

MRSA SEPTIC EMBOLI COMPLICATED WITH PYOPNEUMOTHORAX IN A CASE OF AN INTRAVENOUS DRUG ADDICT WITH INFECTIVE ENDOCARDITIS - A CASE REPORT

Li-Chen Lin¹, Agatha Te¹, Chi-Wei Tao², Ming-Sung Yang³,
Kuo-Chen Lee⁴, Wein-Shung Kuo^{1,5}

Abstract

We report a case of pyopneumothorax as a complication of infective endocarditis with septic emboli in an intravenous (IV) drug addict. A 23-year-old female heroin addict was admitted to our hospital due to complaints of blood stained sputum combined with fever and chills. Blood culture reports in the emergency department and intensive care unit were persistently positive for methicillin-resistant *Staphylococcus aureus* (MRSA). Doppler echocardiography demonstrated severe tricuspid valve regurgitation with vegetation, so the tricuspid valve was repaired with Edwards S. A. V. prosthesis. Repeated attacks of pyopneumothorax and respiratory failure occurred during the hospital course. Decortication and lobectomy were performed and the patient was eventually discharged in stable condition.

Pyopneumothorax is an unusual complication in infective endocarditis (IE) with septic emboli but must be considered in patients who developed respiratory distress.

Key words: Infective endocarditis, Intravenous drug addict, MRSA, Pyopneumothorax, Septic emboli

Case Report

A 23-year-old female heroin addict came to the emergency department complaining of blood stained sputum with fever and chills for ten days. Her body temperature was 39°C, with a respiratory rate of 24/min; blood pressure was 110/63 mmHg and heart rate 138/min. Crackles

were noted over the whole lung field and multiple puncture marks were noted over both upper arms.

Laboratory data revealed an elevated white blood cell count ($17.1 \times 10^9/L$) with a left shift, anemia (hemoglobin 8.4 g/dl) and thrombocytopenia (Platelet count $58 \times 10^9/L$). The coagulation profile was within normal limits; BUN 18 mg/dl and creatinine 1.0 mg/dl. High sensitivity

Correspondence: Dr. Li-Chen Lin

Medical Intensive Care Unit, Cheng-Hsin Rehabilitation Medical Center, No. 45, Cheng-Hsin Road, Pei-Tou District, Taipei City 112, Taiwan

Phone: 886-2-2826-4400 ext.6516; E-mail: sandyinsein@yahoo.com.

Medical Intensive Care Unit¹, Division of Chest Medicine, Department of Internal Medicine², Division of Chest Surgery, Department of Surgery³, Division of Cardiovascular Surgery, Department of Surgery Heart Center⁴, Department of Anesthesiology⁵, Cheng-Hsin Rehabilitation Medical Center

CRP was 22.91 mg/dl (normal value < 0.80 mg/dl). The serological test for syphilis was non-reactive, and HBsAg, anti-HCV, and anti-HIV (I and II) were negative. Doppler echocardiography at the bedside showed severe tricuspid regurgitation with valve vegetation. The heart chamber was within normal size and both ventricular functions were preserved (EF >55%). A chest x-ray showed multiple small bilateral patchy infiltrations with pneumatocele and cavitations. There was a localized pneumothorax on the left lung and pleural effusion on the right. Chest ultrasonography confirmed pleural effusions bilaterally and computed tomography of the chest demonstrated multiple bilateral nodules with thin walled cavities and bilateral pleural effusions (Fig. 1a and 1b). Diagnostic thoracentesis yielded exudative pleural fluid. On the third hospital day, bilateral pyopneumothoraces were noted and a pig-tail was inserted to both sides (Fig. 2). On the tenth hospital day, the patient pulled out the pig-tail from her left chest; however, a follow-up chest x-ray showed no further pneumothoraces.

Unfortunately on the following day, the patient had a sudden cardiac arrest and cardiopulmonary resuscitation was done. A left tension pneumothorax was found on the chest x-ray and severe subcutaneous emphysema developed (Fig. 3), so an emergent pig-tail insertion was performed and the patient was connected to the

mechanical ventilator. A few days later, chest tube close drainage was done after removal of the pig-tail due to poor function. At the same time, another pig-tail was inserted on the right hemithorax for repeated pyopneumothorax (Fig. 4).

