

CT Correlation of Coin Lesion on Chest X-Ray

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Abstract: Among the causes of coin lesions identified on chest x ray, imaging characteristics of each type of pulmonary nodule with clinical findings are important for further management. CT scan, performed for coin lesion on chest x ray, allows for both morphological and anatomical characteristics to evaluate etiology of nodules. **Methodology:** The present study included 30 patients. After coin lesion noted on chest x-ray, all the patients underwent CT Thorax. The images were evaluated and the findings were compared between chest radiography and CT scan. The results were tabulated and statistically analysed. **Result:** Apart from differentiating features on chest xray, CT scan is very useful for evaluation of such coin lesions. CT scan plays crucial role in differentiating benign, malignant and infective etiology of pulmonary nodules. Also CT scan plays key role in follow up of asymptomatic patients.

Keywords: Chest x ray, Computed Tomography, Solitary pulmonary nodule (SPN), Cannon ball metastasis, Round pneumonia

1. Introduction

Solitary nodule in chest x-ray can be benign, malignant or granulomatous lesion. The most important single roentgenological feature is calcification within a lesion. A relatively large, central core of calcium, diffuse calcified stippling on inner ring and outer shell of calcium are all reliable signs of benignancy within a tumor. A laminated appearance with or without calcium gives assurance of inactivity of benign tumor as well. A few flakes of calcium may represent calcium deposits in foci of necrosis within tumor.

Common etiology of Pulmonary nodule:

Benign	Malignant
• Bacterial abscess	• Adenocarcinoma
• Bronchogenic cyst	• Bronchogenic carcinoma
• Rounded atelectasis	• Large cell carcinoma
• Tuberculosis/Infectious granuloma	• Metastatic lesions (breast, head, neck, etc.)
• A-V malformation	• Pulmonary carcinoid
• Lipoma / Hematoma	• Small cell carcinoma
• Hamartoma	• Squamous cell carcinoma
• Pulmonary infarct	
• Rheumatoid nodule	
• Echinococcus cyst	
• Pseudotumor	
• Intrapulmonary lymphnodes	

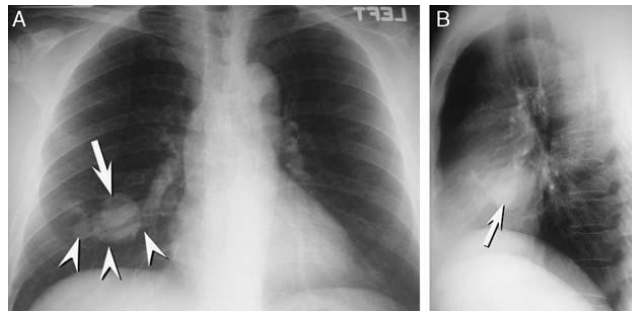
CT allows identification of intrinsic calcium or fat within lung nodule, which may allow a prospective diagnosis of benignity.

CT scan also allows characteristic pattern of calcification within nodule.

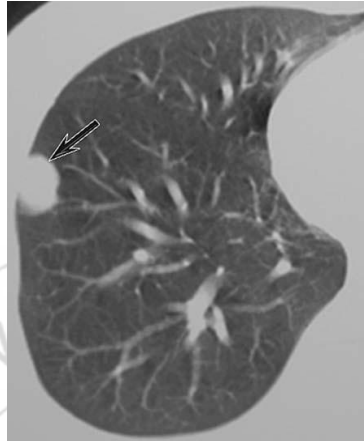
- Tuberculoma: is common cause of granulomatous disease. Granulomas, may exhibit characteristic pattern of calcification including laminar and concentric types, predictive of benign lesions. Diffuse and central calcifications are also characteristic of Granulomatous etiology.
- Hamartoma: are benign lung neoplasms characterized by slow growth and well defined lobular margin. CT may help establish the diagnosis through identification of intralobular fat or calcification. Calcification shows speckled or popcorn morphology.
- Carcinoid tumor: is a low grade primary malignant lung neoplasm that frequently exhibit well defined borders and relationship with airway. These lesions may be completely endoluminal or may abut bronchus and exhibits contrast enhancement and stippled or coarse calcification.
- Intrapulmonary lymph nodes: are often small, well defined and solitary. And usually located in the lung periphery caudal to the level of carina, exhibit elongate morphology and a fissural location and are within 20 mm from pleura.



