

Original research article**An investigation into the usefulness of computed tomography (CT) for diagnosing lung nodules, and comparison of findings from histopathology****Dr. Nuha Fathima**

Junior Resident, Department of Respiratory Medicine, Kanachur Institute of Medical Sciences, Mangalore, Karnataka, India

Corresponding Author:

Dr. Nuha Fathima

Abstract

Background: In pulmonology practise, lung carcinomas are seen fairly frequently; this is primarily due to the contemporary lifestyle, which has led to an ever-increasing population of smokers; secondarily, this is due to the pollution that occurs in the majority of cities across the country; finally, this is due to the fact that pollution is a result of both of these factors. Before gaining confirmation of the diagnosis, the individual in question as well as their family are need to go through a significant degree of social distress. Therefore, there is a pressing requirement for major advancement in the radiographic methods that are now used in the process of cancer diagnosis. Before moving further with the confirmation of the diagnosis, it is essential for the treating physicians and the radiologists to have at least some level of confidence in the initial diagnosis. This will provide them the opportunity to fully prepare the patients and their family for the most likely diagnosis prior to the release of the confirmation report. The methods that confirm the diagnosis consist of both the PET scan and the histopathological examination of the tissue. Both of these procedures need a substantial amount of time, and in a climate like ours, it might be difficult to find a centre that offers PET scanning. As a result, the objective of this study is to determine whether or not CT is an accurate method for diagnosing lung cancer.

Materials and Methods: Seventeen patients were included in the study. The study was a cross sectional study. The sample size of the study consisted of thirty patients. CT scan was done in 17 patients who were identified to have lung nodules either by other mode of radiological studies or first time identified in a CT scan itself.

Results: CT is an excellent option having high sensitivity and specificity in diagnosing a lung nodule. When followed by the routine histo-pathology the efficacy is 100 percent.

Conclusion: Once the lesions have been verified by PET and histology reports, the particular characteristics of the lesions offer an additional advantage in the process of suspecting instances early on, and they also help in the detection of life-threatening illnesses.

Keywords: CT, lung nodule, efficacy, cross sectional study

Introduction

Solitary pulmonary nodules are radiographically defined as spherical opacities that measure less than three centimetres in diameter and are surrounded by lung parenchyma. Solitary pulmonary nodules can be caused by a number of different conditions. Radiological anomalies of this kind are rather common^[1]. There may be a single lesion present, or there may be many lesions present. The term "coin lesion" is no longer applied in the business as a result of the connotations it raises regarding a two-dimensional structure^[2]. Regardless of their size, lung nodules must always be recognised as three-dimensional entities. This is essential. Imaging examinations of other parts of the body could, by coincidence, turn up evidence of the presence of pulmonary nodules^[3]. At the beginning of the CT screening trial, thirteen percent of the smokers who participated in the study had lung nodules that were more than five millimetres in diameter^[4]. 14.8 percent of all scans were recorded in the research that was carried out by Furtado CD *et al.*, despite the fact that this also included nodules that were smaller than 5 mm. Several investigations, on the other hand, have reported occurrences ranging from 5.8 percent to 51 percent^[6, 7]. Screening for lung cancer has not been shown to lower mortality rates, contrary to popular belief^[8]. Careful monitoring of a lesion that was found by chance has the goal of identifying and preventing any unfavourable side effects that may be produced by the condition. This goal can be accomplished by keeping an eye on the lesion^[9].

