



## Inflammation and Infection

## Encrusted Uretero-pyelitis: Case Report



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## ABSTRACT

Encrusted uretero-pyelitis is a rare and serious disease, related to the presence of calcifications in the pelvicalyceal system and ureter, associated with chronic urinary tract infection. In most cases, the causal agent of this infection lithiasis is corynebacterium urealyticum. The specific aspect of calcifications on CT scan can help to suggest diagnosis. To avoid a delay in diagnosis (which is frequent), an accurate exploration by the bacteriologist is crucial. The combination of a glycopeptides antibiotherapy and urine acidification has proved its effectiveness, as described in the medical literature. We report the case of a 77-year-old male patient, successfully treated for a bilateral encrusted uretero-pyelitis by local acidification (Thomas's solution) followed by oral acidification (ammonium chloride).

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## Case presentation

A 77-year-old patient was admitted to emergency services for an alteration of the general state, febricula and back pain. During the medical interview, the patient described a painful urination. Macroscopic hematuria and expulsion of calcified mucosal debris. The patient had endoscopic transurethral resection of the prostate surgery 6 months ago. On the clinical examination there was a bilateral pain at percussion of the lumbar region. The digital rectal examination brought to light a soft but painful prostate. The blood test revealed an important inflammatory syndrome associated with renal failure (creatinemia: 1044  $\mu\text{mol/L}$ ; clearance (MDRD): 4 mL/min), with hyperkalemia. The abdominal and pelvic CT scan which was undertaken as an emergency finds multiple thin, regular urethral calcifications encrusted to the urothelium (Figs. 1 and 2).

On the right, the wall of the calicial and pyelic cavities was completely covered with calcifications showing an ureteral extension aspect. Moreover there was a bilateral dilatation of the calicial and pyelic cavities. The cytobacteriological examination of the urine (CBEU) which was performed externally showed an *Escherichia coli* infection and corynebacterium urealyticum. In view of this obstructive pyelonephritis complicated by acute renal failure, a urine diversion was performed as an emergency with implantation

of ureteral bilateral endoprosthesis and bilateral nephrostomies. The cystoscopy revealed multiple calcified plaques encrusted in the vesical wall and an intravesical calculus. The encrusted pyelitis being diagnosed, an adapted treatment was started with an antibiotic therapy by glycopeptides (Vancomycine) and a urinary acidification with Thomas's solution (solution at pH 4, sodium gluconate 27 g, distilled water 1000 mL). The acidification was performed locally during the first 15 days (instillation from bilateral percutaneous nephrostomy catheter at a rate of a daily 20 to 50 mL instillation per hour with constant pressure under 25  $\text{cmH}_2\text{O}$ ), followed by oral administration of ammonium chloride for 3 months. The 3 month follow-up showed an almost total regression of calcified plaques on the imaging control (Fig. 3) with a restored kidney function.

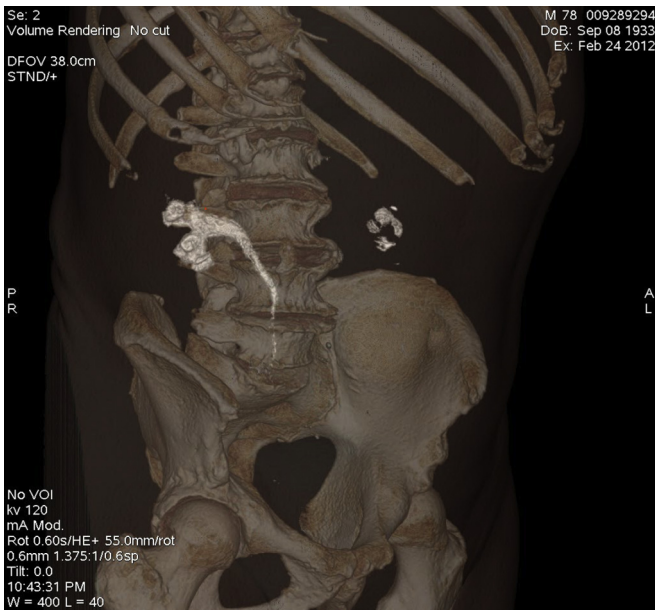
The 1-year follow-up did not show any residual plaques and the renal function was preserved.

## Discussion

The encrusted pyelitis is an infectious disease of the urothelium mostly caused by corynebacterium urealyticum. This slow growing gram positive bacillus is non hemolytic. This multiple antibiotic resistance bacillus, having a particular tropism for the urinary tract has a urease activity responsible for infectious lithiasis.<sup>1</sup> It is the main causative agent of struvite through its urease which is an enzyme responsible for stone formation. Urease hydrolyzes urea to

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**Figure 1.** 3D reconstruction from an abdominal and pelvic CT scan without contrast.