After admission, intravenous vancomycin 500mg every 6 hours was started and intravenous gentamycin 80mg every 12 hours was added for two weeks as combination therapy. Blood cultures isolated the MRSA sensitive to vancomycin, linezolid, teicoplanin, trimethoprim-sulfamethoxazole, levofloxacin and moxifloxacin. After one month, due to persistent fever and a positive yield of MRSA in the blood culture, vancomycin was shifted to intravenous teicoplanin 200mg every 12 hours.

On the thirty-first hospital day, a chest surgeon performed a decortication and wedge resection of the lung abscesses over the left upper and lower lung. On the thirty-fifth hospital day, an opposite right lung abscess with necrosis of right lower lung was found, so a lobectomy of the right lower lung was also performed.

Follow-up Doppler echocardiography showed severe tricuspid valve regurgitation with an increase in the size of the vegetation on the tricuspid valve. Both ventricular functions were normal (EF > 55%) but the right atrium was dilated to about 45mm. Therefore on the forty-fifth hospital day,

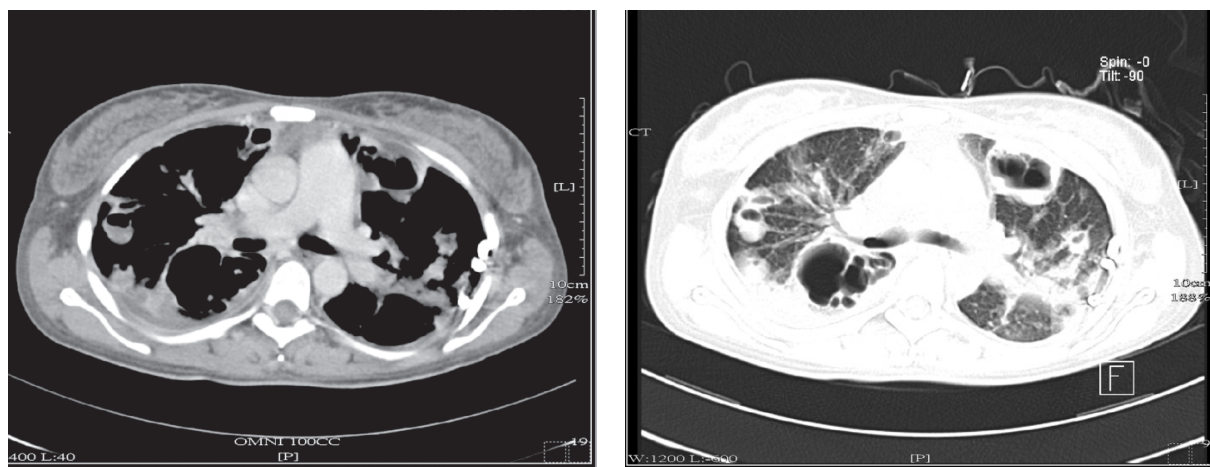


Fig. 1a (contrasted mediastinal window) and 1b (lung window) computed tomography of chest disclosed multiple cavitary lesions with irregular walls in both lungs.

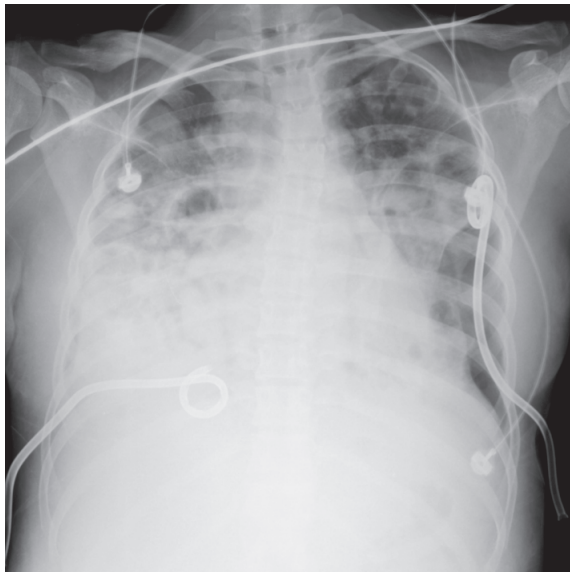


Fig. 2. Chest x- ray showed bilateral pyopneumothorax with pig-tail insertion.

