

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

**Title:** Control of repeated calculi in young male with oral citrate

**Keywords:**

**Authors:** Lola Marta Murillo Morillas, Oscar Heredero Zorzo, María Fernanda Lorenzo Gómez

## 1. Introduction

Kidney stones disease is characterized by the appearance of stones in the urinary system. It is an extremely frequent pathology, so that, approximately, 5-12% of the population of industrialized countries suffers some symptomatic episode before 70 years of age. Renal colic is the set of symptoms derived from acute obstruction of the upper urinary tract, being produced in most cases by calculi and to a lesser extent by clots, tumors or surgical iatrogenesis. This pathology has a higher incidence in white people, aged between 20 and 50 years, being more frequent in men than in women with a ratio of 3:1 (1).

## 2. Description of the clinical case

Male patient who consulted in January 2008 at 47 years of age for left renoureteral crisis.

Physical examination: 175 CM, 82 KG. Apyretic. Depressible soft abdomen, negative Blumberg, pain in lower left ureteral points. Treatment with intramuscular diclofenac, intramuscular metamizole, omeprazole orally, tamsulosin orally, paracetamol orally is indicated. The kidney stone is expelled after 48h: analysis of the stone: 80% calcium oxalate, 20% ammonium urate.

### a) Important background information

-No known drug allergies. Nephrolithiasis. Former smoker.

-Surgical interventions: appendectomy

### b) Evolution

In 2013, circumcision and bilateral vasectomy were performed.

Systematic PSA controls (ng/ml): 0.7 (13-03-2014); 0.64 (15-04-2015).

Control in May 2017: asymptomatic. Ultrasound: both kidneys (Figure 1) and bladder without pathological findings, prostate of 43cc volume, with signs of prostatitis (Figure 2).

Control in August 2018 presents mild dysuria. The patient had suffered from bilateral pulmonary thromboembolism in July 2018. Ultrasound: both kidneys and bladder without pathological findings, prostate of 61 cc volume. Urine analysis: pH 5.5; Hb positive; 19 red blood cells/ $\mu\text{L}$ ; 1 leukocyte/ $\mu\text{L}$ .

Control in November 2018: Negative urine cytology for malignancy. Urine analysis: pH 5.5; Hb positive; 20 red blood cells/ $\mu\text{L}$ ; 5 leukocyte/ $\mu\text{L}$ . TAC is requested.

Control in December 2018: CT: Right kidney: 2 kidney stones of 3.5 (Figure 3) and 2 mm. respectively. Urine analysis: Ph 5.5; Negative nitrites; Hb positive; 17 red blood cells/ $\mu\text{L}$ ; 1 leukocyte/ $\mu\text{L}$ .

Control in July 2019 presents mild dysuria. PSA 1.1 ng/ml. Negative urine culture. Oral citrate (Lit-Control<sup>®</sup> pH Up) is indicated. Patient follow up is scheduled in 3 months, having previously performed urine culture, ultrasound, and analysis.

Control in November 2020: the patient is asymptomatic. It is treated with: Rosuvastatin, apixaban 5mg and oral citrate (Lit-Control<sup>®</sup> pH Up). Laboratory: Hematimetry: Hb 16 g/dl Hcto: 50% Leukocytes: 5560/microL Neutrophilia: 51% Glomerular Filtration: >90; systematic urine: pH: 6; negative nitrites; Hb positive; Red blood cells: 19/ $\mu\text{L}$ , leukocytes: 1/ $\mu\text{L}$ . PSA: 0.808 ng/ml. Urine culture: negative. Ultrasound: Right kidney: two kidney stones in the upper calyces of 3.0 and 2.0 mm of greater diameter. Left kidney and bladder without pathological findings; Prostate 42.5 cc.

### **c) Diagnosis**

Two kidney stones in the upper calyces of the right kidney, well controlled with oral citrate, without increasing in 16 months of evolution, and without complications.

### **d) Treatment**

Continue with the same treatment.

FOLLOW-UP: review in 6 months prior to simple radiography of the abdomen; urinoculture, systematic urine.

### **e) Objectives**

To present the results of the management of a case of kidney stones with oral citrate in a young male.

### 3. Discussion

Urinary stones disease is caused by the presence of stones inside the kidneys or the urinary tract (ureter and bladder). Kidney stones are composed of different substances, with calcium oxalate and uric acid being the most frequent (90%).

Intrinsic etiopathogenic factors involved in the formation of urinary stones other besides race, age and sex have been described (2):

- Personal history of renal colic, as a consequence of the high recurrence rate ranging from 35-50% at 5 years.
- Heredity: The family's health history of urinary stones, mainly in first-degree relatives (father or siblings).

There are also environmental factors that are established as extrinsic conditions related to lithogenesis (3):

- Seasonal and climatic factors: Cases of renal colic increase during the warm months, corresponding to summer and autumn. Also in inhabitants of desert, mountainous and tropical areas.
- Intake of less than 2 liters of water per day, considering the dilutional effect of diuresis as a protective factor for the recurrence of renal colic.
- Dietary factors (4): Depending on the type of the kidney stone, it may be related to excessive consumption of dairy products, foods rich in purines or protein, high sodium intake and obesity.

Kidney stones disease can be expressed with a wide repertoire of clinical manifestations, going from being asymptomatic in the case of calyceal stone without infundibular involvement, to an intense pain in a renal colic, described as one of the most intense pains that the human being can endure. The clinic can guide to the location of the obstruction (5). Calyceal stones without infundibular obstruction are asymptomatic, but when they occur, they manifest themselves as dull low back pain, with hematuria and / or recurrent infections.