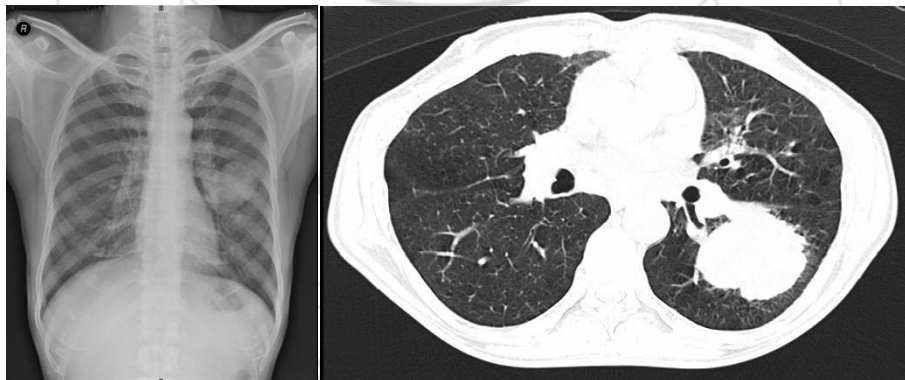
Multiple heterogeneously enhancing nodular lesions in non-seminomatous germ cell tumor of testis diagnosed to be metastasis.



Solitary nodule on chest x-ray was diagnosed as Pulmonary A-V malformation



Malignant solitary pulmonary nodule in a 44-year-old patient with lower extremity alignant fibrous histiocytoma: solitary metastases. Axial thoracic CT shows a 2.5 cm nodule (arrow) in the subpleural right lung proven to represent a solitary metastasis from soft tissue sarcoma.



Solitary nodule in 54 yr old male patient with hemoptysis proved to be squamous cell carcinoma on biopsy

2. Methodology

All the patients with clinical suspicion of lung pathology, who were come for their routine check up in the opd of medicine and pulmonary medicine, underwent chest radiography postero-anterior view at 60 kVp and 10-12.5 mAs in a SIEMENS HELIPHOS-D 500 mA xray machine. After initial evaluation of pulmonary nodule on chest x ray, all patients were subjected to CT scan.

CT scan Thorax were performed in supine position in a SIEMENS SOMATOM EMOTION 6 Slice CT machine in suspended inspiration using a kVp of 120 and mAs of 110. The window width was set between 1200-1500 and window level at -600 to -700. The matrix used was 512 x 512 while the pitch was set at 1.2:1.5 with reconstruction thickness was 5mm.

Diagnosis was based on clinical and radiographic findings.

3. Discussion

We studied CT scan imaging in 30 patients who presented with coin lesion on chest x ray. Out of 30 patients, 8 had multiple nodular lesions whop were diagnosed as metastatic lesions. In 4 patients, nodule remained stable on follow up whereas 5 had biopsy done and diagnosed benign nodule. Among rest, 5 underwent biopsy and were malignant lesion. 7 patients had infectious etiology, mainly tuberculosis and fungal. 1 patient was diagnosed having Arterio-venous malformation on imaging.