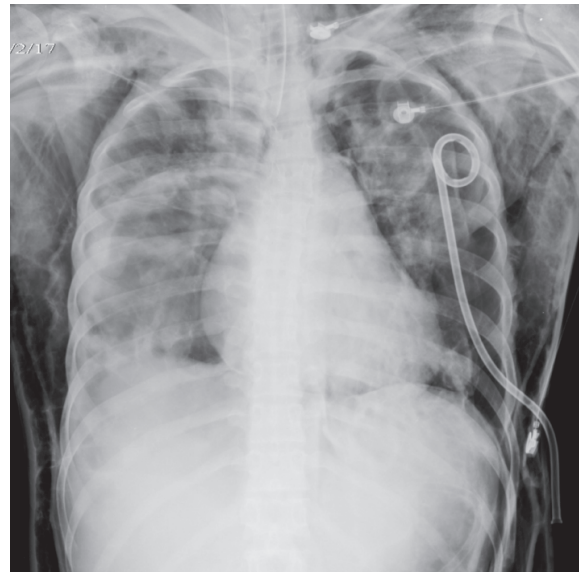


Fig. 3. Chest x-ray revealed severe subcutaneous emphysema status post pig-tail drainage.

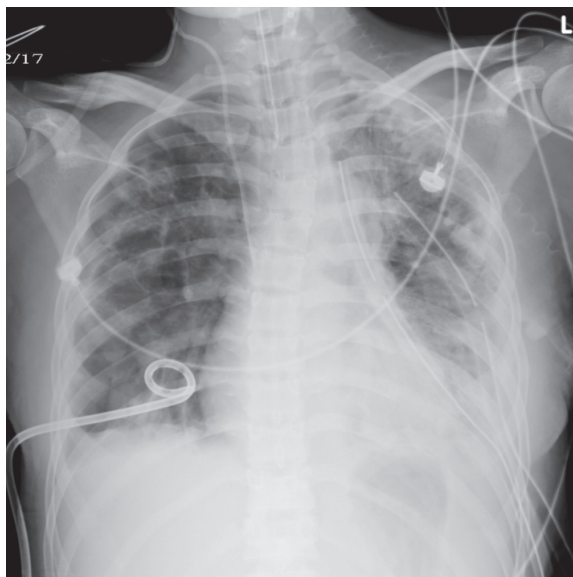


Fig. 4. Chest x-ray showed pyopneumothorax with chest tubes insertion on the left hemithorax and pig-tail insertion on the right hemithorax.

she underwent tricuspid valve annuloplasty with Edwards S. A. V. tissue 33mm after debridement of the vegetation. Resection of the anterior and posterior leaflets was likewise done. The pathology report of the tricuspid valve biopsy revealed

valve tissue with vegetation containing fibrin, acute inflammatory cells and bacteria.

A series of sputum and pleural fluid cultures yielded MRSA and the blood cultures in both the emergency department and intensive care unit also grew MRSA. The postoperative hospital course was uneventful. Subsequent blood cultures were all negative. After 88 days of hospitalization, the patient was discharged in stable condition.

Discussion

Multiple acute or chronic pulmonary sequelae may occur in septic emboli from IV drug addicts resulting from the drug properties itself, contamination, or complications of route of administration. These complications include talcosis, emphysema, pneumonia, septic emboli secondary to right-sided endocarditis, aspiration, pulmonary edema, pulmonary hemorrhage, mycotic aneurysms, pulmonary hypertension and pneumothorax.¹

IE is one of the most serious complications in IV drug addicts. Although *Streptococcus viridans* is the most common cause of IE overall, the

majority of IE patients among IV drug addicts are infected with *Staphylococcus aureus*.^{2,3} Frontera and Gradon hypothesize that IV drug addicts patients exhibit a greater expression of matrix molecules that bind to microbial surface components recognizing the adhesive matrix molecule on the right-side of the valvular surface, predisposing these valves to increased *S.aureus* adherence.^{3,4}

Septic pulmonary emboli may have a cardiac origin, as in damaged and infected heart valves, resulting in multiple small or large nodules, cavities, abscesses, infarction and pulmonary gangrene. This can originate in the peripheral veins of thrombophlebitis near the injection site. Lesions that extend to involve the pleura will result in empyema, bronchopleural fistula and spontaneous pneumothorax. Self-injection into the jugular or subclavian vein may also induce iatrogenic pneumothorax.⁵ Sheu et al. reviewed the four cases of pneumothorax in heroin addicts and found that the pneumothorax was located bilaterally in half of the cases. The associated pleural exudate was sterile in two cases and purulent in the other two.⁶

