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Case Report

Complication of hemothorax after CT-guided percutaneous biopsy of herniated liver masquerading as a pulmonary mass

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ABSTRACT

Hemothorax is a rare complication of percutaneous needle biopsy in the chest at a rate of 0.092%. Rarer yet is diaphragm injury with herniation of intra-abdominal organs. The patient was a 56-year-old female undergoing evaluation for primary lung cancer diagnosis requiring lung mass biopsy. The largest pulmonary nodule was biopsied, which abutted the right hemidiaphragm with the complication of hemothorax. Angiography demonstrated that the source of bleeding was not attributed to intercostal artery injury. Pathology revealed that benign hepatic tissue was sampled. Based on the pathology results, angiographic findings, and detailed review of cross-sectional imaging, the tissue is consistent with herniated liver through the right hemidiaphragm mistaken to be a pulmonary nodule.

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Introduction

Lung biopsy of pulmonary lesions to obtain tissue diagnosis is a common procedure with associated known complications including hemothorax at a rate of 0.092% [1,2]. In the setting of multiple pulmonary nodules, the largest and most percutaneously accessible lesion is usually targeted for biopsy. In this case, it was unrecognized that the pulmonary nodule abutting the diaphragm displayed the “band” sign, “hump” sign [3,4], and a portal vein branch extending into the tissue. Hemothorax after percutaneous lung biopsy is most often attributed to intercostal artery injury [5]. However, in this case, it was likely

due to hepatic parenchyma bleeding for the herniated liver into the right hemothorax.

Case report

A 56-year-old female with chronic cough for 17 years had a computed tomography (CT) of the thorax, which revealed a 2.3 × 1.6 cm right upper lobe mass and a 3.2 × 2.5 cm mass abutting the right hemidiaphragm (Fig. 1A and B). In order to obtain a tissue diagnosis and perform molecular testing,

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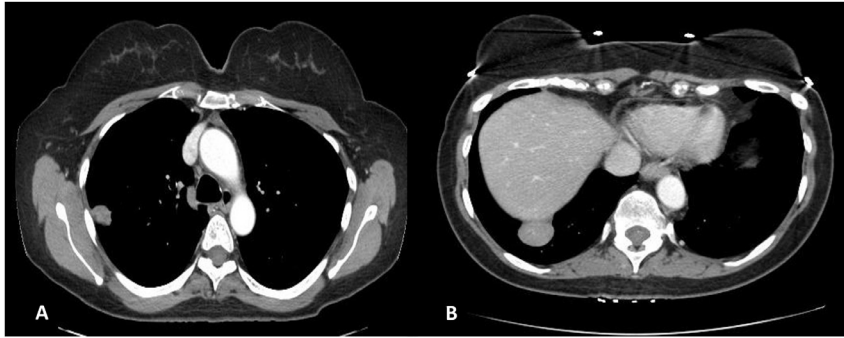


Fig. 1 – (A) 2.3 x 1.6 cm right upper lobe pulmonary mass and (B) 3.2 x 2.5 cm right lower lobe pulmonary mass.



Fig. 2 – Core needle in the right lower lobe pulmonary mass.



Fig. 3 – Postbiopsy CT with new right hemothorax.

a biopsy of the most accessible right pulmonary nodule was requested. The right lower lobe lobulated mass was selected for biopsy based on its location (closer to the chest wall) and its larger size allowing for more tissue collection. The patient presented for biopsy. The risk, benefits, and possible complications including but not limited to pneumothorax or intrathoracic bleeding were discussed with the patient and informed consent was obtained. The patient was placed in the right lateral decubitus position in the CT scanner to approach the lung mass. A 17-gauge guiding needle was advanced into the periphery of the right lower lobe lung mass and in a coaxial technique, an 18-gauge core biopsy was used to obtain tissue utilizing intermittent CT guidance (Fig. 2). A total of 4 core biopsies were obtained. The guiding needle was removed and postbiopsy CT images of the chest demonstrated new and enlarging right pleural fluid consistent with hemothorax (Fig. 3). Due to this finding, the patient was urgently transported to the angiography suite for a thoracic angiogram and possible embolization procedure. The patient's vital signs were continuously monitored and remained stable. A radio-opaque marking BB was placed on the patient's back at the biopsy site. Utilizing sterile technique, the right common femoral artery was

