A Correlational study of computed tomographic evaluation and histopathological diagnosis of patients with chest masses: A hospital based observational study

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Abstract
Objectives: *objective of our study was to correlate the computed tomographic (radiodiagnosis) finding with histopathological diagnosis of patients with chest masses.*
Methodology: *A detail assessment and relevant investigation were performed to all patients. Computed tomography (CT) with Hitachi 3rd Generation was used as a instrumentation. The CT diagnosis was made based on the size, morphology, margin, density, calcification and various other characters. A CT guidance was used for FNAC/needle biopsy in most of the lesions.*
Results: *Data was analyzed by using simple statistical methods with the help of MS-Office software.*
Conclusions: *Chest masses were commonly seen in age group of 26-40 years. Majority of patients of lung lesions were correct on radiodiagnosis (CT diagnosis) as compared to histopathological diagnosis. Incorrect was greater seen on histopathological diagnosis as compared with radiodiagnosis. Patients with mediastinal lesions were more correct on histopathological diagnosis as compared with radiodiagnosis. Inconclusive was greater seen on histopathological diagnosis as compared with radiodiagnosis. Over all, Radiodiagnosis (CT diagnosis) was more correct as compared with histopathological diagnosis of patients with chest masses.*
Keywords: *Chest mass, Lung lesion, Mediastinal lesion, Radiodiagnosis, Histopathological diagnosis.*

Introduction

The chest wall consists of soft, cartilage, and bone tissue. A large part of the masses are originated from soft tissue. Primary chest wall tumors are a heterogeneous group developing in bone and soft tissue. These tumors constitute 2% of all primary tumors of the body, and 5% of the tumors of the thorax. Malignancy rate is around 60-80%. Painful or painless swelling is the most common findings.[1]

Chest wall tumors constitute less than 1% of all tumors. A little more than half the lesions are primary tumors of the chest wall and the remainder are metastatic. It is a relatively frequent location for metastasis from distant organs but extension of underlying lung tumors into the

thoracic wall may also occur. Many studies have reported that metastatic lesions occur with about the same frequency as primary tumor.[2,3]

Benign chest wall tumors, which may be of vascular, peripheral nerve, osseous, cartilaginous, or adipose tissue origin, are relatively uncommon, and few research studies of this group of tumors have been reported. Radiologic imaging is important in the assessment of these tumors, particularly for determining anatomic origin and extent, response Aim of our study was to evaluate the correlation of computed tomographic finding with histopathological diagnosis of patients with chest masses. to therapy, and recurrence.[4]

Materials and Methods

This study was conducted in department of Radiodiagnosis, with collaboration of department of Pathology, Katihar Medical College, Katihar, Bihar India during a period from January 2017 to March 2018. The entire subject signed an informed consent approved by institutional ethical committee of Katihar Medical College, Katihar, Bihar was sought.

Data was collected by random sampling methods. A total of 60 patients (40: males, 20: females) with age group 10 to 70 years were enrolled in this study.

Methods

A complete assessment and relevant investigations were performed to all cases. Patients were included with the plane radiodiagnosis findings of chest mass or suspected chest mass on conventional radiography or a strong clinical suspicion of chest mass.

Instrumentations

CT with Hitachi 3rd Generation with techniques varying per need of the specific lesion were performed to all cases. The CT diagnosis was made based on the size, morphology, margin, density, calcification and various other characters. A CT guidance was used for FNAC/needle biopsy in most of the lesions. The position of the needle can also be confirmed before the biopsy. Because, CT guidance helps to determine the best approach, demonstrate the relationship of vital structures to the lesion and indicates the depth of lesion.

Statistical Analysis

Data was analyzed by using simple statistical methods with the help of MS-Office software.

Observations

In this present study, we were enrolled a total of 60 patients with chest masses. Out of total 60 patients of chest masses, 34(56.67%) patients had lung lesions and 26(43.33%) patients had mediastinal lesions. Out of 60 patients, males were 40 and females were 20. Male and female ratio was 2:1. Patients with age group 10 to 70 years were included. Majority of cases 30(50%) with chest masses were in age group of 26-40 years. In this present study, out of 60 patients of chest masses, 34(56.67%) patients were lung lesions and 26(43.33%) were mediastinal lesions.

Table.1. Age wise distribution of cases with lung lesions.

