

Short reports

The clinical spectrum of *Clostridium sordellii* bacteraemia: two case reports and a review of the literature

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Abstract

Clostridium sordellii is rarely associated with disease in humans. Since its first report in 1922 only a few cases of bacteraemia have been reported. This report describes two cases of *C sordellii* bacteraemia; the oldest and youngest patients reported to date. The first, is a previously well 81 year old woman presented with perianal infection, which was later complicated by thrombosis of the aorta, and the second is a 12 year old boy with epilepsy who presented with an ear infection. These cases are also highlighted to demonstrate the wide spectrum of presentation of *sordellii* bacteraemia.

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Case 1

An 81 year old woman was admitted from a nursing home with profound lethargy and drowsiness. She had been unwell for two days and had lost her appetite. Until her current illness she had been self caring. There was an underlying history of hypothyroidism, smoker induced chronic airway disease, anxiety neurosis with occasional difficult behaviour (treated with long term thioridazine), and irritable bowel syndrome. She was obsessed with her bowels and on occasions was seen by the staff to be manually self evacuating.

On admission she was stuporous. Her pulse rate was 80/minute, blood pressure was 136/70 mm Hg, temperature was 36.7°C, and oxygen saturation was 90%. She was noted to have particularly long fingernails. System examination was unrevealing. On inspecting the back and buttocks, there was a widespread area of ill defined erythema and induration extending from the labia majora, involving the perineum and natal cleft, and extending up to the buttocks and sacrum. Within the erythema there were areas of haemorrhage and blisters with superficial erosions. Peri-anally frank tissue necrosis was seen, and extending from the anal margin, a 3 cm tear was evident. The anus itself was permanently dilated with faecal incontinence (figs 1 and 2).



Figure 1 Perianal gangrene with cellulitis extending to involve the natal cleft and adjacent areas of buttocks. Note the linear and tear at 5 o'clock.

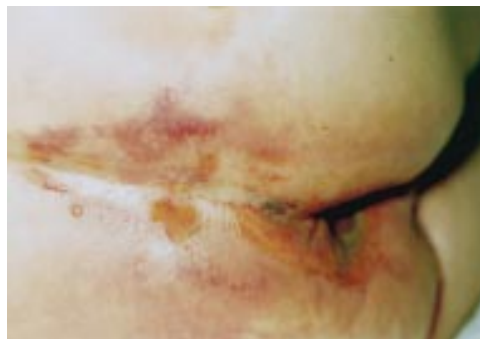


Figure 2 Close up showing areas of subcutaneous haemorrhage with blistering and erosions.

Investigations showed a white blood cell count of 19×10^9 /litre with 92% neutrophils, haemoglobin of 166 g/litre, and platelets at $117\,000/\text{cm}^3$. The erythrocyte sedimentation rate was greatly raised at 102 mm/1st hour. Activated partial thromboplastin time was 24.3 (control, 27) and fibrinogen was 11.2 mg/litre. C reactive protein was 390 (normal, < 12) mg/litre, urea 53 mmol/litre, and creatinine 502 μmol /litre. Serum amylase was normal (23 U/litre). Abdominal ultrasound showed a small sized right kidney at 7.1 cm and the left kidney measuring 9.4 cm with no evidence of urinary tract dilatation. The gall bladder contained stones. An infrarenal aortic aneurysm measuring 3 cm was identified but the mid and distal aorta were obscured.

A provisional diagnosis of sepsis was made and treatment was started with a combination of parenteral antibiotics in the form of cefuroxime,

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metronidazole, and gentamicin. Blood culture was positive with large Gram positive bacilli in the anaerobic bottle after 24 hours incubation (Bactalert microbial detection system). Plates were incubated in a Don Whitley MK 3 anaerobic cabinet, and further identification of the isolate was performed using ATB 32A (Biomerieux UK Ltd, Basingstoke, UK) and confirmed as *C sordellii*. Over the following 24 hours she became hypotensive and less responsive. The lower abdominal wall was cold to touch and pale. Both femoral pulses were absent and she later developed cyanosis of both legs. Her condition continued to deteriorate with shock and oligo-anuria and she died four days after admission.

