

## Bronchopleural Fistula Diagnosed via Bronchoscopy

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### Case Presentation

56 y/o M with PMHx of Osteochondroma presented with 2 weeks dyspnea, generalized weakness and fever. Patient initially believed he had viral syndrome and did not seek medical attention. He had sore throat a week prior to onset of his symptoms. On presentation to the Emergency Department, he was in respiratory failure. He was transiently placed on NIPPV and admitted to ICU. He had CT chest which suggested a right-sided hydro pneumothorax. Patient's condition deteriorated, so patient was intubated in ICU, Frank pus was noted in the ET tube, so urgent bed side bronchoscopy was performed which drained 1000 cc of pus from right upper, and right middle lobe. Post procedure chest X-ray showed decrease in the fluid level, but persistent pneumothorax suspecting a presence of a bronchopleural fistula. Open tube thoracostomy drained another 2-3 L of pus in next 24 h. There was a persistent air leak, confirming diagnosis of bronchopleural fistula. Patient was treated with vancomycin, cefepime and flagyl. All cultures remained negative. Patient was discharged with chest tube, and 6-8 weeks of antibiotics.

### Case Discussion

Empyema is diagnosed when pus is found in the pleural cavity. Most common cause of empyema in the developing countries is tuberculosis. Pneumonia remains an important cause of empyema in developed countries. Bacterial pneumonia is the cause in 70% cases [1]. *Streptococcus pneumoniae*, *Staphylococcus*, *Klebsiella*, *Pseudomonas*, *Haemophilus* sp. *Bacteroides* and *Peptostreptococcus* are the common organisms involved with empyema. Previous surgeries or blunt trauma remain another important factor in developing empyema. In terms of management, choice of antibiotics depends on whether pneumonia is community acquired or health care associated and how sick the patient is. Drainage is often time needed with large bore chest tubes (at least 28 Fr) or Video Assisted Thoracic Surgery (VATS) to aid medical management [2]. There is a literature to support to use local thrombolytics with streptokinase to aid drainage [3] but not on improving patient outcomes and avoiding surgical intervention [4]. The combination of intrapleural r-tPA and DNase therapy reduced hospital length of stay and decreased the need for thoracic surgery [5]. Rib resection and open drainage of pleural space is only recommended when patient can't tolerate open decortication (Figure 1-4).

### Bronchopleural Fistula (BPF)

Bronchopleural Fistula (BPF) refers to a communication between the pleural space and the bronchial tree. It is a rare complication of empyema; more common causes are post-operative complication of pulmonary resection [6], persistent pneumothorax. In developing countries tuberculosis remains very important cause of BPF. A characteristic feature on Chest X-ray is hydro-pneumothorax. CT is considered the imaging technique of choice for visualizing and characterizing BPF [7]. Some of the radiological indicators of BPF include: a) Persistent air leak, even though chest tubes have been placed; b) Reappearance of air in the post pneumonectomy space which was earlier opaque; c) A fall in the height of fluid level by at least 1.5 cm and increase in air level. Another process used for identifying BPF is by observing the color of sputum after injecting methylene blue in

pleural space. Chronic drainage and long term antibiotics is the corner stone of treatment. Bronchoscopic approaches with endobronchial valves and sealing compounds are the newer modalities available for treatment [8]. Limited data exist with independent lung ventilation, high frequency jet ventilation, application of PEEP to chest tube in management of BPF. In terms of surgical approach, suture closure of BPF is buttressed by a vascularized pedicle of omentum or muscle. The closure of BPF in the presence of suppurative infection is likely to fail so is instillation of antibiotic solution and chest closure in the presence of infection [9].

Epigenetic mechanisms including of post-synthesized DNA methylation, post-translational histone modifications and chromatin remodeling, have been found to be involved in a great number of lung associated disorders. For instance, in the study of patients with lung adenocarcinoma, it has been found that majority of the patients displayed hypermethylation at one of the following tumor suppressor genes, including p16/INK4a, MGMT, BRCA1 and RAR $\beta$  [10]. This observation suggested that patterns of DNA methylation at specific tumor suppressor genes might serve as the potential markers for early detection, classification and chemotherapy response of tumors [11,12]. As DNA methyltransferases play a major role in the establishment and maintenance of DNA methylation in humans [13], it is also important

