CASE REPORT / PRIKAZ SLUČAJA

FROM PHARYNGITIS TO MULTIPLE ORGAN DYSFUNCTION SYNDROME: RAPID PROGRESSION OF INVASIVE STREPTOCOCCUS PYOGENES INFECTION

OD FARINGITISA DO VIŠEORGANSKOG ZATAJENJA ORGANA: BRZA PROGRESIJA INVAZIVNE INFEKCIJE UZROKOVANE BETA-HEMOLITIČKIM STREPTOKOKOM GRUPE A

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Abstract

Background: Invasive infections caused by *Streptococcus pyogenes* may rapidly progress from apparently uncomplicated upper respiratory tract infections to severe systemic disease with organ dysfunction.

Case presentation: A previously healthy 28-year-old male with a reported penicillin allergy presented with a four-day history of fever, sore throat, vomiting, and pleuritic chest pain. Laboratory findings demonstrated a pronounced systemic inflammatory response characterized by markedly elevated inflammatory markers, elevated lactate levels, acute kidney injury, and coagulation abnormalities. Blood cultures grew *Streptococcus pyogenes*. Imaging studies revealed a left-sided pleural effusion and a small pericardial effusion. The patient was treated with intravenous antimicrobial therapy and partial pleural drainage, resulting in clinical recovery.

Discussion: This case highlights the potential for rapid progression of invasive *Streptococcus pyogenes* infection from pharyngitis to sepsis with MODS in a young, otherwise healthy patient.

Conclusion: Early recognition and prompt treatment of invasive infections caused by *Streptococcus pyogenes* are essential for favorable outcomes.

Keywords: emergency medicine; invasive infection; multiple organ dysfunction syndrome; sepsis; streptococcus pyogenes

Sažetak

Uvod: Invazivne infekcije uzrokovane bakterijom *Streptococcus pyogenes* mogu brzo progredirati od naizgled nekompliciranih infekcija gornjih dišnih puteva do teške sistemske bolesti praćene multiorganskom disfunkcijom.

Prikaz slučaja: Prethodno zdrav 28-godišnji muškarac s alergijom na penicilin javio se zbog četverodnevnog febrilnog stanja praćenog grloboljom, povraćanjem i pleuritičkom boli u prsima. Rezultati laboratorijskih nalaza ukazali su na izrazito povišene upalne pokazatelje, laktate, akutno bubrežno oštećenje i poremećaj koagulacije. Mikrobiološkom obradom hemokultura izoliran je *Streptococcus pyogenes*. Radiološkom obradom utvrđen je lijevostrani pleuralni izljev i manji perikardni izljev. Primijenjeno je intravensko antimikrobno liječenje uz parcijalnu drenažu pleuralnog izljeva, nakon čega je uslijedio klinički oporavak.

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Rasprava: Ovaj slučaj ukazuje na mogućnost brze progresije invazivne infekcije uzrokovane bakterijom *Streptococcus pyogenes* od faringitisa do sepse sa sindromom multiorganske disfunkcije kod mladog, prethodno zdravog bolesnika.

Zaključak: Rano prepoznavanje i pravodobno liječenje invazivnih infekcija *beta-hemolitičkim streptokokom grupe A* ključni su za povoljan ishod.

Ključne riječi: hitna medicina; invazivna infekcija; sepsa; sindrom multiorganske disfunkcije; streptococcus pyogenes.

Introduction

Group *A beta-hemolytic streptococcus* (*Streptococcus pyogenes*) is a Gram-positive bacterium most commonly associated with upper respiratory tract infections, particularly pharyngitis, as well as skin and soft tissue infections. Although most infections are mild and self-limiting, invasive group A streptococcal (iGAS) infections remain an important cause of morbidity and mortality worldwide (1,2).