The diagnosis of renal colic is clinical. With only the medical history and physical examination can be correctly diagnose; however, it is recommended to perform blood, urine, and complementary tests to complement it: urological ultrasound, simple abdominal X-ray and abdomino-pelvic CT. It is necessary to know the situation and size of the stones, their composition and the possible existence of diseases that are associated with their formation.

Treatment is based on controlling the symptoms produced by renal colic, awaiting the progression of the stone through the ureter by hydration, analgesia and antiemetics (6).

For expulsive therapy: There is evidence that  $\alpha$ -blockers (tamsulosin) and calcium channel blockers (nifedipine, verapamil) may help decrease the expulsion time of the stone, increase the rate of expulsion, and decrease the need of analgesia in stones of less than 1cm of diameter (7); not being indicated in pregnant patients or children.

For uric acid stones (radiotransparent stones on plain radiography of the abdomen and with urinary pH less than 6) chemolysis with potassium citrate can be used for the dissolution of stones. It is recommended to monitor the urinary pH; between 6.0-7.0, and the ensure the alkalizing treatment of the urine is effective (7.8).

#### **4. Conclusions and recommendations.**

Citrate is a potent inhibitor of calcium salt crystallization. Hypocitraturia is a common biochemical alteration in the formation of calcium stones. Acidic pH (systemic, tubular and intracellular) is the main determinant of citrate excretion in the urine. While most patients with kidney stones present idiopathic hypocitraturia, there are several causes for this abnormality including distal renal tubular acidosis, hypokalemia, diets rich in animal protein, and/or low alkaline diet and certain drugs, such as acetazolamide, topiramate, ACE inhibitors, and thiazides.

Citrate treatment is effective in patients with primary or secondary hypocitraturia and in those acidification disorders, which cause a persistently acid urinary pH. Therefore, citrate is very useful to correct hypocitraturia and low urinary pH, and markedly reduce the recurrence of kidney stones.

## 5. References

- 1.-Leopoldo Cogorno-Wasylkowski, Diego-Fernando Carvajal-Buitrago: CRISIS RENOURETERAL O CÓLICO RENAL. En Actualidad en Urgencias Urológicas. Salamanca 2014. Editora Maria-Fernanda Lorenzo-Gómez©. ISBN 978- 84- 617-3076-6. Depósito Legal: S.591-2014. Edit. Ratio Legis. S.L.Cap. 10 pp. 129 – 141.
- 2.-Latterle S. Genitourinary emergencies. En: Stone C, Humphries R. Current Emergency Diagnosis & Treatment. 5ª Edición. Mac Graw-Hill, 2004. p. 760-763.
- 3.-Buitrago F, Calvo JI, Bravo B. Estudio y seguimiento del cólico nefrítico. JANO 25, 2005; 1(587): 43-6.
- 4.-Luján M, Sánchez MT, Turo J, Pascual C, Chiva V, Martín C, Torres J. Climate and epidemiological characteristics of renal colic attendances in an urban setting in Spain. Actas Urol Esp. 2011 Sep;35(8):481-6.
- 5.-Seitz C, et al. Medical Therapy to facilitate the passage of stones: what is the evidence?. Eur Urol. 2009, 56(3):455-471.
- 6.-González C. Litiasis urinaria. Medicine. 2007;9(83):5342-5350
- 7.- C. Türk (Chair), A. Neisius, A. Petrik, C. Seitz, A. Skolarikos (Vice-chair), K. Thomas; N.F. Davis, J.F. Donaldson, R. Lombardo, N. Grivas, Y. Ruhaye. S EAU Guidelines on Urolithiasis. © European Association of Urology 2020. EAU Guidelines. Edn. presented at the EAU Annual Congress Amsterdam 2020. ISBN 978-94-92671-07-3. EAU Guidelines Office, Arnhem, The Netherlands. <http://uroweb.org/guidelines/compilations-of-allguidelines/>.
- 8.-Elisa E. Del Valle, Francisco R. Spivacow, Armando L.Negri. Citrato y litiasis. 2013, 73: 363-368

## 6. Images

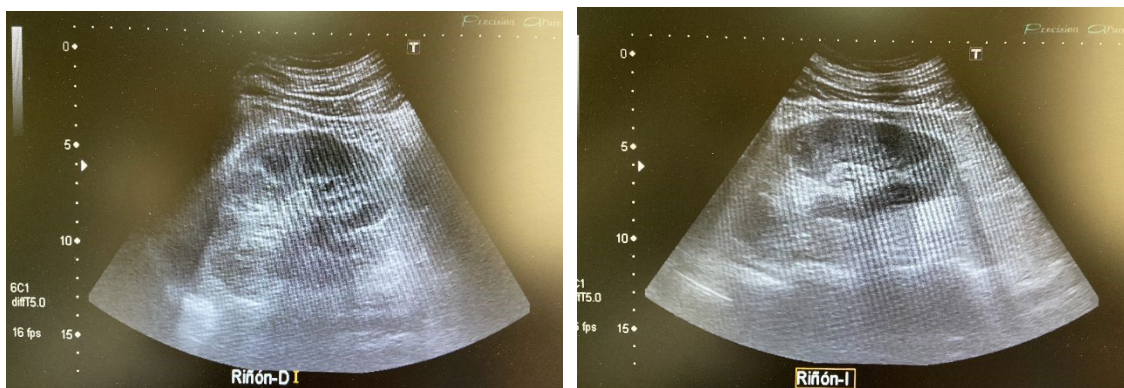


Figure 1. Transabdominal bilateral renal ultrasound: both kidneys in longitudinal projection without stones



Figure 2: Transabdominal vesico-prostatic ultrasound, coronal projection. Signs of chronic prostatitis



*Figure 3. Abdominal CT: cross-section, without contrast: radiopaque stone of 3.5mm of greater diameter in upper calyceal group of right kidney*