

"Have you heard of Alkaline Encrusted Pyelitis?!"

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Introduction

Laboratory urine culture methods are tailored for efficient and cost-effective isolation of common pathogens. However, these may fail to detect unusual pathogens.

Corynebacterium urealyticum, a rare urinary pathogen, can cause alkalization of urine and deposition of calcium in the renal tract of patients with recent urological interventions resulting in the condition alkaline encrusted pyelitis, which has a characteristic appearance in radiological imaging¹.

We present a case of alkaline encrusted pyelitis in a renal transplant recipient, which highlights not only the importance of discussing differential diagnoses and clinical findings with Microbiology, to enable culture methods to be optimized when an uncommon pathogen is suspected, but also raises the question of whether modified culture techniques should be routinely adopted for urine samples from complex patients such as renal transplant recipients to enhance detection of unusual pathogens.

Case Description

History of Presenting Complaint:

A 55 years old lady presented to her local district general hospital with a several weeks history of dysuria and haematuria. Her GP tried to manage symptoms in the community where she received two 7 days courses of oral ciprofloxacin in response to recent urine cultures growing *E. coli* with no effect.

Past Medical History:

Bilateral nephrectomies secondary to neuropathic vesicoureteral reflux, renal transplant with an ileal conduit and recurrent urinary tract infections.

Investigations:

Bloods: WCC 1.89 (Normal 4.0-11.0) Neutrophils 0.75 (Normal 1.5-8.0), CRP 56.9 (Normal 0.1-5.0), Urea 29.6 (Normal 2.5-7.8) baseline 10-12 and a creatinine 358 (Normal 45-84) baseline 90-110.

Urine dipstick: alkaline urinary pH (> 9.0),

Nephrostomy urine samples sent for culture: processed in accordance to UK standards of microbiology investigations (PHE SMI B41)². Chromogenic agar plates are inoculated and incubated for 16-24 hours at 35-37°C in room air; these showed no significant growth (<10⁴ cfu/ml).

Imaging: Ultra sound scan of renal tracts

Ultra sound scan (USS) of renal tracts was performed which showed evidence of calcification of renal pelvis within the transplanted kidney and hydronephrosis.

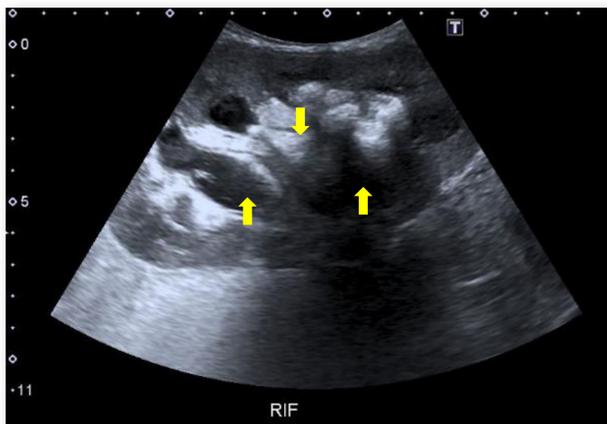


Image 1: Transplanted kidney; Hydronephrosis; Calcification of renal pelvis.

Initial management & Clinical progress

A nephrostomy tube was inserted into the transplanted kidney.

Calcium and vitamin D supplements were stopped.

Empirical treatment was commenced with piperacillin-tazobactam for presumed urinary tract infection, plus acidification of urine using Suby G (citric acid) solution which is infused into the transplanted kidney four times a day via the nephrostomy tube.

However, urine output tailed off over the course of several days accompanied by persistent leucopenia, worsening urea of 32.7, creatinine of 514 and rising CRP of 133.6.

