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Case Report

Pneumococcal pneumonia complicating secondary bacteremia in an immunocompromised patient: a case report

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ABSTRACT

Pneumococcal pneumonia is a significant global public health issue, contributing to considerable morbidity and mortality, as well as placing a strain on healthcare systems. Here, we present the case of a 46-year-old female who was admitted to our hospital with a sudden onset of shortness of breath and right-sided substernal chest pain on the day of admission, accompanied by fever and a productive cough. She displayed an increased respiratory rate and diminished vesicular breath sounds, with bilateral scattered rhonchi. Blood tests and chest radiological findings suggested an infectious etiology. Ultimately, *Streptococcus pneumoniae* was isolated through microbiological culture from both sputum and blood samples, showing similar antimicrobial sensitivity, and appropriate management was initiated. She was discharged after five days of hospitalization, with an uneventful recovery. Appropriate antimicrobial stewardship and pneumococcal vaccination are essential to combat this infection.

Keywords: Pneumococcal pneumonia, Streptococcus pneumoniae, Bacteremia, Vaccination, Antimicrobial stewardship

INTRODUCTION

Pneumococcal pneumonia, caused by *Streptococcus pneumoniae (S.pneumoniae)*, continues to be a pressing public health concern, necessitating ongoing attention and resources. This pathogen is among the most common causes of community-acquired bacterial pneumonia (CABP), responsible for 70-80% of cases worldwide.[1] The pathogen colonizes the nasopharynx and, through transmission to the lower respiratory tract, leads to the development of pneumonia. It is responsible for 4-5 million cases annually, accounting for 0.4% of the total incidence in the Indian population.[1,2] The clinical manifestations can range from mild presentations, manageable at the outpatient department, to severe cases requiring hospital care or even admission to an intensive care unit.[3] Complications from *S. pneumoniae* infections, particularly bacteremia and sepsis, occur at a rate of about 10 to 20%, with the risk increasing with age.[2] The increasing prevalence of antibiotic-resistant strains of *S. pneumoniae* is escalating at an alarming rate in India, proving to be the primary barrier to the effective treatment of community-acquired pneumonia (CAP). Furthermore, despite the growing global clinical evidence on the benefits of pneumococcal vaccination, India is falling behind in its implementation.[4]

Herein, we present a compelling case of pneumococcal pneumonia in a middle-aged patient with no history of pneumococcal vaccination, complicating to secondary bacteremia, observed at a tertiary-care hospital in Eastern India.

CASE REPORT

A 46-year-old female presented to our hospital with primary complaints of fever and productive cough for the past five days. On the morning of admission, she experienced abrupt onset of shortness of breath and right sided substernal chest pain, which worsened with deep

breaths and in supine position. She was a known case of hypertension, type 2 diabetes mellitus and hypothyroidism. Notably, she has no history of pneumococcal vaccination.

On examination, the temperature was 100.1°F, blood pressure 130/70 mm Hg, pulse 85 beats per minute, respiratory rate 21 breaths per minute, and oxygen saturation 98% in room air, random capillary blood glucose (CBG) 141 mg/dl. Arterial blood gas (ABG) analysis was within normal limits. There was no lymphadenopathy or pedal edema. On auscultation, there was decreased vesicular breath sound on right side with bilateral scattered rhonchi. The heart sounds were regular with no murmur.

All baseline investigations were done. Blood analytes were reviewed, primarily showing an elevated total leucocyte count (TLC), C-reactive protein (CRP) and procalcitonin (Table 1). Liver and renal function tests, along with other metabolic panels, were within normal limits. A chest X-ray, taken at the bedside, indicated haziness in the right lower lobe of the lung (Figure 1). HRCT thorax revealed airspace opacities in the right lower lobe segments, with minimal pleural effusion and no cardiomegaly. The electrocardiogram and echocardiography reports were within normal limits. Sputum sample and blood were collected for microscopy and culture on the same day of admission. She was started empirically on intravenous piperacillin/tazobactam (4.5 g, TDS), oral doxycycline (100 mg, BD), nebulization with ipratropium plus levosalbutamol (0.5/1.25 mg, TDS), and formoterol plus budesonide (20 mcg/0.5 mg, BD).

Figure 1: Bedside chest X-ray.

Gram staining revealed moderate polymorphonuclear cells with gram-positive cocci arranged in pairs and short chains (Figure 2). No acid-fast bacteria were identified on Ziehl-Neelsen staining of the sputum smear. The characteristic draughtsman colonies were observed on blood agar which were flat with raised edges and a central depression, showing alpha haemolysis (Figure 3). Eventually, *S. pneumoniae* was identified by the MicroScan WalkAway® plus system (Beckman Coulter, California, USA) from the sputum and blood culture sample on the third and fourth day, respectively. Both cultures demonstrated a similar antibiotic susceptibility pattern, showing sensitivity to amoxyclav, ceftriaxone, cefepime, levofloxacin, linezolid, and vancomycin (Table 2). By day six, her symptoms had completely resolved; TLC normalized (9.95×10^3/µL), and CRP level had decreased. She was then scheduled for discharge from our hospital after 5 days of admission.

