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Case Report

Chest X-Ray Delayed Diagnosis of Lung Cancer with Liver Metastases: Case Report of Misinterpreted Bronchopneumonia

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Abstract

One of the most important reasons for undetected lung cancer by x-ray chest radiography is accompanying bronchopneumonia. It is challenging to distinguish these two clinical entities, so that the diagnosis of lung cancer is not delayed. We present a late-diagnosed case of lung cancer with disseminated metastases in the liver, due to reduced visibility from a bronchopneumonic infiltrate. This case was confirmed by laboratory analyses, tumor markers, computed tomography (CT) and its spread with Doppler echosonography. In summary, we would like to highlight the need for additional diagnosis with CT and the diminished diagnostic value of X-rays in bronchopneumonia.

Keywords: *Lung Cancer; Bronchopneumonia; X-Ray Chest Radiography; Doppler Ultrasonography*

Introduction

Lung cancer is the worldwide commonest cause related death with less than 13% of five years survival rates [1]. The most deaths from lung cancer (80 - 85%) which is leading cause of cancer mortality are directly attributable to smoking [2]. The high concentration of nitrosamines in the composition of modern cigarettes primarily predisposes to adenocarcinoma as opposed to other cell types of cancer [3]. The impact of pneumonia as a complication on lung cancer patients is uniquely severe as it increases their morbidity and mortality compared to other infectious diseases [4]. Emphysema and bronchiectasis, two co-occurring structural lung illnesses, can also have an impact on a cancer patient's risk of developing pneumonia [5]. It might be challenging to identify lung adenocarcinoma from pneumonia when it presents as parenchymal consolidation, which delays diagnosis [6].

Regular x-rays chest is adequate and accepted as a screening test for higher risk population for lung cancer. In recent years, a low-dose computed tomography (LDCT) due to the greater sensitivity and specificity in detecting lung cancer is recommended [7]. Considering the higher radiation dose from computed tomography (CT) compared to regular x-ray chest radiography, and potential risk of CT's ionizing radiation, x-ray chest should not be rejected as a potential screening diagnostic procedure. A study showed that annual CT-related radiation exposure enhanced the risk of developing lung cancer by an estimated 5.5% [8].

This is a case of late diagnosed lung cancer with liver metastases. The purpose of its presentation is to show the diagnostic view and applied laboratory and imaging techniques in its detection.

Case Report

A 65-year-old male patient was hospitalized on 24.12.2022 for difficulty with breathing, shortness of breath, palpitations, occasional dry cough with wheezing, weigh loss of 12 kg in last month and swelling of the lower legs. On admission, the patient was subfebrile with mild chest pain. During a deep inspiration or when coughing, the patient feels pain under the right rib. Occasionally he coughed dry, without sputum or blood in the sputum, negative for Covid-19 rapid test. The patient was normotensive 130/85 mmHg, with decreased oxygen saturation (sPO_2 = 88%), with heart rate (HR = 125 beat per minute), tachypneic with 29 breaths per minute. He was oxygen supported (6 L/min) achieving a saturation of 93%.

He is a worker in the leather industry, a chronic smoker since he was 15 years old, with an average consumption of 25 - 30 cigarettes per day, or 67 pack-years, and moderate alcohol consumer (up to two drinks a day).