In comparison to chest radiography, computed tomography (CT) has superior levels of both specificity and sensitivity. In addition to this, it enables an assessment to be made of the buildings that are located in

the surrounding region. It is strongly suggested that a computed tomography (CT) scan be executed on every patient who has had chest radiography, as well as on certain lesions that have been discovered. CT is the imaging modality of choice for reevaluating pulmonary nodules detected on chest radiographs and tracking lesions on subsequent studies for change in size. This is because CT can detect minute changes in the size of pulmonary nodules. In addition, CT is the imaging technique of choice for determining whether or not nodules have grown in size. The resolution of an image obtained from a chest CT improves in tandem with the reduction in slice thickness. As a consequence of this, thin-cut sliced CT is strongly suggested for use in the examination of single pulmonary nodules. The contemporary style of life has also been linked to an ever-increasing population of smokers, and the high incidence of lung carcinomas in radiological practises is partly attributable to pollution in the majority of cities across the country. Before gaining confirmation of the diagnosis, the individual in question as well as their family are need to go through a significant degree of social distress. Therefore, there is a pressing requirement for major advancement in the radiographic methods that are now used in the process of cancer diagnosis. Before moving further with the confirmation of the diagnosis, it is essential for the treating physicians and the radiologists to have at least some level of confidence in the initial diagnosis. This will provide them the opportunity to fully prepare the patients and their family for the most likely diagnosis prior to the release of the confirmation report. The methods that confirm the diagnosis consist of both the PET scan and the histopathological examination of the tissue. Both of these procedures need a substantial amount of time, and in a climate like ours, it might be difficult to find a centre that offers PET scanning. As a result, the objective of this study is to determine whether or not CT is an accurate method for diagnosing lung cancer.

Aims and Objectives

Study on CT assessments of lung nodules that are supported by histology is required in order to identify whether or not CT is effective. This study must be carried out in order to answer this question.

Materials and Methods

- This study was done in the Department of Pulmonology, Kanachur Institute of Medical Sciences, Mangalore from June 2022 to July 2023.
- Seventeen patients were included in the study.
- The study was a cross sectional study.
- The sample size of the study consisted of thirty patients. CT scan was done in 17 patients who were identified to have lung nodules either by other mode of radiological studies or first time identified in a CT scan itself.

Inclusion criteria

All the patients were confirmed by CT scans to have lung nodules.

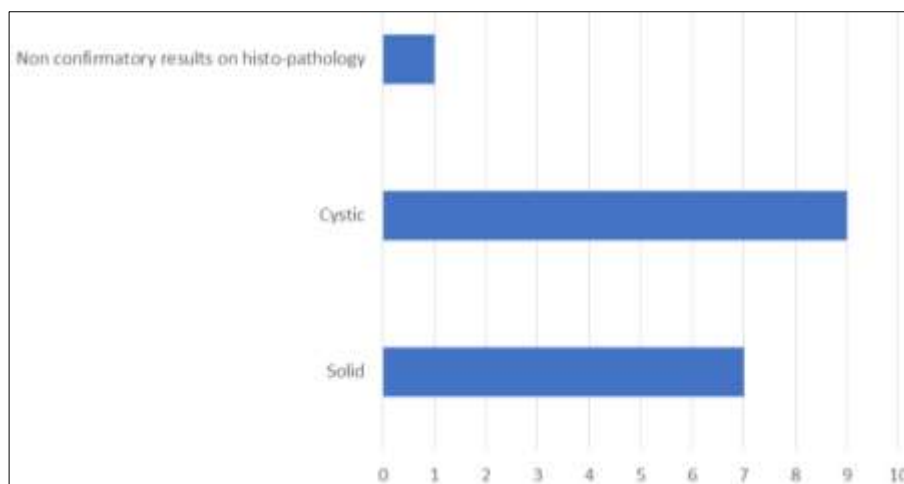
Exclusion Criteria

Other lung pathologies were excluded which were identified by histopathology.