Chest Radiographic and Thoracic CT morphologic abnormalities associated with Malignancy in an SPN:

<i>Favors Malignancy</i>	<i>Favors Benign</i>
• Large Nodule Size	• Small Nodule Size
• Spiculated or Lobulated border	• Smooth Border
• Irregular Shape, • “Notch” Sign, Corona maligna	• Round, Oval, or Tubular shape
• Thick-walled Cavitation	• Satellite Nodules
• “Vascular Convergence” Sign	• Lack of Growth for > 2 years
• Positive Contrast Enhancement on CT	• Calcification
• Ground-glass or Part-Solid • Attenuation	• Fat or Water Attenuation

<i>Fleischner Society Recommendations for asymptomatic Nodules</i>		
<i>Nodule size</i>	<i>Low risk patient</i>	<i>High risk patient</i>
< 4 mm	No follow up	Follow up Ct at 12 months; if unchanged no further follow up.
4 to 6 mm	Follow up CT at 12 months; if unchanged no further follow up.	Follow up at 6-12 months; then 18-24 months if no change.
6 to 8 mm	Follow up at 6-12 months; then 18-24 months if no change.	Follow up at 3-6 months; then 9-12 months and 24 months if no change.
> 8 mm	Follow up Ct at 3, 9 and 24 month; dynamic contrast Ct, PET or biopsy.	Same as for low risk patients
High risk: History of smoking, exposure to carcinogens or lung cancer in 1 st degree relatives.		

In small lesion, complete excision should be carried out rather than biopsy. And if malignancy provrd, lobotomy should be done. But for larger mass, incisional biopsy is to be performed. For Granulomas, safest type of treatment is removal.

4. Conclusion

The differential diagnosis of an SPN is broad and management depends on whether the lesion is benign or malignant. The probability of malignancy in an indeterminate SPN discovered at chest radiography in an adult patient is approximately 40%. The goal of imaging studies and minimally invasive procedures is to modify this probability to a high enough level to warrant surgery or to a low enough level to allow observation of the nodule. The optimal balance of diagnostic testing and intervention depends on a number of factors, and no single approach is appropriate for every patient. A number of evidence-based approaches to the evaluation of the SPN have been published, and adoption of one of these approaches, with modification to suit the needs of the particular practice, allows for early diagnosis of malignancy while minimizing the risk for unnecessary intervention or needless surgery. CT scan helps to differentiate possible etiology of nodular lesion detected on chest x-ray and plays crucial role in further evaluation of the same. CT scan is also recommended for follow up of asymptomatic solitary pulmonary nodule as described. CT allows optimal characterization of pulmonary nodule.

References

- [1] MacMahon H, Austin JH, Gamsu G, et al. Guidelines for management of small pulmonary nodules detected on CT scans: a statement from the Fleischner Society. *Radiology* 2005; 237:395-400.
- [2] Ost D, Fein AM, Feinsilver SH. Clinical practice. The solitary pulmonary nodule. *N Engl J Med* 2003; 348:2535-2542.
- [3] Zerhouni EA, Stitik FP, Siegelman SS, et al. CT of the pulmonary nodule: a cooperative study. *Radiology* 1986; 160:319-327.
- [4] Toomes H, Delphendahl A, Manke HG, Vogt-Moykopf I. The coin lesion of the lung. A review of 955 resected coin lesions. *Cancer* 1983; 51:534-537.
- [5] Cahan WG, Shah JP, Castro EB. Benign solitary lung lesions in patients with cancer. *Ann Surg* 1978; 187:241-244.
- [6] Ginsberg MS, Griff SK, Go BD, Yoo HH, Schwartz LH, Panicek DM. Pulmonary nodules resected at video-assisted thoracoscopic surgery: etiology in 426 patients. *Radiology* 1999; 213:277-282.
- [7] Godoy MC, Naidich DP. Subsolid pulmonary nodules and the spectrum of peripheral adenocarcinomas of the lung: the spectrum of peripheral adenocarcinomas of the lung: recommended interim guidelines for assessment and management. *Radiology* 2009; 253:606-622.
- [8] Swensen SJ, Viggiano RW, Midthun DE, et al. Lung nodule enhancement at CT: multicenter study. *Radiology* 2000; 214:73- 80.
- [9] Yankelevitz DF, Henschke CI. Does 2-year stability imply that pulmonary nodules are benign? *AJR Am J Roentgenol* 1997; 168:325-328.