

V Edition of the Clinical Cases Contest on
non-surgical clinical management of Kidney Stones
Official template

Title: Use of Lit Control pH Up as alkalinizing agent for the treatment of large ureteral uric acid lithiasis

Author/s: Carrasco-Gomez Daniel, Ribokaite Zivile, Molina-Diaz Patricia

Affiliation 1st author: Urology Department, Hospital Regional Universitario de Malaga, Malaga, Spain

Key words (3 to 6): uric acid, lithiasis, alkalinization, non-invasive, medical treatment

1. Abstract

Objective: To evaluate the use of medical treatment with Lit Control pH Up as a useful non-invasive alkalinizing supplement for urolithiasis

Methods: We are presenting the case of a 60 year-old male who came to the emergency department with typical colic caused by a 19 mm left ureteral lithiasis, producing mild ureteropelvic ectasia. After diversion of the urinary tract, CT scan control performed 3 months later just after medical expulsive treatment and Lit Control pH Up use successfully lead to resolution of that lithiasis.

Outcome: After 3 months of urinary alkalinization using Lit-Control® pH Up (potassium citrate, magnesium citrate and theobromine), the patient achieved complete chemolysis with a pH around 6.

Conclusion: We should consider alkalinizing pharmacotherapy as the first treatment option in patients with uric acid lithiasis.

2. Introduction

Management of large ureteral stones (> 10 mm) often involves surgical interventions like URS or lithotripsy. However, non-invasive approaches, including oral dissolution therapy using alkalinizing agents like citrate combined with adjuncts like theobromine, have shown promising. This case report explores the evidence supporting the use of **Lit Control pH Up ©** for complete stone expulsion in such cases, avoiding the need for invasive treatment

3. Clinical Case description

a. Patient information / Medical records

A 60-year-old Spanish male presented with a history of diverticulosis, mesenteric panniculitis, and recurrent renal lithiasis. He had no significant surgical history. His usual medications included paracetamol and

metamizole for episodic lumbar pain caused by recurrent renal stones.

The patient visited the emergency department with right renal fossa pain (similar to previous episodes) lasting one day, associated with nausea but without dysuria or fever. There was reduced diuresis but no additional symptoms. The previous day, he had been discharged after presenting with left lumbar pain. An urgent right urinary tract diversion was indicated using a double-J stent.

Regarding our physical examination, the patient appeared in good general health, stable hemodynamically. He was alert, hydrated, and perfused, with no signs of respiratory distress. Cardiopulmonary auscultation was unremarkable. The abdomen was soft and non-tender, except for discomfort in the right renal fossa. No peritoneal irritation or renal punch tenderness was noted.

b. Diagnostic support studies and results

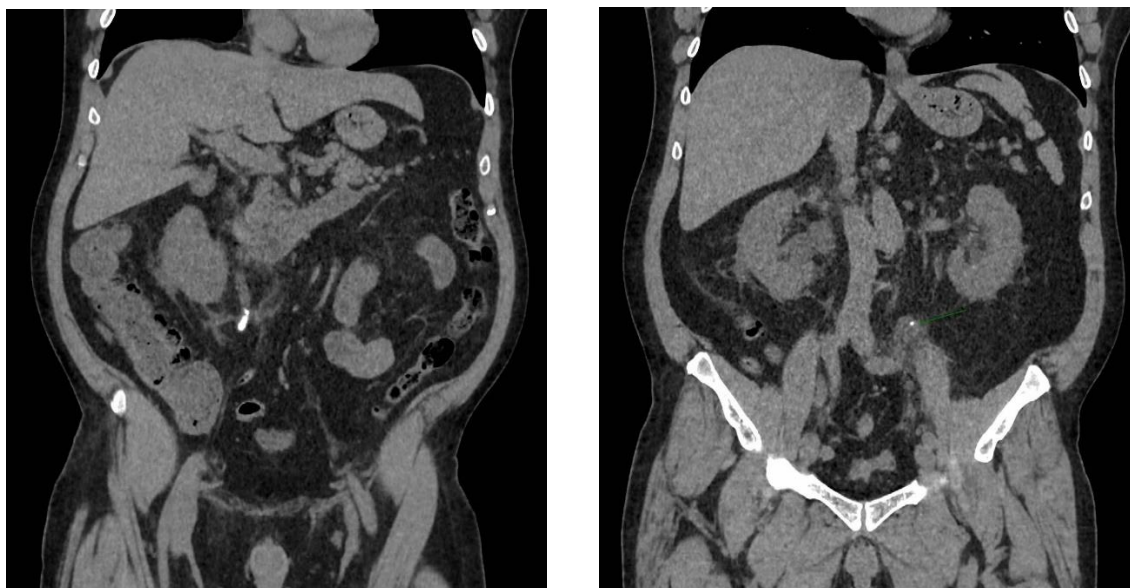
During his stay in the emergency room, a blood test was performed, showing Glu 112, Cr 3.48, FG 18 (previously Cr 1.63, FG 45), K 4.76, Na 132, Cl 101, haemoglobin 13.2 and leucocytosis with a 71.1 CRP. Urinary sample results were positive for leukocytes (+), red blood cells (+++); nitrites analysis was negative. Urine culture sample was also taken, which concluded posteriorly as negative. Regarding image control, first we performed X-ray without visualizing the lithiasis, therefore requiring an abdominal ultrasound and, afterwards, an abdominal CT scan.