Clinical manifestations of invasive group A streptococcal infection include bacteremia, pneumonia, pleural infections, necrotizing fasciitis, streptococcal toxic shock syndrome (STSS), and multiple organ dysfunction syndrome (MODS) (2,3). Severe disease is associated with several virulence factors, including the M protein and streptococcal pyrogenic exotoxins, which act as superantigens and may trigger an exaggerated systemic inflammatory response, endothelial injury, coagulopathy, and multiple organ dysfunction (3). In recent years, an increase in the incidence of invasive group A streptococcal infections has been reported across several European countries and other developed regions, further emphasizing the importance of early recognition and timely treatment (4,5). Invasive infections may occur in individuals of all ages and with variable risk factors (3).

We report a case of rapidly progressive invasive *Streptococcus pyogenes* infection complicated by pleural empyema, pericardial effusion, sepsis, and multiple organ dysfunction syndrome in a previously healthy young adult.

Invasive *Streptococcus pyogenes* infection may rapidly progress from uncomplicated pharyngitis to sepsis with multiple organ dysfunction syndrome, even in previously healthy adults.

Case report

A previously healthy 28-year-old man with a history of penicillin allergy and active smoking presented to the Emergency Department with a four-day history of fever, sore throat, and vomiting. He had been treated with oral azithromycin in the outpatient setting for presumed streptococcal pharyngitis. One day before admission, he developed pleuritic pain in the left hemithorax radiating to the left shoulder.

On presentation, the patient was fully alert and afebrile (36.5 °C), but markedly tachypneic (respiratory rate 51 breaths/min) and tachycardic (heart rate 130 beats/min), with a blood pressure of 135/75 mmHg and peripheral oxygen saturation of 96% on room air. Physical examination revealed enlarged tonsils without visible exudate. Pulmonary auscultation demonstrated markedly diminished breath sounds over the left lower lung field.

Table 1. Changes in laboratory parameters during hospitalization

Parameter	On admission	During hospitalization	At discharge	Reference range
White blood cell count ($\times 10^9$/L)	11.2	24.4	7.4	3.4–9.7
C-reactive protein (mg/L)	485.4	485.4	66.8	0.2–5.0
Procalcitonin (ng/mL)	38.36	38.36	0.05	<0.10
Platelet count ($\times 10^9$/L)	76	33	432	158–424
Creatinine (µmol/L)	225	225	58	64–104
Urea (mmol/L)	12.2	20.1	<1.8	2.8–8.3
Lactate (mmol/L)	2.9	2.9	1.8	0.5–2.2
D-dimer (µg/L)	>4400	>4400	>4400	<500
Aspartate aminotransferase (AST) (IU/L)	49	49	23	11–34
Alanine aminotransferase (ALT) (IU/L)	114	114	50	9–59
Prothrombin activity (%)	73	115	102	>70
International normalized ratio (INR)	1.16	1.16	0.99	*
Fibrinogen (g/L)	5.8	>8.8	>8.8	1.8–3.5

Laboratory investigations revealed a pronounced systemic inflammatory response characterized by markedly elevated inflammatory markers and lactate levels, thrombocytopenia, acute kidney injury, and coagulation abnormalities. During hospitalization, thrombocytopenia and leukocytosis transiently worsened before inflammatory markers, renal function, and liver enzyme levels gradually normalized. The temporal changes in the main laboratory parameters are presented in Table 1.

Radiological evaluation revealed a left-sided pleural effusion with compressive atelectasis of the adjacent lung parenchyma and findings consistent with pleural empyema, together with a small pericardial effusion without hemodynamic compromise. The chest radiograph obtained on admission is shown in **Figure 1**.

