

Case Report

Cepacia Syndrome in a Non-Cystic Fibrosis Patient

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Burkholderia (formerly *Pseudomonas*) *cepacia* complex is a known serious threat to patients with cystic fibrosis, in whom it has the potential to cause the fatal combination of necrotizing pneumonia, worsening respiratory failure, and bacteremia, known as Cepacia syndrome. The potential for this pathogen to infect non-cystic fibrosis patients is limited and its epidemiology is poorly understood. Previously reported cases of severe *Burkholderia cepacia* complex lung infection in immunocompetent hosts include pneumonia, bronchiectasis, pyopneumothorax, and cavitary lesions. We present a case of a 64-year-old man with *Streptococcus pneumoniae* community-acquired pneumonia whose hospital course was complicated by developing cavitary lung lesions, bacteremia, and acute respiratory distress syndrome. Repeated tracheal aspirate and blood cultures grew *Burkholderia cepacia*. Our case appears to be the first report of Cepacia syndrome in a patient without cystic fibrosis. This report raises concern regarding the potential severity of pulmonary *Burkholderia cepacia* complex infection and the need to broaden clinicians' suspicion for Cepacia syndrome. A framework to help diagnose and treat infected non-cystic fibrosis individuals may be useful.

1. Introduction

Burkholderia (formerly *Pseudomonas*) *cepacia* complex (Bcc) has been a recognized serious threat to patients with cystic fibrosis (CF) since it emerged as a major cause of severe pulmonary infection in this population in the 1980s [1–3]. Bcc is known to colonize the lungs of CF patients, occasionally causing chronic pulmonary infection [3–8]. The greatest concern of pulmonary Bcc infection is its potential to cause Cepacia syndrome, a fatal combination of necrotizing pneumonia, rapid respiratory decline, and bacteremia [3, 5, 8–11]. The potential of Bcc to infect non-CF patients is limited and sporadic, and its epidemiology is poorly understood [1, 8]. Large hospital outbreaks are infrequent [2]. Infection in the non-CF population is most commonly nosocomial and due to direct delivery via some clear point source, with resolution of illness upon removing the exposure [8, 12, 13]. Cases of severe Bcc lung infection in immunocompetent hosts have been reported in the literature and include pneumonia, bronchiectasis, pyopneumothorax, and cavitary lesions [7, 14–18]. Table 1 summarizes cases reported in the literature of necrotizing pneumonia due to Bcc in non-CF individuals.

To the best of our knowledge, however, this is one very rare case of classic Cepacia syndrome in a non-CF individual and the only case of Cepacia syndrome due to nosocomial Bcc infection reported in the literature.

2. Case Report

A 64-year-old man presented to the emergency department (ED) complaining of right pleuritic pain, productive cough, and generalized malaise for 4 days. His past medical history was significant for systemic arterial hypertension and type 2 diabetes mellitus. Vital signs on arrival to the ED were: blood pressure of 120/75 mmHg, heart rate of 114 beats/minute, respiratory rate of 22 breaths/minute, and temperature of 96.9°F. His oxygen saturation by pulse oximetry was 89% while breathing ambient air. Coarse rales were heard on auscultation over the right lung field. The rest of the physical exam was noncontributory.

Remarkable laboratory findings included a sodium level of 126 mmol/L (135–145), a bicarbonate level of 7 mmol/L (24–31), a creatinine level of 1.9 mg/L (0.8–2.0), and a glucose of 687 mg/dL (65–115). Arterial blood gas (ABG) showed

TABLE 1: Summary of case reports of necrotizing pneumonia due to *Burkholderia cepacia* complex species in non-cystic fibrosis patients.

