CASE REPORT

Rapid developing empyema by group F beta *Streptococcus anginosus* group

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SUMMARY

A 43-year-old male had progressive pleuritic left-sided chest tightness with shortness of breath. He had dental caries and tenderness on palpation of the left lateral chest. Complete blood count showed leucocytosis. CT scan of the chest with pulmonary emboli protocol showed multiple pulmonary nodules and nodular pleural thickening at left posterior lateral pleura. Forty-eight hours post CTPE scan, CT scan of the chest, abdomen and pelvis displayed right lower lobe consolidation and left-sided pleural effusion with superimposed compressive atelectasis. Ceftaroline intravenous was initiated, with CT-guided pigtail chest tube insertion. Pleural fluid later grew group F beta-haemolytic *Streptococcus anginosus*. Patient improved significantly and was discharged 11 days later with intravenous ertapenem. Patients with group F beta-haemolytic streptococci should be managed aggressively with early and accurate diagnosis, antibiotics, drainage and possible surgery.

BACKGROUND

Pleural empyema is a collection of purulent fluid in the pleural cavity.^{1,2} Predisposing factors linked with empyema include preceding bacterial pneumonia (most common), mucosal disturbance (sinusitis, periodontal disease, enteric disease such as oesophageal perforation), lung abscess, postsurgical complications, neurological disease, alcohol abuse or diabetes.^{1,3} Risk factors for empyema include age (among children and elderly), male sex, pneumonia requiring hospitalisation and comorbid diseases.^{2,4} Group F streptococci generally fall into the *Streptococcus anginosus* group (SAG).⁵ This infection is caused by uncommon group of bacteria. It can cause other serious infections including endocarditis, myocardial abscess, wound infection and meningitis. SAG reportedly causes thoracic infections such as empyema.⁶ One-fifth of SAG infections involve the chest, and empyema is the most common manifestation.^{7–9} Patients with empyema have a reported mortality rate of 5%–30%.⁴ This is a case of empyema which developed in 48 hours rather than the typical 2–3 weeks by SAG.

CASE PRESENTATION

This is a case of a 43-year-old male with a history of chronic back pain post discectomy and neurostimulator placement. He had progressive pleuritic left-sided chest tightness with shortness of breath for 5 days and was treated with prednisone and albuterol

inhaler 2 weeks prior to admission. He was an active smoker of 35 pack years with no previous history of chronic obstructive pulmonary disease (COPD). Chest X-ray displayed no acute cardiopulmonary disease. Two days later, his symptoms progressed.

INVESTIGATIONS

On examination, the patient had moderate distress, with blood pressure of 140/90, heart rate of 90, respiratory rate of 17 and temperature of 97.2 Fahrenheit. He had dental caries and tenderness on palpation of the left lateral chest. Complete blood count showed leucocytosis with normal distribution. Liver function tests were slightly elevated with alanine aminotransferase of 105, aspartate aminotransferase of 58 and alkaline phosphatase of 108. CT scan of the chest with pulmonary emboli protocol (CTPE) showed multiple pulmonary nodules (two largest nodules in image) and nodular pleural thickening at left posterior lateral pleura (figure 1A,B). At this point, malignancy was suggested from gastrointestinal/genitourinary origin and leucocytosis was attributed to prednisone use. Forty-eight hours post CTPE scan, repeated CT imaging was performed and IR-guided right middle lobe nodule biopsy displayed new right lower lobe consolidation and left-sided pleural effusion with superimposed compressive atelectasis (figure 1C,D). Figure 2 shows mediastinal view of CT chest.

DIFFERENTIAL DIAGNOSIS

Diagnosis was shifted to rapid pleural effusion secondary to infectious aetiology. Patient began coughing out sputum, with pleuritic chest pain and crackles on the left lower lung fields. Pleural fluid was hazy and yellowish in hue, showing pH of 7.39 and glucose of 62 mg/dL. Laboratory results included serum-effusion albumin gradient of 0.5, pleural fluid protein to serum protein ratio of 0.8, pleural fluid lactate dehydrogenase (LDH) to serum LDH ratio of 5.8 and pleural fluid LDH of 960 IU/L with serum LDH of 166 IU/L—all of which suggested exudative nature of the pleural fluid. Pleural fluid later displayed group F beta haemolytic streptococci. Initially, gram staining was done, which displayed a positive result. It was placed on both aerobic and anaerobic blood culture mediums, then on a Bactec machine at 37°C and then plated under chocolate blood agar, MacConkey agar and CDC anaerobic blood agar (CABA). The result came out positive for chocolate blood and CABA. S.