Blood cultures yielded *Streptococcus pyogenes*. According to the antimicrobial susceptibility testing, the isolate was susceptible to the empirically initiated antimicrobial therapy, which was therefore continued. Based on the clinical presentation and laboratory and imaging findings, the patient was admitted to the intensive care unit with a diagnosis of sepsis complicated by pleural empyema (pleural fluid was obtained for biochemical and microbiological analysis), pericarditis, acute kidney injury, and sepsis-induced coagulopathy. The NEWS2 score on admission was 5, indicating an intermediate risk of clinical deterioration. Empirical intravenous antimicrobial therapy with meropenem and clindamycin was initiated together with supportive treatment and low-molecular-weight heparin. Partial drainage of the pleural space was performed. Because of the markedly elevated D-dimer levels, pleuritic chest pain, and tachypnea, pulmonary embolism was initially considered in the differential diagnosis but was excluded by computed tomography pulmonary angiography. Deep vein thrombosis was excluded by duplex ultrasonography of the lower-extremity veins.

During hospitalization, inflammatory markers gradually declined, renal function recovered, and the platelet count normalized. After 24 days of hospitalization, the patient was discharged home afebrile, without respiratory symptoms, and in good clinical condition. At discharge, elevated D-dimer levels persisted, consistent with the recent septic state.

Discussion

This case illustrates the rapid progression from acute pharyngitis to sepsis with multiple organ dysfunction in a previously healthy young adult. The patient fulfilled the *Sepsis-3* criteria for sepsis, presenting with acute kidney injury and coagulation abnormalities. These findings represent organ dysfunction secondary to sepsis and reflect the well-established pathophysiological mechanisms of invasive group A streptococcal infection, including systemic inflammatory response and activation of the coagulation cascade (2,5).

A particularly noteworthy feature of this case was the simultaneous involvement of the pleura and pericardium. Pleural empyema is a rare but well-recognized complication of invasive group A streptococcal infection, whereas pericardial involvement is considerably less common and has mainly been described in isolated case reports (6,7). In our patient, imaging studies demonstrated pleural empyema, while echocardiography revealed a small circumferential pericardial effusion without hemodynamic significance.

Early recognition, prompt antimicrobial therapy, and timely source control are essential for favorable clinical outcomes.

Management of invasive group A streptococcal infection is based on early administration of appropriate antimicrobial therapy and prompt source control. In addition to beta-lactam antibiotics, clindamycin plays an important role because of its ability to inhibit streptococcal toxin production and is therefore recommended in severe invasive disease (2). In the present case, early recognition of sepsis, prompt initiation of antimicrobial therapy, and partial drainage of the pleural empyema resulted in complete clinical recovery.

Conclusion

This case demonstrates that invasive group A streptococcal infection may rapidly progress from apparently uncomplicated pharyngitis to sepsis with multiple organ dysfunction syndrome, even in previously healthy individuals. Early recognition of invasive disease, timely diagnostic evaluation, and prompt initiation of appropriate treatment are essential for achieving a favorable clinical outcome.

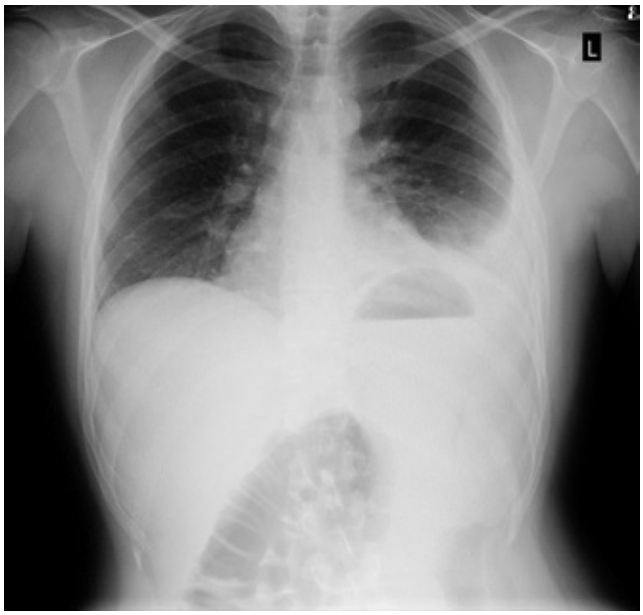

Figure 1. Chest radiograph on admission

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