

INVASIVE STREPTOCOCCUS PNEUMONIAE INFECTION PRESENTING WITH PNEUMONIA AND BACTEREMIA: CLINICAL CASE

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Abstract: Invasive pneumococcal disease (IPD) caused by *Streptococcus pneumoniae* remains a significant cause of morbidity and mortality worldwide, particularly when associated with pneumonia and bacteremia. We report a clinical case of a 37-year-old male patient admitted to the emergency department with fatigue, tachycardia, and dyspnea following several days of fever and cough. Initial clinical and laboratory findings, including hepatosplenomegaly, elevated liver enzymes, leukocytosis, and renal dysfunction, raised suspicion of infectious mononucleosis and atypical hemolytic uremic syndrome. However, thoracic computed tomography revealed multilobar pneumonia. Subsequent blood cultures confirmed *Streptococcus pneumoniae*, establishing the diagnosis of pneumococcal pneumonia complicated by bacteremia. Empirical treatment with piperacillin–tazobactam was initiated and later adjusted to targeted therapy with ceftriaxone according to antimicrobial susceptibility results, leading to significant clinical and laboratory improvement. This case emphasizes the importance of considering pneumococcal infection in the differential diagnosis of patients presenting with nonspecific systemic symptoms and highlights the crucial role of early microbiological diagnosis and targeted antimicrobial therapy in improving patient outcomes.

Keywords: *Streptococcus pneumoniae*, Bacteremia, Community-acquired pneumonia

Introduction

Streptococcus pneumoniae (pneumococcus) has long been one of the most prominent bacterial causes of disease in humans and was one of the first to be identified as a cause of human infection. Since 2000, however, its impact has been blunted by the widespread use of vaccines that largely prevent infection and colonization in young children. [1]. IPD is defined as infection in which *S. pneumoniae* is isolated from a normally sterile body site. Bacteremic pneumococcal pneumonia is, by far, the most common presentation, followed by pneumococcal bacteremia in which no source is identified (termed "primary pneumococcal bacteremia"). Meningitis, septic arthritis, spontaneous peritonitis, osteomyelitis, endocarditis, and soft tissue infection are other major forms of IPD. Some genetic features have been associated with susceptibility to invasive pneumococcal disease (IPD), but the mechanism(s) underlying the association remain unknown [2]. Pneumonia is the most common source of IPD, identified in 65 to 85 percent of invasive pneumococcal cases [3,4,5]. In this case report, we present and discuss a clinical case that was initially evaluated with suspected infectious mononucleosis but was subsequently diagnosed with *Streptococcus pneumoniae* pneumonia complicated by bacteremia.

Summary. *Streptococcus pneumoniae* (pneumococcus) has long been recognized as a major bacterial cause of human disease and is considered one of the first microorganisms to cause human infection. However, since 2000, its impact has been significantly reduced by the widespread introduction of vaccines that significantly prevent infection and colonization in young children [1]. Invasive pneumococcal disease (IPD) is characterized by the isolation of *S. pneumoniae* from normally sterile body cavities or tissues. The most common form of IPD is bacteremic pneumococcal pneumonia. Less commonly, pneumococcal bacteremia of unknown origin ("primary pneumococcal bacteremia") has been reported. Other important clinical forms of IPD include meningitis, septic arthritis, spontaneous peritonitis, osteomyelitis, endocarditis, and soft tissue infections. Although

some genetic traits have been shown to be associated with susceptibility to invasive pneumococcal disease, the precise mechanisms of this association are not yet fully understood [2]. Pneumonia is the most common source of IPD in general, accounting for approximately 65–85% of invasive pneumococcal cases [3–5]. This article presents and discusses a clinical case initially evaluated for suspected infectious mononucleosis but later diagnosed with *Streptococcus pneumoniae* pneumonia and bacteremia.

