8 x 5 x 3 mm brown stone and a greyish portion with an irregular surface and hard consistency. Composition: 95 % calcium oxalate. Indications: calcium phosphate.

a) Important background information

- Medical history: multiple kidney stones. Pyelonephritis with several incomes. Scoliosis.
- Surgical interventions: lithotripsy in 2012. External shock wave lithotripsy in 2015 and 2019.
- Treated with methotrexate for ectopic pregnancy, in July 2015.
- 2 pregnancies in 2016 and 2019.
- ALLERGIES: non-known drug allergies.

b) Evolution

Control in **October 2013:** suffers discomfort in both renal fossae. Renal ultrasound of 31.10.2013: Right kidney of normal size, shape and ecostructure. In lower calyceal groups, a hyperechogenic image is identified with discrete posterior shadow compatible with a kidney stone, measuring approximately 5 mm. Non-dilation of the ureter of the left kidney, normal size and shape. Minimal dilation of the renal pelvis with the presence of 6 mm lithiasic image. No obstruction is observed by this technique. Bladder properly repletioned, no calculus is appreciated. At the Valsalva maneuver, urine output from both ureteral meatises is observed by color Doppler ultrasound (ureteral jet). Conclusion: Hydronephrosis grade I without objectifying obstructive cause by this technique.

Metabolic study in **September 2014** within normality: Hb 14 g/dl; 10180 leucos/microL, neutrophilia 46%. Glomerular filtration >60 mL/minute/1.73m2. URINE ANALYSIS: diuresis 24 h 1100 ml, Cr 117mg/dL, Cr 24 h 1.3 g/24h, CA 22.4 mg/dL, Ca 24 h 246.4 mg/24h, Urate 66.8 mg/dL, Urate 24 h 734.8 mg/24h, Na 121 mmol/L, Na 24 h 133.1 mmol/24h, K 48.2 mmol/L, K 24 h 53 mmol/24h, Cl 90 mmol/L, Cl 24 h 99 mmol/24h; proteins 7.2 mg/dL, proteinuria 24 hours 0.079 g/24h, microalbuminuria 6.8 mg/L, Malb/Crea index 6 mg/g creates. Intact PTH 62.5 pg/mL

October 2014: pyelonephritis; bilateral?: 26-year-old patient with fever up to 39ºC since today, accompanied by general malaise, pain in the hypogastrium and in both renal fossae. No dysuria or voiding symptoms. The pain does not remind him of previous pyelonephritis and renal colic. No cough or expectoration. No vomiting or diarrhoea, although yesterday she reported pain in the epigastrium associated with nausea, without vomiting. She mentions the possibility of pregnancy.

Exploration: Conscious, oriented. Hydrated and perfused. Normocolored. Eupneica. Collaborates. Head and neck: No IY. Isopulsable carotids. COF: hyperemic, without exudate or hypertrophy. Thorax: AC: Rhythmic tones. Don't puff.

Without rub or extratones. AP: MVC in both fields. Abdomen: Soft. depressible. Not painful on palpation. RHA: normal. Not masses or visceromegaly. Bilateral PPL negative. Extremities: No edema. No signs of DVT. Pulses pedios +.

Simple AP abdomen RX is performed: No assessable findings.

Ultrasound of the complete abdomen: Both kidneys of normal size, morphology and ecostructure, with multiple lithiasis images, of left predominance, which do not produce obstruction of the excretory system. Retracted bladder, with smooth walls, without lithiasis images inside. Incidentally, nodular lesion, hyperechogenic, in hepatic segment IV, adjacent to the hepatic hilum, 2 x 2.5 x 1.2 cm in diameter TxCCxAP is visualized; suggestive of hemangioma. Rest of the study within the limits of normality. Conclusion: Bilateral renal stones. Pyelonephritis bilateral?

Pyelonephritis is diagnosed and indicated as treatment: Zinnat 500 mg: 1 tablet / 12 h 7 days, Enantyum 25 mg: 1 tablet / 8 h with a full stomach after taking Tª, Nolotil interspersed if more pain, local dry heat, and drink plenty of fluids.

In **March 2015**, she went for pain in the left renal fossa with nausea without vomiting. No fever. She said that she underwent extracorporeal shock wave lithotripsy due to left kidney stone 7 days ago. In current treatment with ACHO.

