PATTERN OF LUNG CANCER METASTASIS BASED ON PET CT

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ABSTRACT

BACKGROUND

Accurate staging is the cornerstone in management of lung cancer. It helps to determine the therapeutic modality and to assess prognosis. More than half of bronchogenic carcinomas have distant metastasis at the time of diagnosis. Presence of metastasis confers stage 4 for the disease. Presence of metastasis also increases patient morbidity and mortality. So the knowledge of pattern and sites of metastasis in bronchogenic carcinoma is crucial for its detection and management. Staging of bronchogenic carcinoma is one of the important indications for Positron Emission Tomography. Combined Computed tomography and PET (PET-CT) is superior to either modality alone in staging of lung cancer. It helps in identifying the site and morphology of lesion. Aims and Objectives- 1. To determine the sites of metastases in Bronchogenic carcinoma by PETCT 2. To compare sites of metastases with the histological cell type

MATERIALS AND METHODS

It was a hospital based retrospective study involving 78 patients with histologically proven bronchogenic carcinoma who underwent PETCT scan from June 2016-May 2017 in A J Institute of medical sciences, Mangalore. The sites of metastasis were noted. Brain metastasis was not included as MRI is a more sensitive tool. The sites of metastases as determined by PETCT were compared with histological cell type of bronchogenic carcinoma.

RESULTS

There were a total of 78 patients 61 male and 17 females. Majority of them were adenocarcinoma, followed by squamous cell carcinoma 38.5% and small cell carcinoma 9%. Majority had lymph node metastasis to supraclavicular nodes (61.53%) followed by contralateral lung (51.28%), bone metastasis (48.71%), abdominal nodes (28.21%), pleural metastasis (25.64%), adrenals (23.1%), Liver (20.51%), pericardial effusion (3.84%), spleen (2.56%). Among cases of adenocarcinoma 65.85% had metastasis to supraclavicular nodes, 56.09% had metastasis to contralateral lung, followed by bone metastasis (53.65%). Among patients with squamous cell carcinoma, majority ie, 53.33% had metastasis to contralateral lung, 40% had bone metastasis.

CONCLUSION

1. Most common site of metastasis in bronchogenic carcinoma is supraclavicular nodes. 2. Most common organ of metastasis is contralateral lung followed by bone. 3. Commonest extra nodal site of metastasis is contralateral lung for both adenocarcinoma and squamous cell carcinoma.

KEYWORDS

Lung Cancer, Metastasis, PET CT.

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BACKGROUND

Accurate staging is the cornerstone in management of lung cancer. It helps to determine the therapeutic modality and to assess prognosis.[1,2] More than half of bronchogenic carcinomas have distant metastasis at the time of diagnosis.[3] Presence of metastasis confers stage 4 for the disease. Presence of metastasis also increases patient morbidity and mortality.[4] So the knowledge of pattern and sites of metastasis in bronchogenic carcinoma is crucial for its detection and management.

Staging of bronchogenic carcinoma is one of the important indications for Positron Emission Tomography.[5,6]

Combined Computed tomography and PET (PET-CT) is superior to either modality alone in staging of lung cancer.[7,8] It helps in identifying the site and morphology of lesion.

Aims and Objectives

1. To determine the sites of metastases in Bronchogenic carcinoma by PETCT.
2. To compare sites of metastases with the histological cell type.

It was a hospital based retrospective study involving 78 patients with histologically proven bronchogenic carcinoma who underwent PETCT scan from June 2016-May 2017 in A J Institute of medical sciences, Mangalore. The sites of metastasis were noted. Brain metastasis was not included as its sensitivity is not acceptable and MRI is a more sensitive tool.[9] The sites of metastases as determined by PETCT were compared with histological cell type of bronchogenic carcinoma.

Inclusion Criteria

1. Histologically proven bronchogenic carcinoma.
2. PET CT done in same institute.
3. Ages 35-85 of both gender.

Exclusion Criteria

1. PET CT done outside the institute.

RESULTS

There were a total of 78 patients 61 male and 17 females (Chart 1). Majority were in the age group 61-70 (Chart 2).