- Abdominal X-Ray: no lithiasis was visible, X-ray without abnormalities



Image 1: Abdominal X-Ray, non-visible lithiasis

- Abdominal ultrasound:
Pyelocaliceal dilatation grade I/IV left and II/IV right. No obstructive cause can be identified. Pyelocaliceal microlithiasis in left GCI without signs of obstruction.
- Abdominal and pelvic CT scan:
Obstructive lithiasis in right lumbar ureter (L4-L5 level) over an extension of 19 mm approx. and another left ureteral lithiasis of 2 mm (L5 level) with bilateral retrograde dilatation grade II/IV. Microlithiasis in lower calix of non-obstructive characteristics. Bladder: empty, not assessable with lithiasis. Prostatic hypertrophy.



Images 2 and 3: Abdominal CT scan, coronal sections, visualizing 19 mm right lumbar ureteral lithiasis (*left image*), and 2 mm left lumbar ureteral lithiasis (*right image*)

- Urinary sediment (two months before this episode): pH 5, calcium oxalate crystals detected

c. Diagnosis

Bilateral radiolucent lithiasis located in both lumbar ureters (large on the right side, 19 mm).

d. Treatment

During hospitalization, a double-J stent was placed for urinary diversion. After it, blood test was performed with clear improvement of blood parameters (Cr 1.2, GFR 65, CRP 12.4, no leucocytosis). The patient was prescribed Lit Control pH Up (1 tablet every 12 hours), medical expulsive therapy with tamsulosin 0.4 mg/day, routine analgesics (paracetamol and NSAIDs), and metoclopramide for nausea. This regimen was initiated due to the anticipated difficulty of spontaneous stone expulsion, even with standard medical expulsive therapy (MET). Additionally, the patient was placed on the surgical waiting list for right ureteroscopy (URS).

