

# Spontaneous lung pneumatocele in an adult with community-acquired pneumonia

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Pulmonary pneumatoceles are thin-walled, air-filled cystic lesions occurring in lung parenchyma. They occur as a sequelae to bacterial infections of the lung, especially bronchopneumonia. They are commonly seen in infants and children. In this article, we report a rare case of pneumatoceles in a 40-year-old adult following staphylococcal community-acquired pneumonia.

## Keywords:

community acquired pneumonia, Cyst, pneumatocele, staphylococcus

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## Introduction

Pulmonary pneumatoceles are acquired, thin-walled, air spaces in lung parenchyma [1]. Infection plays the most important role in the pathogenesis of pneumatoceles, but noninfectious causes such as hydrocarbon ingestion, trauma, and positive-pressure ventilation have also been observed [2]. Pneumatoceles are common in infants and young children with pneumonia, but unusual in adults [3]. The most common presentation is multiple, thin-walled, cavitary cysts; however, a single emphysematous lesion has also been observed. Pneumatocele sequelae are pneumothorax and secondary infection. Seventy percent cases of pneumatocele occur in infants, and *Staphylococcus* spp. is the most common causal agent followed by pneumococcus [4].

## Case summary

A 40-year-old male farmer presented to our emergency department with a 4-week history of fever and cough. His fever was of intermittent type and high grade associated with chills and rigors. His cough was productive and associated with yellowish-colored sputum. The patient also reported breathlessness since the past 7 days and one episode of mild hemoptysis on day of presentation.

General examination was unremarkable except for mild pallor. He was febrile and tachypneic on admission. On chest auscultation, amphoric breath sounds were present. The right interscapular and infrascapular area had coarse crackles in the left hemithorax. Rest of the systemic examination was not significant. His white blood cell count was  $14\,230/\text{mm}^3$  (neutrophil, 95%, lymphocyte, 5%) and platelet count  $82\,000/\text{mm}^3$ . Routine viral markers for HIV, HCV, and HbsAg were nonreactive. His arterial blood gas analysis was consistent with type 1

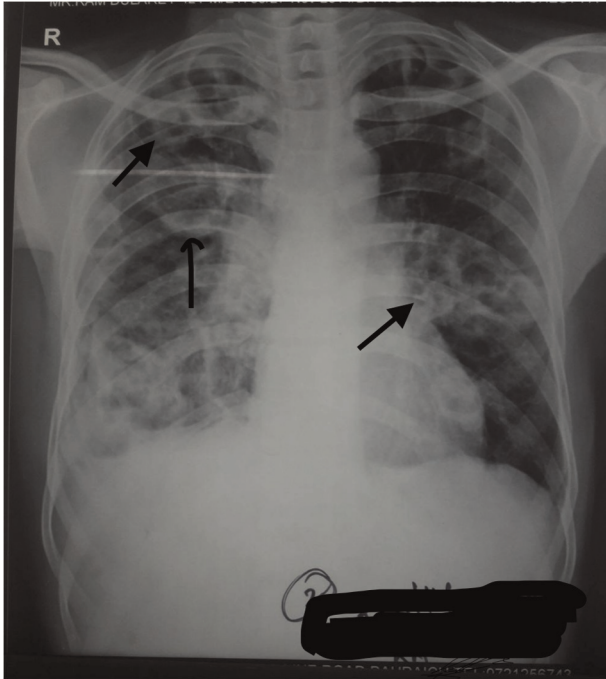
respiratory failure. On admission, a chest radiograph (Fig. 1) revealed consolidation in the right upper lobe of the lung with multiple cavities in the right middle lobe and multiple cysts in left middle lung. The differential diagnosis of such a radiograph would be multiple pneumatoceles, bulla, or lung abscess in hemithorax. Our case did not reveal any bowel sounds in the thorax, and moreover it was on right side; therefore, a possibility of bowel herniation was less. In view of the clinical picture, our first diagnosis was staphylococcal pneumonia with multiple pneumatoceles. Sputum examination demonstrated gram-positive cocci in clusters. Intravenous ceftriaxone plus saulbactam and azithromycin were administered for 3 days, but the patient did not respond symptomatically. Therefore, we started treatment with piperacillin tazobactam and vancomycin for the next 14 days. The patient improved with antibiotics and intravenous fluids. After 2 weeks of therapy, his chest radiography (Fig. 2) showed radiological improvement.