Experimental part

Clinical case: A 37-year-old male patient was admitted to the hospital's emergency department (ED) with complaints of fatigue, tachycardia, and dyspnea. During examination, the patient had an icteric appearance, and elevated biochemical and liver function tests were recorded. The patient reported complaints of intermittent high fever, cough, and scant sputum production that began 6 days ago, and it was learned that he had been taking clarithromycin, oseltamivir, and nimesulide during this period. There was no history of any chronic disease. During physical examination, his general condition was stable, he was conscious, oriented, and cooperative. The skin and mucous membranes were icteric. Crepitus was heard on auscultation of the lungs. The abdomen was soft and no tenderness on palpation. Peritibial edema was not observed. Objective examination: Temperature 36.1°C, Pulse 121 beats/min, A/T 103/67 mmHg, pulse oxygen saturation on room air was 97%. Laboratory parameters are presented in Table 1 and 2.

Table1. Laboratory parameters

	pH	pCO ₂	Na	K	Lac	BE	HCO ₃
1st day	7.37	41	129	4.3	2	1.5	22.7
4 th day	7.44	35.2	138.2	3.7	0.8	0.4	25.6

Table 2. Laboratory parameters

Labs	1 st day	12 th day	A Month later Control
WBC x 103/ μ L	23.0	12.6	5.1
NEU %	96.9%	77.5	56.4%
PLT x 103/ μ L	109	220	1.7
ALT U/L	115	61.0	-
AST U/L	84.0	21.0	-
T.BILURIBIN mg/dl	7.8	1.6	-
CRP mg/l	336.4	6.9	3.5
Creatinine mg/dl	3.4	1.1	1.2
BUN mg/dl	40.9	20.8	19.0
GFR	22	90.0	75
INR	1.01	-	-
Albumin	3.19	-	-
LDH	157	-	148

Results and discussion

A patient with acute renal failure was suspected of having atypical Hemolytic Uremic Syndrome with peripheral smears, hepatosplenomegaly, elevated liver function tests, neutrophilic leukocytosis and lymphopenia. Serology for infectious mononucleosis and hepatitis was requested. Serology for EBV VCA IgM, Anti-HAV Ig M, Anti-HBc Ig M, Anti-HCV, HIV Ag/Ab was negative. Abdominal ultrasound and Computed Tomography (CT) were performed. Blood samples were sent for culture from the patient.

CT abdominal imaging (Fig. 1): Liver enlarged, 27 cm in long axis, Spleen enlarged, 24 cm in long axis. No focal lesion was detected in liver and spleen parenchyma.

CT thoracic imaging (Fig. 2): Patchy ground glass appearance in all lobes in the right lung, extensive consolidation filling the lower lobe, partially extending to the upper lobe in the left lung, and localized ground glass densities. It was evaluated as multilobar pneumonia. No pleural effusion. Trachea and bronchi are patent.

The general urine analysis showed bilirubin 3+, leukocyte element 1, nitrite negative, and bacteria negative. Based on clinical and radiological findings, the patient was diagnosed with pneumonia and initially prescribed broad-spectrum antibiotic therapy — piperacillin-tazobactam.

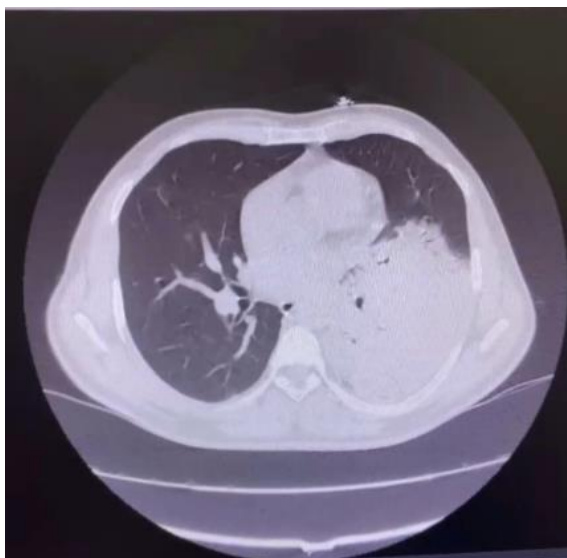


Fig.1.

