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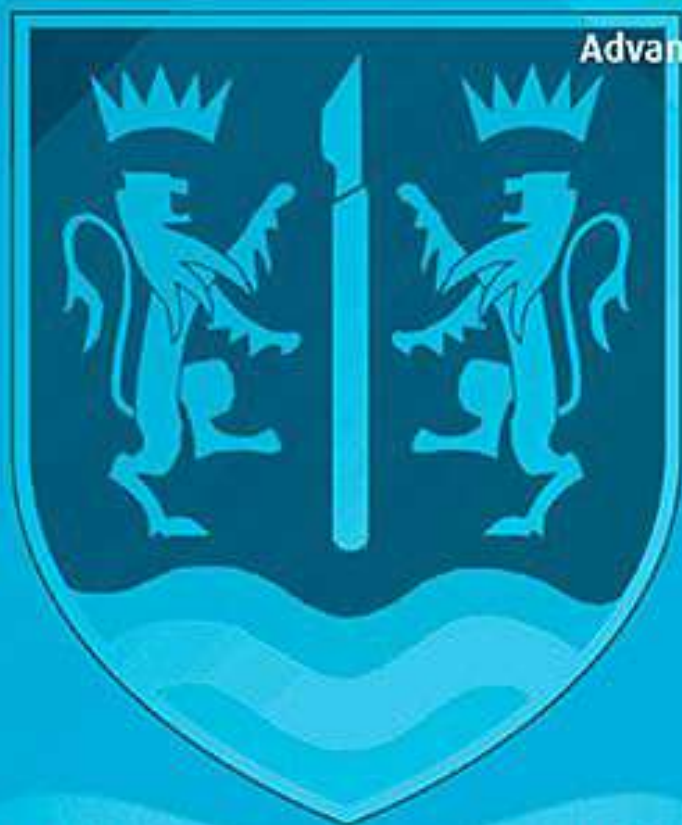
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## Case report

# Bilateral primary spontaneous pneumothorax with multiple bleb performed by VATS and wedge resection: A rare case in Indonesian adult and review article

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## ABSTRACT

**Background:** Bilateral primary spontaneous pneumothorax (PSP) is a rare case of lung disease.

**Case presentation:** A 20-year-old man with a complaint of shortness of breath is suspected of having PSP and tuberculosis. The patient underwent water seal drainage installation in both lung cavities, but showed no improvement. Multiple blebs were found after a few days. A wedge resection with VATS became an option. The patient had improved lung function after the procedure.

**Discussion:** The WSD installation showed lungs improvement. However, when trained for lung expansion, the lung condition became bad. After wedge resection with the help of VATS on multiple blebs, the lung had a significant improvement.

**Conclusion:** Wedge resection could be considered in PSP patients with multiple blebs.

## 1. Introduction

Primary spontaneous pneumothorax (PSP) is one of the most common lung diseases affecting adolescents and young adults [1]. The incidence of PSP is estimated at 18–24 cases/100,000 in men and 6–9.8 cases/100,000 in women [2]. It is reported that 90% of PSP cases occur with blebs or bullae [3] that indicates the need for bullectomy because there are ruptures easily and lungs fail to expand [3,4]. The most common PSP is unilateral while, bilateral PSP is reported in only about 1–2% [2,5]. We found a rare case of bilateral PSP patients with chest wall adhesions who underwent VATS (video-assisted thoracoscopic surgery) and wedge resection. Based on the findings, we are interested in reporting the case using the 2020 Surgical Case Report (SCARE) Guidelines [6].

