Original Research Article

Role of CT imaging to evaluate solitary pulmonary nodule with extrapulmonary neoplasms

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Abstract

Background:A solitary pulmonary nodule is defined as a discrete, well - marginated, rounded opacity less than or equal to 3 cm in diameter that is completely surrounded by lung parenchyma, does not touch the hilum or mediastinum, and is not associated with adenopathy, atelectasis or pleural effusion.

Aim and objectives: To determine the frequency of single lung metastasis, primary lung cancer and benign lesions in patients with solitary lung nodule and a primary extrapulmonary neoplasm, to evaluate the Chest Radiographs and CT characteristics of solitary lung nodule with a primary extrapulmonary neoplasm, to develop a statistical model to guide clinicians regarding choice of patient for diagnostic biopsy.

Materials and methods:A retrospective analysis of CT andChest Radiographs of 50 patients with an extrapulmonary malignant neoplasm and a solitary pulmonary nodule, done in our Dhiraj General Hospital over a 6 – month period.

Results: 50 patients of Extrapulmonary neoplasms were evaluated; out of these patients were diagnosed and evaluated for PrimaryBronchogenicCarcinoma, lung metastases, benign nodule.

Conclusion: Solitary lung nodule in patients with extrapulmonary malignancies showed a variety of patterns on CT. Nearly half of the non – calcified solitary pulmonary nodules identified in this series were malignant. The likelihood of a spread depends on the histological

characteristics of the extrapulmonary neoplasm and the patient's smoking history. Lung cancer was more common than metastatic disease.

Key words

CT imaging, Extrapulmonary neoplasm, Solitary pulmonary nodule.

Introduction

A solitary pulmonary nodule is defined as a discrete, well - marginated, rounded opacity less than or equal to 3 cm in diameter that is completely surrounded by lung parenchyma, does not touch the hilum or mediastinum, and is not associated with adenopathy, atelectasis or pleural effusion. Lesions larger than 3 cm are considered masses and are treated as malignancies until proven otherwise [1, 2].

It is not uncommon for a patient who currently has or has previously had extrapulmonary neoplasm to develop a solitary pulmonary nodule.

Such a nodule may be detected with chest radiography or computed tomography performed as part of the work-up or follow-up of the knownextrapulmonary malignancy. [3]

The determination of the etiology of such a nodule is usually important to direct the appropriate therapy e.g., observation, biopsy, resection, chemotherapy, radiation therapy or a combined approach. Sometimes it is difficult or impractical to obtain tissue and thus establish a definitive diagnosis [4, 5].

In such cases, it may be helpful to know the likelihood that such a nodule represents a benign lesion, metastasis or primary bronchogenic carcinoma.

Aim and objectives

- To determine the frequency of single lung metastasis, primary lung cancer and benign lesions in patients with solitary lung nodule and a primary extrapulmonary neoplasm.
- To evaluate the Chest Radiographs and CT characteristics of solitary lung nodule with a primary extrapulmonary neoplasm.
- To develop a statistical model to guide clinicians regarding choice of patient for diagnostic biopsy.

Materials and methods

A retrospective analysis of CT and Chest Radiographs of 50 patients with an extrapulmonary malignant neoplasm and a solitary pulmonary nodule, done in our Dhiraj General Hospital over a 6 – month period.

Images were reviewed for the presence of solitary lung nodule. If present, the following nodular characteristics were recorded:

- Sidedness,
- Distribution,
- CT attenuation,
- Shape,
- Size,
- Margins and
- Calcification.

The histological characteristics of the nodule were correlated with those of theextrapulmonary neoplasm and with patient age and smoking history.

Results

Distribution of cases was as per **Graph – 1**.

Benign pulmonary nodule

Right upper lobe nodule shows peripheral calcification and high Hounsfield unit enhancement, suggesting that the lesion is a calcified, benign pulmonary nodule (**Figure – 1**).

Graph – 1: Distribution of cases.