Biochemical analysis

The biochemical results on admission were with elevated inflammatory biomarkers: leukocytes (21.94 x 10^9/L), granulocytes (19.25 x 10^9/L), C-reactive protein (62.6 mg/L); with reduced serum iron (9.30 µmol/L), procalcitonin (0.23 ng/mL), lymphocytes (1.39 x 10^9/L) and D-dimer (2815.0 ng FeU/mL). The patient had signs of mild alkalosis (pH = 7.48), actual base excess (9.1 mmol/L), pCO_2 = 45.9 mmHg, pO_2 = 64 mmHg and sO_2e = 0.931%, without a sign of heart failure, brain natriuretic peptide (BNP = 52.60 pg/mL) and signs of mild anemia: erythrocytes (4.29 x 10^{12}/L), hemoglobin (112 g/L) and mean corpuscular hemoglobin concentration (MCHC = 311 g/L). Nitrogenous end products of metabolism results were: urea = 6.4 mmol/L and creatinine = 69.8 µmol/L. The enzyme status results showed: normal alanine aminotransferase (ALT = 24 U/L), elevated aspartate aminotransferase (AST = 50 U/L), normal creatine kinase (CK = 111 U/L), elevated creatine phosphokinase (CK-MB = 178 U/L), elevated lactate dehydrogenase (LDH = 505 U/L), elevated gamma-glutamyl transferase (γGT = 281 ng/L) and normal high sensitive troponin - I (hs-c TI = 8.1 ng/L). The screening tests of hemostasis were normal: prothrombin time (PT) = 12.4 s, thrombin time (TT) = 21.6 s, activated partial thromboplastin time (aPTT) = 33.1 s and international normalized ratio (INR) = 1.22.

X-ray chest radiography

An X-ray chest radiograph was immediately taken on admission (Image 1). The radiologist interprets the x-ray image as fresh consolidation, i.e. bilateral bronchopneumonia.

But the regular circular gray shadows (marked by red arrows) with increased density in the lower part of the right lung lobe became suspicious for a tumor mass. Tumor is denser than the tissue around them, so they show up as lighter shades of gray.

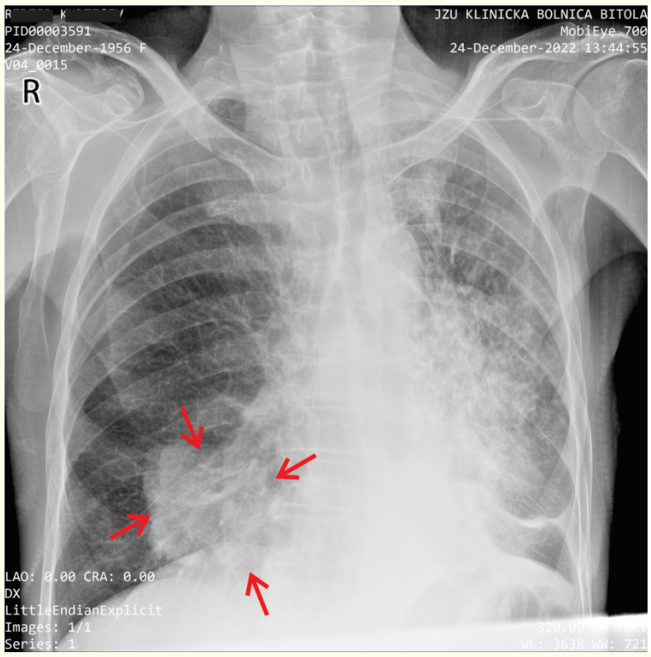

Image 1: *Chest X-ray showing bilateral bronchopneumonia (consolidation in the central and inferior part of the left lung and in the inferior part of the right lung, the marked region was misinterpreted).*

Tumor markers

Due to the suspicion of lung cancer, while waiting for an appointment for a CT scan, tumor markers were obtained: cancer antigen (CA) 125 = 251.5 U/mL, CA 19.9 = 77.5 U/mL, carcinoembryonic antigen (CEA) = 52.0 ng/mL, cytokeratin 19 (CYFRA) 21-1 = 202.7 ng/mL and prostate-specific antigen (PSA) = 0.09 ng/mL Significantly increased values were measured at: CA 125 (increased sevenfold), CA 19.9 (increased twofold), CEA (increased more than eightfold), CYFRA 21.1 (increased approximately a hundredfold).