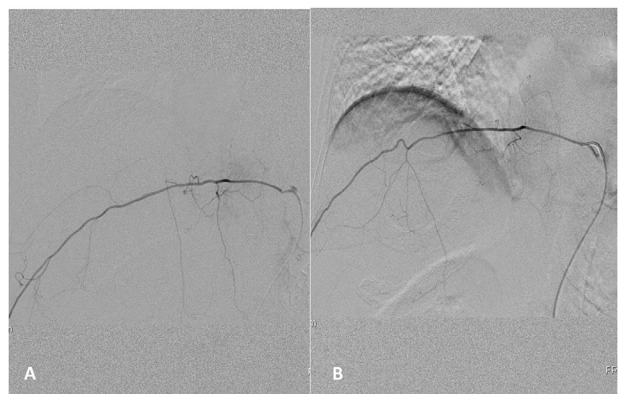


Fig. 4 – Right intercostal artery angiogram x 2 without evidence of injury or hemorrhage.

accessed and a 5-French C2 catheter was advanced in the thoracic aorta. Selective catheterization of 2 separate right intercostal arteries at the level of the marker BB was performed, which did not demonstrate evidence of active arterial hemorrhage or arterial injury (Fig. 4). A cone beam CT was then per-

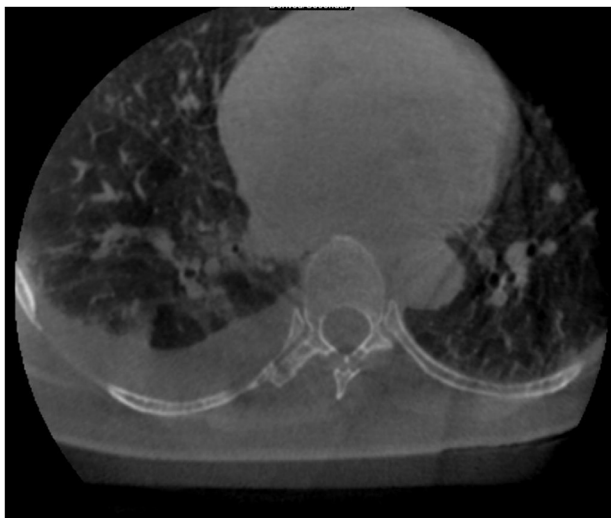


Fig. 5 – Cone beam CT of the chest demonstrating stable right hemothorax.

formed over the patient's chest and demonstrated stable size of the right hemothorax (Fig. 5) when compared to the post-biopsy CT images performed approximately 60 minutes prior. Therefore, the procedure was terminated and an arterial closure device (Mynx Grip) was deployed to achieve hemostasis of the right common femoral artery access site. The patient was monitored for 2 hours on bedrest and was then discharged. The pathology results from the biopsy showed "fragments of benign liver parenchyma with mild triaditis and separate fragments of benign alveolar lung parenchyma; no evidence of malignancy." The patient went on to be diagnosed with stage IV adenocarcinoma consistent with bronchogenic origin with metastasis to the L4 vertebra. After retrospective review of the CT images (which were performed and interpreted at an outside institution), post-IV contrast images in a soft tissue window demonstrated the reported "right lower lobe lobulated lung mass" to display both the band sign [3,4] and hump sign [3,4], and portal vein branches within the tissue (Fig. 6). This appearance has been described in the radiology literature as "abnormal solid lesions within the adjacent pulmonary parenchyma which may cause difficulties in accurate

tracking of diaphragmatic continuity and a thin band of poorer enhancement of the liver parenchyma at the narrowing" from the diaphragm, respectfully [3,4].

