Medica Hospitalia
Journal of Clinical Medicine
Med Hosp 2023; vol 10 (2) : 259–263

OPEN ACCESS

Case Report

CT Scan Imaging in Tuberculosis and Lung Cancer: A Case Report in Lung Hospital

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p-ISSN: 2301-4369 e-ISSN: 2685-7898
https://doi.org/10.36408/mhjcm.v10i2.938

Accepted: March 14th, 2023
Approved: July 13th, 2023

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Abstract

Background : Tuberculosis is a contagious infectious disease that attacks various organs, especially the lungs. Chest CT scan modalities have a role in helping the diagnosis of tuberculosis and lung cancer. This case report presents a rare case of two women diagnosed with tuberculosis and lung cancer.
Cases Presentation : Two women aged 43 and 42 years came to the radiology department with a history of chest pain, loss of appetite, and cough, and underwent tuberculosis therapy by taking medication for two months. The patient underwent chest x photo thorax, abdominal ultrasound, thoracic CT scan, and a biopsy was performed with CT scan guiding.
Discussion : The findings of this case are consistent with previous studies which explained that radiological CT scans found tuberculosis with lung cancer. In the lung window, CT scan chest contrast found cystic bronchiectasis. Other results showed an encapsulated pleural effusion in the right hemithorax, compression atelectasis, and multiple lymphadenopathies.
Conclusion : CT scan imaging simultaneously can show the occurrence of tuberculosis and lung cancer. Lung cancer that worsens can cause adenocarcinoma with metastasis spreading to other organs.

Keywords : computed tomography, tuberculosis, lung cancer

INTRODUCTION

Tuberculosis is a contagious infectious disease caused by Mycobacterium tuberculosis (Mtb) which attacks various organs, especially the lungs.[1] Tuberculosis may coexist with malignancy or manifest as lung malignancy.[1] In 2022, it is the second leading cause of death in the world after COVID-19,[2] and is highly contagious especially in poorly ventilated environments and crowded places.[3] Tuberculosis is a significant risk factor for lung cancer, and continues to increase steadily for years after the diagnosis of tuberculosis, and may reflect the effects of inflammation. Chronic lung disease and scarring resulting from tuberculosis.[4] According to the World Health Organization (WHO) the highest incidence was detected in Southeast Asia at 45% and in the African region by 25% of the total incidents.[5] In Indonesia tuberculosis lung disease is endemic disease number two.[6] In 2020 there were 11,993 deaths out of an estimated total of 842,000 cases,[7] increasing to 969,000 cases in 2021 with a mortality rate of 345 per 100,000 population.[8]

Tuberculosis and lung cancer are often known to coexist.[9] Case study findings suggest that tuberculosis may predispose to lung cancer.[10] Previous studies provide strong evidence of an increased risk of lung cancer among individuals with tuberculosis, and it increases further with coexisting COPD or other smoking-related cancers.[11]

Modalities such as chest scan play a role in assisting the diagnosis of tuberculosis.[12,13] However, cases of tuberculosis dissertation of lung cancer are rare, so case reports discussing tuberculosis biopsies guided by CT scans are important to report. This article reports on two women with tuberculosis dissertation lung cancer.

CASES PRESENTATIONS

This paper presents two cases of tuberculosis and lung cancer dissertation. A 43 year old woman, with a history of chest pain, loss of appetite, and cough for two months. The second woman is 42 years old with the same complaint, namely shortness of breath, and atelectasis lung on chest radiograph, with suspicion of clinical lung cancer tuberculosis. Both patients are new to therapy tuberculosis by taking medication for two months. The patient came to the radiology department to do a chest x-photo, abdominal ultrasound, and chest CT scan. Both patients then had a biopsy performed with CT scan guiding, to be sent to the anatomical pathology laboratory. Laboratory results showed non-small cell lung cancer.

RESULTS

The results of the second biopsy of the patient found adenocarcinoma. The first case was more severe because of adenocarcinoma with distant metastases to the liver, right and left pleural effusion, bronchiectasis in segments 2 and 2 of the right lung and segment 6 of the left lung, thoracic vertebrae, lumbar and thyroid organs left lobe. In addition, metastases were found in the left lobe of the thyroid organ, enlarged lymph nodes in the tracheal, subaortic, right and left axilla. The largest lymphadenopathy with a size of 2.0 cm is in the paratrachea. This condition indicates that the cancer has spread to various tissues.

