Case Report

A massive malignant pleural effusion due to lung adenocarcinoma in an adult male: a case report

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A B S T R A C T

A significant right-sided pleural effusion was seen on chest radiography in a 53-year-old adult male who complained of bilateral chest pain, shortness of breath, and other additional symptoms. The bloody pleural effusion was removed with a chest tube, and cytopathology analysis showed moderate cellularity. After performing a high-resolution computed tomography, it was discovered that the affected lung had a significant pleural effusion on the right side as well as collapsed and consolidated lung parenchyma. Upon further examination, the right lower lobe wedge biopsy cytology smear revealed mucinous adenocarcinoma. Adults...
Introduction

Pleural effusion is linked to a number of illnesses, such as cancer, infections, autoimmune disorders, and trauma [1]. Malignant pleural effusions are usually caused by lung, breast, and lymphoma cancers. Malignant pleural effusions are frequently linked to lung adenocarcinomas [2], which may denote disease development or progression. Local symptoms of lung cancer may be bronchopulmonary, nonbronchopulmonary, metastatic in nature, or could be resulting from the paraneoplastic syndrome [3]. Chest radiographs may resemble pneumonia with consolidation of the lung, where they can imitate a common cold or pneumonia [4]. Chest radiography should be used to distinguish the diagnosis in every patient receiving treatment for pneumonia. Recurring pneumonia and a poor response to medical therapy should highlight the possibility of cancer as an underlying issue.

Bronchioloalveolar carcinoma develops into invasive adenocarcinoma from atypical adenomatous hyperplasia, which is the precursor to lung adenocarcinoma. Adults with primary adenocarcinoma have a worse prognosis [5]. Smoking, underlying infections, air pollution, and genetics are all substantial risk factors for adenocarcinoma; however, in rare instances, none of these risk factors are present.

Case presentation

We present a case of a 53-year-old adult male who presented with shortness of breath and bilateral chest pain for the past month. The shortness of breath was subtle in onset, gradually progressing and aggravated by lying in the left lateral prone position but not aggravated by any other factors. Moreover, the chest pain was diffuse and delayed on onset, non-radiating, and gradually progressing. No significant history of asthma, diabetes mellitus, or tuberculosis was found. However, the patient was a chronic smoker for the past 25 years.

A general physical examination of the patient was unremarkable, with nonpalpable lymph nodes. On respiratory examination the chest shape was asymmetrical, a positive trail sign on the left side, a left-sided tracheal shift, and reduced expansion on the right side were noted. Moreover, generalized tenderness was present on the right side, while vibration and vocal fremitus was decreased, respectively. On chest x-ray, a massive right-sided pleural effusion was seen as shown in Fig. 1A.

Initially, the patient’s signs and symptoms strongly suggested pneumonia, but after a comprehensive evaluation, cytology of the pleural fluid was performed, which revealed moderate cellularity and the presence of lymphocytes,

Fig. 1 – Chest x-ray showing right-sided massive pleural effusion before (A) and after (B) thoracentesis (blue arrow).
polymorphs, and mesothelial cells/macrophages. At times, a few clusters of suspicious cells were seen. These cells showed enlarged nuclei an irregular nuclear membrane with scanty cytoplasm, and a background showing red blood cells and inflammatory cells. Moreover, the smears showed atypical suspicious cells suggestive of a metastatic lesion. Upon further investigation, the pleural effusion had a reddish hue, a protein level of 5.88 g/dL, a white blood cell count of 2000/mm³, a red blood cell count of 6500/mm³, a modestly elevated glucose level of 5.6 mmol, and a suspicious cluster of atypical suspicious cells that were possibly metastatic. No appreciable organism culture, development, or sensitivity was detected.

As shown in Fig. 2, the high-resolution computed tomography (HR-CT) revealed a massive amount of pleural effusion on the right side, along with a collapse and consolidation of the right lung parenchyma beneath it. During the bronchoscopy, a whitish nodule was seen on the right side, and it was located on the medial wall of the lateral segment of the middle or lingular lobe bronchus. The remainder of the bronchial aperture was normal and patent, as was the mucosa.

Further investigation revealed a 10 mL pleural fluid aspiration and smear examination was performed after centrifugation, which revealed atypical suspicious cells suggestive of metastatic lesions. Subsequently, brush cytopathology was performed, and a sample was obtained from the lateral segment of the right middle lobe bronchial brush during bronchoscopy. The microscopic examination demonstrated good cellularity with cuboidal epithelial cell aggregates as shown in Fig. 3. This impression was suggestive of stage IV papillary lung adenocarcinoma in view of the cytologically proven malignant pleural effusion. The neoplastic cells had slightly enlarged nuclei and an abundance of cytoplasm against a hemorrhagic backdrop.

