Necrotizing Pneumonia Associated with Septicemia Caused by *Clostridium perfringens*: A Case Report

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Abstract

Clostridium perfringens (*C. perfringenes*) usually infects patients with trauma and malignancy, and may cause severe infections. We report a case of necrotizing pneumonia complicated with septic shock due to *C. perfringenes* in a 65-year-old immunocompetent male without preceding trauma or malignancy. He presented febrile, shock and respiratory distress initially. He recovered after treatment with effective antibiotics and supportive care. Our patient who developed bacteremic pneumonia complicated with septic shock illustrates the pathogenic potential of *C. perfringenes* in an immunocompetent host. *C. perfringenes* related necrotizing pneumonia related with a 50 % mortality rate was demonstrated. Infections caused by *C. perfringenes* are associated with high risk of mortality and morbidity if antibiotic therapy is not timely prescribed. (J Intern Med Taiwan 2011; 22: 287-291)

Key words: Necrotizing pneumonia, Septicemia, *Clostridium perfringens*, Immunocompetent

Introduction

Clostridium perfringens (*C. perfringens*) used to infect patients with trauma or immunocompromising conditions, such as cancer[1]. Infections caused by *C. perfringens* is associated with high risk of mortality and morbidity if antibiotic therapy is not timely instituted[2,3]. Pneumonia related to *C. perfringens* has rarely been described, and, in most of the reported cases, clostridial pneumonia is associated with invasive procedures or penetrating chest injuries[3]. Herein, we presented a case of necrotizing pneumonia in a 65-year-old immunocompetent male who developed septicemia due to *C.*

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perfringens.

Case Report

A 65-year-old male, previously healthy, developed productive cough 10 days before the admission. Fever was also present in the following days. He presented with chest pain, and shortness of breath. He was brought to the emergency room of Changhua Christian Hospital. There was no history of malignancy, receipt of invasive procedures, or trauma. Upon admission, he was febrile with a temperature of 38.5°C, blood pressure 80/56 mmHg, and respiratory rate 24 breaths per minute. Oxygen saturation of fingertip artery was 92% while he was breathing with room air. Laboratory examination on admission revealed white blood cell count of 12,400/mm^3, hematocrit 37.9%, platelet count 21,600/mm3, and C-reactive protein 36.4 mg/dL (<0.3 mg/dL). A chest X-ray obtained on admission showed a pneumonic patch of the right middle lobe, bilateral interstitial infiltration, and pleural effusion (Figure 1 A). Treatment was initially started with penicillin and gentamicin after blood and sputum cultures were performed. On the 1st hospital day, the patient's condition deteriorated rapidly. The arterial blood gas data revealed pH 7.465, PCO_2 29.6 mmHg, PO_2, 89.2 mmHg, HCO_3, 21.5 mmol/L while he was breathing oxygen at 2 L/minute per nasal cannula. The follow-up chest film showed rapid consolidation over the right lung. Antibiotics were changed to ceftriaxone (2000 mg intravenously every 12 hours) plus clarithromycin (500 mg p.o. twice daily). The chest computed tomography (CT) disclosed the massive consolidation over the right middle lung and left lung (Figure 1 B). The bacterium was identified as *C. perfringens* with the use of an API 20A strip (BioMérieux, Durham, N.C.). Despite treatment of ceftriaxone and clarithromycin, he remained febrile on day 5 of hospitalization. On the 6th hospital day, ceftriaxone was changed to amoxicillin-clavulanate intravenous 1500mg every 6 hours for better coverage of the anaerobes. He became afebrile and follow-up chest radiography revealed gradual resolution of the consolidation. He recovered well and was discharged on the 13th hospital day. During the

