An unusual case of polymicrobial anaerobic bacteraemia in a male with ureteral calculi

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Introduction: We describe an unusual case of anaerobic bacteraemia caused by Fusobacterium gonidiaformans and Peptoniphilus asaccharolyticus, both commensal organisms normally found within human oropharyngeal, gastrointestinal and genitourinary tracts.

Case presentation: One week following a routine colonoscopy with polypectomy, a 65-year-old male with renal calculi was admitted with a 3-day history of severe abdominal pain and chills. He required urgent placement of a percutaneous nephrostomy tube. Urine cultures were negative but blood cultures were positive for Fusobacterium gonidiaformans and Peptoniphilus asaccharolyticus.

Conclusions: We hypothesized that, following his colonoscopy, the patient developed transient bacteraemia with commensal gut organisms. In the setting of multiple ureteral calculi, this transient bacteraemia became a clinically significant infection, manifesting as acute ureterolithiasis with concurrent bloodstream infection. The routine collection of blood for anaerobic culture led to pathogen identification and appropriate antimicrobial therapy.
neutrophils, creatinine of 1.5 mg dl$^{-1}$, lactic acid of 3.3 mmol l$^{-1}$ (normal range 0.5–2.2 mmol l$^{-1}$), a normal platelet count of 162 000 µl$^{-1}$ and a normal international normalized ratio of 1.09. Liver transaminases were normal. His urinalysis showed positive nitrates, 59 white and 62 red blood cells per high-power field and 4+ bacteria. A computed tomography scan of the abdomen and pelvis revealed moderate left hydroureter and hydronephrosis in the setting of multiple ureteral calculi (>5 stones, largest 7 mm), accompanied by periureteral and perinephric fat stranding. Following the collection of urine and blood cultures, the patient was started on vancomycin and aztreonam, the latter chosen because of the patient’s history of anaphylactic reaction to β-lactams.

He was admitted to the medical intensive care unit and had a left-sided percutaneous nephrostomy tube placed by interventional radiology. He remained haemodynamically stable throughout the 6-day hospital course with resolution of his pain, fever, epistaxis and leukocytosis. Of note, while in the medical intensive care unit, his platelets decreased to 95 000 µl$^{-1}$ with a concurrent increase in international normalized ratio to 1.43; these values returned to normal before discharge.

The urine culture obtained prior to antibiotics was negative, but blood cultures grew anaerobic Gram-positive cocci in clusters and Gram-negative bacilli less than 24 h after collection. The isolates were identified as $P$. asaccharolyticus and Fusobacterium species based on colony morphology and biochemical tests (Vitek-2 ANC anaerobe identification card; Biomerieux). A matrix-assisted laser desorption/ionization time-of-flight mass spectrometry system (Bruker Daltonics) confirmed the initial findings of $P$. asaccharolyticus and identified the Fusobacterium isolate as $F$. gonidiaformans. The $F$. gonidiaformans isolate was susceptible to penicillin, clindamycin and metronidazole.

The patient was discharged home to complete a 14-day course of therapy with metronidazole. Following an uneventful recovery, he received laser lithotripsy to remove the ureteral calculi.

**Discussion**

Fusobacterium spp. are a rare cause of disease in humans, with a recorded incidence of 0.55 per 100 000 of the population per year, accounting for less than 1% of all bacteraemias and less than 10% of anaerobic bacteraemias (Afra et al., 2013; Bourgault et al., 1997; Ngo et al., 2013; Nohrström et al., 2011; Yang et al., 2011), approximately 50% of which are healthcare associated (Afra et al., 2013; Bourgault et al., 1997). In 1936, Lemierre described *Fusobacterium necrophorum* as a cause of oropharyngeal infections causing sepsicaemia in young healthy adults associated with internal jugular venous thrombosis (Afra et al., 2013; Brazier et al., 2002; Nohrström et al., 2011). More recently, *Fusobacterium nucleatum* has emerged as a pathogen causing bloodstream infections in elderly men with underlying co-morbidities that include malignancy, immune suppression, dialysis, cardiac disease and recent surgery (Afra et al., 2013; Bourgault et al., 1997; Candoni et al., 2003; Epaulard et al., 2006; Goldberg et al., 2012; Nohrström et al., 2011; Yang et al., 2011). Interestingly, $F$. nucleatum is one of the more common anaerobic organisms involved in polymicrobial bloodstream infections; it is most often associated with coagulase-negative *Staphylococcus* spp. and Peptostreptococcus spp. (Afra et al., 2013; Bourgault et al., 1997; Goldberg et al., 2012; Yang et al., 2011). Although poorly characterized so far, $F$. gonidiaformans seems to be a member of the normal gut microbiome (George et al., 1981). Rare case reports describe *F*. gonidiaformans as a cause of peritonitis and retropharyngeal abscesses as well as septic thrombophlebitis in an intravenous drug user (Brook, 1994; George et al., 1981; Gillis et al., 2011; Rubinstein et al., 1974).

Peptostreptococcus spp. are a more common cause of bacteraemia than *Fusobacterium* spp., with a recorded incidence of 0.9 per 100 000 of the population per year (Ngo et al., 2013). Many *Peptostreptococcus* spp., including *P*. asaccharolyticus, are part of the normal gut microbiome and are largely viewed as having low virulence (Minces et al., 2010). When found as a cause of disease, *Peptostreptococcus* spp. are usually part of polymicrobial infections, often detected in conjunction with *Fusobacterium* spp., as described above (Epaulard et al., 2006; Yang et al., 2011). They are also rare causes of infective endocarditis, often with high morbidity (Minces et al., 2010).

Beyond sepsis caused by a polymicrobial anaerobic bloodstream infection, this case has other unique features. First, clinically relevant bacteraemia following colonoscopies are exceedingly rare (Hartong et al., 1977; Kumar et al., 1982, 1983; Low et al., 1987). This remains true even with procedures that disrupt the mucosal barriers such as colorectal stent placement or endoscopic resection of colorectal tumours (Chun et al., 2012; Min et al., 2008). To our knowledge, this is the second description of sepsis due to anaerobic bacteraemia following routine colonoscopy with polypectomy; the first report described sepsis due to *Clostridium perfringens* (Kunz et al., 2009). Secondly, the patient presented with sepsis due to obstructive uropathy, probably caused by anaerobic organisms, as bacteria were noted on direct microscopy but aerobic culture did not yield any growth. We hypothesize that either transient bacteraemia during the colonoscopy or the procedure itself may have caused modest peritoneal inflammation that was sufficient to precipitate ureteral obstruction in this patient with ureteral calculi. Anaerobic organisms are rare causes of urinary tract infections (<0.1%), but among patients with negative aerobic cultures and with persistent signs and symptoms of infection that localize to the genitourinary tract, anaerobic cultures may assist with diagnosis (Bannon et al., 1998). Thirdly, the patient presented with a 3-day history of epistaxis, moderate thrombocytopenia and a slightly elevated prothrombin time, all of which resolved...
with treatment of the underlying infection. These clinical features raise the possibility of a coagulopathy caused by the infection. Coagulopathy is a well-described feature of infection caused by F. necrophorum and may also be a feature of infection with F. nucleatum (Epaulard et al., 2006).

Finally, our case underscores the utility of anaerobic blood cultures. With no a priori suspicion for anaerobic pathogens, the patient’s urine was only cultured for aerobic organisms and was thus negative. Fortunately, the routine collection of blood for anaerobic culture led to pathogen identification and appropriate antimicrobial therapy for our patient’s infection.

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References