## 2. Case presentation

A 20-year-old male, Javanese, with a complaint of shortness of breath. The patient experienced shortness of breath for  $\pm 2$  weeks and worsened a day before being admitted to the hospital. The complaint was accompanied by coughing 1 week before hospitalization. The

patient had no history of allergy and comorbid diseases (such as diabetes mellitus, hypertension, asthma, etc.). There was no history of lung disease in the family. Pulmonary function examination results obtained RR = 28  $\times$ /min. The examination showed a decrease in vocal fremitus and hyper resonance on percussion in both lung fields. On auscultation, there was decreased vesicular base sound in both lung fields. The results of blood gas analysis showed respiratory alkalosis with moderate hypoxemia with the administration of 3 lpm nasal O<sub>2</sub>. X-ray results showed bilateral pneumothorax, with a heavier left lung (Fig. 1). Furthermore, water seal drainage (WSD) was installed in both lungs.

On the third day of treatment, the patient showed improvement in RR = 26  $\times$ /min, Spo<sub>2</sub> = 96% with Nasal O<sub>2</sub> 3 lpm. On the 8th day of treatment, the patient's right lung had maximal expansion. The chest tube was clamped for 1  $\times$  24 h. On day 10, the GeneXpert was declared negative and the right lung collapsed. The clamp was reopened on the chest tube of the right lung, while the left lung had not shown improvement. On the 15th day, there was a change in lung conditions where the left lung was fully expanded and the right lung was still not fully expanded. The left lung clamp was performed on the 8th day on the right lung. On the 16th day, the left lung was still fully expanded but the right lung was still not fully expanded. The WSD in the left lung was

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removed and still inflated (Fig. 2). At this time, the patient was diagnosed with a right secondary spontaneous pneumothorax.

On the 23rd day, the patient experienced severe shortness of breath. When the patient underwent a puncture test, his shortness of breath suddenly got severe with coughing up blood, cold sweat, and desaturation with a peripheral oxygen saturation of 85–86%. The paramedic team then installed contra ventile and mini WSD. After 2 chest tube insertions, shortness of breath did not decrease and increasing instead. Therefore, the patient was placed on a ventilator and chest tube. On the 24th day, a chest CT scan without contrast showed a right hydropneumothorax and a left pneumothorax that had a chest tube attached with a distal tip as high as VTh level 4–5 on the right side and as high as VTh 5–6 on the left side, multiple blebs in the apical segment of the superior lobe of the lung. Right and apicoposterior segments of the left superior lobe showed no bronchopleural fistula (Fig. 3).

On the 34th day, the patient underwent Wedge Resection with VATS. Multiple bullae in the left superior lobe were found with pulmonary adhesions to the chest wall. The attachment was released and continued with wedge resection with 4 staplers via uniportal VATS. Multiple blebs were found leaking in that section. A chest X-ray was conducted after wedge resection to evaluate the procedure. On the 38th day, the results of the GeneXpert tissue were negative. The WSD was removed on the 39th day (Fig. 4).

### 3. Discussion

Primary spontaneous pneumothorax is often asymptomatic. However, a larger pneumothorax can cause sudden dyspnea, chest pain, increased heart rate, anxiety, and increased hypotension and tachycardia. This condition indicates that pneumothorax has an intrapleural