Postmortem examination showed the lower rectum to be oedematous, brown, and discoloured, although the rest of the large bowel was normal. The peritoneal cavity contained a small amount of clear fluid. The abdominal aorta was thrombosed from the level of the renal arteries downwards. The thrombus extended into the renal arteries and the kidneys showed changes consistent with cortical necrosis.

Case 2

A 12 year old boy with tuberous sclerosis and associated epilepsy was admitted with a one week history of cough, fever, and lethargy. He had been seen five days earlier with signs of an ear infection in the right ear and started on amoxicillin. However, his condition deteriorated and he was referred to hospital by his general practitioner. On examination, he appeared unwell but conscious with a pulse rate of 124/minute, tachypnoea with respiratory rate of 24/minute, and a temperature of 38.4°C. The right ear appeared red and auroscopy revealed evidence of otitis media. A systolic flow murmur was audible over the precordium. The chest was clear to auscultation and abdominal examination was normal. Investigations showed a white blood cell count of 10.9×10^6 /litre with 87% neutrophilia and a left shift on blood film. C reactive protein was 75 (normal, ≤ 8) mg/litre. A chest radiograph was normal. Blood cultures taken on admission revealed a growth of Gram positive bacilli later identified to be *C sordellii*. Intravenous cefotaxime was started with gradual improvement; the fever subsided after five days and he was discharged home on oral antibiotics.

Discussion

Clostridium sordellii, a Gram positive spore forming anaerobe, is one of the lesser known members of the clostridia species. It is ubiquitous in distribution, and is found in soil and as part of the human intestinal flora. The organism was first described in 1922 by Sordellii¹ who isolated the bacteria from a patient with postoperative gas gangrene. Since then, occasional cases of myonecrosis and gas gangrene have been described.

The pathogenicity of *C sordellii* was historically related to its ability to produce a lethal factor previously known as β -toxin. This toxin was found to be dermonecrotic and haemor-

rhagic when injected intradermally into rats and guinea pigs. β -Toxin was subsequently found to consist of two types of toxins, a lethal toxin (LT; a glucotransferase) and a haemorrhagic toxin (HT). LT causes local necrosis and rapidly spreading oedema by increasing vascular permeability. It is also leucocidal and causes degranulation of mast cells. HT on the other hand causes haemorrhagic fluid accumulation in ligated rabbit ileal loop preparations and is cytotoxic in cell cultures. Both LT and HT bear antigenic as well as pathophysiological resemblance to *C difficile* toxins B and A, respectively, and antitoxin to *C sordellii* is used to neutralise both *C difficile* toxin A and toxin B by antigenic crossreactivity. As many as 43 different strains of *C sordellii* may exist, and not all are toxicogenic.² Considerable interstrain variation in the production of toxins occurs, possibly as a result of chromosomal and/or plasmid mechanisms interacting with local conditions, and this may account for the differences in virulence and the clinically less severe cases.³

Clostridium sordellii is a recognised animal pathogen causing enteritis and enterotoxaemia in sheep and cattle. Unlike humans, however, infection in animals is thought to be caused by ingestion. Outbreaks among sheep flocks have been reported recently in our area.⁴

Human infection with *C sordellii* is rare in the literature. Most of the cases reported over the past two decades have been in healthy young women, usually after delivery or in the puerperium, often resulting from an infected episiotomy site and lacerations of the birth canal.⁵ A case of spontaneous endometritis in a previously healthy 39 year old has also been reported.⁶ Similarly Browdie *et al* described a young previously well 23 year old man who developed *C sordellii* infection after a deep laceration of his thigh with a saw.⁷ Bacteraemia was not detected in these patients and all these cases had a terminal outcome. The clinical picture of the cases described conforms to a similar pattern, characterised by minimal or absent pain, absence of fever and rash, a pronounced neutrophilia and high haematocrit, and progressive hypotension that rapidly becomes refractory to treatment. The presentation of our first patient was similar. Our patient was also found to have thrombosis of the aorta. Involvement of a major artery has not been reported before, although thrombosis of nearby small vessels has been shown in the postmortem reports of previous cases.