| Author, year | Age, gender | Exposure | Bacteremia | Rapid respiratory decline | Outcome |
|---------------------------|-------------|-----------|------------|---------------------------|----------|
| Belchis et al., 2000 [18] | 44, M | Community | Yes | Yes | Death |
| Belchis et al., 2000 [18] | 40, F | Community | No | Yes | Death |
| Belchis et al., 2000 [18] | 43, F | Community | No | Yes | Death |
| Suresh et al., 2013 [16] | 63, M | Community | Unclear | No | Survival |

paO₂ of 59 mmHg (80–100) on room air. Chest X-ray (CXR) demonstrated right middle lobe consolidation (Figure 1). The patient was admitted to the intensive care unit (ICU) with diagnoses of diabetic ketoacidosis (DKA) and acute hypoxemic respiratory failure secondary to community-acquired pneumonia. Empiric intravenous antimicrobial therapy was initiated comprising ceftriaxone (2 grams every 12 hours) and azithromycin (500 milligrams daily). Blood cultures obtained on admission grew *Streptococcus pneumoniae*, and azithromycin was discontinued. The patient's medical condition improved and he was transferred to a medical ward on hospital day 2. His clinical course was complicated by worsening tachypnea, leukocytosis of 21,700/mm³ (4,500–10,400), and hypoxemia. ABG while receiving 40% venturi mask showed paO₂ of 46 mmHg. Repeat CXR showed worsening bilateral infiltrates (Figure 2). He was intubated, placed on mechanical ventilation, and readmitted to the ICU with the diagnosis of acute respiratory distress syndrome (ARDS). Ceftriaxone was replaced with intravenous vancomycin (1 gram every 12 hours) and cefepime (2 grams every 12 hours). A chest computed tomography (CT) with contrast showed a large consolidation with air bronchograms involving the superior segment of the right lower lobe, with a cavitary-like lesion with air fluid levels in the posterior aspect of the right hemithorax, suggestive of empyema, necrotizing pneumonia, or abscess (Figure 3). His ICU course was further complicated by refractory shock and multiorgan dysfunction syndrome. Blood and bronchoalveolar lavage (BAL) cultures obtained in the ICU grew *Burkholderia cepacia* complex. Antimicrobial therapy was substituted with doripenem 250 milligrams intravenously every 8 hours, adjusted to creatinine clearance. Despite all medical therapy, the patient expired on the 30th day of ICU admission.

3. Literature Review

A review of the literature was undertaken to compare our case to other reported cases of necrotizing pneumonia due to Bcc in non-CF patients and the results are listed in Table 1. PubMed search terms “Cepacia syndrome AND immunocompetent,” “Cepacia syndrome AND non-cystic fibrosis,” and “Cepacia syndrome AND without cystic fibrosis” yielded no results. A PubMed search using search terms “*Burkholderia cepacia* AND necrotizing pneumonia AND immunocompetent” yielded only one report of cases of necrotizing pneumonia due to Bcc in non-CF patients [18]. A Google Scholar search using the same search terms also yielded one case report [16]. Belchis et al. in 2000 described 3 cases of community-acquired necrotizing pneumonia caused by Bcc in men and women in their 40s, one of which also had