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Figure 1 CT abdomen, chest, pelvis: before and after. (A, B) Images of the first CT scan from different cuts. (C, D) Images 48 hours after the first CT scan. C approximates A cut, while D approximates B cut. Comparison of C and D against A and B shows development of loculated effusions in a matter of 48 hours. The arrows indicated in B and D are pulmonary nodules.

anginosus was suspected to be the species because of the patient's previously reported lung infections.

TREATMENT

Initially, the patient was started on ceftaroline 600mg every 12 hours to cover the streptococcus infection and methicillin-resistant *Staphylococcus aureus*. The patient underwent CT-guided

Figure 2 CT chest (mediastinal window). (A) (on the left) CT chest mediastinal view performed to rule out pulmonary embolism. (B) (on the right) CT chest, abdomen and pelvis performed to rule out primary malignancy. Lower part of the chest showed interval change on the left lower lung in 2 days span of time.

Learning points

- ▶ One-fifth of *Streptococcus anginosus* group infections involve the chest, and empyema is the most common manifestation.
- ▶ Patients with empyema have a reported mortality rate of 5%–30%.
- ▶ Formation of empyema occurs in three stages: the exudative stage, the fibrinopurulent stage and the final stage which produces a thick pleural peel forming into empyema.
- ▶ To successfully manage empyema, penicillin is the preferred antibiotic, with early and complete drainage of infected fluid.
- ▶ Formation of empyema usually develops in weeks but in rare instances it can develop very rapidly. Rapid response prevents progression to pneumonia and development of a parapneumonic effusion.

pigtail chest tube insertion and subsequently the sensitivity showed that the microorganism was resistant to clindamycin, erythromycin and tetracycline. The organism was sensitive to cefotaxime, penicillin and vancomycin. Minimum inhibitory concentration assay was not determined as concentration cannot be performed. Due to the loculated nature of the pleural effusion, bronchoscopy followed by left video-assisted thoracoscopic surgery and complete decortications with chest tube insertion were performed.

OUTCOME AND FOLLOW-UP

The patient improved significantly and was discharged 11 days later with intravenous ertapenem. Ertapenem was chosen because of the patient's questionable history of allergies with penicillin and because ertapenem has very low cross-reactivity with penicillin.¹⁰ Ertapenem can be administered once daily, and although it is not an ideal choice of antibiotic, it was given to the patient to avoid compliance issues.¹⁰ One month post discharge, the patient was completely relieved of symptoms and in good health.

DISCUSSION

Despite several descriptions of body abscesses by SAG, empyema caused by this group remains under-reported. Formation of empyema has three stages: the first stage occurs 2–5 days from untreated pneumonia, second stage occurs 5–10 days after untreated effusion collection and if untreated for 10–21 days, the final stage produces a thick pleural peel to prevent the lungs from re-expanding, thus forming empyema.^{1–4} Mean time for pus formation in SAG infections is 18 days.¹¹ Other reports found that empyema developed 4–6 weeks after onset of aspiration of bacteria into the lungs.⁴ In our case, empyema developed in 2 days. For successful management of empyema, 0.1 g/mL of penicillin is the preferred antibiotic, with early and complete drainage of infected fluid.^{3–12} Drainage is usually performed in closed methods, but open surgical drainage may be needed due to chest tube failure or late presentation.³ A recent study showed that small (<14 F) drainage catheters were effectively used to manage infected pleural fluid collections.¹ For surgical treatment, thoracotomy is usually required, with one study showing about 81% of patients cured.⁷ Procedures including sputum culture, transtracheal aspiration and percutaneous lung needle aspiration were used to find the pathogens involved in pneumonia and pulmonary abscess.¹³ Although the incidence of empyema by SAG is low, infections are linked with high morbidity and mortality, and thus patients should be managed aggressively with early and accurate diagnosis, antibiotics, drainage and possibly surgery.³

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Contributors All authors contributed equally to the making of this manuscript. DP and PSS worked with the patient and composed the first draft of the case. MA and AM worked on the second draft and finalised it.

Patient's perspective

- ▶ I came to the hospital with chest pain and back pain. I had no idea what was going on. They diagnosed my disease at the right time and gave me proper antibiotics. I feel much better now with the antibiotics. I am very pleased to all the staff of Monmouth Medical Center.

Competing interests None declared.

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