Case Report

Fatal case of community-acquired empyema thoracis and candidemia caused by *Candida albicans*

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Abstract

We report a fatal case of community-acquired empyema thoracis and candidemia caused by *Candida albicans*. The patient responded poorly to human recombinant activated protein C and intravenous fluconazole treatment and died of profound shock with multiple organ failure 8 days after admission. © 2011 Elsevier Inc. All rights reserved.

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1. Introduction

The incidence of fungal empyema thoracis has increased in recent years, and most cases of this clinical entity are acquired nosocomially in immunocompromised patients (Ko et al., 2000). Herein, we describe a fatal case of community-acquired pyopneumothorax caused by *Candida albicans*.

2. Case report

A 62-year-old man came to the emergency department because of sudden onset of left-sided chest pain and epigastralgia while riding a motorcycle. Initial vital signs were normal with the exception of increased body temperature (38.1 °C). The patient had a decades-long history of mitral and aortic stenosis status post valve replacement. Chest radiograph showed a blunted costophrenic angle in the left chest (Fig. 1A). Empiric ertapenem (1 g/day) therapy was administered after completion of a workup for sepsis; however, a sudden onset of oxygen desaturation, hypotension, and consciousness change occurred within 24 h of admission. Follow-up chest radiograph revealed bilateral consolidation with pneumothorax in the left lung (Fig. 1B). The patient was intubated and placed on ventilator support. Frank pus was drained after chest tube insertion. Gram stain of the purulent pleural effusion disclosed yeast-like organisms but no bacteria were visible. The preliminary diagnosis was pyopneumothorax with acute respiratory failure and septic shock. The patient was admitted to the intensive care unit (ICU) where he received human recombinant activated protein C (rhAPC) within 48 h of ICU admission because of multiple organ failure, high APACHE-II score (27), and low serum protein C activity (13.7%). Two sets of blood cultures (Bactec 9240, Becton Dickinson, Sparks, MD) obtained at admission and fungal cultures of drained pus (pleural effusion) all yielded *Candida albicans* on the third day of hospitalization. All specimens were negative for bacteria after culture for 5 days. Computed tomography did not reveal any findings suggestive of gastrointestinal perforation, such as esophageal thickening or ruptured varices, extraluminal air in the mediastinum, or free air in the abdominal cavity. Abdominal ultrasonography revealed previously undiagnosed liver...
cirrhosis. Clinical response was poor despite intravenous fluconazole (400 mg/day) since the third day of hospitalization. Low serum protein C activity (7.8%) persisted even after completion of the rhAPC infusion. The patient died of profound shock with multiple organ failure 8 days after admission. Autopsy of the patient was not performed.

3. Discussion

A previous study demonstrated that rhAPC administrated as an adjuvant therapy to standard antimicrobial therapy could improve the survival rate in patients with severe sepsis caused by various pathogens, including fungal infections (Opal et al., 2003). After the completion of rhAPC infusion, low protein C activity (<40%) was shown to be associated with significant mortality (Shorr et al., 2008). This might explain the failure of rhAPC treatment in our patient with persistently low serum protein C activity and inadequate antimicrobial therapy.

The major causes of fungal empyema thoracis include abdominal infection, bronchopulmonary infection, surgical intervention, and repeated thoracentesis (Baradkar et al., 2008; Ko et al., 2000; Tu et al., 2006). Our patient did not have any evidence suggestive of gastrointestinal perforation or undergoing preceding surgery. The possible reasons for the development of an empyema in this patient remain unknown, although hematogenous seeding of the organism from the gastrointestinal tract into the pleural cavity was likely. In a previous retrospective study, community-acquired fungal empyema thoracis comprised only 16% of all cases. Among the clinically significant fungal isolates, 64% were Candida species, including C. albicans (38%), C. tropicalis (18%), and C. glabrata (18%). All patients receiving surgery or pleural irrigation with antifungal agents survived. Despite the aforementioned management, the crude mortality was high (73%). Multivariate analysis showed a significantly increased risk of death in immunocompromised patients (relative risk [RR] 1.58; \( P < 0.005 \)) and in those with respiratory failure (RR 2.31; \( P < 0.001 \)). Systemic antifungal therapy was associated with a significantly lower risk of death (RR 0.69; \( P < 0.05 \)) (Ko et al., 2000).

In a recent prospective cohort study of 73 patients with pneumonia, Candida species comprised 9.3% of 54 microbial isolates collected from blood, endotracheal aspirates, and bronchoalveolar lavage (Brozek et al., 2007). In a recent retrospective analysis of 128 cases of culture-positive pleural effusion, Ishiguro et al. (2010) demonstrated that isolation of Candida species could be an important clue for empyema due to gastrointestinal perforation. Five of 7 patients with empyema due to esophago- or gastropleural fistula had Candida empyema. Four of them yielded C. albicans and 1 yielded C. glabrata. All 5 patients received antibiotics, chest tube insertion, and pleural cavity irrigation for empyema treatment. Three of them recovered from Candida empyema (Ishiguro et al., 2010). The factors contributing to the death of the patient with fungal pyopneumothorax reported herein include the immunocompromised state of the patient (liver cirrhosis), acute

Fig. 1. Chest radiograph on arrival to the emergency department shows a blunted left-sided costophrenic angle (panel A); new infiltrates in the right lung field and left-sided pneumothorax 48 h after admission (panel B).
respiratory failure, delayed diagnosis and treatment of suspected empyema thoracis with systemic antifungal therapy, failed adjuvant treatment with rhAPC, and lack of surgical intervention for empyema thoracis.

In summary, we report a fatal case of community-acquired empyema thoracis and candidemia caused by *C. albicans*. Early recognition of an immunocompromised state, the combination of appropriate antifungal therapy, and individualized surgical intervention in patients with fungal empyema thoracis could be life-saving. For rhAPC adjuvant therapy to be effective, adequate antimicrobial therapy needs to be administered.

References


