4th Edition of the Clinical Case Contest related to the non-surgical clinical management of renal lithiasis.

Official template

Title: Early calcification of percutaneous nephrostomy due to Proteus Mirabilis infection.

Key words (between 3 and 6): calcification, nephrostomy, infection, lithiasis, pH.

1. Abstract

Complications associated with ureteral catheters are common. They appear in patients with significant associated comorbidity and frequent contact with the hospital environment. Alterations in the microbiota and the growth of urease bacteria can cause calcifications, obstruction and infections. To prevent the formation of calcifications, pH modifiers can be used. The following is a case of a nephrostomy patient with early obstruction due to calcification caused by Proteus Mirabilis. After changing the nephrostomy, antibiotic treatment and pH acidification were prescribed. Subsequent controls showed a clear improvement and absence of calcifications.

2. Introduction

Nephrostomies allow urinary drainage of the upper urinary tract. Usually, patients with urinary catheters have complex or irreparable surgical solutions to resolve the obstructive cause. Therefore, they usually require periodic changes. In addition, they are usually multi-pathological patients associated with numerous risk factors such as advanced age, diabetes, immunosuppression, cancer, chronic kidney disease, frequent contact with the hospital environment (1) (2).

There is currently little consensus on the management and treatment of complications of calcification, encrustation or lithiasis of urinary catheters (2).

The polymeric surface of the catheter allows the creation of bacterial biofilm in the extension of the foreign body. The entry of pathogens alters the urothelial microbiota, brings the external environment into contact with the urothelium and favors colonization by bacteria with greater pathogenic capacity (3).

The most frequent cause of obstruction in urinary devices in percutaneous nephrostomies is the deposit of struvite or calcium phosphate crystals.

The colonization of the medium by bacteria with urease activity such as Corynebacterium urealyticum, K.pneumonie, Providencia struartii, or Proteus Mirabilis among others, produces an elevation of the urinary pH, increasing the deposit of struvite crystals in the polymeric medium generating an obstruction of the catheter. This

bacterial growth can in turn produce urinary tract infection such as pyelonephritis, renal abscess, pyonephrosis, sepsis or emphysematous pyelonephritis. (4) There are various therapies for catheter calcification or the appearance of catheter-associated lithiasis. It is therefore necessary to individualize each case according to the patient's characteristics, comorbidity, calcification and associated complications. The management of catheter-associated calcifications may vary from medical treatment, extracorporeal lithotripsy, endourological or invasive surgeries (5)

3. Description of the clinical case:

a. relevant background

A 56-year-old South American woman, whose medical history of interest includes type II diabetes mellitus (metformin), hypertension (olmesartan with hydrochlortiazide), type I obesity, and type I obesity. II (metformin), arterial hypertension (olmesartan with hydrochlortiazide), type I obesity. Regarding her surgical history, 2 months ago the patient underwent an open hysterectomy for large uterine fibroids where the right ureter was completely damaged and a partial lesion of the left ureter that required placement of a left double J catheter. Postoperatively, urinoma was detected and treated with percutaneous drainage. After stabilization and resolution of the urinoma the patient was discharged with left double J and right nephrostomy. The case was discussed in committee where reconstructive ureterovesical surgery was decided.

- Current episode

Currently she comes to the emergency room with right lumbar pain and anuria of 10 h of evolution, nauseous sensation, currently denies dysthermic sensation. The last nephrostomy change was performed 7 days ago and the first day after the change she refers a non-thermometric dysthermic sensation that subsided with paracetamol.

- Physical examination

The patient is conscious, oriented, in good general condition. Abdomen soft, depressible, discomfort in the right flank, no signs of peritoneal irritation, positive right renal fist percussion.

Empty urostomy bag, so nephrostomy washes were performed without being able to verify patency, so an attempt was made to unblock the catheter using Teflon-coated guide and hydrophilic guide. After verifying complete obstruction of the catheter, it was decided to urgently change the nephrostomy in the operating room by direct radiological vision.

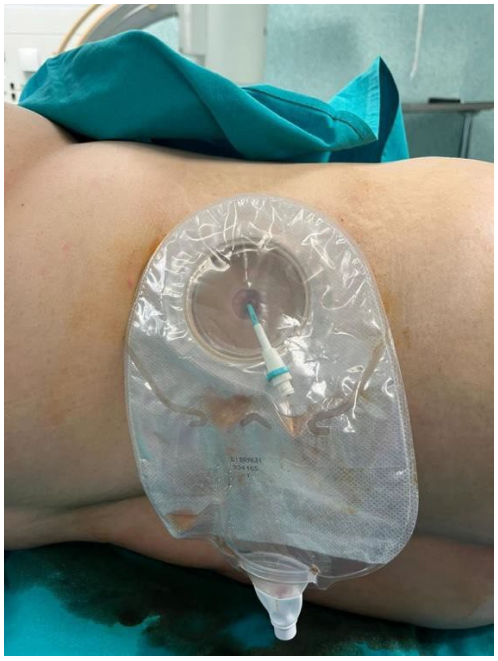

Figure 1: Urostomy bag in anuria.