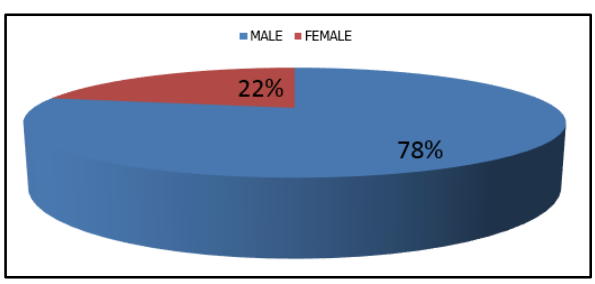

Chart 1

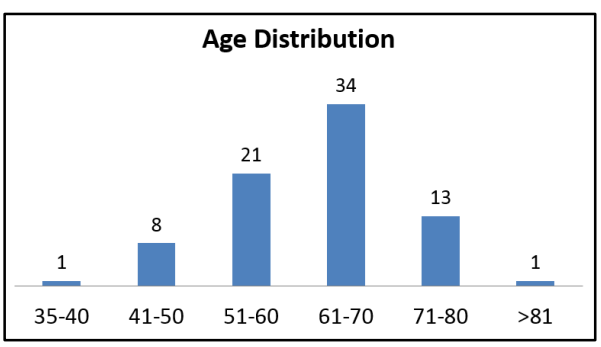

Chart 2

Majority of them were adenocarcinoma i.e., 52.5% (41 cases), followed by squamous cell carcinoma 38.5% (30 cases) and small cell carcinoma i.e., 9% (7 cases) (Chart 3).

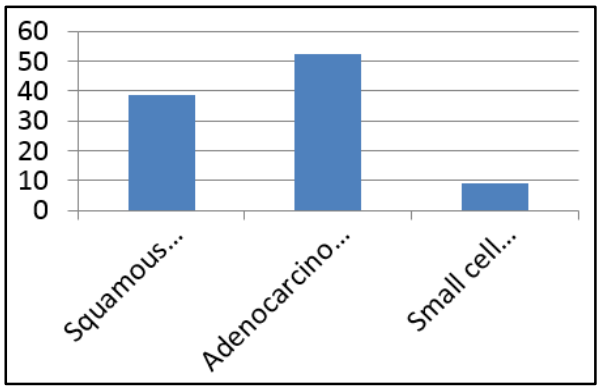

Chart 3

In the study group, Majority had lymph node metastasis to supraclavicular nodes (61.53%) followed by contralateral lung (51.28%), bone metastasis (48.71%), abdominal nodes (28.21%), pleural metastasis (25.64%), adrenals (23.1%), Liver (20.51%), pericardial effusion (3.84%), spleen (2.56%). Chart 4 shows the actual number of cases in each site of metastasis.

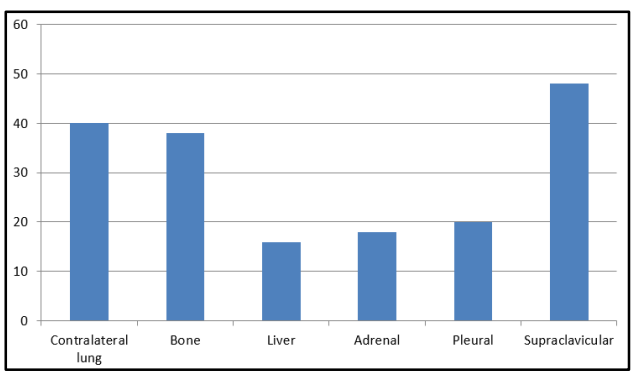

Chart 4

Among cases of adenocarcinoma 65.85% had metastasis to supraclavicular nodes, 56.09% had metastasis to contralateral lung, followed by bone metastasis (53.65%), 24.39% had adrenal metastasis, 19.15% liver metastasis and 24.39% to pleura. Among adenocarcinoma patients 7.32% had pericardial effusion and 4.87% splenic metastasis which were not seen in other cell types. (Table 1).

Among patients with squamous cell carcinoma, majority i.e., 53.33% had metastasis to contralateral lung followed by 46.67% to supraclavicular nodes. 40% had bone metastasis, 30% to pleura, 23.33% to adrenals, 16.67% each to abdominal nodes and liver.

Among small cell carcinoma, all patients had metastasis to supraclavicular nodes, followed by bone (57.14%), Liver (42.85%), adrenal (14.28%), pleural (14.28%) and contralateral lung (14.28%).