CT scan

Unenhanced CT scan was performed at 5th day of admission, with following imaging parameters: tube voltage 120 kVp; tube current 120 - 250 mA. The radiologist described the performed CT scans as follows: reduced transparency in the left lung with a zone of consolidation in the middle and lower parts, an air bronchogram is present posterior-basally and laterally. A small pleural effusion was detected on the same side, on the left. In the right lung, in the middle parts, a larger tumor shadow was found with surrounding pneumonitis, in addition to a neoinfiltrative change. A selection from the series of native CT scans in sagittal, axial and coronal views are shown in image 2 and 3.

The patient was treated with fluid therapy and with therapeutic doses of: cardiotonic (Cedilanide á 500 mcg 1x1), diuretics (Furosemide á 20 mg), bronchodilator (Aminophylline á 240 mg), corticosteroids (6-methylprednisolone á 40 mg), hepatoprotectors (Tabl. Prunus mume Leviker® 1x1), L-Ornithine L-Aspartate (Hepa-Merz®) 2x2 amp. á 10 mL, double antibiotic therapy (Imipenem and Cilastatin 3x0.5 g) and anticoagulant therapy (Fraxiparine á 0.4 mL, 2x1).

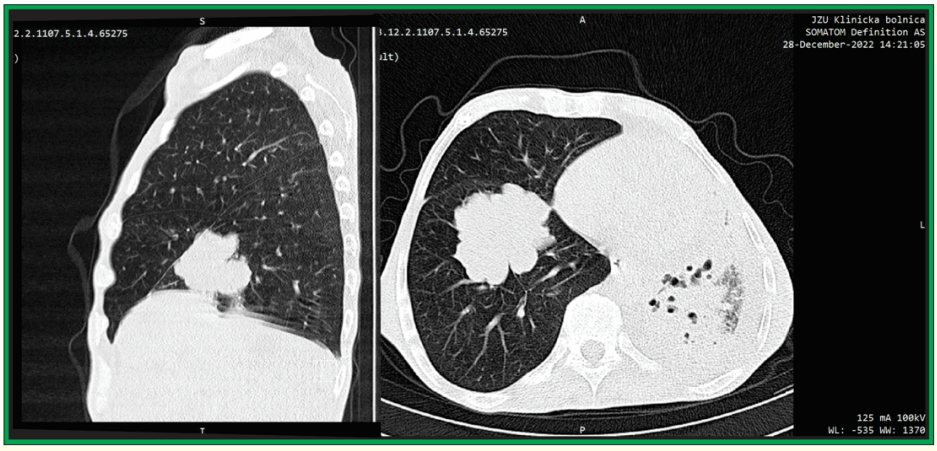

Image 2: *Computed tomography (CT) scan of right lung carcinoma in inferior part (sagittal and axial view).*

Image 3: *Computed tomography scan of right lung carcinoma in inferior part (coronal view).*

Doppler ultrasound examination

Due to the verification of a malignant process in the lungs, Doppler ultrasonography was indicated for the detection of potential metastatic spread. We used ultrasound scanner General Electric Logic 5 pro and Doppler ultrasound probe of 3 MHz.

We detected a feeding signal with pulsating wave and a drainage signal with continuous wave which penetrate from the inside to the outside of the metastases (Image 4). A chaotic spotty signal (independently of phase of cardiac and respiratory cycles) was detected in both side of the base line, along with the signal of the portal vein [9]. The liver metastases are shown as hyperechoic circles thin hypoechoic periphery, solitary or grouped in cluster formations.