Age group (Years)	No. of cases	Percentage
10-25	4	6.67%
26-40	30	50%
41-55	15	25%
56-70	11	18.33%
Total	60	100%

Table.2. Distribution of Subjects Based on Computed Tomography (CT) findings of patients with lung lesions (N=34).

CT findings	Type of lesions			
	Tuberculosis	Hydatid Cyst	Aspergilloma	Malignancy
Character				
Predominantly solid	7(20.59%)	1(2.94%)	-	14(41.17%)
Predominantly cystic	2(5.89%)	5(14.71%)	3(8.82%)	4(11.76%)
Homogeneous	3(8.82%)	3(8.82%)	-	-
Non-homogeneous	5(14.71%)	3(8.82%)	3(8.82%)	18(52.94%)

Margin				
Smooth	-	3(8.82%)	1(2.94%)	-
Lobulated	3(8.82%)	-	-	7(20.59%)
Irregular	5(14.71%)	3(8.82%)	1(2.94%)	10(29.41%)
Contrast Enhancement				
Homogenous	-	-	-	2(5.88%)
Non-homogenous	4(11.76%)	1(2.94%)	1(2.94%)	11(32.36%)
Peripheral	-	3(8.82%)	-	-
Absent	4(11.76%)	-	-	2(5.88%)
Calcification	-	-	-	2(5.88%)
Air bronchogram	3(8.82%)	3(8.82%)	1(2.94%)	2(5.88%)
Lymph nodes	2(5.88%)	1(2.94%)	-	4(11.76%)
Pleural effusion	4(11.76%)	-	-	9(26.47%)
Mediastinal invasion	-	-	-	8(23.52%)
Chest wall invasion	-	-	-	3(8.82%)
Adjacent pleural thickening	3(8.82%)	-	-	2(5.88%)
Adjacent lung infiltration	4(11.76%)	-	1(2.94%)	5(14.71%)

Character of CT findings of total 34 cases with lung lesions, 7(20.59%) cases of tuberculosis were predominantly solid followed by 5(14.71%) non homogenous. In cases of hydatid cyst, 5(14.71%) majority of patients were Predominantly cystic followed by 3(8.82%) homogenous and non homogenous. In cases of aspergilloma, 3(8.82%) were predominantly cystic and non homogenous. In cases of malignancy, 18(52.94%) majority of cases were non-homogeneous followed by 14(41.17%) predominantly solid. Margine of CT findings, in patients of tuberculosis, 5(14.71%) were irregular followed by 3(8.82%) lobulated. In cases of hydatid cyst, 3(8.82%) patients were smooth and irregular. In cases of malignancy, 7(20.59%) cases were lobulated followed by 10(29.41%) irregular.

Contrast enhancement of CT findings, 4(11.76%) majority of patients were non homogenous, adjacent lung infiltration, pleural effusion, and absent followed by 3(8.82%) air bronchogram and adjacent pleural thickening. In cases of malignancy, 11(32.36%) majority of patients were non homogenous followed by 9(26.47%) pleural effusion, 8(23.52%) mediastinal invasion and 5(14.71%) adjacent lung infiltration.

Table.3. Distribution of subject based on mediastinal lesion (N=26).

Density	Type of lesion						
	Tuberculosis	Hydatid Cyst	Germ Cell Tumour	Thymoma	Lymphoma	Epicardial Fat	Neurogenic Tumour
Character							
Solid	6(23.07%)	-	5(19.23%)	6(23.07%)	5(19.23%)	2(7.69%)	3(11.53%)
Cystic	-	-	4(15.38%)	-	1(3.84%)	1(3.84%)	-
Homogenous	5(19.23%)	-	1(3.84%)	-	-	-	2(7.69%)
Non-homognous	-	-	8(30.76%)	8(30.76%)	5(19.23%)	2(7.69%)	2(7.69%)
Margin							
Smooth	4(15.38%)	-	5(19.23%)	4(15.38%)	1(3.84%)	2(7.69%)	2(7.69%)
Lobulated	3(11.53%)	-	3(11.53%)	3(11.53%)	2(7.69%)	1(3.84%)	2(7.69%)
Irregular	-	-	1(3.84%)	1(3.84%)	1(3.84%)	-	-
Contrast enhancement							
Homogenous	-	-	2(7.69%)	-	-	-	1(3.84%)
Non-homogenous	-	-	7(26.92%)	4(15.38%)	2(7.69%)	-	1(3.84%)
Peripheral	1(3.84%)	-	1(3.84%)	-	1(3.84%)	-	1(3.84%)
Absent	1(3.84%)	-	1(3.84%)	4(15.38%)	1(3.84%)	1(3.84%)	-
Calcification	3(11.53%)	-	4(15.38%)	2(7.69%)	-	-	-
Pleural effusion	-	-	1(3.84%)	2(7.69%)	1(3.84%)	-	-
Lymph nodes	1(3.84%)	-	-	-	5(19.23%)	-	-

