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Mini Review

Diagnostic Accuracy of Computed Tomography Scan in Mediastinal Masses

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ABSTRACT

Introduction: Mediastinal lesions include a wide spectrum of pathology, ranging from tumors (benign and malignant), cysts, vascular anomalies, and lymph node masses to diffuse lesions such as pneumomediastinum, mediastinitis, mediastinal fibrosis and encysted pleural effusion.

Aims and objectives: The basic aim of the study is to analyse the diagnostic accuracy of computed tomography scan in mediastinal masses assuming histopathological findings as gold standard.

Material and methods: This cross sectional study was conducted in Sir Ganga Ram Hospital, Lahore from October 2019 to April 2020. After taking informed consent, computed Tomography was performed on Toshiba Aquilion Multislice CT scanner before and after intravenous contrast administration.

Results: Age range in this study was from 25-65 years with mean age of 48.57 ± 10.53 years. Majority of the patients 58.78% were between 46-65 years of age as shown in Table 1. Out of these 148 patients, 82 (55.41%) were males and 66 (44.59%) were females with ratio of 1.2:1. Mean duration of disease was 8.39 ± 4.78 months (Table 2). Mean size of mass was 5.21 ± 2.45 cm.

Conclusion: It is concluded that computed tomography is a highly sensitive and accurate non-invasive modality for differentiating malignant and benign mediastinal masses, and has not only dramatically improved our ability of accurate diagnosis of mediastinal masses but also improved patient care by timely and proper treatment.

Key words: Mediastinal, Histopathology, Vascular anomalies, Lymph node

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INTRODUCTION

Mediastinal lesions include a wide spectrum of pathology, ranging from tumors (benign & malignant), cysts, vascular anomalies, and lymph node masses to diffuse lesions such as pneumomediastinum, mediastinitis, mediastinal fibrosis and encysted pleural effusion (Mushtaq N *et al.*, 2014). These lesions are challenging problems frequently faced by the radiologist. Mediastinal masses span a wide histopathological and radiological spectrum. The most frequent lesions encountered in the mediastinum are thymoma, neurogenic tumours and benign cysts, altogether representing 60% of patients with mediastinal masses (Yokoyama Y *et al.*, 2014). Neurogenic tumours, germ cell neoplasms and foregut cysts represent 80% of childhood lesions, whereas primary thymic neoplasms, thyroid masses and lymphomas are the most common in adults (Aroor AR *et al.*, 2014). In a study, malignant mediastinal masses were found to be 44.0% (Dutta P *et al.*, 2014).

Chest radiograph is the imaging modality in the initial diagnosis of mediastinal masses, however, it may appear normal in the presence of mediastinal masses. Posteroanterior (PA) and lateral radiograph of the chest for an unrelated cause are the usual ways in which an asymptomatic mediastinal mass is identified (Tomiyama N *et al.*, 2009). Chest radiography obviously is the first study that would be performed in an individual with symptoms referable to the thorax. The PA view allows for determination of bilaterality and superior or inferior location, while the lateral chest radiograph determines the specific compartment. Mediastinal sonography is an effective imaging technique and is characterized by low cost and multiplanner images. It is used as an adjunctive technique to other invesitagtions. Further evaluation is done with Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). Percutaneous image-guided core biopsy of mediastinal lesions is also indicated to reach a conclusion (Tomiyama N *et al.*, 2009).

To develop an accurate and cost-effective imaging plan, there are 4 primary goals when imaging mediastinal masses: (1) identification and accurate compartmental localization; (2) detailed mass description; (3) provision of an accurate and succinct differential diagnosis; (4) recommendation of a cost-effective imaging and patient management plan (Thacker PG *et al.*, 2015).

Objectives

The basic aim of the study is to analyse the diagnostic accuracy of computed tomography scan in mediastinal masses assuming histopathological findings as gold standard.

METHODOLOGY OF THE STUDY

This cross sectional study was conducted in Sir Ganga Ram Hospital, Lahore from October 2019 to April 2020.

Inclusion criteria

- All patients with chest x-ray showing mediastinal widening by soft tissue mass of any size and >3 months duration.
- Patients 25-65 years of age.
- Both genders.

Exclusion criteria

- Patients already operated for mediastinal mass.
- Patients having biopsy proven report.
- Patients with chronic liver disease (assessed on history and medical record (s/creatinine >1.1 mg/dl).