X-ray imaging results thorax found a picture of pneumonia, underlying (underlying disease-principal disease) and tuberculosis lungs. Furthermore, the patient underwent abdominal ultrasound with the results obtained multiple nodules in the liver, which are liver metastases from lung cancer adenocarcinoma. Ultrasound of the abdomen also found right pleural effusion, which is also a metastasis from adenocarcinoma cancer, and multiple nodules. This is metastatic lung cancer adenocarcinoma.

Chest CT scan with contrast of CT scan imaging results found a solid mass in segment 10 in the left lung, size 3.75 x 3.28 x 4.11 cm, multiple solid nodules in the segment right lung 5, 6, 8, 9, 10. The largest size of the nodule is 1.24 x 1.35 x 1.10 cm, on the right 10th segment. In segment 5,6,8,9,10 the right lung is the largest in size on the right, and a solid nodule is also found on the left 10th segment. In the lung window CT scan chest contrast found cystic bronchiectasis in segment 1, 2 right lung, and segment 5 left lung. On CT scan of the chest, multiple lymph nodes were also found lymphadenopathy in the upper-lower, paratracheal, subavic, interlobar, right and left axilla with the largest size of 2.00 x 1.40 cm in the lower paratrachea. CT scan results also found duplex pleural effusion. Lesions were found on the bone window sclerotic partially lytic on coccus paper thoracic 2, 4, 10, 12. In the mediastinum window found a solid nodule in the gland left lobe measures 0.83 x 0.86 cm. The impression from this CT Scan shows tuberculosis lung and a solid mass in the lung with metastases to the liver, vertebrae, and duplex pleural effusion (see Figure 1).

The results of the adenocarcinoma biopsy in the second patient found right pleural effusion, but no metastases were found in the liver or thoracic and lumbar spine. There was also atelectasis in segment 3 of the right lung, but no bronchiectasis was found. Another finding is the presence of lymphadenopathy in the paratrachea, subcarina, right and left axilla.

CT scan imaging results in the second patient were found in the right lung pattern bronch-vascular looks increased, no spot appear. Lesion looks isodens lobulated at 3,5 segments right lung (±7.9 x 5.3 x 7.1 cm in size), accompanied by a narrowing of the right middle bronchus, attached to the right inferior bronchus. Right inferior pulmonary, post-contrast injection appears

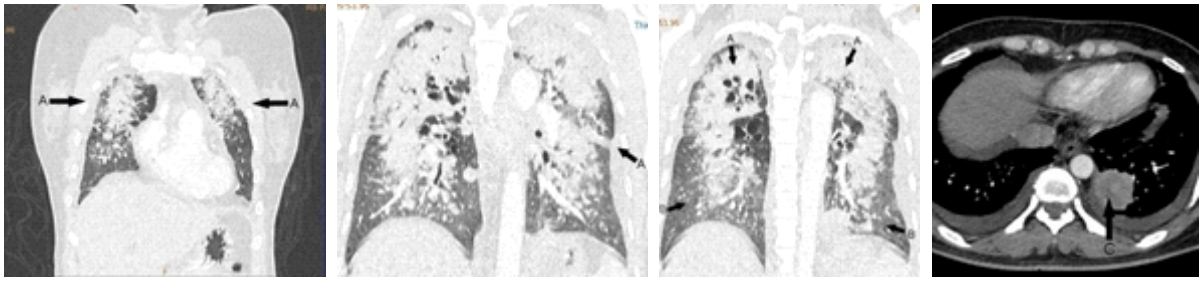

Figure 1. The first patient's CT scan results found tuberculosis lung (A), lung nodule in bilateral lung (B), solid mass in left lung (C).

Figure 2. CT scan of the second patient, found tuberculosis lung (A), nodule / mass in lung right (B), right pleural effusion (C).

enhancement. Pleural effusion was seen in the right hemithorax with thick walls. Compression atelectasis of the 3rd segment of the right lung. The left lung has a pattern bronchovascular looks normal, no spot, and nodules and atelectasis. The trache doesn't look pushed, the left bronchus doesn't look narrow, and the esophagus doesn't widen, the walls don't look thick, and no masses are visible. Other results showed that the left and right thyroid did not appear enlarged and no mass was seen. Furthermore, the shape and location were normal, the aorta was not dilated and calcification was not seen. Another finding was multiple lymphadenopathies in the right and left upper-lower paratrachea, subcarina, and right and left axilla (Figure 2).