On the basis of mediastinal lesions of cases with chest masses, (23.07%) majority of patients of tuberculosis of character of CT findings were solid followed by 5(19.23%) homogenous. And 8(30.76%) patients of germ cells were non homogenous followed by 5(19.23%), 4(15.38%) cystic and 1(3.84%) homnogenous. 8(30.76%) cases of thymoma were non homogenous followed by solid. 5(19.23%) cases of lymphoma were solid and non homogenous followed by 1(3.84%) cystic. 2(7.69%) patients of epicardial fat were solid and non homogenous followed by 1(3.84%) cystic. 3(11.53%) patients of neurogenic tumour were solid followed by 2(7.69%) homogenous and non homogenous.

On the basis of margin of CT findings, 4(15.38%) majority of patients of tuberculosis were solid followed by 3(11.53%) lobulated. 5(19.23%) majority of patients of germ cells tumours were smooth followed by 3(11.53%) lobulated and 1(3.84%) irregular. 4(15.38%) majority of patients of thymoma was smooth followed by 3(11.53%) lobulated and 1(3.84%) irregular.

2(7.69%) patients of neurogenic tumour were smooth and lobulated.

According to contrast enhance finding of CT, 3(11.53%) majority of patients of tuberculosis were calcification followed by 1(3.84%) peripheral, absent and lymph nodes. 7(26.92%) patients of germ cell tumour were non homogenous followed by 4(15.38%) calcification. 4(15.38%) patients of thymoma were non homogenous, absent followed by 2(7.69%) calcification and pleural effusion.

Table.4. Comparisons between Radiographic and Histopathological Diagnosis

	Radiographic diagnosis			Histopathological diagnosis		
	Correct	Inconclusive	Incorrect	Correct	Inconclusive	Incorrect
Lung						
Tuberculosis	3(8.11%)	3(8.11%)	5(13.51%)	5(13.88%)	4(11.11%)	6(16.66%)
Hydatid cyst	3(8.11%)	3(8.11%)	1(2.70%)	-	1(2.77%)	1(2.77%)
Aspergilloma	2(5.41%)	-	-	-	-	2(5.88%)
Malignancy	17(45.94%)	-	-	16(44.44%)	1(2.77%)	-
Total	25(67.56%)	6(16.21%)	6(16.21%)	21(58.33%)	6(16.66%)	9(25%)
Mediastinum						
Tuberculosis	4(11.76%)	3(8.82%)	1(2.94%)	2(7.14%)	3(10.71%)	-
Hydatid cyst	-	-	-	-	-	-
Germ cell tumour	9(26.47%)	-	-	8(28.57%)	1(3.57%)	-
Thymoma	4(11.76%)	4(11.76%)	-	4(14.28%)	2(7.14%)	-
Lymphoma	4(11.76%)	-	-	3(10.71%)	1(3.57%)	-
Epicardial fat pad	2(5.88%)	-	-	1(3.57%)	-	-
Neurofibroma	3(8.82%)	-	-	3(10.71%)	-	-
Total	26(76.47%	7(20.58%)	1(2.94%)	21(75%)	7(25%)	0

In this present study, we were correlated the radiodiagnosis and histopathological diagnosis of lung lesion and mediastinal lesions. Radiological diagnosis was approached for 37 patients of lung lesions. And it was corrected in 25(67.56%) patients. Histopathological diagnosis was approached for 36 patients of lung lesions. And it was corrected in 21(58.33%) patients.

Similarly, radiological diagnosis was approached for 34 patients of mediastinal lesions. It was correct in 26(76.47%) patients. And histopathological diagnosis was approached for 28 patients of mediastinal lesions. It was correct in 21(75%) patients. We were seen that majority of patients 21(75%) of mediastinal lesions were correct.

