ORIGINAL RESEARCH PAPER

RADIOLOGY

Volume - 7 | Issue - 1 | January - 2017 | ISSN - 2249-555X | IF : 3.919 | IC Value : 79.96

MULTIDETECTOR COMPUTED TOMOGRAPHIC EVALUATION OF MEDIASTINAL MASSES

KEYWORDS: CT(Computed Tomography), Mediastinum, Lymph node

Dr. Varsha V Jadhav

Assistant Professor at Dept of Radiodiagnosis, Grant Govt Medical College and JJ gr of Hospitals, Mumbai.

Dr. Ramesh R Chaple.

Associate Professor. Dept of Radiodiagnosis, Indira Gandhi Govt Medical College.

ABSTRACT

Introduction: *CT is indispensable in imaging mediastinum. CT is able to characterise, localize and assess the extent of mediastinal lesion.*

Aims and Objectives: *To study CT characteristics, distribution of mediastinal masses and involvement of neighbouring structures. To compare CT findings with histopathological diagnosis and find sensitivity of CT for diagnosing mediastinal masses.*

Methods: *50 patients were selected from November 2010 to October 2012. In all cases plain with contrast CT thorax was done.*

Results: *Majority of mediastinal masses were in anterior 26(52%) followed by posterior 15(30%) and middle 9(18%) mediastinum. lymph nodal masses constituted 40%(n=20) of total mediastinal masses. Among these metastatic lymph node involvement is predominant(45%).Thymic masses 26.9%(n=7), metastatic lymph node 44.4%(n=4), neural tumors 33.3%(n=5) were most common masses in anterior, middle and posterior mediastinum respectively. CT appears 94% sensitive for diagnosing mediastinal mass.*

Conclusion: *CT has significant role to play in evaluation of mediastinal masses.*

INTRODUCTION:

CT is indispensable in imaging mediastinum. Because of its excellent contrast resolution and tomographic format, CT is able to identify normal mediastinal structures, opacified vessels, and vascular abnormalities, characterise lesions based on their attenuation values (fat, calcium, or water attenuation, contrast enhancement), localize lesion and can assess the extent of lesion. Mass effect or invasion of surrounding structures also can be known from CT. CT helps in staging of tumors. The additional role of CT is in performing CT guided biopsies of lesions.

While both CT and MRI provides cross sectional depiction, CT has better spatial resolution and shorter imaging time, besides being less expensive and being more widely available. Coexisting lung abnormalities and calcification within lesions are better appreciated on CT.

This study was conducted to evaluate the data obtained from thoracic Computed Tomography of mediastinal masses.

AIMS AND OBJECTIVES:

- To study CT characteristics, distribution of mediastinal masses and involvement of neighbouring structures.
- To compare CT findings with histopathological diagnosis and find sensitivity of CT for diagnosing mediastinal masses.

REVIEW OF LITERATURE AND ANATOMY:

Mediastinum is extra pleural space within thorax between two pleural spaces. It extends from sternum anteriorly to vertebral column posteriorly. Upper limit is formed by thoracic inlet and lower limit by diaphragm.[1]

According to Sutton [1] anterior mediastinum lies in front of anterior pericardium and trachea, middle mediastinum lies within pericardial cavity but including the trachea, and posterior mediastinum lies behind posterior pericardium and trachea.

CT of normal mediastinum. Five 1-cm thick sections are selected to show important anatomical features (A–E). Level of each section is illustrated in diagram(Fig 1).