	Adeno-Carcinoma (41)	Squamous Cell Carcinoma (30)	Small Cell Carcinoma
Contralateral lung	23 (56.09%)	16 (53.33%)	1 (14.28%)
Bone	22 (53.65%)	12 (40%)	4 (57.14%)
Supraclavicular nodes	27 (65.85%)	14 (46.67%)	7 (100%)
Abdominal nodes	17 (41.46%)	5 (16.67%)	0
Liver	8 (19.15%)	5 (16.67%)	3 (42.85%)
Adrenal	10 (24.39%)	7 (23.33%)	1 (14.28%)
Pleural deposits	10 (24.39%)	9 (30%)	1 (14.28%)
Pericardial effusion	3 (7.32%)	0	0
Splenic metastasis	2 (4.87%)	0	0

Table 1

DISCUSSION

Lung cancer is most common cause of cancer related death worldwide. Approximately 50% of lung cancer cases are metastatic at diagnosis.[3] The primary role of imaging is initial staging. Knowledge of the sites of metastatic disease and the frequency with which metastasis occurs at presentation may be used to design appropriate algorithms for the pre-treatment imaging workup and to provide the most suitable treatment. PETCT has better sensitivity and specificity for staging bronchogenic cancer and in distant metastasis. PET can detect metastasis in 6% to 37% of unsuspected cases.[9] It can detect metastasis in up to 1-8% of clinical stage 1 disease and 7-18% of clinical stage 2 disease.[10] Meta-analysis studies suggest that PET CT scan has a higher diagnostic value than bone scintigraphy for bone metastasis detection with sensitivity and specificity of >90%.[11] It shows a 97% sensitivity and 94% specificity for detection of adrenal metastasis in lung cancer.[12]

Previously squamous cell carcinoma was the most common cell type in lung cancer patients. Over the years this has changed and currently adenocarcinoma is the most common type.[13] As per some studies in India also adenocarcinoma is the most common celltype.[14] In this study group also adenocarcinoma formed the majority

The most common sites of metastasis in bronchogenic carcinoma as per previous studies are the lung, bone, brain, liver and adrenal gland.[15,16] In a large study on metastatic locations, 18% of patients had lung metastasis, 16% bone metastases, 12% brain metastases, 7% liver metastases, and 6% adrenal gland metastases at diagnosis.[17] Some other studies done mention brain followed by bone and liver were commonest sites of metastasis.[18,19] In our study majority had lymph node metastasis to supraclavicular nodes (61.53%) followed by contralateral lung (51.28%), bone metastasis (48.71%), abdominal nodes (28.21%), pleural metastasis (25.64%), adrenals (23.1%), Liver (20.51%), pericardial effusion (3.84%), spleen (2.56%). PET CT being more sensitive in detection of lymph node metastasis in bronchogenic carcinoma. This might be the reason for higher frequency of lymph node metastasis in the study.[10]

Presence of metastasis to supraclavicular nodes indicates an inoperable disease in bronchogenic carcinoma. So recognising this metastasis is important. The nodes being not clinically palpable does not rule out metastasis.[20] Integrated PET/CT is useful for the detection and characterization of non-palpable supraclavicular lymph nodes in lung cancer patients because it has a high sensitivity and negative predictive value.[10] In our study 61.53% of cases showed possible metastasis to supraclavicular nodes. Around 56% were adenocarcinoma and also the commonest site of metastasis in adenocarcinoma. All cases of small cell carcinoma showed metastasis to supraclavicular nodes.

Bronchogenic carcinoma is the third most common form of cancer to spread to bone. Around 30–40% of patients with lung cancer have bone metastases during the course of their disease; the median survival time of patients with this secondary lesion is around 7 months.[21] Bone metastasis from lung cancer are associated with considerable negative effects on both patient quality of life and survival. There will be increased incidences of pathological fractures and neurological complications. In a study on non small-cell lung cancer patients, the most common site of skeletal metastases was the spine in 50% of patients, followed by the ribs (27.1%), ilium (10%), sacrum (7.1%), femur (5.7%) and humerus, scapula and sternum (2.9%).[22] In our study 48.7% cases showed bone metastasis with 58% them having adenocarcinoma. 53.65% of cases among adenocarcinoma, 40% squamous cell carcinoma and 57.14% of small cell carcinoma cases had bone metastasis.

Studies indicate that presence of liver or adrenal metastasis implies poor prognosis for patients of bronchogenic carcinoma.[23] In our study 20.5% of patients had liver metastasis, majority being adenocarcinoma. 23% had adrenal metastasis with adenocarcinoma being 55.5% of the cases. Splenic metastasis is a rare occurrence. In a study on 267 autopsy cases of lung cancer from 1975 to 1992 showed splenic metastasis from lung cancer to be 5.6%.[24] In our study it was 4.87% and all cases were adenocarcinoma.

CONCLUSION

1. Most common site of metastasis in bronchogenic carcinoma is supraclavicular nodes
2. Most common organ of metastasis is contralateral lung followed by bone.
3. Commonest extra nodal site of metastasis is contralateral lung to both adenocarcinoma and squamous cell carcinoma.

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