

Case Report

Ureteric Stone-Related *Escherichia coli* Bacteraemia Associated with Spondylodiscitis

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Abstract: *Escherichia coli* (*E. coli*)-related urosepsis associated with a ureteric stone has been shown to cause a systemic bacteraemia that can spread to other parts of the body. Hematogenous spread of infection is the most common cause of pyogenic spondylodiscitis. A 74-year-old female presented with acute left-sided flank pain and was found to have an obstructing 9 mm distal ureteric stone. After initial management involving ureteric stent insertion, the patient deteriorated and developed an *E. coli* associated bacteraemia, which proved difficult to treat. Further investigations revealed a subsequent spondylodiscitis, which required a 6-week course of antibiotics and no additional intervention. This case presents the likely association of stone-related bacteraemia, complicated by urinary tract instrumentation leading to spondylodiscitis, and demonstrates the importance of clinicians' awareness of other causes of unresolving sepsis in an elderly patient.

Keywords: urosepsis; *Escherichia coli*; ureteric stone; bacteraemia; spondylodiscitis; flank pain; urinary infection



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1. Introduction

The prevalence of urolithiasis has increased in recent years for both men and women and is one of the most common urological pathologies [1]. The presence of urinary tract calculi is regarded as a significant risk factor for developing a urinary tract infection by precipitating urinary stasis and enabling bacteria to accumulate and proliferate on the urothelium [2].

Urinary tract infection associated with obstructive uropathy may lead to urosepsis, a potentially life-threatening systemic response to infection. Urosepsis is typically a result of urinary tract obstruction caused by either urolithiasis, tumour or stenosis, but can also be caused by urinary tract manipulation through techniques such as ureteroscopy [3].

E. coli bacteraemia is the most common cause of sepsis in the UK and enters the blood from the urinary tract in 47% of infections [4].

Spondylodiscitis is characterised by an infection involving the intervertebral disc and adjacent vertebrae, which can lead to osteomyelitis of the spinal column [5]. Hematogenous spread of bacterial infection is the most common cause of pyogenic spondylodiscitis and can originate from the urinary tract, respiratory tract, skin or intestinal tract, which, in turn, can progress to a systemic bacteraemia.

This case details the finding of spondylodiscitis in a 74-year-old female, following an *E. coli* bacteraemia associated with a ureteric calculus requiring ureteroscopy.

2. Case History

A 74-year-old female presented to her local emergency department with a one-day history of sudden onset left-sided flank pain, fever and haematuria. She was investigated

for ureteric colic with a CT KUB, which identified a 9 mm left-sided distal ureteric stone (Figure 1). This was her first presentation of ureteric colic with no background of any stone-related disease. The patient had no significant past medical history and took no regular medications. The patient underwent an emergency left ureteric stent insertion due to ongoing pain, mild acute kidney injury (creatinine 75; baseline creatinine 50) and mildly raised inflammatory markers (WCC 15.2, Neut 14.2, CRP 2). A urine culture taken on admission grew fully sensitive *E. coli*; a blood culture was not performed, as the patient was not pyrexial in the department.



Figure 1. CT Kidneys, Ureters and Bladder (KUB).

The patient was discharged home the next day with a 7-day course of antibiotics, with a view to subsequent ureteroscopy and laser stone fragmentation. The patient then re-presented to hospital 24 h later with worsening left flank pain and rigors overnight and was commenced on intravenous co-amoxiclav and gentamicin. The patient's increasing inflammatory markers showed evidence of progressive infection (WCC 20.5, CRP 50). Subsequent blood and urine cultures grew a fully sensitive *Escherichia coli* (*E. coli*). Despite this antibiotic cover, the patient continued to show evidence of sepsis and spike high-grade temperatures. Microbiology advice was sought, and the patient's symptoms steadily improved after switching her antibiotics to ciprofloxacin. A series of radiological investigations were performed to identify other sources of infection. A renal ultrasound that was carried out initially to investigate for any obvious collection or abscess was unremarkable. An abdominal CT scan excluded other sources of intra-abdominal infection, and a trans-thoracic echocardiogram revealed no evidence of infective endocarditis. A Positron emission tomography (PET) scan identified increased ^{18}F -FDG uptake centred on the T10/T11 disc with endplate destruction, consistent with spondylodiscitis. This finding was confirmed by a spinal MRI scan (Figure 2).



Figure 2. Magnetic Resonance Imaging (MRI) spine.

3. Discussion

E. coli related bacteraemia is the most common form of sepsis in the UK, with an 18% all-cause mortality rate at 30 days [4]. Urosepsis is a systemic response to urinary infection and can develop secondary to urinary tract obstruction associated with urolithiasis and also following urinary tract manipulation. In this case, the patient presented with an obstructing ureteric stone and underwent a ureteric stent insertion, resulting in the development of urosepsis the following day. Despite prolonged antibiotic therapy, the patient's clinical situation did not improve, and extensive investigations were undertaken to identify a subsequent source of infection.

Spondylodiscitis is an infection of the intravertebral disc which can invade the vertebrae and lead to osteomyelitis of the spinal column [6]. Pyogenic spondylodiscitis is most often caused by the hematogenous spread of bacteria from the urinary tract, respiratory tract, skin or intestinal tract to the vertebral discs, which can, in turn, lead to a systemic bacteraemia. Spondylodiscitis arising from an *E. coli* urosepsis has only been described in the literature in isolated cases. Ponte et al. outlined a septic discitis in a 77-year-old woman following an episode of *E. coli* urinary infection, which ultimately required surgical disc removal [7]. In this case, needle biopsy and aspiration of the discitis was required to determine the appropriate antibiotic treatment. This contrasts with our case, as the spondylodiscitis responded well to antibiotic therapy, and no further intervention, including aspiration, was required. Salehi et al. described a 68-year-old female with a 2-month history of low back pain, who was found to have *E. coli* positive urine cultures and spondylodiscitis, successfully treated with antibiotics [8]. Muller et al. reported a 38-year-old female with severe left flank pain who developed an *E. coli* discitis, who was also treated with oral antibiotics [9]. Interestingly, all of these individual case reports appear to be in females, which corroborates with the greater incidence of urinary tract infection in females than males.

The patient's stone was radiolucent on her abdominal X-ray with a density of 750HU on CT, suggestive of a calcium oxalate formation [10]. The relationship between kidney stone disease and urinary tract infection is well documented; however, recent studies have outlined a particular association between *E. coli* and calcium oxalate formation [11,12]. Despite appropriate antibiotic cover during the initial ureteric stent insertion, the patient went on to develop a systemic bacteraemia, which is thought to have implicated this spondylodiscitis. The patient had several risk factors associated with this progression. The insertion of a retrograde stent is most likely to have precipitated this event, and the patient's age and gender make her susceptible to opportunistic infections.

4. Conclusions

This interesting case demonstrates the likely association of ureteric stone-related *E. coli* bacteraemia requiring ureteroscopy, leading to spondylodiscitis. The persistence of infective signs despite appropriate antibiotic cover highlights the importance of clinical suspicion and investigation of other possible sources of infection aside from the primary diagnosis of urosepsis. This case illustrates the potential for haematogenic spread of *E. coli* from the urinary tract.

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