



# Infective Endocarditis Caused by *C. sordellii*: The First Case Report from India

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## Abstract

### Keywords

- ▶ infective endocarditis
- ▶ *Clostridium sordellii*
- ▶ diagnosis

*Clostridium sordellii* is a gram-positive anaerobic bacteria most commonly isolated from skin and soft tissue infection, penetrating injurious and intravenous drug abusers. The exotoxins produced by the bacteria are associated with toxic shock syndrome. We report here a first case of infective endocarditis due to *C. sordellii* from a female patient with ventricular septal defect from India.

## Introduction

Anaerobes are major components of the normal microbial flora present on human skin and mucosa. Infections due to anaerobic bacteria are common, but they are difficult to isolate from infected sites and are often overlooked.<sup>1</sup> Anaerobic endocarditis is a rare entity. Aerobes such as *Staphylococcus aureus*, *Streptococcus viridians*, groups A, C, and G streptococci and *Enterococcus* species are the most common microorganisms that cause infective endocarditis (IE).<sup>1</sup>

The most frequently reported causes of anaerobic endocarditis are *Bacteroides* (particularly the *Bacteroides fragilis* group), anaerobic *Streptococcus*, *Clostridium* spp., *Peptostreptococcus*, *Fusobacterium*, *Propionibacterium*, and *Lactobacillus* spp.<sup>2</sup> *Clostridium sordellii* endocarditis has not been reported from India. Here, we report the first case of *C. sordellii* endocarditis in a female patient from India.

## Case Details

A 28-year-old female, suffering from acyanotic congenital heart disease with ventricular septal defect (VSD) was

admitted to the cardiothoracic vascular surgery ward of All India Institute of Medical Sciences (AIIMS), New Delhi, India with complaints of worsening shortness of breath and palpitations. Patient reported having an episode of IE 3 months back for which she had been admitted to AIIMS and was discharged after treatment. However, with the latest presentation there was no history of fever, although there was a history of tooth extraction a week before.

On clinical examination, there was a loud diastolic murmur in the aortic area. The chest roentgenogram revealed cardiomegaly. An echocardiography showed a ruptured sinus of Valsalva with normal right ventricular function, severe aortic regurgitation, and no evidence of cardiac vegetations. Hemogram revealed a hemoglobin of 9.6 g/dL with a platelet count of 120,000/mm<sup>3</sup>. Urine and blood cultures of the patient were consistently sterile. Within 5 days of admission, an RSOV repair was performed. The VSD was closed with a Gor-Tex patch and an aortic valve replacement was done. Aortic valve tissues were sent for aerobic, anaerobic, and fungal culture. The postoperative period was uneventful.

On microscopy, there was no evidence of bacteria on Gram Stain or fungal elements on KOH mount. Cultures on routine and enriched bacteriological media were consistently

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negative, even on prolonged aerobic incubation. Aerobic blood cultures sent previously also had been consistently negative.

The specimen was received in Robertson's cooked meat (RCM) medium in anaerobic bacteriology laboratory. After 48 hours of RCM incubation under anaerobic conditions, subcultures were performed on Brain Heart Infusion Blood Agar (BHIBA), Blood Agar (BA), and MacConkey Agar (MA). The BHIBA was incubated under anaerobic conditions and BA in CO<sub>2</sub> desiccator as per standard protocol.<sup>2</sup> BHIBA plates showed the growth of metronidazole sensitive colonies which upon Gram staining revealed gram-positive bacilli with subterminal spores. BA and MA showed no growth. Conventional biochemicals were set up after obtaining growth anaerobically in peptone yeast extract broth. Organism produced indole and urease, liquefied gelatin, fermented glucose, and produced lecithinase. It did not ferment lactose, hydrolyze esculin, reduce nitrates and was lipase negative. The findings were confirmed using the API 20A system. It was labeled as *C. sordellii* based on the findings. After the identification, we further inquired about the history of diarrhea to rule out any translocation of *Clostridioides difficile* (morphologically similar organism) from gastrointestinal tract into the blood stream and no such history was obtained. The isolate *C. sordellii* was subjected to polymerase chain reaction (PCR) for *C. difficile* toxins A and B (tcdA and tcdB) and was found to be negative.<sup>3</sup> The patient was put on metronidazole along with other antibiotics and was discharged after improvement. On follow-up, she was doing well and had no evidence of recurrence of infection.

