



## Massive Hemothorax; A Rare Complication after Percutaneous Nephrolithotomy

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### Abstract

*Percutaneous nephrolithotomy (PCNL) is a common procedure done for stone removal, as it is less invasive than an open procedure. But several complications may occur. Hemothorax or collection of blood in the pleural space is a rare complication following percutaneous nephrolithotomy (PCNL). We present a case of massive hemothorax who had undergone PCNL. Five days after PCNL, the patient was admitted to the Department of Pulmonary Medicine, SGT Hospital, Gurugram with complaints of chest pain, fever, dry cough and pain in right hypochondrium. Chest X-ray and thorax computed tomography (CT) revealed massive pleural effusion on the right hemothorax with lung collapse in a 21-year-old male patient with a right renal stone. A chest tube was inserted for drainage and was removed after 4 days when a chest X-ray revealed good expansion of the lung. In conclusion, the patients who underwent PCNL via intercostal access should be closely followed-up for signs and symptoms of hemothorax.*

**Keywords:** Hemothorax, percutaneous nephrolithotomy, Supracostal access, Pleural effusion.

## Introduction

Percutaneous nephrolithotomy (PCNL) has been the preferred surgical technique for the treatment of renal stones for many years [1]. The selection of percutaneous access points varies according to the placement of stones in the pelvicalyceal system. Subcostal access is preferred mostly for PCNL to avoid possible injury to the lungs and pleura. Supracostal access may be required in patients with upper caliceal stones and staghorn stones for complete stone removal [2]. Pleural injury during percutaneous access may lead to complications including hydrothorax, pneumothorax, hydropneumothorax and urinothorax [3]. Hemothorax, the presence of blood in the pleural space, is a rare complication following PCNL [1]. We report a 21-year-old man who developed massive hemorrhagic pleural effusion six days after PCNL was performed for left renal stones. In this case report, ethical approval was not required. Written informed consent was obtained from the patient.

## Case Report

The patient underwent the right PCNL at the Department of Surgery, SGT Hospital, Gurugram. Supracostal access was done between the 11th and 12th left ribs. 16-30 French Amplatz dilator was used for tract dilatation. There was no suspicion of complication during PCNL. Oxygen saturation and peak airway pressure were within normal limits during operation. There were no residual fragments in fluoroscopy images at the end of the procedure. Extravasation and/or pleural leakage were not seen in the pyelogram that was obtained after nephrostomy placement. Routine chest X-ray imaging done preoperatively [Figure 1] of this patient was normal. The postoperative course of the patient was uneventful without any complaints like dyspnea, chest pain or fever. The patient was discharged on the fifth postoperative day.

Six days later the patient was admitted to the Department of Pulmonary Medicine, SGT Hospital, Gurugram with chest pain, fever, dry cough and pain in right hypochondrium which have developed in six days. On clinical examination, the patient was alert and tachypneic with a respiratory rate of 20 per minute and was febrile at 38.8°C, pulmonary auscultation showed no breath sounds in the lower two-thirds of the right hemithorax. Oxygen saturation was 90 percent at room air. The chest radiograph showed massive pleural effusion on the right side [Figure 2] and ultrasound (whole abdomen) revealed renal pyonephrosis of the right kidney. Thorax CT confirmed the massive pleural effusion [Figure 5].

The diagnosis was confirmed by demonstration of the pleural fluid that was found to be a transudate by thoracentesis with a pleural fluid creatinine of 0.75 mg/dl compared to a serum creatinine level of 1.1 mg/dl, pleural fluid protein of 2.43 gm/dl compared to the total protein of 7.4 gm/dl and pleural fluid glucose of 37 mg/dl compared to a serum glucose level of 114 mg/dl. The pleural fluid ADA was 30.10 U/L, and LDH was 933 U/L. Pleural fluid-serum creatinine ratio was 0.68 (0.75/1.1).

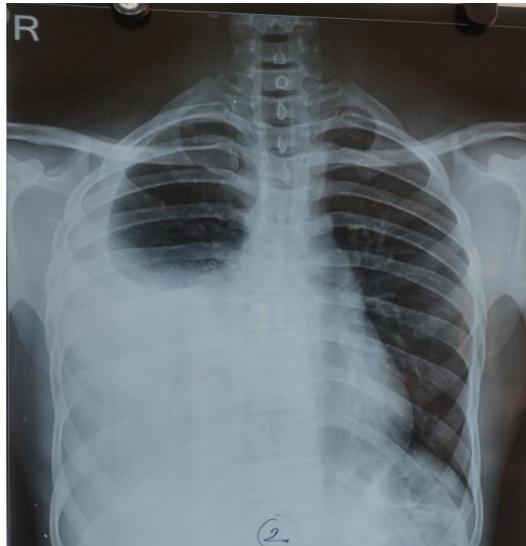
On routine investigations, hemoglobin was 10.6 gm/dl with a total leukocyte count of 11900/cmm. Routine blood coagulation tests were deranged with activated partial thromboplastin time (aPTT) of 62.3 seconds, prothrombin time (PT) 17.1 second, international normalized ratio (INR) 1.5, bleeding time (BT) 2:10 minutes, clotting time (CT) 4:8 minutes and raised D dimer of 1.25mg/l. Vitamin K injection for 3 days with double antibiotic coverage was started and two units whole blood transfusion was done.