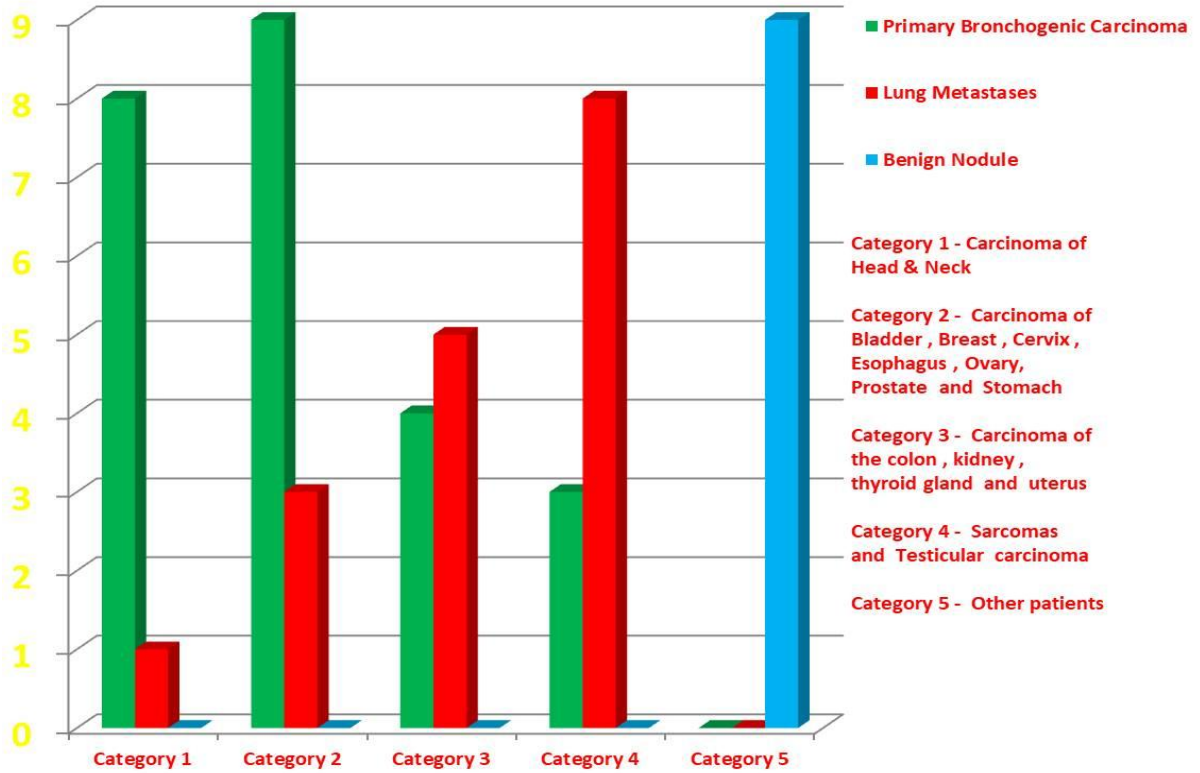
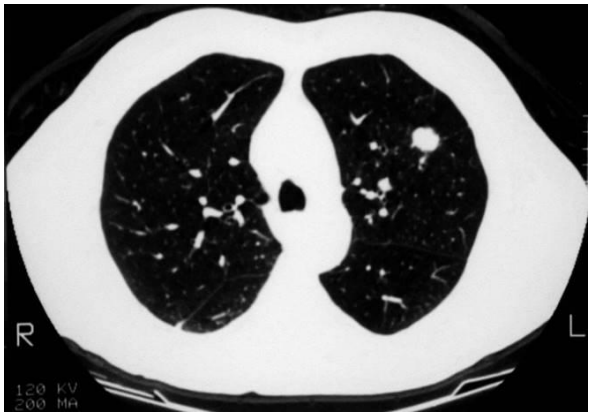


Figure – 1: Benign pulmonary nodule.