In **September 2015** she went to the emergency room for right low back pain. She is admitted for pain control due to renal colic.

She was being treated with Methotrexate until a month ago for ectopic pregnancy.

In **March 2018**: consultation for pain in the right renal fossa.

An analysis is requested: Hb 14.2 g/dL, Hto 40.5 %, Leukocytes 18.83 x 10^3/µL, NE % 80.4 %, Neutrophils 15.14 x 10^3/µL. Urea 34.6 mg/dL, Creatinine 0.71 mg/dL, URINE ANALYSIS: Urine pH 5.0, Density 1.017 g/mL, Glucose Urine Qualitative Negative mg/dL, Protein Urine Qualitative Negative mg/dL, Ketone Bodies Negative, Bilirubin Negative, Urobilinogen Negative, Nitrites Negative, Leukocyte Esterases 1+, Hemoglobin Urine 2+ BIOCHEMISTRY: Pregnancy Test Negative SEDIMENT: Bacteria P SCARCE, Epithelial Cells Negative /µL, Red blood cells Urine 11 /µL, Leukocytes urine 22 /µL, Non-Squamous Cells Negative, Hyaline Cylinders Negative, Yeast Negative PROTEINS: C-reactive protein 0.19 mg/Dl

ABDOMINAL MRI is performed: In the hepatic IVB segment, at least two well-defined areas are identified, with suppression in T2FATSAT sequences, without pathological enhancement or repercussion in diffusion study. The findings are consistent with areas of focal steatosis. Right grade I pyelocaliceal ectasia (Figure 1),

with normal caliber ureter, assess pyeloureteral junction syndrome. Spleen, pancreas, both suprarenal glands and left kidney are normal.

Ultrasound of urinary system: Kidneys of normal size and ecostructure with good corticomedullary differentiation and preserved cortical thickness, with bilateral presence of millimetre hyperechogenic images compatible with kidney stone in all calyceal groups of left kidney and middle calyceal group of right kidney, without functional repercussion. Right pyelocaliceal dilation that decreases with postural changes (2nd bladder repletion). Non-dilated left pyelocaliceal system. Well-repletioned bladder (complete repletion) without alterations at the wall or content.

In **July 2018**, she underwent a positive urine culture with amoxicillin-resistant E. Coli (>100000/ml). Sensitive to Nitrofurantoin, Fosfomycin, TrimethoprimSulfamethoxazole.

In **September 2019**, she suffered pain in the left renal fossa. An AP CT scan was performed with a radiopaque image in the left kidney of about 15 mm suggesting calculi. Presence of multiple radiopaque images <10 mm in the right kidney (figure 2).

Due to the size of the stones, she was referred to the reference centre (Complejo Asistencial Universitario de León) where she underwent extracorporeal lithotripsy by shock waves in November 2020.

In **December 2019**, she attended a post-operative check-up. An abdominal ultrasound was performed and a 3mm stone was seen in the right kidney. No stones were observed in the left kidney. Bladder with stones in the right intramural ureter. The sagittal view shows two hyperechogenic images on the posterior aspect of the bladder close to the mouth of the ureter (figure 3).

AP abdominal X-ray shows a radiopaque image in the bladder in the area of the bladder trigone. There were no other findings of interest (figure 4). Expulsive treatment was prescribed with Tamsulosin plus prednisone, which was ineffective, so endoscopic extraction with a Dornia® catheter was performed in January 2020. Urine systemic: pH 5; nitrites: negative; leukocyte esterase positive; sediment: 4 red blood cells/microL; 20 leukocytes/microL. Urine culture: negative. Citrate treatment was prescribed (Lit-Control® pH Up).

Control in **September 2020**: she is asymptomatic. A follow-up x-ray is requested in which there are no radiopaque calculi (Figure 5).

3. Discussion

Kidney stones disease can be expressed with a wide repertoire of clinical manifestations, going from being asymptomatic in the case of calyceal stones without infundibular involvement, to intense pain in renal colic. Symptoms depend on location to the location, size and obstructive capacity (3).

Recent studies indicate that 60% of patients who have had one stone will have another before 10 years, 35% before 5 years and 15% before 1 year of the first episode.

It presents as a pain of sudden onset, paroxysmal, unilateral and very intense pain, located in the costolumbar region, radiating anterodorsally when following the ureteral trajectory towards the bladder, iliac fossa, inguinal region, genitals.