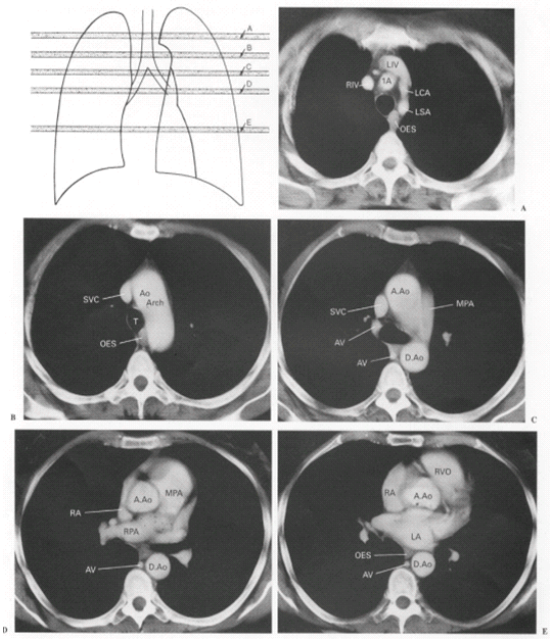

Fig 1: Axial CT scans of thorax showing normal mediastinum at various levels[2]. (A.Ao = ascending aorta, AV = azygos vein, D.Ao = descending aorta, IA = innominate artery, LCA = left carotid artery, LIV = left innominate vein, LPA = left pulmonary artery, LSA = left subclavian artery, MPA = main pulmonary artery, Oes = oesophagus, RIV = right innominate vein, RPA = right pulmonary artery, SVC = superior vena cava, T = trachea, RA = right atrium, LA = left atrium, RVO = right ventricular outflow tract.)

MATERIAL AND METHODS:

THIS PROSPECTIVE, HOSPITAL BASED STUDY OF EVALUATION OF MEDIASTINAL MASSES IN PATIENTS WITH MEDIASTINAL WIDENING OR CLINICALLY SUSPECTED MEDIASTINAL MASS, USING MULTIDETECTOR CT SCAN WAS CARRIED OUT AT TERTIARY CARE INSTITUTE FROM NOVEMBER 2010 TO OCTOBER 2012. Study includes 50 patients, having conditions like neoplasm, congenital cysts, infection, vascular aneurysms, lesions extending into mediastinum from other compartments like retrosternal goiter, diaphragmatic hernias.

Volume - 7 | Issue - 1 | January - 2017 | ISSN - 2249-555X | IF : 3.919 | IC Value : 79.96

Equipment:
1. Dual Slice Helical Somatom Emotion Duo CT Scanner; Siemens Medical Systems, Forchiem, Germany

CT thorax protocol:
Patients were kept NBM for six hours before study. Initial supine AP scout film with 30mA was obtained to confirm tomographic plane. Pre and post contrast scan were done in supine position using 4 mm collimation, 5 mm slice thickness (70 mA, 130Kv) from thoracic inlet upto supra renal glands in intermittent suspended inspiration.

For contrast enhancement initially 80-100 ml of dynamic injection of 370mg/ml iodinated nonionic contrast iopamidol(Inj. Lek-Pamidol) OR in a dose of 300mg of Iodine/Kg body weight(in children) was given and axial section were taken from thoracic inlet to level of suprarenals. Contrast was injected at start delay of 25-30 sec with flow rate of 2.3ml/sec(3 ml/sec for vascular pathologies).

Sagittal and coronal reconstructions done.

Pre and post contrast attenuation values, size, location of mass , presence of calcification ,origin, mass effect on adjoining structures and structures like lung fields, pleura, chest wall, adrenals were studied. Sutton's method of mediastinal division was used to locate tumor in mediastinum.

CT diagnosis was confirmed either by histopathological examinations in cases of neoplasms

OBSERVATION AND RESULT:
Demographic and clinical profile distribution of study(table 1):
Most common age group to present with mediastinal mass is between 46-60 yrs(30%). 24% were children. Male were affected more than female. 92% patients were symptomatic, having symptoms like cough , dyspnea, fever ,chest pain.