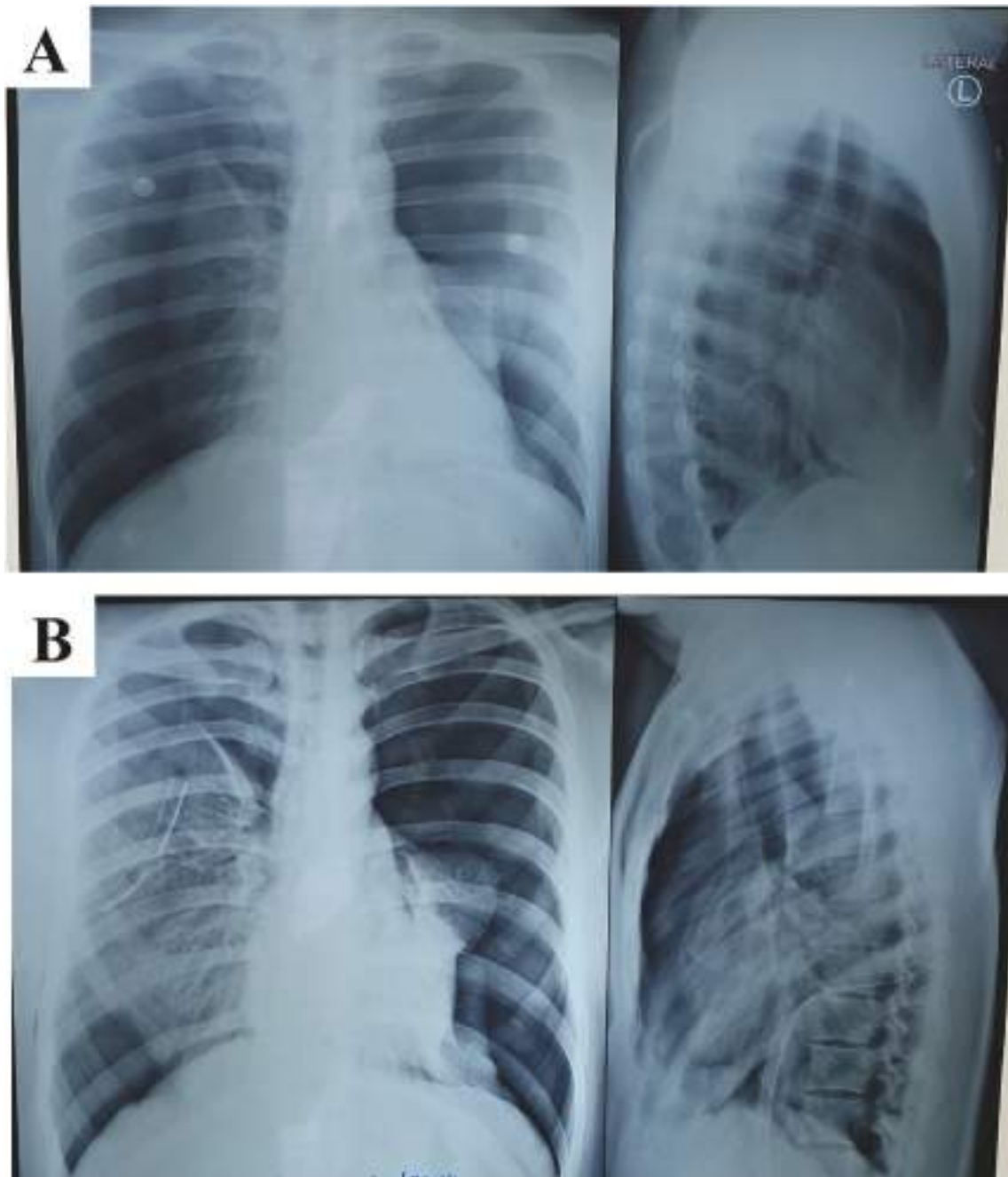


Fig. 1. A. Chest X-ray of anterior-posterior and left lateral before chest tube insertion; B. Chest X-ray of anterior-posterior and left lateral after chest tube insertion.