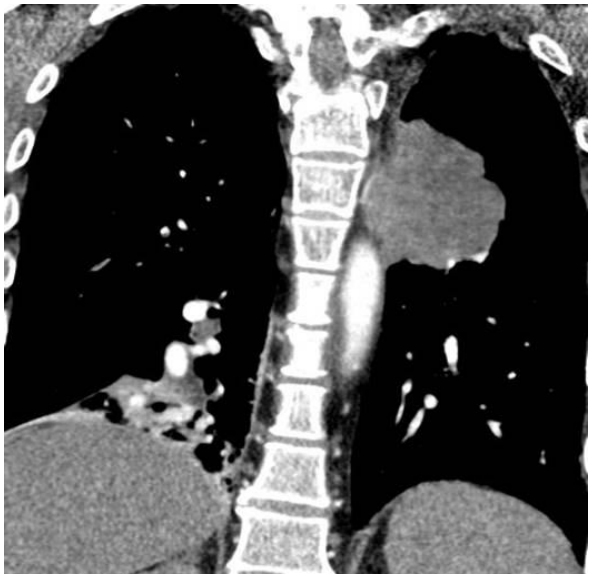
Figure – 2: Metastatic deposit.

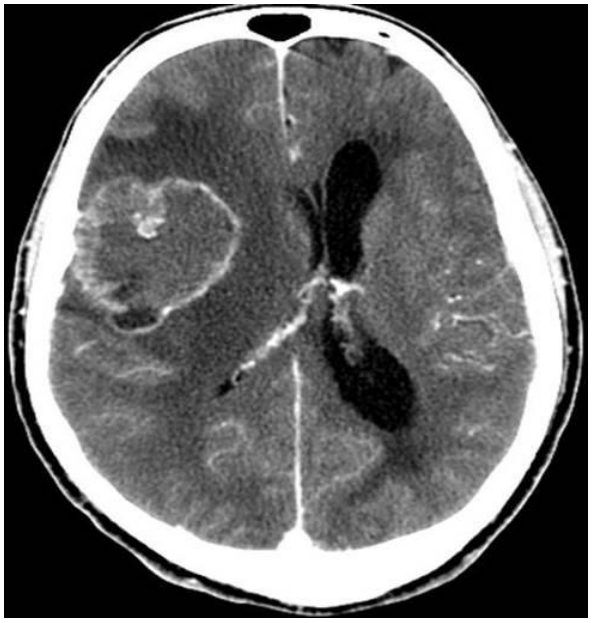


Metastatic deposit

A 1.5 cm coin lesion in the left upper lobe in a patient with prior colonic carcinoma. Transthoracic needle biopsy findings confirmed this to be a metastatic deposit (**Figure – 2**).

Figure – 3 to 5: Primary bronchogenic carcinoma with brain metastases.





Primary bronchogenic carcinoma with brain metastases (Figure – 3 to 5)

- Chief complaints of the patient - Severe shortness of breath, Headache, Altered mental status
- History of smoking was present.
- CT of the brain performed revealed an enhancing intra-axial lesion.
- Pathologically proven as a - Bronchogenic Carcinoma.

Lung metastases (Figure – 6 to 8)

- Multiple calcified as well as soft tissue nodules in both the lung fields suggestive of lung metastases.
- Multiple enlarged necrotic mediastinal nodes seen, largest tracheo-bronchial node.
- Left parahilar lingual lobe of lung shows calcified scarring with surrounding heterogeneously enhancing soft tissue lesion of size 42 x 28 mm.
- Multiple poorly enhancing hypodense lesions seen in both lobes of liver of average size 1-3 cm, suggestive of liver metastases.

Figure – 6 to 8: Lung metastases.

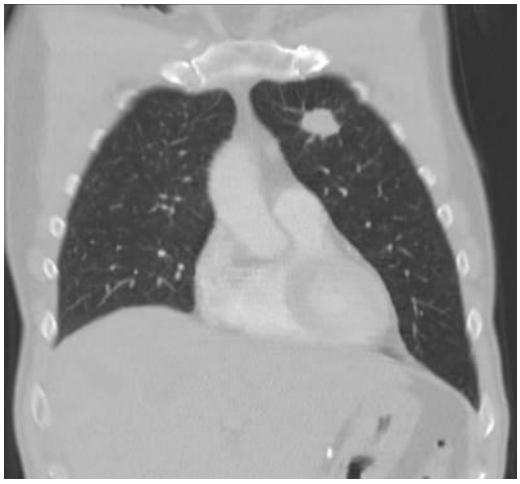


Figure – 9 to 14: Lung cancer left upper lobe.