Empyema with associated pneumonia has been reported previously in three patients, and in one patient the clinical picture was also complicated by infective endocarditis.⁸⁻¹⁰ However, unlike those presenting with myonecrosis or gynaecological infections, where the outcome has been universally fatal, respiratory infections seem to carry a more favourable prognosis. Our 12 year old patient is the first adequately reported case of ear infection as a result of *C sordellii*.

Clostridial bacteraemia is uncommon. Previously reported incidences range between 0% and 2.9%. More recently, a 10 year analysis from a teaching hospital showed that clostridia

Table 1 Reported cases of *Clostridium sordellii* bacteraemia in the literature

Ref	Age/Sex	Underlying condition	Presenting illness	Presumed portal of entry	Outcome
14	18/M	Acute alcoholic intoxication	Cardiorespiratory arrest, myonecrosis, necrotic-haemorrhagic pancreatitis	GI/colon	Fatal
10	61/M	Rheumatic valvular disease Congestive heart failure	Pneumonitis, empyema Infective endocarditis†	Oropharynx	Survived
12	54/M	Metastatic melanoma to colon	Septic shock	GI/colon	Fatal
12	40/F	Genitourinary malignancy	Postoperative wound infection§	Unknown	Survived
15	37/M	IV drug abuse, sickle cell thalassaemia, inflammatory bowel disease, functional asplenia	Pneumonitis, back pain, bleeding from rectum	?GI/colon ?Auto-inoculation	Survived
16	48/F	Liver transplantation, immunosuppressive treatment	Septic shock	?Transcutaneous liver biopsy	Fatal
17	55/M	Transitional cell carcinoma of the bladder, radiation colitis	Intra-abdominal sepsis, perforated viscus	GI/colon	Fatal
13	29/F	Caesarian section	Septic shock, retroperitoneal sepsis	GI/colon	Fatal
18	37/M	Chronic alcoholism/liver cirrhosis	Haemetemesis peritonitis, intravascular haemolysis	?GI	Fatal
19	73/M	Metastatic prostate cancer	Perirectal and ischioirectal abscess	GI/rectum	Fatal
Case 1	81/F	Traumatic self evacuation	Widespread cellulitis, perirectal necrosis	GI/rectum	Fatal
Case 2	12/M	Epilepsy	Ear infection	Ear	Survived

Four other cases of *C. sordellii* bacteraemia have been reported but the description is incomplete and outcome not reported.¹³

†Two further cases of endocarditis have been reported in one series but no details were provided.²⁰

§No further details given.

GI, gastrointestinal tract; IV, intravenous.

were responsible for <1% of cases of bacteraemia.¹¹ Similarly, in our district general hospital over a period of three and a half years (1996–99) we isolated 31 cases, accounting for 0.2% of all cases of bacteraemia. Among clostridia, bacteraemia caused by *sordellii* species is very rare and only a handful of documented cases have been reported (table 1).^{10–20} Bodey *et al* reported their experience with clostridial bacteraemia over a 12 year period in patients with cancer and identified 136 episodes in 135 patients. Of these, only two cases of *sordellii* bacteraemia were identified.¹² Our two cases of *sordellii* among 31 clostridial isolates over a 40 month period gives a high incidence of 6% of *sordellii* bacteraemia. Similarly, Alpern and Dowell reported a 5.7% incidence based on four isolates of *C. sordellii* from 86 patients with non-perfringens clostridial bacteraemia over a seven year period.²¹ However, both the details and outcome of these cases are not completely reported. This suggests that bacteraemia caused by *C. sordellii* is probably under-reported.

