Lit-Control devicare

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

Official template

Title: Lit-Control® pH Up prevents morbidity and mortality in Mini-PCNL treatment of large obstructive uric acid stones.

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1. Abstract (no longer than 150 words)

The objective of this clinical case is to evaluate the effectiveness of Lit-Control® pH Up in the treatment of large uric acid stones, thus avoiding the surgical risks and complications of more invasive procedures. We present the case of a 59-year-old woman who, during an incidental imaging test, was found to have a large impacted stone in her right renal pelvis, causing secondary hydronephrosis. After an unsuccessful attempt at Mini-PCNL due to the presence of purulent urine and the visualization of a radiolucent stone on fluoroscopy, the patient was treated with Lit-Control® pH Up until the next surgical intervention was scheduled. During follow-up, a reduction in stone size was observed, eventually leading to its complete disappearance. Therefore, Lit-Control® pH Up could be considered an effective alternative therapy for the treatment of large stones, instead of more invasive interventions.

2. Introduction

Uric acid stones account for a significant proportion of urinary stones. Understanding the pathophysiology of stone formation is crucial for guiding treatment. Hyperuricosuria, low urine output, and acidic urine are well-known contributing factors. However, the most important factor for the formation of uric acid stones is persistently acidic urine[1].

According to the European Association of Urology (EAU) guidelines, percutaneous nephrolithotomy (PCNL) remains the standard surgical method for treating large renal stones. This procedure carries associated complications. Although morbidity related to PCNL is much lower compared to open surgery, numerous studies in the literature have reported a wide range of complications with varying frequencies[2]. Several comparative studies have been conducted between mini-PCNL and standard PCNL, demonstrating the superiority of mini-PCNL over standard PCNL with a significantly lower rate of adverse effects. However, it has been suggested that due to the smaller access sheath in mini-PCNL, there is a longer operative time and

subsequently a higher absorption of bacterial endotoxins, leading to a greater likelihood of complications[3].

Since urine acidity is a prerequisite for the formation and growth of uric acid stones, urinary alkalinization with potassium citrate or sodium bicarbonate is a highly effective treatment that results in the dissolution of existing stones and the prevention of recurrence[1]. Alkalinizing therapy plays a valuable role in the conservative treatment of uric acid stones, reducing the need for surgical intervention[4].

We present the case of a 59-year-old female patient with large impacted uric acid stones in the renal pelvis, which was resolved solely with alkalinizing medical treatment.

3. Clinical Case description

a. Patient information / Medical records

A 59-year-old woman, with a history of recurrent lower urinary tract infections, is referred to Urology due to an incidental finding on an abdominal CT scan. The patient reports occasional bilateral lumbar discomfort of gradual onset.

b. Diagnostic support studies and results

The abdominal CT scan shows right-sided hydronephrosis secondary to a 16 x 9 mm stone (500 HU) obstructive in the renal pelvis, with urothelial hyperenhancement and inflammatory changes in the renal sinus (Figure 1).

c. Diagnosis

A 16 x 9 mm stone obstructive in the right renal pelvis causing secondary hydronephrosis.

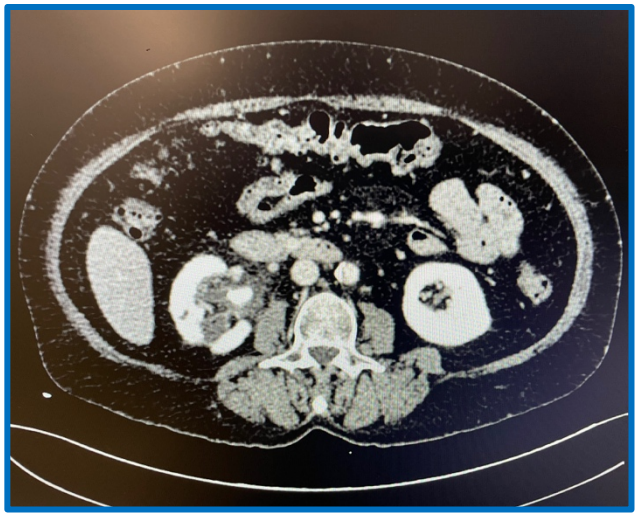

Figure 1. CT scan: obstructive stone in the right renal pelvis; secondary hydronephrosis.

d. Treatment

Surgical intervention for the right renal stone is considered. The patient is presented with different surgical options. However, given the size and location of the stone, mini-PCNL is chosen due to its favorable access via both the middle and lower calyceal groups. A preoperative urine culture is ordered.