After obtaining informed consent and an opinion from the oncology team, the patient was admitted and a thoracentesis was performed for symptomatic relief; the volume drained was approximately 1300-1500 cc. Fig. 1B depicts the chest after a thoracentesis was performed, along with a postprocedural hydropneumothorax that was subsequently resolved. Following this, pleurodesis was performed, and the patient was started on a chemotherapy regimen of cisplatin and bevacizumab in addition to radiotherapy. On further staging, it was found the tumor was unresectable, denoting that surgical management was not an appropriate treatment of choice. However, the patient responded well to the pharmacologic treatment given and was later discharged and scheduled for further outpatient follow-up.

Discussion

Our case report is based on a 53-year-old male with a history of chronic tobacco use. The patient presented with chronic symptoms of bilateral chest pain and shortness of breath. The shortness of breath was not aggravated by any exposure, was subtle in onset, and worsened when lying in the left lateral prone position. The chest pain was also gradual, diffuse, and non-radiating. No associated diseases like asthma, tuberculosis and diabetes mellitus were present. On physical examination, the lymph nodes were not palpable. The respiratory examination revealed asymmetry in chest movement. The trachea was shifted to the left side of the chest, with a positive trail sign on the same side. Lung expansion was reduced on the right side, with decreased vibration and vocal fremitus on the same side. Generalized tenderness was also noticed on the right side of the chest.

Radiological findings revealed a massive pleural effusion on the right side of the chest. Pleural fluid was drained for examination and appeared red. On cytopathological examination, the pleural fluid was composed of moderate cellularity, showing polymorphs, lymphocytes, and macrophages/mesothelial cells. A few clusters of suspicious cells were also noticed. The characteristics of these cells were scanty cytoplasm, enlarged nuclei with irregular nuclear membranes, and inflammatory cells and red blood cells in the background. Moreover, a smear of atypical cells revealed the features of a metastatic lesion. HR-CT was performed, which showed massive pleural effusion on the right side with collapse and consolidation of lung parenchyma of the affected lung. Cytology was performed by lung brush that showed good cellularity with cuboidal epithelial cells. Finally, the lung biopsy confirmed the presence of papillary adenocarcinoma in the lung.

Adenocarcinoma of the lung is the most common type of lung cancer, especially in western countries. It is included under the heading of non–small cell lung carcinoma. It also has a strong association with active smoking as well as a history of smoking. The signs and symptoms are very insidious and do not appear until the disease is advanced. Early recognition of the disease is very beneficial in the disease outcome. At the time of initial diagnosis, about 20% of the patients have localized cancer, 25% of patients have regional metastasis of
cancer, and 55% of the patients have distant metastasis of cancer. Patients present with a variety of symptoms based on the location of cancer. Common signs and symptoms include chest pain, cough, shortness of breath, wheezing, and hoarseness. Metastatic cancer symptoms include bone pain, spinal cord impingement, and seizures. The patient with adenocarcinoma needs a complete workup and staging to determine the choice of treatment. Investigations include radiological techniques like x-ray and HR-CT. A confirmatory diagnosis is made on the basis of the transthoracic needle biopsy [6].

Staging is based on the Tumor-Node-Metastasis staging criteria. It is evaluated through a CT scan of the affected lung and the management is based on the staging of cancer. Cancer management is based on systematic therapy, radiation, and surgery. Despite these techniques, no cure is available for lung carcinoma which leaves palliative care as the last resort. Systematic therapy is based on the platinum combination. Cisplatin is preferred in young adults while carboplatin in old people. Radiation therapy is considered when surgery is not an option, however, it is the treatment of choice for the early stages of cancer [7].

**Conclusion**

Adenocarcinoma is the most common primary lung carcinoma. The most important risk factor is smoking and tobacco use. The patients are usually asymptomatic until the disease is advanced. The diagnosis of the disease is based on radiology, like x-rays and HR-CT. However, confirmatory diagnosis is done by a CT-guided transthoracic lung biopsy. However, the treatment is based on the staging of the cancer. The management consists of systemic therapy, radiation, and surgery. In the early stages, the 5 years survival rate is 65% and 35% in the advanced stages. Since no cure is present yet, palliative care is the last resort.

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**Patient consent**

Signed consent for a case report was obtained from the patient’s legally authorized representative (LAR).

The IRB approval was taken from Ganesh Shankar Vidyarthi Memorial Medical College Ethics Committee (Approval number: EC/BMHR/2022/92).