A chest tube was inserted in the right fifth intercostal space in the midaxillary line and two liters of hemorrhagic fluid was drained over 48 hours. The patient also developed 3-4 episodes of hematuria on the second day of admission which was resolved in 2 days. The urine routine test was within normal limits. Repeated chest radiographs showed that minimal residual pleural effusion [Figure 3, 4]. The chest tube was removed on the fourth day and the patient was discharged with an oral antibiotic.

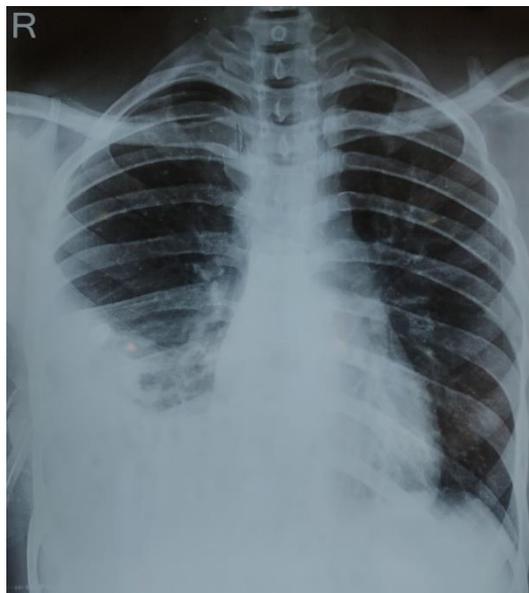
In conclusion, patients who underwent PCNL via supracostal access should be closely followed-up for signs and symptoms of hemothorax. The treatment of hemothorax includes drainage of blood from pleural space.



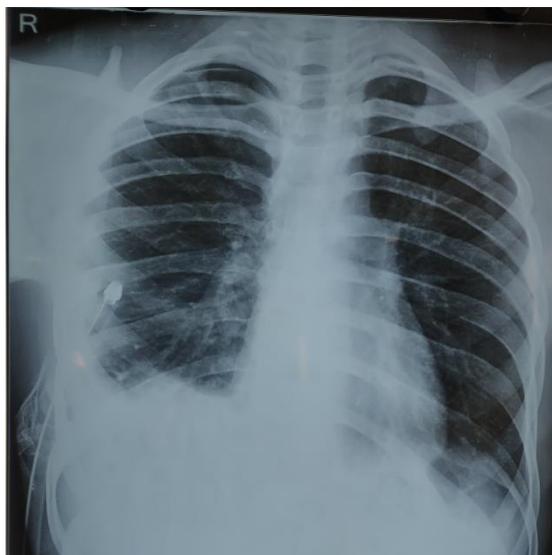
**Figure 1:** Preoperative Chest X-ray



**Figure 2:** Chest X-ray on day of admission showing massive pleural effusion



**Figure 3:** Post ICD Chest X ray (1) after 1 litre fluid drain



**Figure 4:** Post IC Chest X-ray (2) after 2 litre fluid drain



**Figure 5:** CECT Thorax of a patient with massive hemothorax

## Discussion

Hemothorax is a rare cause of pleural effusion, defined as the accumulation of blood in pleural space. The reported etiologies of hemothorax in the literature are percutaneous nephrolithotomy, percutaneous nephrostomy, extracorporeal shock wave lithotripsy, renal biopsy, renal transplantation, blunt trauma to kidney, bladder laceration and retroperitoneal inflammatory fibrosis [4]. Eleven cases reported after

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PCNL has been reported in the literature [4,5]. Overall complication rates after PCNL have been reported as 23.3% and thoracic complication rates have been reported as 0-11.6% [1]. Thoracic complications including pneumothorax, hydrothorax, hemothorax, and urinothorax were reported with a rate of 16% for supracostal versus 4.5% for subcostal access [6]. In the same study, complication rates in patients who underwent supra-11th and 12th rib access were 35% and 10%, respectively. Lallas and colleagues reported that urinothorax never occurred with subcostal access but did complicate 2.3% of superior access to the 12th rib and 6.3% of superior access to the 11th rib [7].

In our case, hemothorax occurred as a result of pleural injury due to supra-12th upper pole percutaneous access during PCNL. Our case is different from the previous reports because there were no signs of pleural injury intraoperatively and postoperatively. There was no pleural effusion on postoperative day 1st in chest X-ray. In a study by Yadav et al. 10.7% of the patients who underwent PNL had pleural effusion detected by CT scan and only 3.6% of patients were symptomatic [8]. Additionally, Ogan et al evaluated 104 patients who underwent supracostal and infracostal access; pleural effusion detection rates via CT were 45% and 29%, respectively [9]. Chest radiograph and thoracic CT imaging is the preferred imaging modality in the detection of pleural effusions and underlying causes. However thoracocentesis should be performed to confirm the diagnosis of hemothorax and parameters in pleural fluid should be evaluated: transudative pleural fluid, pleural fluid serum creatinine ratio and pleural fluid ADA, LDH [10].

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