Table 1:Demographic and clinical profile distribution of study

Age in Years	No. of cases(Percentage)
0-15	12(24%)
16-30	8(16%)
31-45	7(14%)
46-60	15(30%)
>61	8(16%)
Sex	**No. of cases(Percentage)**
Male	30(60%)
Female	20(40%)
	No of patients(Percentage)
Symptomatic	46(92%)
Asymptomatic	4(8%)

Compartmental distribution of mediastinal masses
In study anterior mediastinal masses formed majority with 52%(n=26) of total masses followed by posterior(30%,n=15) and middle(18%,n=9) mediastinum masses. Some patient showed separate mass involving different compartments. In these 6%(n=3) showed separate mass involving anterior and middle mediastinum and they were predominantly lymph nodal mass due to metastasis from carcinoma lung. 4%(n=2) showed masses in both posterior and middle mediastinum and were predominantly due to tuberculous involvement.

Among anterior mediastinal masses, thymic masses formed majority constituting 26.9%(n=7), followed by metastatic lymph node 19.2%(n=5) of total anterior mediastinal masses.
In middle mediastinum metastatic lymph node involvement formed majority i.e. 44.4%(n=4), followed by TB lymph node enlargement constituting 22.2%(n=2).

Majority of posterior mediastinal masses were contributed by neural tumors constituting 33.3%(n=5) followed by paravertebral abscess constituting 20%(n=3). Posterior mediastinal masses were predominantly seen among adults constituting 73.3%(n=11) and children constituted 26.7%(n=4).

CT characteristics:
Enhancement patterns noted were heterogeneous, homogeneous, rim enhancement, intense enhancement. In our study majority showed heterogeneous enhancement i.e. 44%(n=22) followed by homogeneous enhancement i.e.18%(n=9); Majority were solid masses constituting 54%(n=27), followed by solid + cystic masses 26%(n=13). 20% of cases showed calcification in mediastinal masses. Mass effect was noted in 58% cases and was predominantly noted on tracheobronchial tree.

CT diagnosis:
Most common mediastinal mass were metastatic lymph nodes from Ca lung(18%,n=9), followed by TB lymph nodes(14%,n=7) and neurogenic tumors(10%,n=5).

Neurogenic tumors constituted 27.3% of all paediatric mediastinal masses. Schwannoma was most common among all mediastinal neurogenic tumors.

CT appears 94% sensitive for diagnosing mediastinal masses. In study 43 cases were histologically verified out of which 40 showed finding consistent with CT findings. Two cases (Lymphangioma, Hydatid cyst) were confirmed by operative findings. Two cases of hiatus hernia were confirmed by endoscopy. One case of thymic hyperplasia was conservatively managed. Rest two cases were of vascular origin.

DISCUSSION:
Following study was undertaken with objectives of determining disease pattern affecting mediastinum and to correlate CT findings with histopathology reports.

In **our study** 92.% patients were symptomatic and 8% patients were asymptomatic. This is similar to study by **Dubashi B et al [3]** in which 97 % patients were symptomatic and 3 % were asymptomatic.

In **our study** males(60%) were more commonly affected than females(40%). Which is comparable to study done by Singh **G et al [4]** which also shows affection of males(61.1%) more compare to females(38.9%).

All age groups: In **our study,** the majority of the mediastinum masses were in the anterior mediastinum constituting 52% followed by posterior (30%) and middle (18%) mediastinal compartment, which is similar to the study conducted by **Devis et al [5]** wherein anterior, middle and posterior mediastinum constituted 54 %,20 % and 26 % respectively.

In **our study** Lymphoma, neural tumors ,thymic tumors constituted 8 % ,10%,14% of mediastinal masses respectively, whereas they constituted 16%,14%, 17 % respectively in study conducted by **Davis et al[5].**

Malignant lesions predominated in our study and majority occurred between 4-6th decade. Malignant lesions have predominated in male population while benign lesions have occurred with equal frequency in both. Majority of the benign lesions have occurred in between the 2nd and 4th decade.