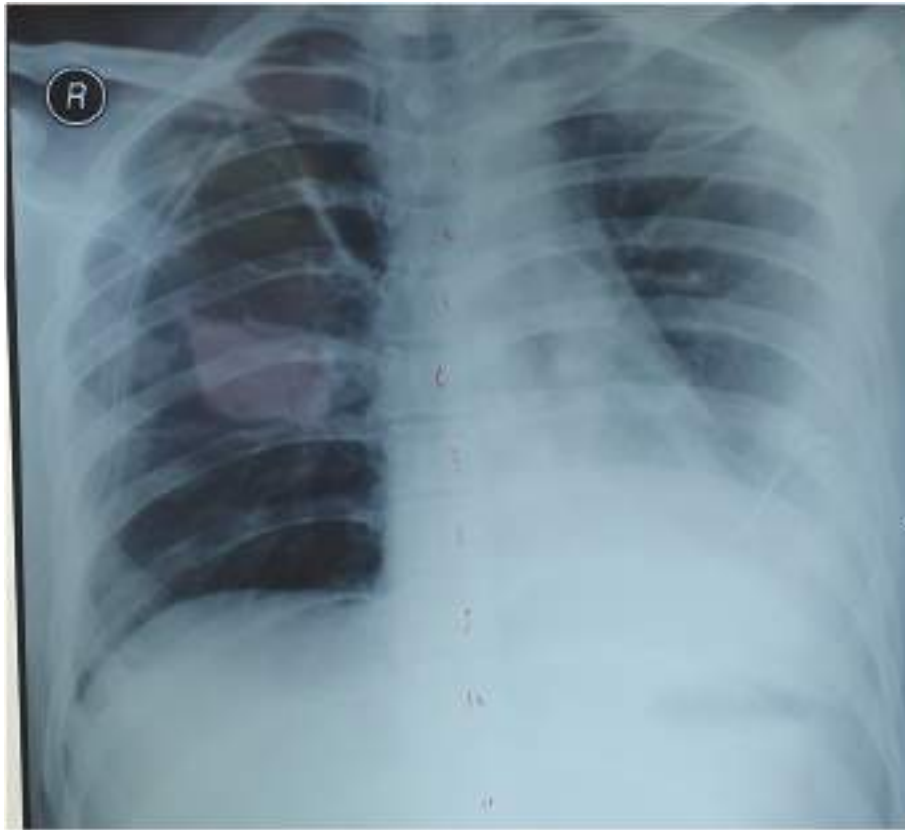


Fig. 2. Chest X-ray of anterior-posterior that shows a maximum expansion of right lung, while the left lung is still not in the maximum condition.