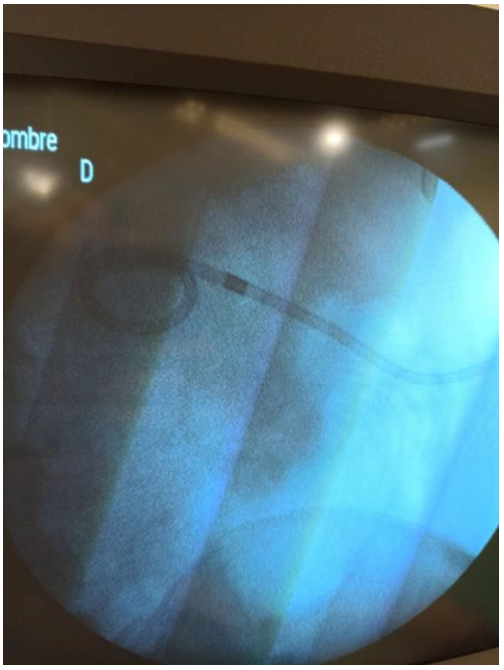

Figure 2: Right nephrostomy prior to replacement.

b. Diagnosis support studies and results

Blood analysis: ions without alterations, Cr 0.9, FG 77, leukocytes 14,000, neutrophils 85%, hemoglobin 12.1,

platelets 277,000, prothrombin activity 89%. Urine sediment: pyuria. pH 7.1.

Urine culture: Proteus Mirabilis

c. Diagnosis

The patient presented with anuria in a previously functioning catheter that had recently been changed. Therefore, given the clinical situation and physical examination with complete stop of guidewire passage, our suspicion is percutaneous nephrostomy obstruction.

d. Treatment

During the intervention, anesthesia was not necessary, since intravenous analgesia (Paracetamol) was sufficient, the procedure lasted only a few minutes and the patient was cooperative at all times. Direct radiological vision confirms a calcification inside the catheter that prevents urine outflow. The hydrophilic guidewire was passed in parallel to the renal pelvis and then a 10ch autoretentive nephrostomy was placed in the middle calyx.

After the change of nephrostomy, an outflow with abundant sediment was observed, so urine was collected for culture. The opacification shows a dilated pelvis in the context of the obstruction of the catheter to the iatrogenically damaged distal ureter.

Due to the regular general condition of the patient, it was decided to admit her to the hospital ward for antibiotherapy and symptomatic control. The patient was discharged the next morning with good diuresis and good general condition to her home where she was waiting to undergo ureterovesical reconstructive surgery.

e. Evolution and follow-up

Given early calcification of the catheter due to an infectious cause, she was initially treated empirically until urine culture results confirmed sensitivity to cefixime, receiving treatment for 7 days with cefixime 400mg. In addition, from discharge, pH modifiers such as Canoxidin® were proposed to the patient with the aim of acidifying the pH to prevent the formation of calcifications and incrustation of the device. In a follow-up visit two months later, the patient reported no similar episodes or catheter-associated infections. Likewise, a new nephrostomy change was performed without incident and the urinary pH was at that time at 5.6.

f. Clinical results

In our case, the patient has not had any more catheter-associated complications, so the expected result has been effective and she is waiting at home for bladder reconstructive surgery. Our personal experience has shown how pH modifications can have a favorable impact on the quality of life of patients with urinary catheters, reducing calcifications and avoiding catheter-associated urinary tract infections. Therefore, we must not forget that a fundamental pillar is the prevention of the occurrence of an event and good medical management of the disease. In addition, we have tools that allow us to monitor urinary pH to observe therapeutic compliance, under- or overdosage, such as Lit-Control® pH Meter.

4. Discussion

Calcifications or incrustations associated to urinary devices are a common problem in the daily life of patients with nephrostomies, uniJ or double J. There are several reasons to introduce preventive measures with the aim of reducing calcification and its associated comorbidity (6).

Most calcifications are due to deposit of microcrystals due to the urease activity of certain bacteria and favor their appearance. This is due to the alteration of the microbiota of patients with indwelling or long-standing catheters, since colonization of the catheter and the formation of a biofilm that causes lesions in the urothelium occurs. All this generates chronic inflammation and deposition of crystals, mostly of struvite (7).

This can be done by increasing the frequency of changes, increasing the diameter of the device. Also, there are certain pH modifying agents that can prevent the appearance of lithiasis or calcifications such as L-methionine, an acidifying agent for predominantly alkaline urine that can benefit from this element. Likewise, phytates inhibit the growth of new crystals and therefore the qualification of these devices (8,9).

In our case a very positive result has been seen with appropriate treatment for scale with Canoxidin® and Lit-Control® pH Meter, which allows pH monitoring to assess the therapeutic range indirectly in a simple way by pH measurements.(10)

5. Conclusions and recommendations

The acidification of pH by means of pharmacological products is a useful tool in patients with chronic ureteral catheters, reducing the associated calcifications and their possible complications. Therefore, Canoxidin® should be part of the treatment of patients with calcified catheters associated with recurrent urinary tract infections. In addition, it is possible to monitor urinary pH to check response to treatment with devices such as Lit- Control® pH Meter.

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