

CASE REPORT/ OLGU SUNUMU

Pleural Empyema Caused by Streptococcus Constellatus in an Immunocompetent Young Adult: A Case Report

İmmunkompetan Genç Yetişkinde Streptococcus Constellatus'un Neden Olduğu Plevral Ampiyem: Bir Vaka Raporu

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Abstract

Objective: Members of the Streptococcus anginosus group (SAG) are associated with deep-seated and purulent infections. Pleural empyema caused by Streptococcus constellatus is rare and is more commonly reported in immunocompromised individuals. This report describes a case of S. constellatus-associated pleural empyema in a young adult without identifiable predisposing risk factors.

Methods: A 35-year-old male with no history of comorbid disease or immunosuppression presented with progressive dyspnea and pleuritic chest pain. Laboratory investigations revealed leukocytosis and elevated inflammatory markers. Thoracic computed tomography demonstrated loculated pleural fluid collections in the right hemithorax. Initial management consisted of tube thoracostomy. Due to insufficient drainage and incomplete lung expansion, video-assisted thoracoscopic surgery (VATS) was performed. Pleural fluid samples were obtained for microbiological analysis.

Results: Intraoperatively, dense fibrinous septations and abundant purulent material were observed, and loculations were disrupted to achieve adequate drainage and pleural cavity irrigation. Pleural fluid culture yielded Streptococcus constellatus, while blood cultures were negative. Antibiotic therapy was adjusted according to the antibiogram results. During follow-up, marked clinical and radiological improvement was observed without the development of systemic sepsis.

Conclusions: Although uncommon, S. constellatus can cause invasive and organized-phase empyema even in immunocompetent individuals. In cases of loculated or treatment-resistant pleural infection, SAG members should be considered as potential pathogens, and management should include timely surgical intervention combined with culture-guided targeted antimicrobial therapy.

Keywords: Streptococcus constellatus, Pleural empyema, Video-assisted thoracoscopic surgery

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Öz

Amaç: Streptococcus anginosus grubu (SAG) üyeleri derin yerleşimli ve pürülan enfeksiyonlarla ilişkilidir. Streptococcus constellatus'a bağlı plevral ampiyem nadir görülmekte olup çoğunlukla immünsuprese bireylerde bildirilmektedir. Bu çalışmada, altta yatan belirgin risk faktörü bulunmayan genç bir erişkinde gelişen S. constellatus ilişkili plevral ampiyem olgusunun sunulması amaçlandı.

Yöntem: Streptococcus anginosus grubu (SAG) üyeleri derin yerleşimli ve pürülan enfeksiyonlarla ilişkilidir. Streptococcus constellatus'a bağlı plevral ampiyem nadir görülmekte olup çoğunlukla immünsuprese bireylerde bildirilmektedir. Bu çalışmada, altta yatan belirgin risk faktörü bulunmayan genç bir erişkinde gelişen S. constellatus ilişkili plevral ampiyem olgusunun sunulması amaçlandı.

Bulgular: VATS sırasında fibrinöz septasyonlar ve yoğun pürülan materyal izlendi; lokülasyonlar açılarak plevral boşluk irrigasyonu ve drenajı sağlandı. Plevral sıvı kültüründe Streptococcus constellatus izole edildi, kan kültürleri negatifti. Antibiyogram sonucuna göre hedefe yönelik antibiyotik tedavisi düzenlendi. İzlem sürecinde klinik ve radyolojik olarak belirgin düzelme saptandı ve sistemik sepsis gelişmedi.

Sonuç: S. constellatus nadir görülmekle birlikte immünsupresyonu olmayan bireylerde dahi invaziv ve organize faz ampiyeme yol açabilmektedir. Loküle ve tedaviye dirençli plevral enfeksiyonlarda SAG üyeleri etken olarak düşünülmeli; zamanında cerrahi girişim ve kültüre dayalı hedefe yönelik antimikrobiyal tedavi planlanmalıdır.

Anahtar Kelimeler: Streptococcus constellatus, Plevral ampiyem, Video yardımcı torakoskopik cerrahi

INTRODUCTION

The Streptococcus anginosus group (SAG) comprises S. anginosus, S. intermedius, and S. constellatus. These microorganisms are commensals of the oropharyngeal, gastrointestinal, and genitourinary flora (1,2). However, they may be isolated as pathogens particularly in cases characterized by purulent infections and abscess formation (3). A distinctive feature of SAG members is their propensity to cause deep-seated and destructive infections (2,3).