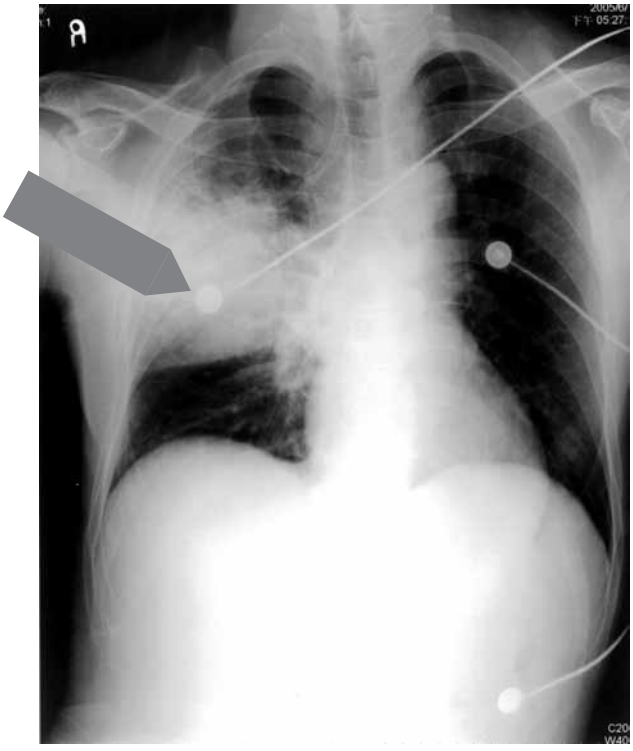

Figure 1 A: A chest X-ray on admission showed a pneumonic patch of the right middle lobe, bilateral interstitial infiltration, and pleural effusion.

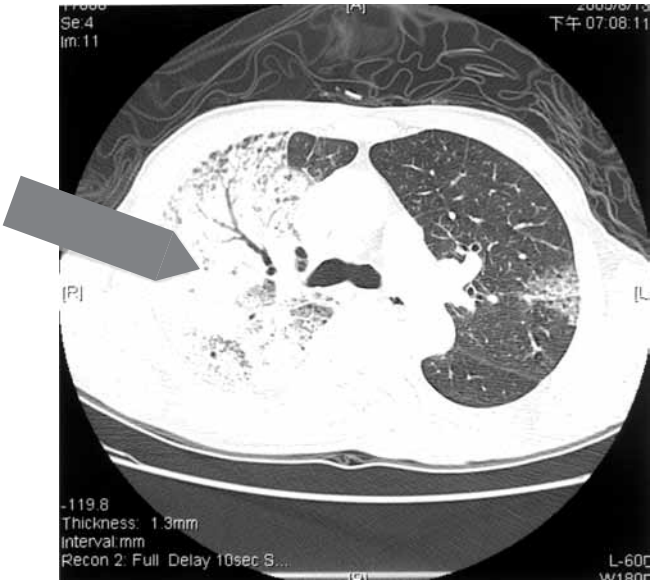

Figure 1 B: The chest computed tomography (CT) disclosed the massive consolidation over the right middle lung .

Table 1. Evidence-based Literature Review for the Pleuro-pulmonary Infections with *Clostridium perfringens*

Patient numbers	Age	Sex	Underlying diseases	Risk factors	Site of infection	Treatment	Outcome	Reference
1	65	M	No	No	Necrotizing pneumonia with pleural effusion, shock	Amoxiciliin/clavulanate	Survive	This case
1	82	F	Paroxysmal atrial fibrillation s/p dual chamber pace-maker , hypertension, normochromic normocytic anemia, arthritis, osteoporosis, cholelithiasis	NM	Bilateral pleural effusion with consolidation of lower lobes and lingual , followed by gangrenous pneumonia	Clindamicin and amoxiciliin/clavulanate	Survive	7
1	59	M	Carcinoma of the pancreas	Hepaticojejunostomy, duodenojejunostomy	A fulminant sepsis accompanied by massive intravascular haemolysis	Drainage and antimicrobial chemotherapy	Fatal	8
1	NM	NM	NM	NM	Necrotizing pneumonia with pulmonary emboli	Drainage and antimicrobial chemotherapy	NM	9
1	NM	NM	Renal transplant	Renal transplant	Acute empyema with hydropneumothorax, associated with bacteremia	Drainage and antimicrobial chemotherapy	NM	10
1	NM	NM	No trauma	Bowel obstruction,	Bacteraemia, pneumonia associated with pleural effusion	Drainage and antimicrobial chemotherapy	Fatal	11
1	66	M	NM	NM	Necrotising pneumonia and empyema, complicating pulmonary embolus.	Benzylpenicillin with metronidazole and drainage	Fatal	12
5	NM	NM	No penetration of the thorax	NM	All with pleural empyema, two of five with pyopneumothorax	Drainage and antimicrobial chemotherapy	NM	13
1	19	F	NM	NM	Pneumonia associated with pleural empyema	Penicillin and drainage	Survive	14
2	NM	NM	NM	NM	Primary clostridial pleuropulmonary infection	One with penicillin; the other uncertained	One cured, the other died	15
11	NM	NM	NM	An invasive procedure in 7 patients	Rapidly progressive, necrotizing pneumonia and empyema	Drainage and antimicrobial chemotherapy	NM	16