The impression obtained in the second patient was a solid lobulated mass in segment 3.5 of the right lung with a size of ±7.9 x 5.3 x 7.1 cm, accompanied by a narrowing of the right medial bronchus, attached to the right inferior bronchus, encased pulmonary artery right inferior, and suspected right lung tumor. In addition, there is an encapsulated pleural effusion in the right hemithorax accompanied by compression atelectasis in the 3rd segment of the right lung. Other results are multiple lymphadenopathies in the upper-lower paratrachea right and left, subcarinal, and there are right and left axillae.

DISCUSSION

This case report describes the discovery of tuberculosis with lung cancer in Lung Hospital dr. Ario Wirawan, Salatiga. This finding is consistent with a previous study by Thattaamuriyil Padmakumari,[9] that CT scan radiology has the ability to differentiate tuberculosis and lung cancer,[14] and evaluates the potential predictive role of clinical parameters. CT scan radiology has become one of the most influential topics in quantitative imaging research. This is because CT scan radiology is a method applied to imaging that allows the extraction of thousands of quantitative ultrastructural parameters from pixels.[15]

In the first case report, there was an adenocarcinoma with metastases in both pleural effusions. Further findings revealed that metastases had spread to various body tissues such as the liver, thyroid lobe, lymph glands, and others. These results indicate that tuberculosis that is already severe is more difficult to treat and often leads to death.[16–18] According to Dacosta, the incidence of tuberculosis lesions is significantly associated with carcinoma, being the main cause of death in many countries around the world.[19] Previous research by Cukic explained that lung tuberculosis patients are at risk of bronchial drainage carcinoma, peripheral lung carcinoma, and cavernous carcinoma.[20] It is possible that pulmonary tuberculosis enhances the risk of lung cancer.[21] This supports the statement of Hui *et al* that there is a direct relationship between tuberculosis and lung cancer, especially adenocarcinoma.[22]

In the second patient, it was found that the right lung had an increased bronch-vascular pattern, accompanied by narrowing of the right median bronchus, and attached to the right inferior bronchus. On the left

lung, the bronch-vascular pattern appears normal, no spots were seen, and nodules or atelectasis. According to Hors *et al* incidental non-nodular lung findings can broadly be characterized as an airway or airspace related disorder and a diffuse parenchymal abnormality.[23]

In the lung window CT scan chest contrast found cystic bronchiectasis. This is consistent with previous findings that CT scores bronchiectasis peripherals have added value to pulmonary function tests in monitoring cystic fibrosis lung disease.[24] Tuberculosis lung can coexist with carcinoma squamous cell lung at the same time.[25] Lung cancer and pulmonary tuberculosis are two major public health problems related to clinical and radiological presentations.[26,27] The result of Park *et al* show that pulmonary tuberculosis is a risk factor for developing chronic obstructive pulmonary disease and lung cancer.[28] An investigation by Qin *et al* explained that tuberculosis is an important risk factor for lung cancer, which originates from chronic inflammation and infection.[29]

CT Scan results showed that there was an encapsulated pleural effusion in the right hemithorax accompanied by compression atelectasis, and multiple lymphadenopathy, which are common radiological findings in many thoracic diseases.[30] Characteristics of lung cancer in tuberculosis patients the most common fibrothorax or empyema is squamous cell carcinoma.[31] Radiological findings of CT scans can find tuberculosis and cancer in the lungs and can be used to stop cancer at an early stage.[26]

CONCLUSION

Based on the biopsy results and CT scan radiological findings, it can be concluded that tuberculosis and lung cancer can coexist in these patients. Lung cancer that worsen can cause adenocarcinoma with metastases spreading to the liver, pleura, thoracic vertebrae, and lumbar spine.

CONFLICT OF INTEREST

No conflict of interest to declare.

FUNDING

This work did not receive any grand from funding agencies in the public, commercial, or not-for-profit sectors.

ETHICAL APPROVAL

Approval was not required.

INFORMED CONSENT

The informed consent approval by the family patient. The authors declare that this case report does not contain any personal information that could lead to the identification of the patients.

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