Results

Table 1: Solid vs the cystic

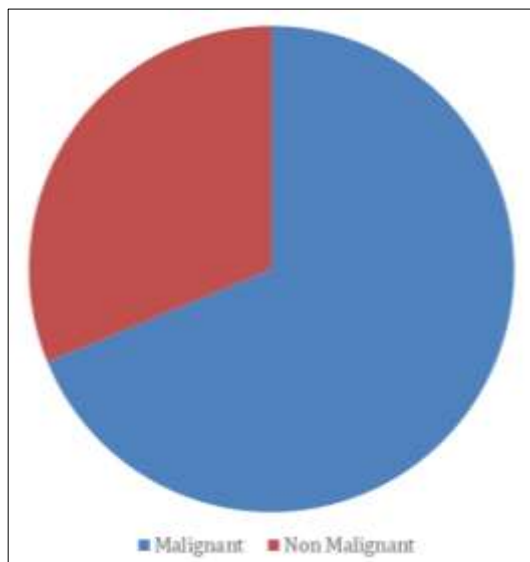
Solid	Cystic	Non confirmatory results on histo-pathology
07	09	1



Graph 1: Solid vs the cystic

Table 2: Malignant vs non-malignant (in solid)

Malignant	11
Non Malignant	05



Graph 2: Malignant vs Non-malignant (in solid)

Table 3: Cystic

Cystic	5 were Adenomas
--------	-----------------

Table 4: Size of the nodule and their diagnosis on histopathology

01-0.4 cm	0.4-0.8 cm	> 0.8 cm
2 (Tuberculosis) so were not included in the study		
Benign	05 - adenomas	
Malignant	2 (Squamous cell)	09 (4-small cell, 2 – giant cell and 3 – squamous)

Table 5: Margin and contour in solid nodules

Margin and contour	Benign	Malignant
Regular and smooth	5- adenomas	
Spiculated		6
Lobular	6 were lobular	All were lobular

Table 6: Other signs

	Benign	Malignant
Halo sign positive	Nil	1 giant cell.
Calcification	Nil	5 had calcification

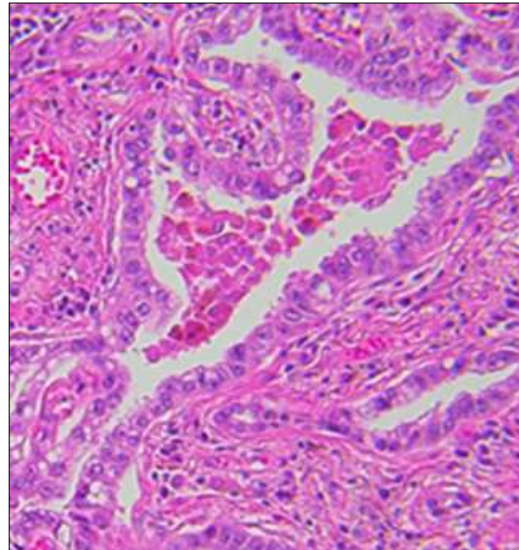


Image 1: Adenoma of Lung



Image 2: Adenoma on CT

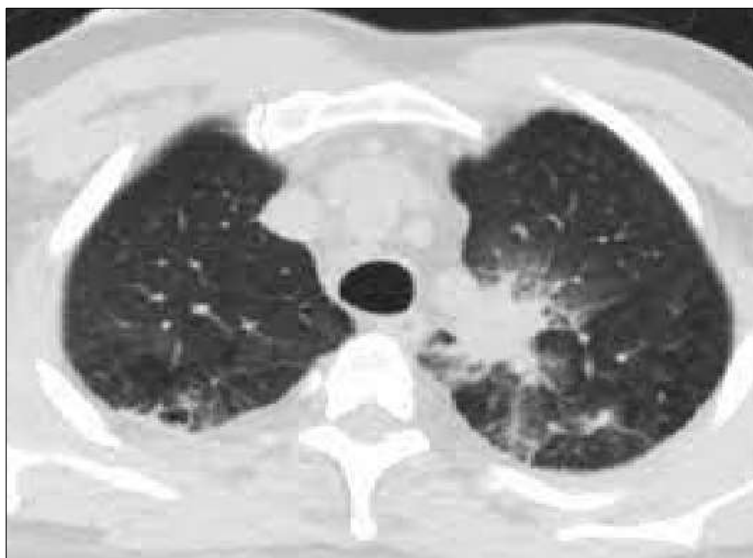


Image 3: Halo Sign

So CT is an excellent option having high sensitivity and specificity in diagnosing a lung nodule. When followed by the routine histo-pathology the efficacy is 100 percent.