e. Evolution and progress

Two weeks after being evaluated in Outpatient Consultation, the urine culture was positive for E. coli (multi-sensitive), and the patient was treated with Cefuroxime 500 mg, one tablet every 12 hours for 5 days. Subsequently, a surgical intervention was performed, with an unsuccessful attempt at right mini-PCNL, due to the exit of abundant purulent urine after placing a percutaneous nephrostomy. A radiographic image showed a radiolucent stone. After a good postoperative recovery, the patient was discharged with antibiotic therapy (Ciprofloxacin 500 mg every 12 hours for 5 days), urinary alkalinizing treatment (Lit-Control® pH Up 1 capsule every 12 hours), and Tamsulosin 0.4 mg every 24 hours until removal of the nephrostomy tube. Follow-up was planned in Outpatient Consultation with a new abdominal CT scan.

One month later, the patient returns for follow-up, reporting discomfort from the nephrostomy tube, which resolves with analgesics, with no other significant symptoms. The follow-up abdominal CT scan shows changes related to the interventional procedure with a nephrostomy catheter in the middle calyceal group (GCM), along with perirenal plane reticulation and a fusiform collection (35 x 55 x 80 mm AP x T x CC) in the posterior pararenal space, consistent with a hematoma and inflammatory changes in the surrounding region, along with resolution of the right system dilation and a remaining 7 mm stone in the pelvis (Figure 2).

The nephrostomy tube is patent. The patient continues on Lit-Control® pH Up 1 capsule every 12 hours until the next follow-up in one month, with a CT scan to assess the possibility of nephrostomy tube removal if the stone is completely resolved.

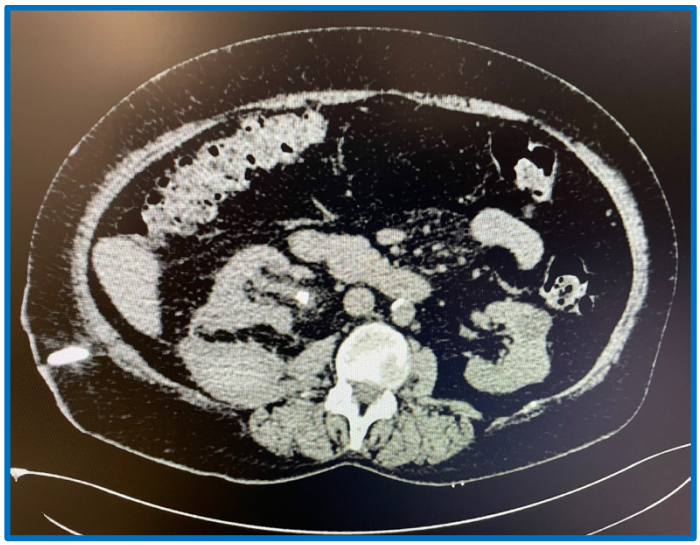

Figure 2. Figure 2. CT: Stone size has decreased by more than two-thirds. Approx. 500 HU. Laminar perirenal hematoma.

The follow-up CT scan shows the right nephrostomy tube without any abnormalities, with a reduction in the fusiform pararenal collection and no evidence of stone (Figure 3). Therefore, the patient remains on treatment with Lit-Control® pH Up 1 capsule every 12 hours, with follow-up in 3-4 months for a metabolic study.

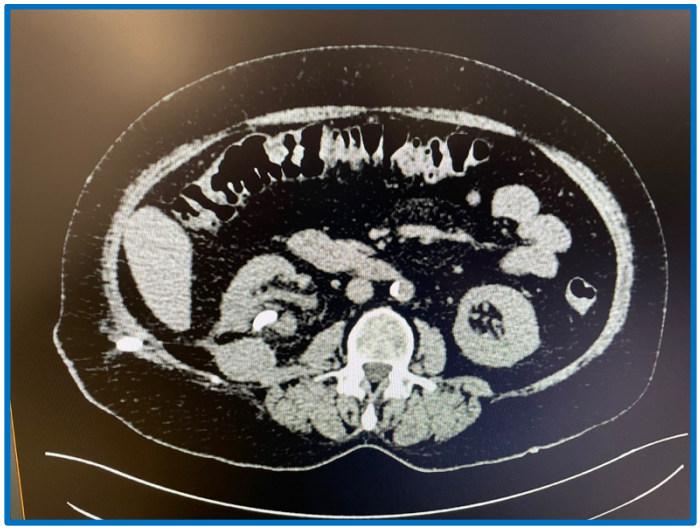

Figure 3. No evidence of stone.

f. Clinical results

The patient remained asymptomatic at all times, with no reports of hematuria, lower urinary tract infections (UTI), or stone expulsion. The metabolic study performed was within normal limits, except for hypcitraturia of 198 mg/24h (normal upper value: 320). Dietary recommendations were reinforced, and the dosage of Lit-Control® pH Up was maintained at 1 capsule every 24 hours. Six months later, a follow-up CT scan showed persistent absence of stones, at which point Lit-Control® pH Up was discontinued.