Discussion

Chest wall tumors are divided into 3 as malignant, benign and neoplastic. While local invasion of metastasis and adjacent organ tumors constitutes the majority of the chest wall masses, primary chest wall tumors generate 5% of all thoracic neoplasms, and 1-2% of all primary tumors[1].

Primary malignant tumors are derived from the soft tissue, bone and cartilage structures[5]. Most of the malignant tumors are sarcoma-carcinoma metastases of organs or local invasion of adjacent organ tumors such as lung, pleura, mediastinum, and breast tumors[6].

This present study was conducted in department of Radiodiagnosis, Katihar Medical College, Katihar, Bihar**.** In this present study, we were enrolled 60 patients of chest masses. Out of them, 34(56.67%) patients were lung lesions and 26(43.33%) patients were mediastinal lesions. Male and female ratio was 2:1. Majority of cases 30(50%) with chest masses were in age group of 26-40 years.

Zohreh Mohammadtaheri, et al. (2014) were conducted a study and found that patients with chest wall tumour were the mean age of patients was 47.7 years (range 4 to 90 years). There were 85 males (68.5%) and 39 females (31.5%). Male to female ratio was 2.1. The majority of benign tumors were lipoma (35.7%), followed by schwannoma and benign spindle cell tumor (two cases each, 14.3%). Based on the histopathological examination and clinical findings, the malignant tumors were divided into two subgroups of primary or secondary. Forty-nine patients (46.2%) had primary tumors of chest wall and 57 had secondary tumors, mostly originating from the lungs and pleura.

Over half the malignant tumors (57 patients, 53.8%) were metastases from distant organs or direct invasions from adjacent structures. The primary sites were deter-mined in 51 cases either clinically or by immunohisto-chemical staining; mostly originating from the lungs (35.7%) and adjacent pleura (22.8%). The common his-tologic types were carcinomas (63.1%) and malignant mesotheliomas (22.8%). In addition, among metastatic tumors, there were 6 patients with hematologic neop-lasms (10.5%), one metastatic gastrointestinal stromal tumor (GIST) and one malignant fibrous histiocytoma.[7]

In our present study, on the basis of character of CT findings of total 34 cases with lung lesions, 7(20.59%) cases of tuberculosis were predominantly solid followed by 5(14.71%) non homogenous, 3(8.82%) homogenous and 2(5.89%) predominantly cystic. In cases of hydatid cyst, 5(14.71%) majority of patients were Predominantly cystic followed by 3(8.82%) homogenous and non homogenous. In cases of aspergilloma, 3(8.82%) were predominantly cystic and non homogenous. In cases of malignancy, 18 (52.94%) majority of cases were non-homogeneous followed by 14(41.17%) predominantly solid and 4(11.76%) predominantly cystic.

Margine of CT findings, in patients of tuberculosis, 5(14.71%) were irregular followed by 3(8.82%) lobulated. In cases of hydatid cyst, 3(8.82%) patients were smooth and irregular.

In cases of aspergilloma, 1(2.94%) patients were smooth and irregular. In cases of malignancy, 7(20.59%) cases were lobulated followed by 10(29.41%) irregular.

A study by Kuriyama et al. (1991) has demonstrated air bronchogram in 72% of adenocarcinomas of the lung and have suggested that when an air bronchogram is detected, suspicion of malignancy should be high.[8]

In this present study, contrast enhancement of CT findings, 4(11.76%) majority of patients were non homogenous, adjacent lung infiltration, pleural effusion, and absent followed by 3(8.82%) air bronchogram and adjacent pleural thickening. In cases of hydatid cyst, 3(8.82%) majority of patients were peripheral and air bronchogram followed by 1(2.94%) non homogenous and lymph nodes. In cases of aspergilloma, 1(2.94%) cases were non homogenous and air bronchogram. In cases of malignancy, 11(32.36%) majority of patients were non homogenous followed by 9(26.47%) pleural effusion, 8(23.52%) mediastinal invasion and 5(14.71%) adjacent lung infiltration. Mediastinal invasion and chest wall invasion were not seen in cases of tuberculosis, hydatid cyst and aspergilloma.