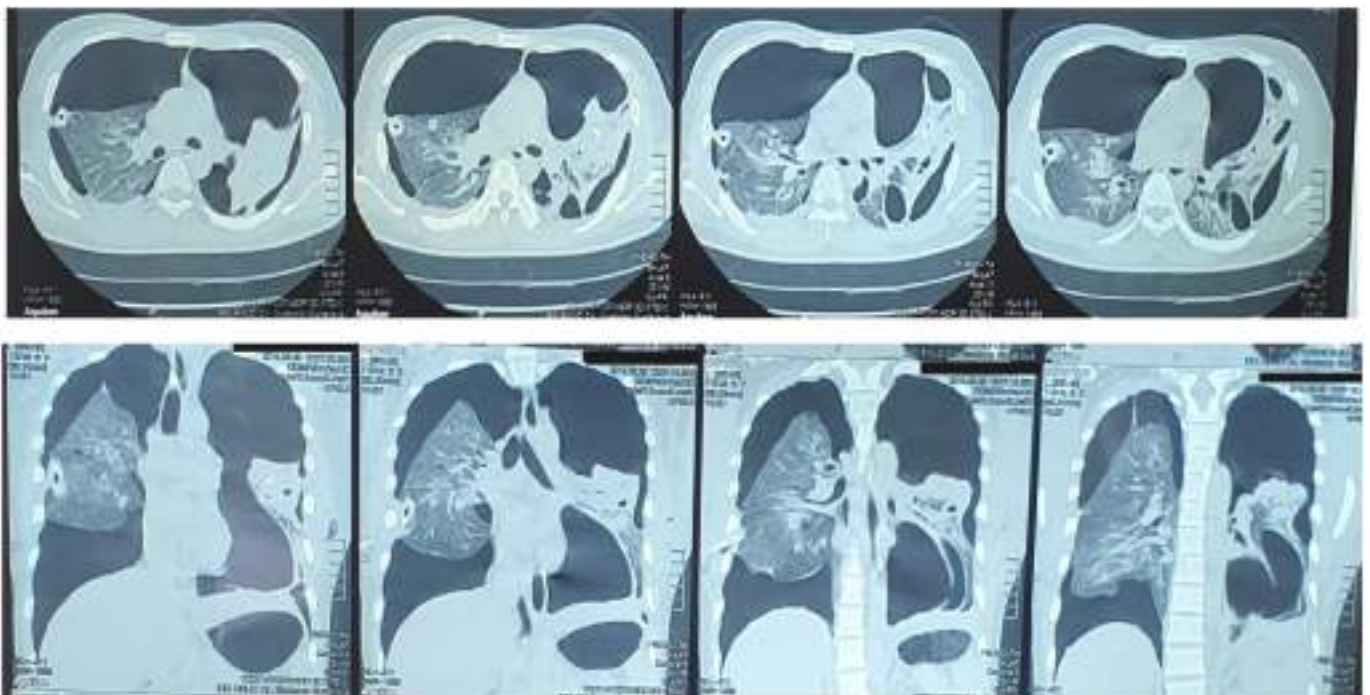


Fig. 3. CT scan showing multiple blebs in the apical segment of the right superior lobe and the apicoposterior segment of the left superior lobe.

pressure that exceeds atmospheric pressure, causing mediastinal deviation, reducing venous return, and cardiovascular collapse [7]. According to the British Thoracic Society guidelines (2003), approximately 50% of PSP patients go to the hospital >2 days after the onset of

symptoms [2].

Diagnosis of patients with PSP is conducted through an accurate medical history, detailed physical examination, and evaluation of radiological examinations. A chest X-ray taken with the patient standing



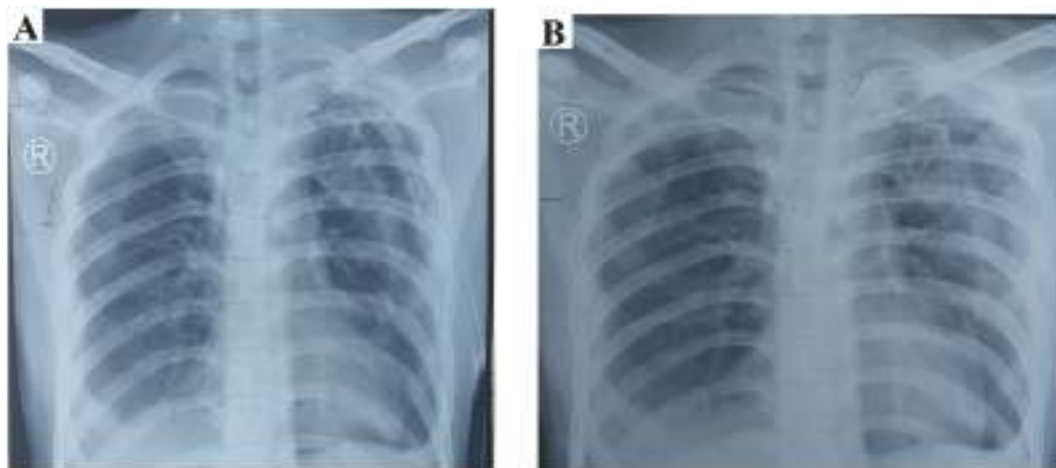


Fig. 4. Chest X-ray of anterior-posterior before (a) and after WSD removal (b).

(PA and lateral projections) has a sensitivity of about 70%. Thoracic computed tomography (CT) scan has a sensitivity of 100% and can determine the size of the pneumothorax. It can also assess changes in the lung parenchyma to determine the cause of the condition [2]. Observation can be performed as initial management in patients with a pneumothorax less than 1 cm. At the time of observation, PSP patients are administered with 100% oxygenation because it can increase the reabsorption time of pneumothorax by 4 times. The resolution of pneumothorax is about 1.3–2.2% of hemithorax volume per 24 h. The chest X-ray is repeated 4–6 h after diagnosis to ensure that pneumothorax is not enlarged. Once the pneumothorax is proven stable, the patient can be discharged and controlled through an outpatient clinic. Successful observation in patients with small PSP accounts for more than 80% of cases. Patients with small PSP have a lower potential recurrence rate when observed than with chest tube insertion [8].