Among SAG species, S. anginosus is more frequently reported, whereas S. constellatus is less commonly described in thoracic infections. Clinical analyses of lung abscesses caused by S. constellatus have demonstrated that the infection may be associated with marked parenchymal destruction and the development of complications (4). These findings suggest

that this microorganism can, in certain cases, result in a more invasive and aggressive clinical course than previously anticipated (3,4).

Invasive infections due to S. constellatus have also been reported in individuals without underlying immunosuppression (5). Similarly, empyema cases occurring in young adults without significant comorbidities have identified this organism as the causative agent (6). Collectively, these data indicate that although uncommon, members of the SAG can be clinically significant pathogens capable of causing potentially invasive pleural infections (5,6).

Herein, we present a case of S. constellatus-associated pleural empyema in a young adult patient without any identifiable predisposing risk factors.

CASE PRESENTATION

A 35-year-old male presented with progressive dyspnea and pleuritic chest pain. His medical history was unremarkable for diabetes mellitus, malignancy, alcohol dependence, chronic lung

disease, or immunosuppression. Laboratory evaluation revealed leukocytosis and elevated inflammatory markers. Thoracic computed tomography demonstrated loculated pleural fluid collections and pleural thickening (Figure 1).

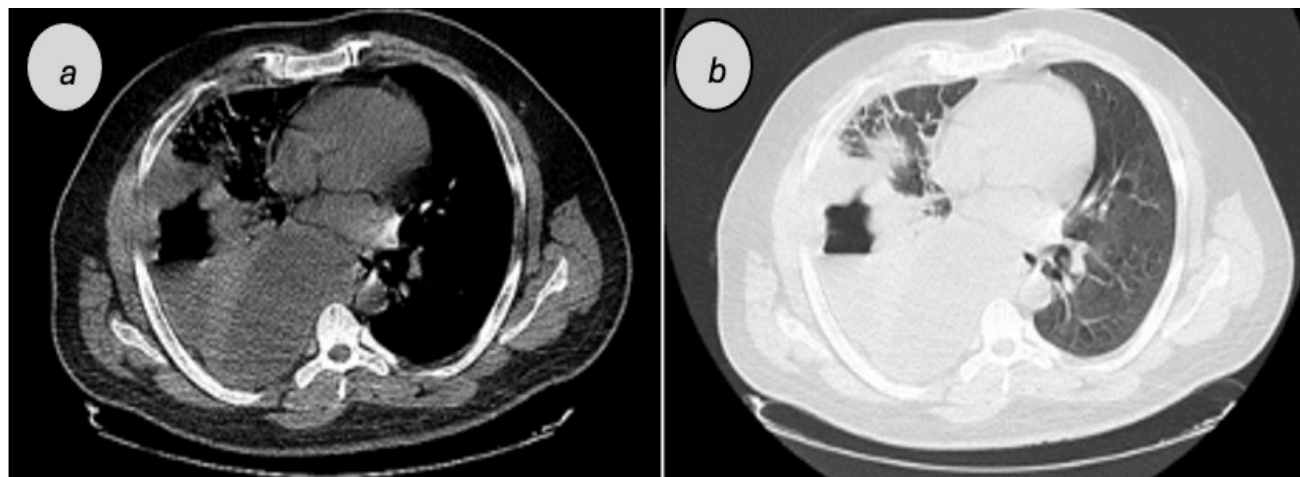


Figure 1. Thoracic computed tomography demonstrating multiloculated pleural fluid collections in the right hemithorax with marked pleural thickening and focal air–fluid levels; (1a) mediastinal window and (1b) parenchymal window

Initial management included tube thoracostomy. Empirical antibiotic therapy with intravenous ceftriaxone and clindamycin was initiated at admission. During follow-up, drainage was insufficient and full lung re-expansion was not achieved. Consequently, video-assisted thoracoscopic surgery (VATS) was performed (Figure 2). Intraoperatively, fibrinous septations and dense purulent material were observed; loculations were disrupted, and pleural cavity irrigation and adequate drainage were achieved. A thick fibrotic layer was noted on the visceral pleural surface. In the postoperative period, intrapleural alteplase (Actilyse®) was administered through the chest tube, and daily drain irrigations were performed.

Pleural fluid specimens were cultured on blood agar. The isolated microorganism was identified as *Streptococcus constellatus* using an automated microbiological identification system (Figure 3). Antimicrobial susceptibility testing revealed susceptibility to benzylpeni-

cillin, cefotaxime, ceftriaxone, levofloxacin, and ampicillin, while resistance to erythromycin and clindamycin was detected. Blood cultures were negative. After the susceptibility results demonstrated resistance to clindamycin, clindamycin was discontinued and treatment was continued with ceftriaxone according to the susceptibility profile. During follow-up, both clinical and radiological improvement were observed, and no signs of systemic sepsis developed.