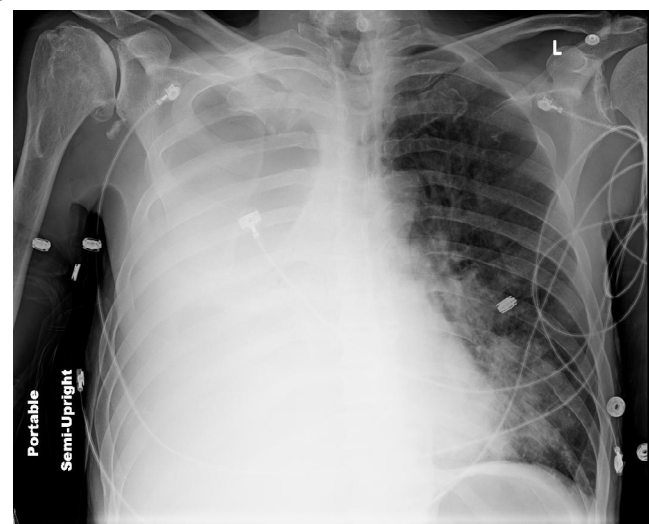


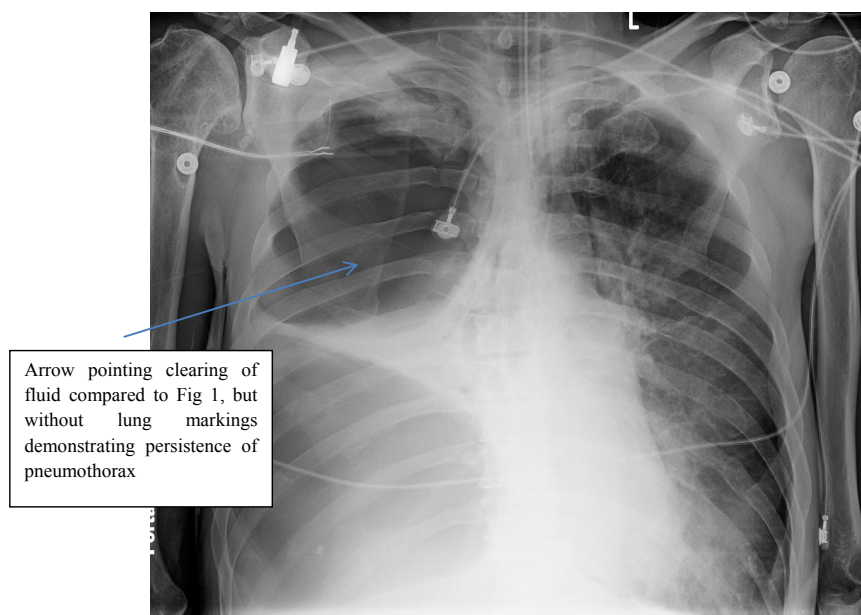
Figure 1: Chest x-ray showing right sided hydro pneumothorax.

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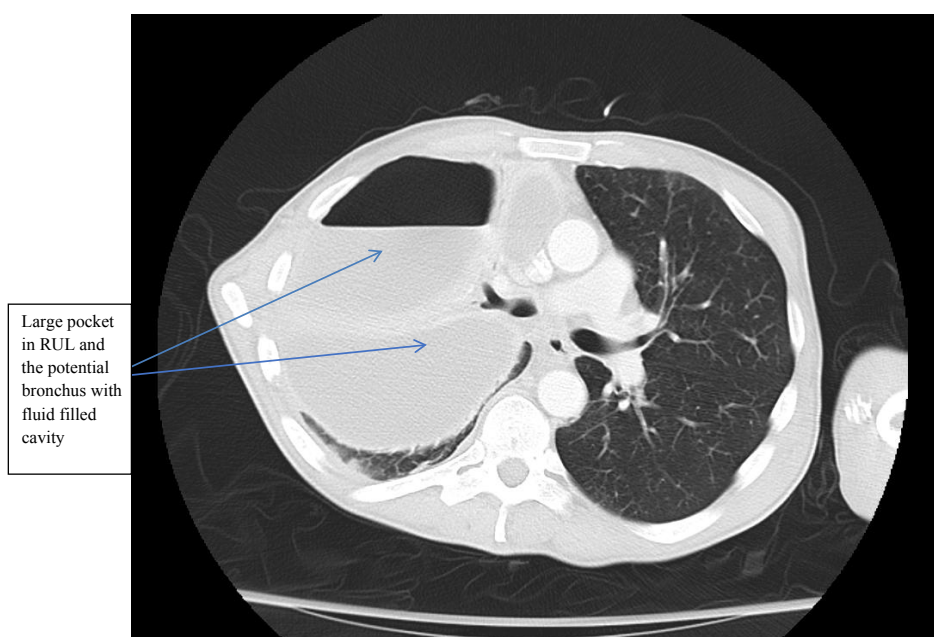
**Figure 2:** Chest x-ray post bronch demonstrating significant reduction in fluid level, but persistent pneumothorax, without expansion of lung. Arrow in the figure pointing out the clearing of fluid without lung markings, demonstrating pneumothorax.



**Figure 3:** Chest CT with mediastinal windows showing multiple pockets of fluid collection with atelectatic lung on right side.

to investigate the levels of these epigenetic enzymes in the patients with lung diseases. Interestingly, since histone methyltransferases G9a and GLP are also involved in the protection of DNA methylation, particularly at imprinted loci [14], understanding of the expression

and stability of these histone modifiers will not only help us to reveal the mechanisms that required for the genesis and progression of lung disorders but also shed light on the inheritance of these human disorders.



**Figure 4:** Chest CT with Lung windows, showing large pocket in RUL and possible communication of the bronchus with fluid filled cavity.

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