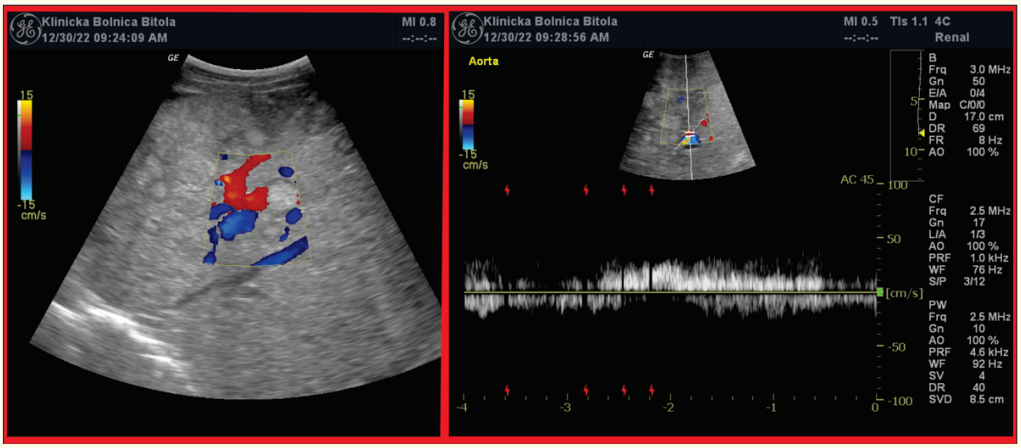

Image 4: *Lung cancer-metastasis detected by B-mode and triplex color doppler ultrasonography and measuring of the blood flow in liver and in the metastasis.*

Discussion

We present a case of lung cancer in an advanced stage with metastatic dissemination, for which we have no histological confirmation of the type of cancer. Taking into account the eight-fold increase in CEA and the hundred-fold increase in CYFRA 21.1, we put emphasis on non-small cell lung cancer (NSCLC).

Confirmation of the correct histological diagnosis at the time of lung carcinoma detection has no other special significance, except for educational purposes. Although initiated, the patient refused bronchoscopy with cytological analysis of the carcinoma. He also refused further oncology examinations and chemotherapy. NSCLC represents a heterogeneous group of lung cancer without "small cells" on histology. The major histological types include: adenocarcinoma of lung and squamous cell carcinoma (SCC) of the lung [12]. The increased sevenfold value of CA 125 draws attention to think about SCC. Tumor markers and CT findings, as well as the highest prevalence of NSCLS as most common type of lung cancer (80 - 85%) of all lung cancers, suggest an opinion on NSCLS. Elevated serum concentration of LDH means that this patient and all patients with high concentrations of LDH had a significantly worse prognosis than the patients with normal levels. Only one third of the patients with NSCLS and high concentration of LDH have probability of overall survival at one year [13]. Tas., *et al*. in their study found a strong significant positive correlation between LDH serum concentration and weight loss, albumin, performance status [13]. Jing., *et al*. found that γGT contributed in prediction of metastasis, poor prognosis and poor survival of lung cancer [14]. They found a pronounced correlation with the presence of metastases in liver, bone and lymph nodes, too [14].

Lung cancer and pneumonia both affect the lungs and have a number of similar symptoms. By weakening immune function, lung cancer can potentially raise the risk of pneumonia. The patient was hospitalized for manifest symptoms and signs of bronchopneumonia with low oxygen saturation, and the carcinoma was discovered as an incidental finding with the bronchopneumonia. The cancer was not detected on the initial x-ray, the radiologist overlooked it, and tumor markers, CT scan and abdominal echo were performed on suspicion of cancer.

Lung cancer does not cause symptoms before its advanced stages. The patient went to the doctor for the first time due to the complication of the cancer with a diagnosis of bronchopneumonia verified clinically and by x-ray chest radiography. According to this, more than 65% of the patients who have pulmonary cancer experience severe lung infections, such as pneumonia, while they are unwell.

Despite the appropriate application of antibiotics, oxygen support and other therapy, although the patient's condition has slightly improved, his prognosis due to liver metastases is inauspicious.

Conclusion

We concluded that additional imaging techniques and laboratory analyzes are necessary to complement x-ray chest radiography in the detection of lung cancer. The combined occurrence of bronchopneumonia and lung carcinoma can mask the cancer, therefore, in addition to the x-ray chest, it would be necessary to do a CT scan. If there is a real possibility of cancer, an ultrasound of the abdomen should also be performed.

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