Aspiration can be utilized as initial management for patients with primary pneumothorax. The procedure may be considered for younger patients (<50 years old) with a secondary pneumothorax of moderate size (1–2 cm in size). Percutaneous needle aspiration results from incomplete lung expansion in 59–83% of patients with PSP and 33–67% of patients with PSS. The recurrence rate of pneumothorax after aspiration is almost the same as after chest tube insertion. Chest tube insertion is the most common surgical procedure performed in thoracic surgery. Chest tube placement is indicated for patients with symptomatic PSP, as well as symptomatic, iatrogenic, and traumatic pneumothorax. The goal of chest tube placement is an expansion of the collapsed lung [8].

Surgery is a common method for pneumothorax with persistent air leakage (5–7 days after thoracic drainage), failure of lung expansion, repeated pneumothorax (ipsilateral or contralateral), bilateral spontaneous pneumothorax, hemothorax, patients with high-risk occupation (aircraft personnel, scuba divers). The goal of surgery for pneumothorax is to remove air from the pleural space (bleb resection) and prevent recurrence (removal of the intrapleural space). Small posterolateral thoracotomy, transaxillary mini-thoracotomy, minimally invasive endoscopic surgery (VATS) are common surgical procedures. Bullae can be removed by different surgical procedures, including lung resection, staple excision, electrocoagulation, suture ligation. To prevent recurrence of the pneumothorax, resection is combined with several procedures to remove the inter-pleural space. These procedures can include parietal pleurectomy (partial-apical or total), parietal pleural abrasion (mechanical pleurodesis), chemical pleurodesis (application of sclerosing agents). Open thoracotomy with bullectomy and pleural abrasion or pleurectomy can effectively reduce the recurrence rate by 1%. In minimally invasive surgery, not all blebs can be detected, and the recurrence rate is 5–10% higher, but the length of hospitalization is

shorter better postoperative lung air exchange, and less severe postoperative pain [8–10].

Open surgery is slightly superior or equally effective as the ‘closed’ thoracoscopy method but has higher morbidity. A thoracoscopy is recommended should there are clinical indications for invasive surgery. When performed without pleurodesis, the recurrence rate is very high up to 20%. Adequate pleurodesis is the basis for thoracoscopy, thereby preventing recurrence. All pleurodesis techniques are based on the successful induction of some form of pleural inflammatory agent. This can be achieved by mechanical abrasion, partial resection, or thoracoscopy installation of an abrasive agent (e.g. talc). There is evidence that the use of talc is safe, in both short and long-term studies and does not cause cancer, pulmonary fibrosis, impaired lung function, or impairment in subsequent thoracic surgery, and is the cheapest agent. Recurrence prevention techniques on thoracoscopy, be it ‘medical’ or ‘surgical’, usually show a recurrence rate of between 0 and 10% [2,11,12].

#### 4. Conclusion

A 20-year-old man with a complaint of shortness of breath is suspected of having PSP and tuberculosis. Water seal drainage is installed in both lung cavities. When treated for a few days, the lung condition has an ups and downs prognosis. GeneXpert results do not support the diagnosis of tuberculosis. Bleb is found in both lung cavities, thereby wedge resection is performed with VATS. After treatment, the lung condition improved and the WSD is removed.

#### Consent

We have requested the patient's consent to publish this case report for educational purposes.

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#### Ethical approval

We have conducted an ethical approval base on the Declaration of Helsinki at Ethical Committee in Dr. Soetomo General Academic Hospital, Surabaya, Indonesia.

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Resti Yudawati.

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Nisya Hapsari: collecting data, analysis, drafts, revisions, and supervision; Resti Yudhawati: methodology, analysis, revision, and review.

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The authors declare that they have no conflict of interest.

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