The clinical manifestation is based on local irritative symptoms (positive homolateral fist-percussion, abdominal muscle defense, pain on palpation of the ureteral points) and irritation due to contiguity with visceral symptoms of digestive predominance (nausea, vomiting, feeling of fullness, reflex intestinal ileus (4).

It is also accompanied by vegetative manifestations such as tachycardia, alterations in blood pressure, cold sweats, and pallor (5).

Complicated renal colic is one that presents with fever, oligoanuria, or poor pain control. These patients normally require hospital admission for treatment of possible urological sepsis with antibiotic therapy and renal bypass (5)

Diagnosis is mainly clinical after the anamnesis and physical examination. It is recommended to perform blood, urine analysis (assessing a possible urinary infection if there were positive nitrites, micro or macrohematuria and leukocyturia), and complementary tests to complement the diagnosis and rule out complicated renal colic. We will begin with urological ultrasound (with S96% and E100% in stones greater than 4 mm) to assess the degree of pyelocaliceal dilation presented by the renal unit. In case of doubt, the abdomino-pelvic CT scan (S98% and E100%) can be used to help make the differential diagnosis. (6)

The main pathologies with which the differential diagnosis must be made are acute pyelonephritis, renal infarction, acute appendicitis, intestinal occlusion, acute diverticulitis, biliary colic, dissection of abdominal aortic aneurysm among others (6).

Outpatient treatment will be based on hydration together with analgesia (diclofenac or oral metamizole) (7), tamsulosin (as expulsive therapy), potassium citrate (in case of radiolucent stones). In the case of emergencies, water restriction and metoclopramide (when there is nausea and vomiting) should be prescribed.

In case of colic complications, a urinary diversion will be performed by placing a ureteral catheter or nephrostomy tube plus antibiotic therapy in case of sepsis (Ceftriaxone 1-2 grams every 24 hours, iv + Gentamicin 3-5 mg / kg / day, IV distributed every 8 – 12 hours / Piperacillin-tazobactam 4 g / 500 mg every 6-8 hours, iv / Imipenem 0,5-1g every 6 hours, iv.) (8).

4. Conclusions and recommendations

Kidney stones is a chronic disease characterized by the formation of stones in the urinary system, whose diagnostic suspicion is based on symptoms and is confirmed by complementary imaging and laboratory tests.

Treatment is based on medical measures and may require catheterization or referral in case of complicated urinary tract obstruction. Oral citrate helps to control the disease.

5. References

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6. Images

Figure 1. Abdominal MRI with right grade I pyelocaliceal ectasia with normal calibre ureter, suggestive of pyeloureteral junction syndrome.

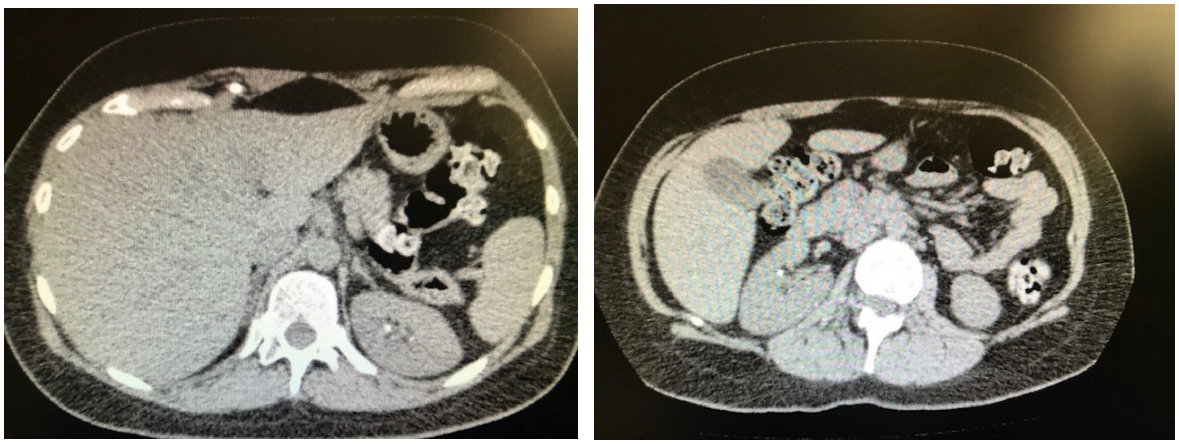

Figure 2. AP CT with a radiopaque image in the left kidney of about 15 mm suggesting kidney stone. Presence of multiple radiopaque images <10 mm in the right kidney.