Discussion

In this case, the misinterpretation of liver herniation into the thorax through the diaphragm as a pulmonary nodule led to targeting for percutaneous biopsy and the complication of hemothorax. Percutaneous lung biopsy is a common procedure with an ever-growing demand to obtain larger volumes of tissue not just to arrive at an accurate diagnosis, but for molecular testing and in some cases for clinical trial eligibility. The "lobulated right lower lobe mass abutting the hemidiaphragm" was described on a report from an outside facility. Imaging is reviewed prior to scheduled procedures when it is available to determine feasibility of biopsy. It is not heavily scrutinized in a diagnostic capacity as to render an interpretation, which has already been done. However, if it had been more carefully reviewed, the operator may have recognized that the right lower lobe mass was hepatic tissue, not a lesion of lung origin. When presented with a patient with multiple pulmonary masses, it is assumed that the findings represent a single process. In this case, however, the patient had a solitary right upper lobe pulmonary nodule and herniated hepatic tissue through the right hemidiaphragm. The lack of intercostal artery injury as the source of the hemothorax (a known source of biopsy related hemothorax [5]) can be attributed to bleeding from the herniated liver parenchyma bleeding into the right hemithorax. The patient's chest CT demonstrated right lower lobe mass abutting the hemidiaphragm and had signs indicating it was indeed herniated liver tissue. The hump and band signs refer to the shape of the liver located above the right hemidiaphragm and the linear hypodensity at the level the liver crosses the diaphragm [3,4].

Diaphragm injuries are estimated to occur on 0.8%-8% of patients with blunt trauma to the abdomen [3,4]. One study that analyzed 200 patients who had CT scans after blunt thoracoabdominal trauma found 13 patients with diaphragm rupture. Of those, only 2 were right hemidiaphragm injuries [3]. It has been suggested that right hemidiaphragm injury may be unrecognized and therefore may be underdiagnosed at the

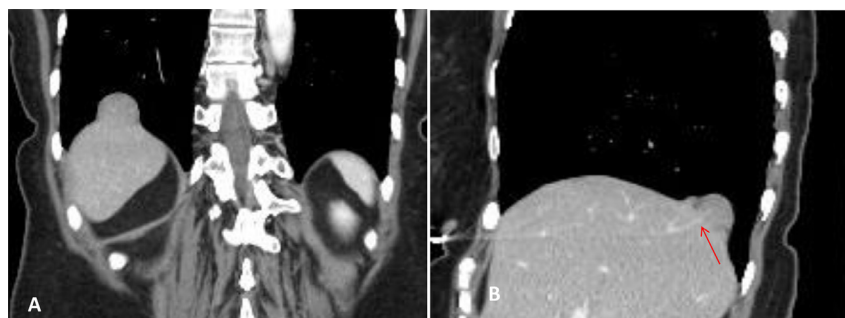


Fig. 6 – (A) Coronal CT demonstrating the "hump" and "band" sign. (B) Sagittal CT of the liver demonstrating a portal vein extending into the herniated liver parenchyma (arrow).

time of injury [3] or have a delayed presentation [6]. Our patient had no reported recent history of high velocity blunt trauma, which is commonly responsible for diaphragm injury [3,6]. She did suffer from a chronic cough that may have contributed to liver herniation through the diaphragm [7].

Conclusion

In conclusion, hemothorax is a rare complication of lung biopsy [1,2]. This case presents a unique combination of liver herniation through the diaphragm mimicking a right lung pulmonary nodule with a simultaneous right upper lung solitary pulmonary nodule. When hemothorax occurs during lung biopsy, it is typically attributed to chest wall vascular injury or pulmonary parenchymal injury [5]. In this case, the source of hemothorax likely came from the biopsied herniated liver tissue. Review of available imaging prior to lung biopsy is an important step in preparation for the procedure. Cross-sectional imaging with multiplanar reconstruction is valuable to properly characterize pulmonary nodules. The “hump” and “band” signs should be remembered while evaluating a right lung nodule abutting the right hemidiaphragm [3,4]. This is of a rare occurrence of biopsy of a presumed pulmonary mass, which was herniation of liver tissue leading to the uncommon complication of hemothorax.

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