Data collection

After permission from local ethical review committee, total number of 148 patients who were admitted in other departments of Ganga Ram Hospital, Lahore and referred by clinician to the radiology department fulfilling the inclusion/exclusion criteria was selected. After

taking informed consent, computed Tomography was performed on Toshiba Aquilion Multislice CT scanner before and after intravenous contrast administration. Each CT scan findings was interpreted by one consultant radiologist (at least 5 years of experience) and was looked for benign or malignant mediastinal mass as per-operational definition.

Data analysis

Collected data was analyzed through computer software SPSS 20.0. Mean and standard deviation were calculated for quantitative variables i.e. age, duration of disease and size of mass.

RESULTS

Age range in this study was from 25-65 years with mean age of 48.57 ± 10.53 years. Majority of the patients 58.78% were between 46-65 years of age as shown in (*Table 1)*. Out of these 148 patients, 82 (55.41%) were males and 66 (44.59%) were females with ratio of 1.2:1. Mean duration of disease was 8.39 ± 4.78 months *(Table 2)*. Mean size of mass was 5.21 ± 2.45 cm *(Table 3)*. All the patients were subjected to CT scanning of the thorax and CT scan supported the diagnosis of malignant mediastinal mass in 83 (56.08%) patients and benign mediastinal mass in 65 (43.92%) patients *(Table 4)*.

Table 1: Distribution of patients according to Age

Age (years)	No. of Patients	%age
25-45	61	41.22
46-65	87	58.78
Total	148	100.0
Mean ± SD = 48.57 ± 10.53 years		

Table 2: Distribution of patients according to duration of disease

Duration of disease	No. of Patients	%age
4-12 months	93	62.84
>12 months	55	37.16
Total	148	100.0
Mean ± SD = 8.39 ± 4.78 months		

Table 3: Distribution of patients according to size of mass

Size of mass (cm)	No. of Patients	%age
≤ 5	101	68.24
>5	47	31.76
Total	148	100.0
Mean ± SD = 5.21 ± 2.45 cm		

Table 4: Computed tomography and histopathology findings

	Positive result on Histopathology	Negative result on Histopathology	P-value
Positive result on CT	79 (TP)*	04 (FP)***	0.0001
Negative result on CT	05 (FN)**	60 (TN)****	
*-TP=True positive **-FP=False positive ***-FN=False negative ****-TN=True negative			

DISCUSSION

Computed tomography is the most important imaging modality in the evaluation of mediastinal mass. Characterisation on CT scan is based on specific attenuation of air, fat, water and calcium. High resolution multiplanar reformation images display the detailed anatomical relationship of the tumour with the adjacent structures. Magnetic Resonance imaging has high contrast resolution and multiplanar capability, thereby providing additional information as to location of tumour and extent of intraspinal involvement and is a preferred modality in evaluating neurogenic tumours (Kalhan S *et al.*, 2012). I have conducted this study to determine the diagnostic accuracy of computed tomography scan in differentiating malignant and benign mediastinal masses, taking histopathology as gold standard (Kumar P *et al.*, 2013).

Age range in my study was from 25-65 years with mean age of 48.57 ± 10.53 years. Out of these 148 patients, 82 (55.41%) were males and 66 (44.59%) were females with ratio of 1.2:1. All the patients were subjected to CT scanning of the thorax and CT scan supported the diagnosis of malignant mediastinal mass in 83 (56.08%) patients and benign mediastinal mass in 65 (43.92%) patients (Li H *et al.*, 2013). Histopathology findings confirmed malignant mediastinal mass in 84 (56.76%) patients and benign mediastinal mass in 64 (43.24%) patients. In CT positive patients, 79 (True Positive) had malignant mediastinal mass and 04 (False Positive) had benign mediastinal mass on histopathology (Kaur H *et al.*, 2014). Among 65, CT negative patients, 05 (False Negative) had malignant mediastinal mass on histopathology whereas 60 (True Negative) had benign mediastinal mass on histopathology (P=0.0001) (Rashid N *et al.*, 2011).

CONCLUSION

It is concluded that computed tomography is a highly sensitive and accurate non-invasive modality for differentiating malignant and benign mediastinal masses, and has not only dramatically improved our ability of accurate diagnosis of mediastinal masses but also improved patient care by timely and proper treatment.

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