FIGURE 1

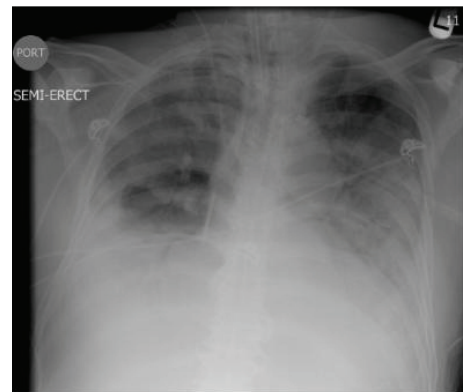


FIGURE 2

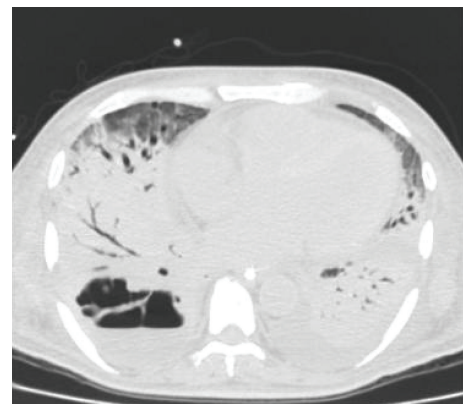


FIGURE 3

bacteremia [18]. All 3 cases resulted in rapid clinical decline and death. Suresh et al. in 2013 described an additional case of community-acquired necrotizing pneumonia with lung cavitation in a 63-year-old man [16]. It is unclear whether or not this man was also bacteremic. He did not experience the rapid decline that defines Cepacia syndrome, however, and complete recovery was observed within 6 weeks.

When compared to our case, these previous reports of necrotizing pneumonia caused by Bcc infection in non-CF individuals were community-acquired with varying bacteremia status. Three of the cases experienced rapid decline and death. Only one of the four cases meets all of necrotizing pneumonia, bacteremia, and rapid respiratory decline which are necessary qualifications for Cepacia syndrome. Our case of a hospitalized patient with necrotizing pneumonia and bacteremia due to Bcc infection appears to be a very rare case of Cepacia syndrome in a non-CF individual and maybe the first case due to nosocomial infection.

4. Discussion

While Bcc is a known threat to patients with CF, its potential to infect and harm non-CF individuals is less well established. Infection in the non-CF population is most commonly nosocomial via contaminated hospital equipment, but horizontal transmission from CF patients has been reported [7, 8, 12, 13, 19]. Bcc bacteremia in non-CF patients is most often related to direct bloodstream access via contaminated peripheral or central intravenous catheters, with resolution of symptoms after removal of the contaminated equipment [13]. Pulmonary infection in non-CF patients is similarly nosocomial and nearly always related to mechanical ventilation and contaminated water [12]. We suspect that our patient most likely acquired the infection via respiratory equipment, as he received nebulizer therapy, noninvasive ventilation, and ultimately invasive ventilation over the course of his hospital stay. Other reported sources within hospitals described in the literature include disinfectants, antiseptics, topical anesthetics, respiratory therapy equipment, mouthwash, and lotions [20–22]. Horizontal transmission between CF and non-CF patients is thought to occur in some hospital situations when infection control guidelines are unclear or inadequately followed [8, 19]. Ledson et al. described a rare case of social Bcc transmission from colonized children with CF to their healthy, non-CF mother outside of the hospital, causing a chronic bronchiectasis [7]. In many cases, however, the source of infection remains unknown [8, 19, 21].

Bressler et al. found that significant risk factors for Bcc bacteremia in non-CF patients include having had at least 2 bronchoscopic procedures, having an indwelling venous catheter, renal failure requiring dialysis, tracheostomy, and recent abdominal surgery [8]. The patient described in this report had two of these hypothesized risk factors: a central venous catheter and renal replacement therapy. Despite their identification of several physical risk factors, causality was difficult to establish. Cases of Cepacia syndrome with varying species of Bcc have been reported in CF patients known to be chronic respiratory carriers [4, 9]. Cepacia syndrome is nearly always fatal, with only very few cases reported of

successful treatment, all in CF patients [3, 5, 11]. Cases of severe Bcc lung infection other than Cepacia syndrome have been reported in immunocompetent hosts, most of which survived with appropriate antimicrobial therapy [7, 14–16]. To our knowledge, however, this is the first report of Cepacia syndrome in a non-CF individual.

Historically, there has been argument over the role of Bcc as a disease-causing agent or merely as a marker of underlying lung disease [10]. For this reason, controversy remains over precautionary infection control measures once Bcc infection in non-CF patients has been identified [10, 19, 21]. Our case raises concern regarding the potential lethality of pulmonary Bcc infection in the non-CF host and the need for a framework to help guide early diagnosis and treatment of infected individuals.

Conflict of Interests

The authors declare that they have no conflict of interests.

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