In **our study** 20 cases showed mediastinal lymph nodal enlargement. In our study, metastatic, tubercular and lymphoma were the pathologies of nodal enlargement and they constituted 45 %, 35 % and 20 % respectively of total cases of nodal masses. **Chakraborti KL et al [6]** conducted a study involving 25 cases of mediastinal lymph nodal enlargement and showed that lymphomatous lymph nodes

Volume - 7 | Issue - 1 | January - 2017 | ISSN - 2249-555X | IF : 3.919 | IC Value : 79.96

constituted 20 % of all lymph nodes, which is similar to **our study** (20%). In the study by **Kumar A et al**[7] tubercular lymph nodes constituted 34.3% of total mediastinal nodes, which is similar to **our study**(35%).

Moon WK et al [8] showed in their study that rim enhancement is due to central caseation necrosis and is seen in active tubercular disease and calcifications are seen predominantly in inactive disease (could be seen in few cases of active disease). In our study peripheral rim enhancement was seen in 57.14 % and calcification was seen in 28.6% of patients.

In a study conducted by **Pandey DK et al** [9] (56 cases), retrosternal goiter was found in 3.6 % of cases which is similar to **our study** in which it represents 4 % of cases.

Sensitivity of CT in diagnosing mediastinal mass lesions is 94% according to our study. This is similar to study conducted by **Baron et al**[10]**,** in which CT was 92% sensitive for diagnosing mediastinal masses.

CONCLUSIONS:

So computed tomography definitely has major role to play in evaluation of mediastinal masses and is highly sensitive for diagnosing mediastinal masses.

REFERENCES:

1. Gregson RHS, Whitehouse RW, Wright AR, Jenkins JPR. The mediastinum. In: Sutton P editor: Textbook of Radiology and Imaging; Vol 1. 7th edition. London: Churchill Livingstone; 2003. P. 57-86.
2. Padley S, Sharyn LS, MacDonald. The normal chest. In: Adam A, Dixon A.K. Grainger RG, Allison DJ editor: Grainger & Allison's Diagnostic Radiology: A Textbook of Medical Imaging; vol 1. 5th edition. London: Churchill Livingstone; 2008. p. 201-18.
3. Dubashi B, Cyriac S, Tenali SG. Clinicopathological analysis and outcome of primary mediastinal malignancies-A report of 91 cases from a single institute. Ann Thorac Med 2009 Jul-Sep;4(3):140-2.
4. Singh G, Amin Z, Wuryantoro I, Wulani V. Characteristis of Mediastinal mass patient and factors associated with mortality during hospitalization. Chest 2011 oct;140 (4_Meeting abstracts):307A
5. Davis RD, Oldham HN, Sabiston DC. Primary cysts and neoplasms of the mediastinum: Recent changes in clinical presentations, methods of diagnosis, management and results. Ann Thorac Surg 1987 Sept;44(3): 229-37.
6. Chakraborti KL, Jena A. MR evaluation of the mediastinal lymph nodes. Indian J chest Dis Allied Sci 1997 Jan-Mar;39(1):19-25.
7. Kumar A, Dutta R, Kanan U, Kumar R, Khilani G, Gupta S. Evaluation of mediastinal lymph nodes using 18F-FDG PET scan and its histopathologic correlation. Ann Thorac Med 2011;6(1):11-6.
8. Moon WK, Im JG, Yeon KM, Han MC. Mediastinal tuberculous lymphadenitis: CT findings of active and inactive disease. AJR Am J Roentgenol 1998 Mar;170(3):715-8.
9. Pandey DK, Ahemed Z, Masood I, Singh SK, Jairapuri Z. Role of fine needle aspiration cytology in evaluating mediastinal masses. Lung India 2009 Oct-Dec;26(4):114-6.
10. Baron RL, Levitt RG, Sagel SS, Stanley RJ. Computed tomography in the evaluation of mediastinal widening. Radiology 1981 Sep;138(1):107-13.