Mediastinal masses include a wide variety of tumors which are still a great challenge for thoracic surgeons, both about diagnosis and

management.[9] They may be congenital or acquired, also can be primary or secondary. Mediastinal tumors represent 3% of all tumors seen within the chest.[10] Among these lesions, the most common histological types are lymphomas, thymomas and germ cell tumors.[9] The location and composition of a mass is critical to narrowing the differential diagnosis.[11,12] Anterior mediastinal tumors account for 50% of all mediastinal masses, including thymoma, teratoma, thyroid disease and lymphoma.[13] Masses of the middle mediastinum are typically congenital cysts while those arising in the posterior mediastinum are often neurogenic tumors.[11]

In this present study, on the basis of mediastinal lesions of cases with chest masses, (23.07%) majority of patients of tuberculosis of character of CT findings were solid followed by 5(19.23%) homogenous. And 8(30.76%) patients of germ cells were non homogenous followed by 5(19.23%), 4(15.38%) cystic and 1(3.84%) homnogenous. No any case of hydatid cyst was found. 8(30.76%) cases of thymoma were non homogenous followed by solid. 5(19.23%) cases of lymphoma were solid and non homogenous followed by 1(3.84%) cystic. 2(7.69%) patients of epicardial fat were solid and non homogenous followed by 1(3.84%) cystic. 3(11.53%) patients of neurogenic tumour were solid followed by 2(7.69%) homogenous and non homogenous.

On the basis of margin of CT findings, 4(15.38%) majority of patients of tuberculosis were solid followed by 3(11.53%) lobulated. 5(19.23%) majority of patients of germ cells tumours were smooth followed by 3(11.53%) lobulated and 1(3.84%) irregular. 4(15.38%) majority of patients of thymoma was smooth followed by 3(11.53%) lobulated and 1(3.84%) irregular. 2(7.69%) patients of neurogenic tumour were smooth and lobulated.

According to contrast enhance finding of CT, 3(11.53%) majority of patients of tuberculosis were calcification followed by 1(3.84%) peripheral, absent and lymph nodes. 7(26.92%) patients of germ cell tumour were non homogenous followed by 4(15.38%) calcification. 4(15.38%) patients of thymoma were non homogenous, absent followed by 2(7.69%) calcification and pleural effusion.

In this present study, CT finding of lung lesions, no any patients of hydatid cyst was found.

Findings of our study was similar the findings of Zerhouni et al.(1985)[14].

In our present study, when we were correlated the radiodiagnosis and histopathological diagnosis of lung lesion and mediastinal lesions. Radiological diagnosis was approached for 37 patients of lung lesions. And it was correct in 25(67.56%) patients. Inconclusive was in 3(8.11%) patients of tuberculosis and hydatid cyst. Ant it was incorrect in 5(13.51%). Histopathological diagnosis was approached for 36 patients of lung lesions. And it was correct in 21(58.33%) patients. Inconclusive was present in 4(11.11%) patients of tuberculosis and 1(2.77%) patients of hydatid cyst. And it was incorrect in 6(16.66%) patients of tuberculosis, 2(5.55%) patients of aspergilloma and 1(2.77%) of hydatid cyst.

Similarly, radiological diagnosis was approached for 34 patients of mediastinal lesions. It was correct in 26(76.47%) patients. Inconclusive was present in 3(8.82%) patients of tuberculosis, 4(11.76%) patients of thymoma. It was incorrect in 1(2.94%) patients of tuberculosis. And histopathological diagnosis was approached for 28 patients of mediastinal lesions. It was correct in 21(75%) patients. Majority of patients 21(75%) of mediastinal lesions were correct. Inconclusive was in 3(10.71%) patients of tuberculosis, 2(7.14%) patients of thymoma and 1(3.57%) patients of germ cell tumour. It was incorrect in 6(21.42%) patients of tuberculosis, 2(7.14%) patients of aspergilloma and 1(3.57%) patients of hydatid cyst.

Conclusion

In this present study, we were concluded that chest masses were commonly seen in age group of 26-40 years. Males were more prone to female. Majority of patients of lung lesions were correct

on radiodiagnosis (CT diagnosis) as compared to histopathological diagnosis. Incorrect was greater seen on histopathological diagnosis as compared with radiodiagnosis. Patients with mediastinal lesions were more correct on histopathological diagnosis as compared with radiodiagnosis. Inconclusive was greater seen on histopathological diagnosis as compared with radiodiagnosis. Over all, we were seen that patients on radiodiagnosis (CT diagnosis) were more correct as compared with histopathological diagnosis.

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