Discussion

In India, the younger population is the age group that is most likely to have developed the habit of smoking. The worrying trend of an increase in the number of persons who smoke can be seen everywhere. Because of the present levels of pollution and the appearance of novel lung diseases such as COVID-19, it is hard for us to forecast the specific results of where we are heading. In terms of the imaging examination, it is important to have earlier radiographs or chest CT photos in order to identify the growth of the nodule. This may be done by looking at the progression of the lesion. Additional imaging techniques, such as CT enhancement studies and PET/CT scans, can determine if solid lung nodules have the potential to develop into cancerous tumours. If a solid nodule shows an enhancement on CT of less than 15 HU and a low or nonexistent absorption of glucose that has been tagged with a radioactive isotope, this indicates to the chance that the nodule is benign. If a solid nodule shows an enhancement on CT of more than 15 HU, this signals to the likely that the nodule is malignant. In order to avoid incorrectly interpreting the findings of imaging, it is vital to have an understanding of the various pitfalls that might occur during the nodule enhancement and PET/CT investigation of lung nodules that grow as a result of viral or inflammatory illnesses. It will be helpful in reducing the risk of erroneous pessimism, which will assist reduce unneeded strain in patients as well as in the relatives of patients. Concentrating on the good aspects of the situation can help you achieve your goal. PET imaging has limited value due to the low metabolic activity of the nodules because CT enhancement studies cannot be performed on subsolid nodules, and CT enhancement studies cannot be performed on subsolid nodules.

Conclusion

At this stage, the appearance of pulmonary nodules has been acknowledged, and an in-depth discussion regarding them has taken place. Once the lesions have been confirmed by PET and histology reports, the distinctive features of the lesions give an extra benefit in the process of suspecting instances early on and also aid in the identification of life-threatening conditions. This is because the specific characteristics of the lesions provide evidence that the lesions are malignant.

References

1. Tuddenham WJ. Glossary of terms for thoracic radiology: recommendations of the nomenclature committee of the Fleischner society. *AJR Am J Roentgenol.* 1984;143(3):509-517.
2. Gould MK, Fletcher J, Iannettoni MD, *et al.* Evaluation of patients with pulmonary nodules: when is it lung cancer? ACCP evidence-based clinical practice guidelines (2 nd edn). *Chest.* 2007;132(suppl 3):108S130S.
3. Holin SN, Dwork RE, Glaser S, *et al.* Solitary pulmonary nodules found in a community-wide chest roentgenographic survey. *Am Tuberc Pulm Dis.* 1959;79(4):427-439.
4. Henschke CI, Yankelevitz DF, Libby DM, *et al.* Survival of patients with stage I lung cancer detected on CT screening. *N Engl J Med.* 2006;355(17):1763-1771.
5. Furtado CD, Aguirre DA, Sirlin CB, *et al.* Whole-body CT screening: spectrum of findings and recommendations in 1192 patients. *Radiology.* 2005;237(2):385-394.
6. Gohagan J, Marcus P, Fagerstrom R, *et al.* Baseline findings of a randomized feasibility trial of lung cancer screening with spiral CT scan vs chest radiograph: the lung screening study of the national cancer institute. *Chest.* 2004;126(1):114-121.
7. Swensen SJ, Jett JR, Hartman TE, *et al.* Lung cancer screening with CT: mayo clinic experience. *Radiology.* 2003;226(3):756-761.
8. Bach PB, Silvestri GA, Hanger M, *et al.* Screening for lung cancer: ACCP evidence-based clinical practice guidelines (2nd edn). *Chest.* 2007;132(suppl3):69S77S.
9. Steele JD. The solitary pulmonary nodule. Report of a cooperative study of resected asymptomatic solitary pulmonary nodules in males. *J Thorac Cardiovasc Surg.* 1963;46:21-39.