Lung cancer left upper lobe (Figure – 9 to 14)
A left upper lobe nodule with central lucency and poorly circumscribed margins was diagnosed as actinomycosis based on needle biopsy findings.

Computed tomography (CT) scan of the patient in the previous image. After needle biopsy, the presence of classic sulfur granules confirmed a diagnosis of actinomycosis.

Lung metastases with renal cell carcinoma (Figure – 15, 16)
Left Renal mass arising from midpole with perinephric involvementsuggestive of malignant mass - Renal Cell Carcinoma.
Subcentimeterlung nodule in right basal lung suggestive of lung metastases.

Figure – 15, 16: Lung metastases with renal cell carcinoma.

Conclusion

- Solitary lung nodule in patients with extrapulmonary malignancies showed a variety of patterns on CT.
- Nearly half of the non-calcified solitary pulmonary nodules identified in this series were malignant.
- The likelihood of a spread depends on the histological characteristics of the extrapulmonary neoplasm and the patient's smoking history.
- Lung cancer was more common than metastatic disease.

References

1. Swanson SJ, Jaklitsch MT, Mentzer SJ, Bueno R, Lukanich JM, Sugarbaker DJ. Management of the solitary pulmonary nodule role of thoracoscopy in diagnosis and therapy. Chest, 1999; 116: 523S–524S.
2. Gurney JW, Lyddon DM, McKay JA. Determining the likelihood of malignancy in solitary pulmonary nodules with Bayesian analysis. Part I: theory. Radiology, 1993; 186: 405–413.
3. Munden RF, Pugatch RF, Liptay MJ. Small pulmonary nodules detected at CT: clinical importance. Radiology, 1997; 202: 105– 110.
4. Gupta NC, Maloof J. Probability of malignancy in solitary pulmonary nodules using fluorine-18-FDG and PET. Chest, 1996; 112: 943–948.
5. Schwarz CD, Lenglinger F, Eckmayr J, Schauer N, Hartl P, Mayer KH. VATS (video-assisted thoracic surgery) of undefined pulmonary nodules. Preoperative evaluation of videoendoscopicresectability. Chest, 1994; 106(5): 1570–1574.
6. Van Sonnenberg E, Casola G, Ho M. Difficult thoracic lesions: CT guided biopsy experience in 150 cases. Radiology, 1988; 167: 457–461.
7. Wicky S, Mayor B, Cuttat JF, Schnyder P. CT-guided localization of pulmonary

nodules with methylene blue injections for thoracoscopic resections. Chest, 1994; 106: 1326–1328.

8. Yang ZG, Sone S, Takashima S, Li F, Honda T, Maruyama Y, Hasegawa M, Kawakami S. High-resolution CT analysis of small peripheral lung adenocarcinomas revealed on screening helical CT. AJR Am J Roentgenol., 2001; 176: 1399–1407.
9. Munden RF, Hess KR. "Ditzels" on chest CT: survey of members of the Society of Thoracic Radiology. AJR Am J Roentgenol., 2001; 176: 1363–1369.
10. Laurent F, Remy J. Management strategy of pulmonary nodules. J Radiol., 2002; 83: 1815–1821.
11. Kradin RL, Spirn PW, Mark EJ. Intrapulmonary lymph nodes: clinical, radiologic, and pathologic features. Chest, 1985; 87: 662–667.
12. Diederich S, Lenzen H, Windmann R, Puskas Z, Yelbuz TM, Henneken S, Klaiber T, Eameri M, Roos N, Peters PE. Pulmonary nodules: experimental and clinical studies at low-dose CT. Radiology, 1999; 213: 289–298.