An urgent CT scan of renal tracts was performed

Imaging: CT Scan of renal tracts

Repeat imaging in the form of CT scan of the renal tract revealed extensive calcification in the collecting system suggestive of alkaline encrusted pyelitis associated with chronic *Corynebacterium urealyticum* infection"

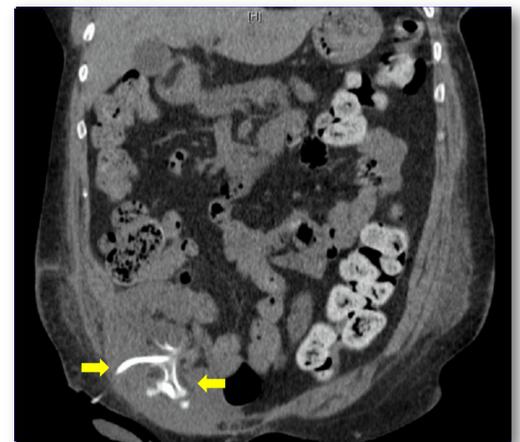


Image 2: Transplanted kidney; Extensive calcification in the collecting system.

Microbiological Culture

The clinical team contacted the Microbiologist to discuss the differential diagnosis of alkaline encrusted pyelitis and whether routine urine culture would detect *Corynebacterium urealyticum*. Repeat urine samples were advised, which were incubated on sheep blood agar for 72 hours at 35-37°C in 10% CO₂.

Corynebacterium urealyticum was isolated from 2 out of 4 urine samples. It was resistant to: penicillin, ciprofloxacin; susceptible to: clindamycin, tetracycline, vancomycin, linezolid and gentamicin based upon EUCAST breakpoints.

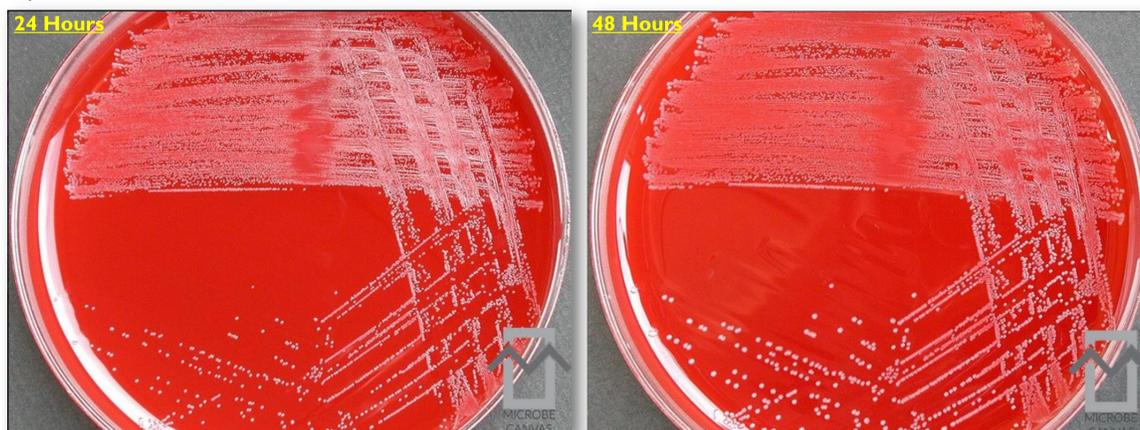


Image 3: *C. urealyticum* on blood agar (Microbe Canvas)

Treatment and Outcome

The patient was treated with 1 week IV vancomycin followed by 3 weeks oral doxycycline. Local acidification of urine continued for 6 weeks and mechanical removal of debris by interventional radiology. Follow up imaging showed significant clearing of the calcification. Leucopenia resolved with treatment with WCC reaching 6.8.

Conclusion

Alkaline encrusted pyelitis is a rare condition seen in patients with recent urological intervention, who present with evidence of urinary tract infection, strongly alkaline urine and renal tract calcification.

Altered culture conditions are necessary to isolate implicated pathogens which highlight the importance of liaising with the microbiology laboratory and raises the question of whether urine from renal transplant recipients should routinely undergo prolonged incubation on blood agar in addition to routine laboratory culture.

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References

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2. Public Health England, "SMI B 41: Investigation of urine," PHE, 2017. [Online]. Available: <https://www.gov.uk/government/publications/smi-b-41-investigation-of-urine>.

Images

1. Image 3: Courtesy of Microbe Canvas, <http://microbe-canvas.com/Bacteria/gram-positive-rods/cells-differoid/obligate-aerobic-2/catalase-positive-5/lipophilism-2/corynebacterium-urealyticum.html>