4. Discussion

The prevalence of uric acid urinary stones contributes significantly to the global burden of disease due to high recurrence rates and diagnostic challenges[4]. The incidence of uric acid stones varies across countries, representing between 5% and 40% of all urinary stones. Hyperuricosuria, low urine output, and acidic urine are well-known contributing factors. However, the most important factor for uric acid stone formation is persistently acidic urine. The pathophysiological basis of persistent urine acidity is still unclear, although several mechanisms have been proposed[1]. In our case, the patient had hypocitraturia, which favors the precipitation of uric acid crystals in the urine.

Percutaneous nephrolithotomy (PCNL) has been internationally recognized as a treatment for kidney and upper ureteral stones due to its ability to achieve a high stone-free rate[3]. According to the European Association of Urology (EAU) guidelines, PCNL remains the standard surgical method for treating large renal stones[2]. However, although the morbidity associated with PCNL is much lower compared to open surgery, it is considered a more invasive procedure compared to other treatment methods. Numerous studies in the literature have reported a wide range of complications with varying frequencies[2]. The most common complications are bleeding requiring blood transfusions and sepsis, due to the inhibition of cell-mediated immunity and humoral defense mechanisms.

The PCNL procedure has evolved with the miniaturization of the access sheath, better optics, and improved fluoroscopic equipment[3]. Recent evidence shows that tract size correlates positively with bleeding rates and renal injuries. The consensus is that mini-PCNL should be defined as a PCNL technique that uses a sheath size of 22 Fr or less. The mini-PCNL technique, with a smaller tract size, could reduce the risk of bleeding and shorten hospital stay[3]. Several comparative studies have been conducted between mini-PCNL and standard PCNL. Li et al. published evidence showing the superiority of mini-PCNL over standard PCNL, with a significantly lower rate of blood transfusion and shorter hospital stay. However, with a smaller percutaneous tract, mini-

PCNL also presents limitations, including less efficient irrigation, restricted visualization, difficulty in extracting stone fragments, and the theoretical risks of elevated renal pelvic pressure (RPP) during the procedure[3]. It has been suggested that, due to the smaller access sheath in mini-PCNL, there is longer operative time and subsequently greater absorption of bacterial endotoxins, leading to a higher likelihood of complications complications[2]. Ineffective renal access may lead to severe complications, such as massive bleeding, thoracic or intestinal injury, and renal pelvic perforation. Therefore, an efficiently performed mini-PCNL procedure requires years of training and practice[3]. Due to these drawbacks, the safety and efficacy of mini-PCNL are still under discussion. The decision was made to employ mini-PCNL in our patient because she presented a large, impacted stone in the right renal pelvis, and the percutaneous access would be very favorable for both the middle and lower calyceal groups, while considering the possible surgical complications.

Furthermore, understanding the pathophysiology of stone formation is important for guiding medical treatment. Urine acidity is a prerequisite for the formation and growth of uric acid stones. Urinary alkalinization with potassium citrate or sodium bicarbonate is a very effective treatment, leading to the dissolution of existing stones and prevention of recurrence[1]. One study observed complete or partial dissolution of uric acid stones in 80.5% of patients, with 61.7% achieving complete dissolution and 19.8% achieving partial dissolution[4]. In our patient's case, it was confirmed that by using Lit-Control® pH Up, the stone was completely dissolved after proper treatment.

5. Conclusions and recommendations

Thus, we can conclude that uric acid stones cause renal damage due to obstructive uropathy. Although PCNL (Percutaneous Nephrolithotomy) has emerged as the gold standard treatment for large and complex renal stones, alkalinization therapy is a safe and effective method for the conservative treatment of uric acid stones and could be considered the cornerstone of management. Therefore, dissolution therapy plays a valuable role in the conservative treatment of uric acid stones, reducing the need for surgical intervention.

Despite the significant morbidity burden posed by uric acid stones, current guidelines are limited by deficiencies in the existing body of research. It would be advisable to conduct further studies to develop evidence-based clinical guidelines for the diagnosis, treatment, and prevention of uric acid urolithiasis with urinary alkalinization using Lit-Control® pH Up.

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

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