In recent years, there have been several reports of IE due to the involvement of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) that is found in young and healthy populations with no known risk factors for the acquisition of IE.⁷ The majority of CA-MRSA infections have been skin and soft tissue infections, and most common dermatologic conditions seen were abscesses, cellulitis, folliculitis, and impetigo.⁸ These strains have a common pulsed-gel electrophoresis pattern, possess different exotoxin gene profiles (e.g., Panton-Valentine Leucocidin, PVL) and harbor Type IV staphylococcal cassette chromosome *mec*.^{9,10} Lina et al.¹⁰ reported that PVL genes produce cytotoxins that can cause tissue necrosis and leukocyte destruction, and are associated with staphylococcal skin infections and necrotizing pneumonia.⁸ The combination of CA-MRSA in skin lesions and skin trauma through intravenous drug injection may present a new susceptible popu-

lation for acquisition of CA-MRSA IE.⁹ However, the clinical significance of the PVL gene in IE needs further study and routine screening is not recommended. So screening for PVL genes was not performed in our case.

The antibiotic management of CA-MRSA IE requires a similar approach to treatment as MRSA IE, as a result of the resistance of CA-MRSA to β -lactam agents. Although CA-MRSA tends to be more susceptible to antibiotic agents than healthcare-associated MRSA, treatment should follow current international guidelines as described by the British Society for Antimicrobial Chemotherapy,¹¹ the European Society for Cardiology¹² and the American Heart Association.^{7,13}

Indication for surgery depends on several clinical variables. According to ACC/AHA guidelines, valve stenosis or regurgitation leading to heart failure is one of the indications for surgery in patients with native valve endocarditis. Recurrent emboli and persistent vegetation despite appropriate antibiotic therapy is a favor of surgery in these patients.¹⁴

The important determinants of early outcome of surgery for IE are the general condition and the hemodynamic status of the patients prior to surgery. Other factors might include stroke, renal failure and pulmonary complications that were present prior to surgery. Early referral for surgery is important in minimizing mortality in these patients, however, the assessment of the significance and severity of complications and the timing of referral for surgery remain subjective to substantial extent. Abstinence from drugs and social rehabilitation may be an important determinant of long-term outcome in IV drug addicts who undergo surgery for IE.¹⁵

In our case, the tricuspid valve was infected with CA-MRSA and complicated with septic emboli causing multiple small lung abscesses and pyopneumothorax. Antibiotic therapy, chest tube drainage and surgical intervention saved the life of our patient. The risk of HIV and hepatitis was low because she never shared needles or syringes.

In conclusion, pyopneumothorax could be

a life threatening complication of septic pulmonary emboli in an IV drug addicted patient with IE. We must therefore be alert to such complications when a drug addict is admitted in critical condition.

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靜脈毒癮者之金黃色葡萄球菌心內膜炎合併敗血性肺栓塞及膿氣胸 -- 個案報告

林麗真¹，戴佩玲¹，陶啓偉²，楊明松³，
李國禎⁴，郭文雄^{1,5}

摘要

我們提出的病例為靜脈毒癮患者中因感染性心內膜炎合併敗血性肺栓塞引發膿氣胸症。一位海洛因成癮之二十三歲女性病患因咳血、發燒、寒顫而入院治療，胸部X光片表現為典型之兩側周邊多發性浸潤併空洞及肋膜積液，血液培養報告為金黃色葡萄球菌。心臟超音波檢查發現，心臟三尖瓣膜閉鎖不全及三尖瓣膜之贅生物。住院中陸續發生膿氣胸之情形，抗生素治療併外科手術治療包括：肺葉切除及瓣膜置換術，病患情況穩定後順利出院。

心內膜炎發生敗血性肺栓塞併發膿氣胸症並非常見，但可能造成嚴重病情惡化，臨床醫師應提高警覺查出這些併發症及立即給予適當處置。

關鍵詞：感染性心內膜炎，靜脈毒癮者，金黃色葡萄球菌，膿氣胸症，敗血性肺栓塞

聯絡人：林麗真醫師

112 台北市北投區振興街 45 號，振興醫院內科加護中心

電話：02-2826-4400 轉 6516；E-mail：sandyinsein@yahoo.com

振興復健醫學中心內科加護中心¹，內科部胸腔內科²，外科部胸腔外科³，心臟醫學中心⁴，麻醉科⁵