## Discussion

Although IE due to anaerobic bacteria is a rare condition, a surge in recent times has been observed. The increased use of interventional procedures for diagnosis or management predisposes individuals to develop bacteremia due to aerobic and anaerobic bacteria.<sup>3</sup> In the year 1977, Finegold et al reported over 200 cases of anaerobic IE, out of which 17 cases were due to *Clostridium* species. He also showed that *Clostridium perfringens* was the commonest among all clostridia.<sup>4</sup> Other species such as *Clostridium bifermentans*, *Clostridium clostridiformis*, *Clostridium septicum*, and *Clostridium ramosum*

have also been implicated as a cause of IE.<sup>5-7</sup> *C. sordellii* IE has been scarcely reported.

It is thus evident from the above that *Clostridia* should be considered as a plausible cause of infectious endocarditis and not just dismissed as a laboratory contaminant upon being isolated from such cases. We also reviewed our laboratory data of last years. In the year 2019, we received 73 cardiac specimens of patients suffering from infectious endocarditis for anaerobic culture and found only one sample positive for *Clostridium* spp. Since *C. sordellii*'s first isolation in the year 1922, it has been commonly linked with lethal post-traumatic skin and soft tissue infections, penetrating injury, medical abortions, pericarditis along with some reported cases of bacteremia (►Table 1).<sup>8-14</sup> The pathogenicity of *C. sordellii* by productions of exotoxins are associated with toxic shock syndrome.<sup>15</sup> Of these exotoxins, lethal toxin and hemorrhagic toxin are two major virulence factors, which showed antigenic as well as pathophysiological resemblance to *C. difficile* toxins B and A, respectively. *C. sordellii* antitoxin is used to neutralize both *C. difficile* toxin A and toxin B by antigenic cross reactivity in cell culture assay.<sup>16</sup>

The abovementioned fact has been highlighted in a case report by Elsayed and Zhang<sup>17</sup> in which a patient positive for *C. difficile* stool assay was actually suffering from *C. sordellii* infection. This signifies the fact that mere phenotypic characterization may lead to misdiagnosis. Both *C. sordellii* and *C. difficile* are asymptotically carried in the gastrointestinal tracts of approximately 10% of adult humans and both share close similarity in host range and virulence factors; therefore, we performed molecular test to differentiate both.<sup>15,18</sup>

It is to be noted that emergence of the more virulent BI/NAPI epidemic clone of *C. difficile* from various parts of United States of America and Canada further necessitates the need to carefully distinguish *C. sordellii* from *C. difficile* as an etiological agent as both the pathogens phenotypically may look similar.<sup>19</sup> Therefore, the newer molecular techniques based on the detection of specific virulent genes will help to discriminate as was observed in this study where the strain was negative for *C. difficile* tcd A and B tox PCR. Thus, early and accurate identification of this organism is required for appropriate treatment as it is frequently misidentified as *C. difficile* species. This may lead to prescribing inappropriate antimicrobial therapy leading to mismanagement of the cases.

**Table 1** Cases of *Clostridium sordellii* infection

Age	Sex	Presenting complaints	Underlying condition	Outcome	References and year
67 y	F	Septic shock	Pleomorphic gluteal sarcoma	Survived	(2016) <sup>8</sup>
8 mo	–	Abscess in right thigh	Constrictive pericarditis	Survived	(2011) <sup>9</sup>
81 y	F	Abdominal pain	Cholangitis	Survived	(2011) <sup>10</sup>
59 y	F	Postoperative monitoring	Rectal malignancy	Fatal	(2009) <sup>11</sup>
27 y	F	Pelvic pain and bleeding	Medical abortion	Fatal	(2004) <sup>12</sup>
81 y	F	Perirectal necrosis	Traumatic self-evacuation	Fatal	(2000) <sup>13</sup>
12 y	M	Ear infection	Epilepsy	Survived	(2000) <sup>13</sup>
73 y	M	Perirectal abscess	Prostatic cancer	Fatal	(1999) <sup>14</sup>

Our report is aimed to draw attention to the accurate identification of *C. sordellii* in clinical samples, upon the isolation and identification as in this case in the microbiology laboratories.

In conclusion, *C. sordellii* is a rare infection, but one that needs a high index of suspicion to improve clinical outcome.

#### Conflict of Interest

None.

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