**Figure 3.** CT scan after a 3 month acidification: persistence of a few small encrusted residues on the right, total disappearance of calcifications on the left. D = Right, G = Left.

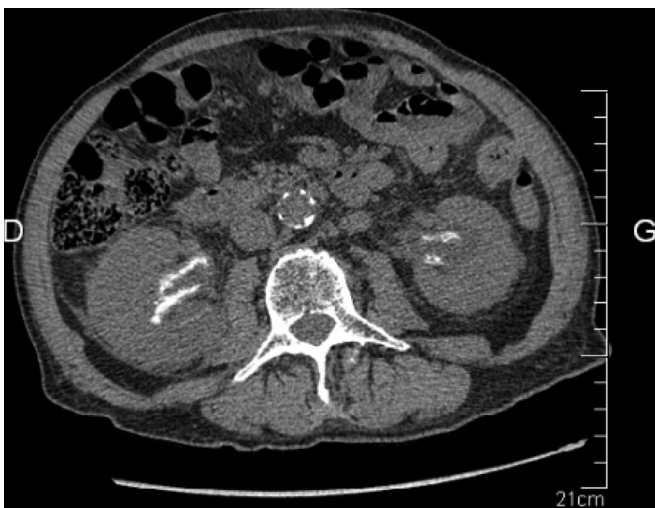
ammonial and carbon dioxide, which causes urine alkalinization (pH >8) and stimulates the formation of magnesium ammonium phosphate stones (struvite). The main factors which promote encrusted pyelitis are immunosuppression, renal transplant, broad spectrum antibiotic therapy selecting this multi-resistant germ and endourological manipulations. Encrusted pyelo-ureteritis can appear in various clinical forms: from asymptomatic forms to pictures including lumbago, cystitis and rejection of calcified mucosal debris. Hematuria is systematic.

The main complications of the encrusted pyelitis are: obstructive uropathy associated with end-stage renal failure, renal abscesses and ureteral stenosis. The histological examination highlights a thickening of the urothelium with superficial micro-calcifications, necrosis and an underlying inflammatory infiltrate.<sup>2</sup> The imaging is essential to raise a diagnosis. For Thoumas et al, the abdomen/pelvis CT scan without contrast agent is the baseline examination.<sup>3</sup> Calcifications covering the urothelium can be thin and regular or

thick and irregular encrusting the wall of renal calyces, the renal pelvis, the ureter and the bladder.<sup>4</sup> Staghorn calculi can be easily differentiated from encrusted pyelitis lesions through multiplanar reconstruction images. During the cystoscopy, encrusted pyelitis lesions with under mucosal calcified plaques can be observed. Crystalluria is an essential examination to support the diagnosis. It makes it possible to identify struvite crystals. Urine pH is alkaline (>7). Since the lag phase of the germ involved (48 to 72 h) is higher than the regular period of conservation of CBEU, it is imperative to specify the research of the very germ to the bacteriologist. This germ can also be identified among stone fragments, plaques or calcified mucosal debris. In case of suspected encrusted pyelitis in spite of negative cultures, the DNA of the corynebacterium can also be searched by PCR. The antibiotic treatment has proved its effectiveness even if the germ is naturally resistant to most antibiotics. Its sensitivity to glycopeptides (vancomycines and teicoplanine) is almost constant.<sup>3</sup> The duration of the antibiotic treatment has been the subject of long-running debate and depends on the severity of infection. A duration of more than 2 weeks is most often recommended. Antibiotic treatment must always be associated with urinary acidification. There are different types of acidifications: Oral dissolution of the plaques, using acid solutions such as Thomas's liquid or the 10% hemiacridine solution. These solutions acidify urines and dissolve calcium crystals. The use of these solutions requires nephrostomy tube and a ureteral catheter in order to avoid pains related to high renal pressure. The local flow rate must be 20 mL/min and it must be adapted to the patient's tolerance (lumbago often mentioned). CBEU must be sterilized before starting therapy. Acidification will be stopped once calcifications have disappeared on imaging. The most frequent complication is candiduria. Oral dissolution of the plaques using ammonium chloride in capsule, described by Khallouk and al. is a non-invasive alternative with no significant side effect. Some authors even recommend this treatment as the first-line treatment.<sup>5</sup>

## Conclusion

Encrusted uretero-pyelitis by corynebacterium urealyticum is a rare disease. Its treatment requires the combination of an antibiotic therapy adapted to an efficient urinary acidification either locally or orally.



**Figure 2.** Aspect of CT scan before acidification: typical aspect of encrusted pyelitis.

**Conflicts of interest**

None.

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