Notes : NM meant "no mention in the article".

follow-up as an outpatient for more than one year, there were no evidence of malignancy identified, especially at respiratory tract and gastrointestinal tract.

Conclusion

This is a rare case of necrotizing pneumonia and septic shock caused by *C. perfringens* although microbial anaerobic infections were reported as early as 1897[4]. In Jackson's study for population-based laboratory surveillance for invasive *C. perfringens* disease, the annual incidence of invasive *C. perfringens* disease was estimated 0.83 per 100,000[4]. Risk factors for *C. perfringens* pneumonia included aspiration of oropharyngeal or gastric contents, pulmonary embolism with infarction (hematogenous seeding of infarcted lung tissue)[5]. *C. perfringens* pneumonia is often associated with chronic diseases, such as diabetes or cirrhosis, and underlying pleuropulmonary pathology (pulmonary tuberculosis, chronic pleural effusions)[5].

Predisposing factors to *C. perfringens* pneumonia included malignant neoplasm, hematologic disorders, organs transplantation, recent gastrointestinal or obstetric and gynecologic surgery, intestinal obstruction, diabetes mellitus, post-splenectomy, use of cytotoxic agents or corticosteroids, and use of prophylactic antimicrobial agents for bowel preparation prior to surgery[5,6]. After survey of this patient during the hospital stay and subsequent follow-up, there was no evidence of malignancy, especially at respiratory tract and gastrointestinal tract. We supposed that the source of *C. perfringens* bactermeia should come from his respiratory tract.

Our patient who developed bacteremic pneumonia complicated with septic shock illustrates the pathogenic potential of *C. perfringens* in an immunocompetent host. After reviewing the literature on *C. perfringens* pleuro-pulmonary infections (Table)[7-16], we are able to identify 26 cases. The clinical presentations usually consist of pneumonia (sometimes, necrotizing pneumonia), and pleural effusion (sometimes, pleural empyema). Treatment should include drainage and adequate antimicrobial chemotherapy. As a whole, mortality rate is 50% (four expired in 8 patients). Infections caused by *C. perfringens* are associated with high risk of mortality and morbidity if antibiotic therapy is not timely prescribed.

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產氣莢膜梭菌導致菌血症合併壞死性肺炎：個案報告

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摘　要

產氣莢膜梭菌（*Clostridium perfringens*）通常感染惡性腫瘤或是創傷的病患，感染後有可能導致嚴重的感染。我們報告一個病例健康 65 歲男性病患，罹患產氣莢膜梭菌導致菌血症合併壞死性肺炎，最初臨床表現是發熱，休克，與呼吸窘迫。使用有效的抗生素及即時的支持治療，病患恢復健康。這位病患是產氣莢膜梭菌導致生菌血症與肺炎併發休克。在回顧世界文獻並且分析產氣莢膜梭菌相關性壞死性肺炎的案例進行分析，整體而言，產氣莢膜梭菌感染引起的死亡率爲 50%。產氣莢膜梭菌感染在高風險病患，如果沒有及時治療會發生極高的死亡率和併發症。