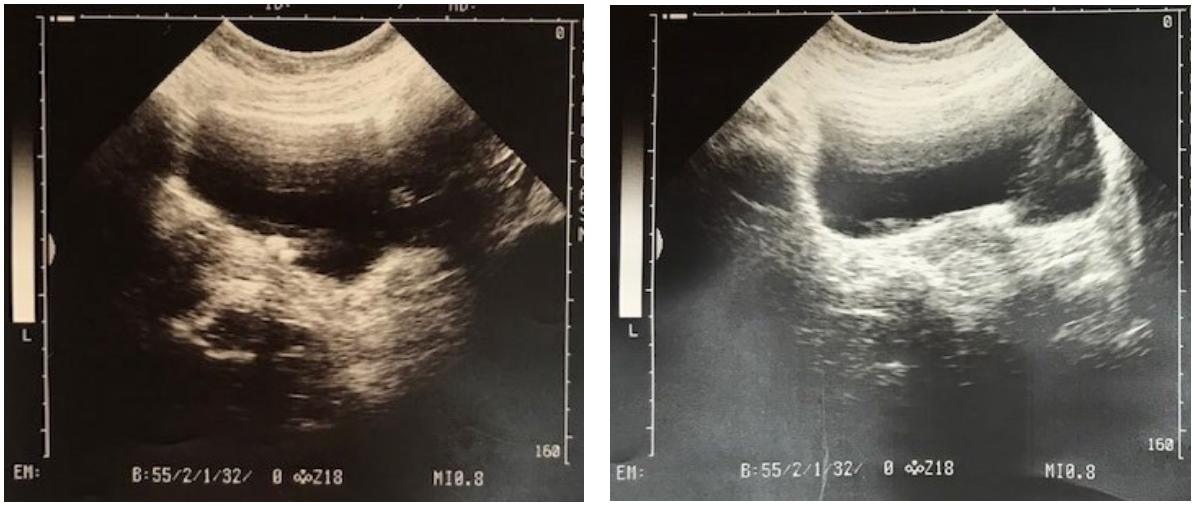

Figure 3. Bladder ultrasound with stone in the right intramural ureter. In the sagittal cut, two hyperechogenic images are seen on the posterior face of the bladder near the mouth of the ureter.

Figure 4. AP abdominal RX, radiopaque image in the bladder in the bladder trine area.

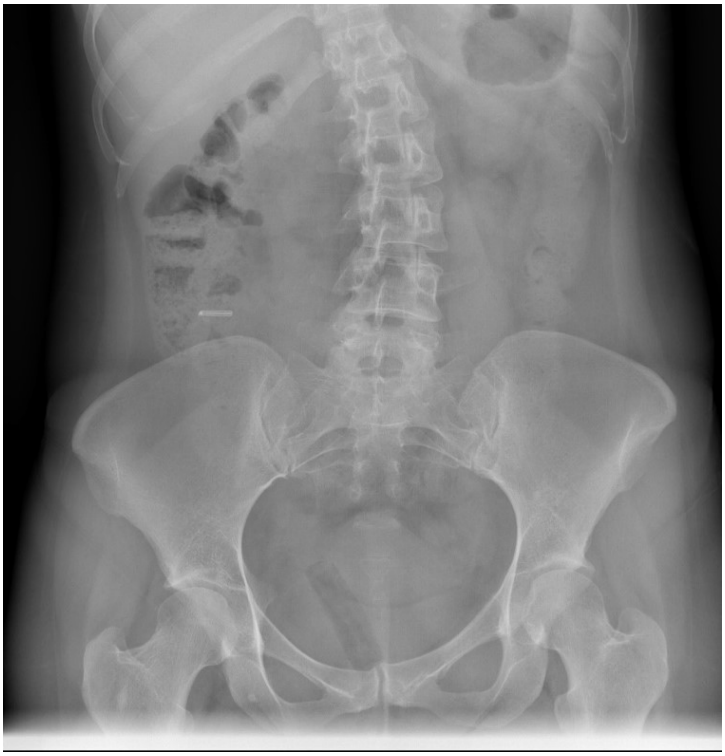

Figure 5. Simple X-ray of abdomen without radiopaque stone.