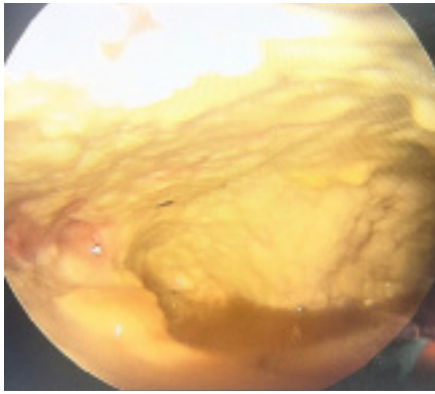


Figure 2. Intraoperative thoracoscopic view during video-assisted thoracoscopic surgery (VATS) demonstrating dense fibrinous septations and abundant purulent material within the pleural cavity.

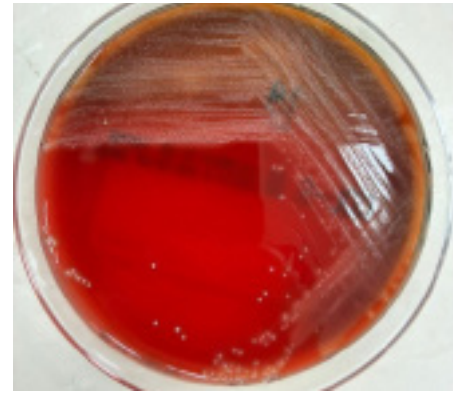


Figure 3. Growth of *Streptococcus constellatus* colonies on blood agar following incubation of the pleural fluid specimen, demonstrating small, round, gray-white appearing colonies.

DISCUSSION

Empyema is most commonly associated with *Streptococcus pneumoniae*, *Staphylococcus aureus*, and anaerobic microorganisms (7). Although members of the *Streptococcus anginosus* group (SAG) play a more limited role in the etiology of empyema, they have been increasingly reported in recent years, particularly in deep-seated purulent infections (8).

The pathogenicity of *S. constellatus* has been attributed to factors such as capsular structure, extracellular enzyme production, and properties that facilitate fibrin deposition (3,9). These biological characteristics may explain the organism's tendency to cause septated and localized infections. Indeed, cases of lung abscess and complicated pleural infections have demonstrated significant local tissue destruction associated with this pathogen (4).

A considerable proportion of reported cases involve patients with immunosuppression or significant comorbidities (4,8). However, invasive infections in immunocompetent individuals have also been described (5,6). This observation suggests that *S. constellatus* should not be regarded solely as an opportunistic pathogen, as it is capable of causing clinically significant infections even in otherwise healthy hosts under appropriate conditions.

Empyema typically progresses through three stages: exudative, fibrinopurulent, and organized phases. In the organized phase, pleural thickening and fibrin deposition may restrict lung expansion and, in some cases, necessitate surgical decortication. However, timely intervention with video-assisted thoracoscopic surgery (VATS), including disruption of loculations and clearance of the pleural cavity, may reduce the need for more extensive surgical procedures (10).

This case highlights that *S. constellatus* is not merely a commensal organism but can lead to invasive and septated pleural infections under suitable conditions. The abscess-forming capacity and fibrin-promoting biological properties of SAG members may account for localized yet potentially complicated infectious processes (3,9). Therefore, in cases of loculated or treatment-resistant empyema, *S. constellatus* and other SAG members should be considered as potential pathogens, and management should rely on accurate microbiological identification with culture- and antibiogram-guided targeted antimicrobial therapy.

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Conflict of interest statement:

The authors declare that they have no conflicts of interest related to this manuscript.

A part of this study has been submitted for presentation as a poster entitled "Organized

Pleural Empyema Caused by *Streptococcus constellatus* in a Young Adult Without Underlying Immunosuppression” at the 42nd Turkish Microbiology Congress (XLII. Mikrobiyoloji Kongresi) held in Antalya, Türkiye, and is currently under review.

Author Contributions:

EZ: Conceptualization, Methodology, Supervision, Formal Analysis, Data Curation, Investigation, Writing – Original Draft, AK; Methodology Supervision, Resources, Formal Analysis, Writing – Review & Editing, İK; Resources Formal Analysis, Writing – Review & Editing

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