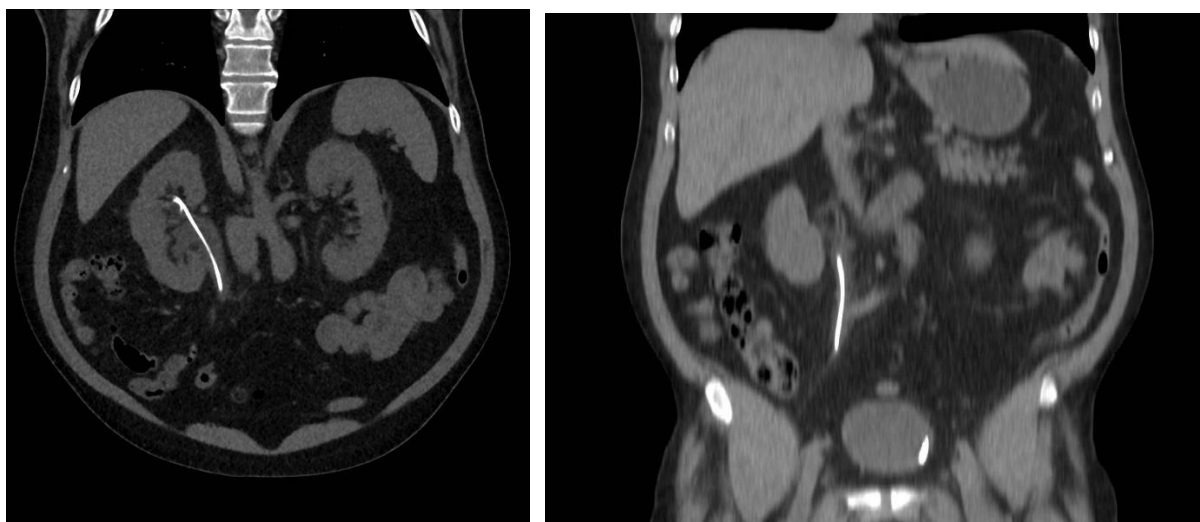
e. Evolution and progress

The use of the myLit-Control App® was recommended to enhance urinary pH monitoring for both the patient and the healthcare provider.

Blood test one month after treatment revealed Glu 89, Cr 1.09, GFR 73, uric acid 7.6 mg/dL, and normal ion values. 24-hour urine analysis results were in normal range (Citrate: 13 mg/dL, 24-hour citrate excretion: 390 mg/24h, oxalate: 1.11 mg/dL, 24-hour oxalate excretion: 33.3 mg/24h)

At a three-month follow-up, a CT scan revealed no renal or right ureteral lithiasis, with only mild residual ectasia (described left kidney as not dilated. Disappearance of microlithiasis in lumbar ureter at the level of the psoas. Non-obstructive microlithiasis in inferior calix. Right kidney with grade II/IV residual pyelocaliceal dilation secondary to previous lithiasis. No visualization in Scout).

The patient was asymptomatic. Imaging demonstrated grade I/IV residual dilation and a correctly positioned double-J stent. Reactive retroperitoneal lymphadenopathy (less than 1 cm) and increased periureteral fat trabeculation were observed. The double-J stent was subsequently removed without complications.



Images 4 and 5: Abdominal CT scan, coronal sections showing full resolution of the lithiasis and adequately placed double-J stent.

Six months later, an ultrasound follow-up and a 24-hour urine metabolic study were scheduled. The patient had discontinued Lit Control pH Up, and metabolic testing showed hyperuricosuria (980 mg/24 h) with a urinary pH of 6. The treatment was restarted along with lifestyle modifications, including weight loss and dietary changes.

f. Clinical results

At the one-year follow-up, the patient remained asymptomatic, with no evidence of renal or ureteral lithiasis on imaging. Preventive treatment with potassium citrate was continued.

4. Discussion

Oral chemolysis is based on alkalinisation of urine by application of alkaline citrate or sodium bicarbonate. The pH should be adjusted up to 7.0-7.2, reaching at least 6-6.5 in order to have an impactful effect. Chemolysis is more effective at a higher pH, which might, however, promote calcium phosphate stone formation. Patients will need to adjust the dosage of alkalinising medication by self-monitoring the pH of their urine.

The use of Lit Control pH Up, a formulation that includes citrate and theobromine, is supported as an effective strategy in managing uric acid kidney stones by promoting urinary alkalinization and enhancing stone dissolution. Calcium oxalate stones, as well as uric acid stones, are highly sensitive to urinary pH, and maintaining a urine pH between 6.0 and 6.5, as in our case, can significantly reduce stone formation and aid in dissolving existing stones. Our presented case serves as an example that in selected cases we can avoid invasive treatment of large urolithiasis with the use of these supplements.

Evidence suggests low urinary citrate levels and acidic pH are key contributors to stone formation, which can be counteracted by citrate supplementation, which could be done naturally (more controversial) or by supplements such as Lit-control pH Up. Citrate serves as a potent inhibitor of calcium crystallization, effectively reducing supersaturation of calcium oxalate and uric acid in the urine, while theobromine may contribute by relaxing smooth muscle in the ureter, potentially aiding in stone passage. However, it is also important to take into account that not always an increasing urinary citrate implies a higher urinary pH. Furthermore, the use of alkalinizing agents such as those in Lit Control formulations has been shown to improve outcomes by stabilizing pH and reducing the likelihood of stone recurrence. Therefore, after hyperuricosuria with normal blood urea was observed in follow-up, we decided to agree with the patient upon the use of Lit Control pH Up as preventive treatment for future episodes.