Clostridium sordellii bacteraemia affects all ages and our two cases span the youngest and oldest patients reported. It can occur in previously healthy individuals, as described in a 29 year old postpartum patient and in our two patients.¹³ In our first patient, we suspect introduction of infection occurred by breaching the lower bowel mucosa through manual self evacuation and trauma to the anus. This portal of entry has been described previously with other clostridial infections but only recently for *C. sordellii*.²² Our second patient presented with an ear infection, and although the organism may have entered the bloodstream from other potential sites, no other site of infection was detected. More commonly, bacteraemia occurs in patients predisposed to infection because of underlying malignancy or immunosuppression.²² Of the cases reported in the literature, four had underlying malignancy and two were immunocompromised; one on immunosuppressants having recently undergone liver transplantation and the other with functional asplenia. Two other patients had severe alcoholism (table 1). In two patients,^{16–19} bacteraemia followed a diagnostic

procedure, namely a transcutaneous liver biopsy^{16–19} and transrectal prostatic biopsy.¹⁹

Pseudobacteraemia involving *C. sordellii* that occurred as a result of using contaminated tincture of thimerosal during subculturing in a clinical microbiology laboratory has been described,²³ raising the important issue of implementing appropriate safeguards in the routine processing of culture material.

Clostridium sordellii bacteraemia carries a high mortality. Among the 12 cases adequately reported in the literature, the mortality is 67%. Reviewing each of the reported cases in detail suggests that both the clinical course of illness and outcome is dependent on the site of infection. In the case reported by Cunniffe,¹⁷ the 55 year old patient had developed radiation colitis after radiotherapy and cystectomy for an advanced poorly differentiated bladder carcinoma. He presented with evidence of intra-abdominal infection by a gas producing organism and a perforated viscus, and necropsy showed a haemorrhagic and necrotic descending colon. Similarly, the first patient described briefly by Bodey *et al* had colonic pathology.¹² He was known to have metastatic melanoma to the colon and presented in septic shock and died within 24 hours. The 48 year old woman reported by Morey *et al* developed shock and died 12 hours after a liver biopsy.¹⁶ The procedure was undertaken nine days after a liver transplant for primary biliary cirrhosis and the patient was on immunosuppressants. Necropsy revealed putrid exudates containing gas bubbles in the liver, pancreas, spleen, and myocardium denoting widespread septicaemia that probably antedated the procedure. Bitti *et al* described a 29 year old woman who developed a retroperitoneal infection two days after a Caesarian section.¹³ More recently, Borer *et al* reported a fatal case of a 73 year old man with metastatic cancer of the prostate who became acutely unwell with perirectal ischioirectal abscess formation 24 hours after a transrectal biopsy of the prostate.¹⁹ *Clostridium sordellii* was isolated from both blood cultures and abscess fluid. These cases along with our 81 year old woman who had no malignancy or evidence of immunosuppression demonstrate that *sordellii* bacteraemia caused by visceral or internal

organ involvement is invariably fatal, regardless of underlying pathology and immune status. This might be caused, at least in part, by the paucity of initial signs of infection (concealed infection), which result in delayed presentation.

In contrast, superficial and cutaneous infections, even when accompanied by bacteraemia, have a favourable prognosis. This can be seen by the outcome of the 40 year old woman with postoperative wound infection and genitourinary malignancy reported by Bodey *et al.*,¹² the intravenous drug abuser reported by Spera *et al.*,¹⁵ and our 12 year old patient. The successful outcome in these cases might be related to early identification and institution of appropriate antibiotic treatment.

The role of immunotherapy in *sordellii* infections is unknown. Whereas antitoxin treatment is recommended for *C botulinum* infection, and recommendations for specific immunoprophylaxis against *C tetani* depend on the patient's previous immunisation history and the nature of the wound, *C sordellii* antitoxin has never been tested for potential efficacy by parenteral or enteral administration, and immunotherapy might have a plausible role in the overall management of these critically ill patients.

In conclusion, *C sordellii* is a rare infection, but one where a high index of suspicion is required to improve outcome. This should allow early identification of the infection and prompt the commencement of treatment.

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