## Discussion

Pneumatoceles mostly occur in 61% of cases of staphylococcal pneumonia. The most important mechanism behind the formation of pneumatoceles is perforation of an abscess into the bronchial wall, thus allowing air to enter the abscess cavity. A check-valve mechanism due to obstruction by inflammation and edema creates tension produced by the trapped air. Pneumatoceles usually appear within the first week of pneumonia, and disappear by an average of 6 weeks.

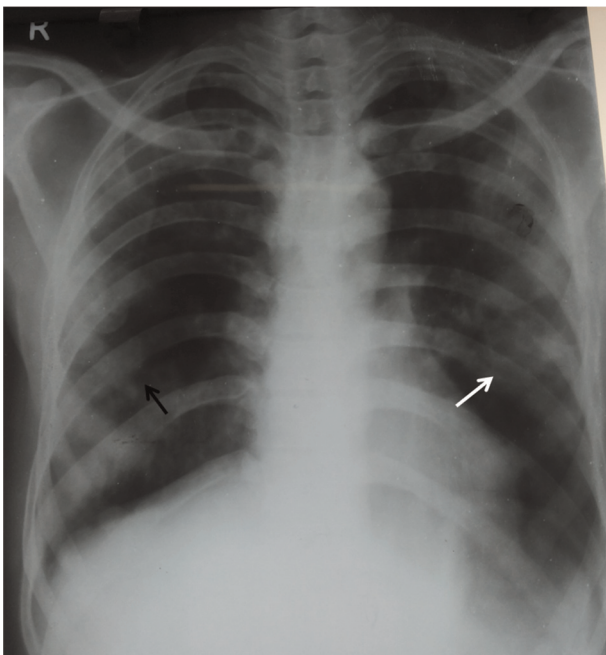
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Figure 1



Chest Xray PA view showing fully developed Pneumatocele in both lung. (black arrow)

Figure 2



Chest X-ray PA view after two week of therapy demonstrating resolved air filled cyst suggestive of Pneumatocele (white arrow)

Surgical intervention is necessary only when pneumatoceles grow large enough to cause cardiorespiratory distress by compression or by rupture into the pleural space. Staphylococcal pneumonia with pneumatoceles is common in children but uncommon in adults.

The initial event in the formation of pneumatocele is inflammation and narrowing of the bronchus, leading to the formation of an endobronchial ball valve that leads to distal dilatation of the bronchi and alveoli. The obstruction is believed to be caused by inflammatory exudates within the airway lumen or wall, allowing air to enter the cystic space but not to leave it. Pulmonary pneumatoceles are formed initially by drainage of necrotic lung parenchyma and subsequent enlargement of the pneumatocele caused by check-valve bronchiolar obstruction, which is due to either pressure from the adjacent pneumatocele or intraluminal inflammatory exudates. They can be single but are more often multiple, thin-walled, air-filled, cyst-like cavities or 'ring shadows' greater than 1 cm in diameter with walls less than 4 mm and of uniform thickness [5]. The majority of pneumatoceles are due to pneumonia, and the most common agents are *Staphylococcus aureus* (most common), *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Escherichia coli*, group A streptococci, *Klebsiella pneumoniae*, and adenovirus. In addition to infection, they are also seen in trauma, positive-pressure ventilation, especially in preterm neonates, and hydrocarbon ingestion.

Pulmonary pneumatoceles resolve spontaneously within antibiotics is the first-line therapy. Invasive approaches should only be reserved for patients who develop complications. The clinical course of our patient improved gradually with antibiotic treatment. Physiological immune response of circulating leukocytes to various stressful events is often characterized by an increase in neutrophil counts and a decline in lymphocyte counts [6]. In this case, neutrophilia with relative lymphopenia could be a marker of bacteremia.

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#### Conflicts of interest

There are no conflicts of interest.

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