Consequently, when used consistently, Lit Control pH Up could promote stone passage without surgical intervention, making it a cost-effective and non-invasive treatment option for patients with kidney stones like those over 1 cm in size, as it happens in our case. Continued monitoring of urinary parameters is essential to ensure treatment efficacy, facilitated by apps such as myLit-Control App®

5. Conclusions and recommendations

In managing a 60-year-old patient with a 19 mm uric acid lithiasis located in the lumbar ureter, Lit Control pH Up offers a promising, non-invasive solution. The inclusion of citrate in the formulation effectively increases urinary pH to an optimal range, reducing calcium oxalate supersaturation and inhibiting crystal aggregation or uric acid stone formation. Consistent use of Lit Control pH Up, combined with regular monitoring of urinary pH and stone size through imaging, can provide gradual or fully effective resolution of the stone. This method circumvents the need for lithotripsy or other invasive treatments, aligning with evidence-based recommendations for non-surgical management, if possible, of acidic kidney stones.

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

Hernandez Y, Costa-Bauza A, Calvó P, Benejam J, Sanchis P, Grases F. Comparison of Two Dietary Supplements for Treatment of Uric Acid Renal Lithiasis: Citrate vs. Citrate + Theobromine. *Nutrients*. 2020 Jul 7;12(7):2012. doi: 10.3390/nu12072012. PMID: 32645831; PMCID: PMC7400936.

Julià F, Costa-Bauza A, Berga F, Grases F. Effect of theobromine on dissolution of uric acid kidney stones. *World J Urol*. 2022 Aug;40(8):2105-2111. doi: 10.1007/s00345-022-04059-3. Epub 2022 Jun 11. PMID: 35689678; PMCID: PMC9279199.

*Geraghty RM, Davis NF, Tzelves L, Lombardo R, Yuan C, Thomas K, Petrik A, Neisius A, Türk C, Gambaro G, Skolarikos A, Somani BK. Best Practice in Interventional Management of Urolithiasis: An Update from the European Association of Urology Guidelines Panel for Urolithiasis 2022. *Eur Urol Focus*. 2023 Jan;9(1):199-208. doi: 10.1016/j.euf.2022.06.014. Epub 2022 Aug 1. PMID: 35927160.

Goldfarb DS. Empiric therapy for kidney stones. *Urolithiasis*. 2019 Feb;47(1):107-113. doi: 10.1007/s00240-018-1090-6. Epub 2018 Nov 26. PMID: 30478476; PMCID: PMC6361718.

**Skolarikos A, Somani B, Neisius A, Jung H, Petřík A, Tailly T, Davis N, Tzelves L, Geraghty R, Lombardo R, Bezuidenhout C, Gambaro G. Metabolic Evaluation and Recurrence Prevention for Urinary Stone Patients: An EAU Guidelines Update. *Eur Urol*. 2024 Oct;86(4):343-363. doi: 10.1016/j.eururo.2024.05.029. Epub 2024 Jul 27. PMID: 39069389.

Shen J, Zhang X. Potassium Citrate is Better in Reducing Salt and Increasing Urine pH than Oral Intake of Lemonade: A Cross-Over Study. *Med Sci Monit*. 2018 Apr 1;24:1924-1929. doi: 10.12659/msm.909319. PMID: 29605825; PMCID: PMC5894568.

Siener R. Can the manipulation of urinary pH by beverages assist with the prevention of stone recurrence? *Urolithiasis*. 2016 Feb;44(1):51-6. doi: 10.1007/s00240-015-0844-7. Epub 2015 Nov 27. PMID: 26614113.

Skolarikos A. Medical treatment of urinary stones. *Curr Opin Urol*. 2018 Sep;28(5):403-407. doi: 10.1097/MOU.0000000000000523. PMID: 29939860.