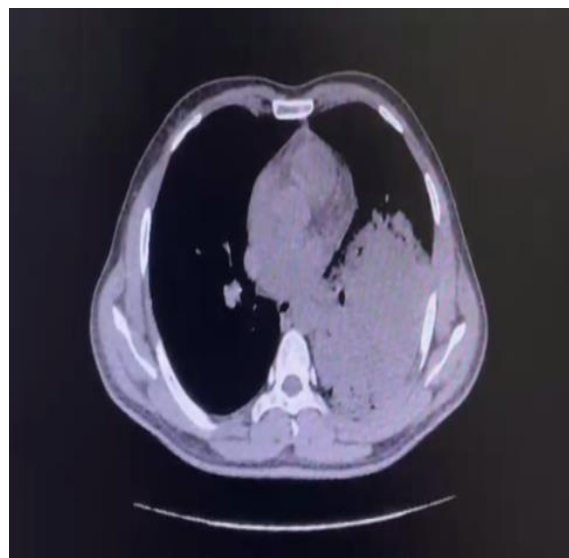


Fig. 2. CT thoracic imaging

At a later stage, *Streptococcus pneumoniae* was isolated in both aerobic and anaerobic blood cultures, confirming the diagnosis. It is shown in Table 3.

Table 3. Results of aerobic and anaerobic blood cultures

Microorganism grew	<i>Streptococcus pneumoniae</i>
Levofloxacin	Highly susceptible
Cefotaxime	Standard dose susceptible 0,19 mcg/ml
Benzympenicillin	Higher dose susceptible 0,19 mcg/ml
Meropenem	Standard dose susceptible 0,125 mcg/ml
TMP-SMX	Resistant
Erythromycin	Resistant

Piperacillin tazobactam, which had been started, was stopped and replaced with ceftriaxone 1g *2 times. Bacteremia was treated with intravenous ceftriaxone. The patient's liver and kidney function tests began to return to normal. The microorganism did not grow in the control blood cultures taken after the start of treatment.

Immunoglobulin indicators were requested to investigate Common Variable Immunodeficiency in a patient with no known comorbidities. ANA/C3/C4 negative, P-ANCA, C-ANCA negative were determined. The current laboratory indicators in the foreground were considered as secondary complications due to *S. pneumoniae* bacteremia.

Discussion: Bacteremia is present in approximately 20–25% of cases of *S. pneumoniae* pneumonia [6,7]. Patients with positive blood cultures tend to be younger, have a shorter duration of

illness, and are more likely to have a severe course, including septic shock, in-hospital mortality, and 30-day mortality [8–9]. The risk of death in patients with bacteremia is directly correlated with the clinical severity of the infection at the time of onset [10], and this risk has been shown to persist for up to 10 years [10,11].

Lobar consolidation is often observed in patients with bacteremia *S. pneumoniae* pneumonia. A white blood cell (WBC) count <6000 or >25000 has been associated with a fivefold and threefold higher mortality rate, respectively.

“Currently, the median age of patients with pneumococcal pneumonia is approximately 65–70 years. The onset of the disease is more insidious and often presents with symptoms similar to those of a viral infection lasting several days, with a dramatic clinical deterioration occurring when a bacterial infection is present. Once pneumonia symptoms develop, the disease progresses rapidly, and patients are often admitted to hospital within the first three days.” [12,13,14].

“The current clinical case is noteworthy from a diagnostic perspective: the patient was initially evaluated with suspected infectious mononucleosis, but based on the clinical course and laboratory findings, *Streptococcus pneumoniae* pneumonia and bacteremia were confirmed. This observation highlights the fact that pneumococcal infections can mimic other viral diseases in the early stages and the importance of timely microbiological testing for accurate diagnosis. From a treatment perspective, the patient was initially prescribed broad-spectrum piperacillin-tazobactam, but after the detection of pneumococcus in blood culture, targeted antimicrobial therapy (ceftriaxone) was switched, resulting in clinical improvement. This fact once again emphasizes the importance of a targeted treatment strategy based on microbiological results.”

Conclusion

Streptococcus pneumoniae pneumonia can present with nonspecific clinical signs, which can pose significant difficulties in the differential diagnosis phase. Early microbiological diagnosis and selection of adequate antimicrobial therapy play a crucial role in improving clinical outcomes. In addition, the introduction of pneumococcal vaccination in risk groups is of fundamental importance in the prevention of invasive pneumococcal infections and is an important component of preventive strategies.

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