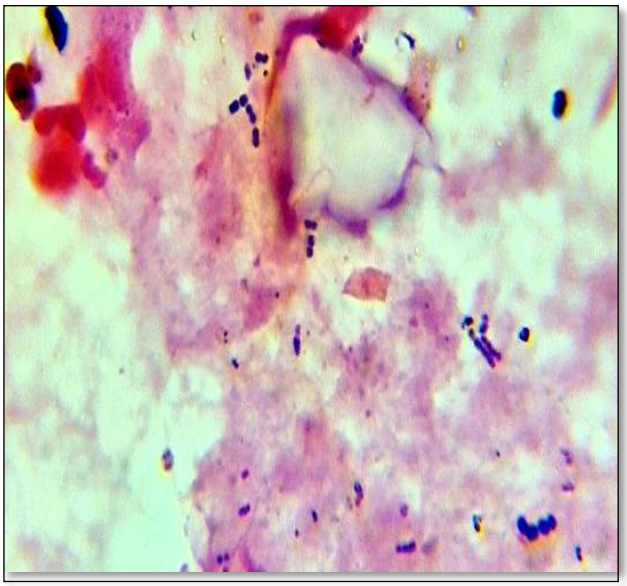

Figure 2: Gram-stain of the sputum sample revealing gram-positive cocci in pairs and short chains.

Figure 3: Draughtsman colonies of *Streptococcus pneumoniae.*

Table 1: Comparison of significant blood analyte parameters at admission and at discharge.

Parameters	At admission	At discharge	Reference range
Haemoglobin (g/dl)	10.9	11	12.0-15.0
TLC (10^3/µl)	15.61	9.95	4.0-10.0
DC-neutrophils (%)	84	76	40-80
DC-lymphocytes (%)	13	21	25-40
Platelet count (10^3/µl)	220	-	150-450
CRP (mg/dl)	4.79	2.86	<0.8
Procalcitonin (ng/ml)	0.39	-	0.01-0.1
T3 (nmol/l)	0.92	1.94	1.32-2.96
T4 (nmol/l)	122.6	158.4	41.3-162.5
TSH (µIU/ml)	2.79	3.57	0.27-4.2
Glycosylated Hb (%)	7.42	-	4.0-5.6

Table 2: Antibiogram of *Streptococcus pneumoniae* isolate.

Antibiotic	Sensitivity
Amoxyclav	S
Cefotaxime	R
Ceftriaxone	S
Cefepime	S
Levofloxacin	S
Linezolid	S
Vancomycin	S
Erythromycin	R
Meropenem	I
Tetracycline	S
Trimethoprim-sulfamethoxazole	R

*S-Sensitive, I-Intermediate, R-Resistant

DISCUSSION

India has the highest mortality and morbidity rates from invasive pneumococcal disease (IPD), particularly among adults over 50 years old.[5] In contrast to the majority of studies, this case highlighted pneumococcal pneumonia in a middle-aged patient (under 50 years). *S. pneumoniae* especially impacts vulnerable populations, including the elderly, young children, and individuals with weakened immune systems. The important risk factors for pneumococcal pneumonia include dementia, seizure disorders, heart failure, cerebrovascular disease, chronic liver disease, diabetes, alcoholism, tobacco smoking, chronic obstructive pulmonary disease (COPD), and HIV infection.[6] Early diagnosis is critical, as pneumococcal pneumonia can progress swiftly, resulting in severe complications such as septicaemia, meningitis, endocarditis, and respiratory failure.[4] The highest case fatality rates for invasive pneumococcal disease (IPD) were noted in cases of pneumococcal septicaemia, with an unknown infection focus, pneumonia, and meningitis. Resistant strains contribute to high treatment failure rates, prolonged hospitalization, and an increased risk of mortality.[7] In the absence of new antibiotics, managing pneumococcal diseases presents a significant challenge. In this context, preventing risk factors becomes critically important. The measures include implementing suitable infection control practices, antimicrobial stewardship, and initiatives to decrease susceptibility to pneumococcal diseases through vaccination in the elderly (≥50 years).[8]

CONCLUSION

Despite the considerable morbidity and mortality linked to pneumococcal pneumonia, it is frequently misdiagnosed, mistreated, and underestimated. The rise of antibiotic-resistant strains requires careful selection of therapeutic agents based on local resistance patterns. Public health initiatives promoting pneumococcal vaccination among the elderly and at-risk populations are crucial in combating this preventable illness.

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