

Pathological analysis of mediastinal masses in National Hospital for respiratory diseases, Sri Lanka

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Abstract

Introduction

This study describes pathological findings of mediastinal masses among patients referred to National Hospital for Respiratory Diseases.

Methods

A descriptive cross-sectional study was conducted among patients with mediastinal masses referred to National Hospital for Respiratory Diseases, Welisara, Sri Lanka in 2017, who underwent excision or guided biopsy followed by standard histological and immunohistochemical staining.

Results

The population was aged 8-75[mean (SD)=42.8(17.0)] years. Of 139 patients, 80(57.6%) were males. Masses were located in anterior mediastinum in 49.6 % (n=69), superior mediastinum in 20.1 % (n=28), middle mediastinum in 15.1 % (n=21) and posterior mediastinum in 14.4 % (n=20). Majority (65.5%, n=91) were excision biopsies. The rest were core biopsies. Commonest mass was lymphoma [n=27,19.4%;Non-Hodgkin(n=20),Hodgkin(n=7)] followed by thymic tumours [n=22,15.8%;benign(n=16), malignant(n=6)], germ cell tumours (11.5%,n=16), metastatic deposits (10.8%,n=15), developmental cysts (8.6%,n=12), non-neoplastic lymphadenitis (7.9%,n=11), neuroectodermal tumours (5.8%,n=8), soft tissue sarcomas (2.9%,n=4), leiomyoma (0.7%,n=1), benign spindle cell tumour (0.7%,n=1) and plasmacytoma (0.7%,n=1). Twenty-one (15.1%) specimens were either normal or inconclusive. A one-way ANOVA showed significant differences in the distribution of age among different types of masses [Welch's F (df=7, n=115) =10.09, p=.000]. Post-hoc comparisons, showed that the age of patients with germ cell tumours (mean=29.7±11.5 years), developmental cysts (mean=38.8±16.5years) and lymphomas (mean=34.0±15.7

years) were less compared to the patients with other masses. A Chi-square test indicated no significant association between gender and the type of mediastinal mass [χ^2 (df=7, n=115) =6.561, p=.48].

Conclusions

Lymphoma was the commonest mediastinal mass in this population. Germ cell tumours, developmental cysts and lymphomas were commonly found among the young.

Introduction

Mediastinal tumours are uncommon lesions with diverse clinical characteristics. The initial presentation of these patients may vary from incidental detection to life-threatening casualty admissions (1). There has been a significant increase in the detection of mediastinal tumours with the advent of new imaging modalities. A recent Indian study concluded that 3% of the intrathoracic tumours were comprised of mediastinal tumours (2). Moreover, a high mortality is associated with the mediastinal tumours in this part of the world due to late presentation (3).

The anatomical location of the mass is crucial for the tentative diagnosis (1, 4). However, regional studies assessing the anatomical and histopathological data on mediastinal masses are sparse. Furthermore, there are no published data on clinicopathological variations of mediastinal masses in a Sri Lankan setting. National Hospital for Respiratory Diseases (NHRD), Welisara is the prime centre managing mediastinal masses and the only institution in the country which offers the general thoracic surgical services to the patients. Hence, a nationally representative sample could be obtained from this hospital. The objective of this study was to describe pathological findings of mediastinal masses among patients who were referred to the NHRD, Welisara, Sri Lankans in the year of 2017.

Methods

This descriptive cross-sectional study was conducted among the patients admitted to medical and surgical units at the NHRD from 1st January to 31st December 2017. The study was conducted in accordance with the guidelines set out by the Declaration of Helsinki (5).

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All patients referred to NHRD from 1st January to 31st December 2017 with mediastinal masses who had undergone histopathological analysis were included in the study. Patients with retrosternal thyroid masses in the anterior mediastinum and primary epithelial oesophageal malignancies in the posterior mediastinum were excluded from the study. Clinical, pathological and radiological data were obtained from the pathological database at the Department of Pathology, NHRD. Firstly, the patient identifiers were removed from the database by an independent person. The investigators were given access to the deidentified database including details of age, gender, microscopic and macroscopic pathological findings of biopsy specimen. Standard histological stains and immunohistochemical stains were used in the pathological diagnosis of mediastinal masses. All the diagnoses were made by a single pathologist.

Data were analysed using Statistical Package for Social Sciences (SPSS) software, version 23. Descriptive data were presented as percentages or as mean \pm standard deviations. Significance of associations among continuous variables was tested using a one-way Analysis of Variance (ANOVA) and categorical variables using chi-squared test. In all analyses a priori alpha value of 0.05 was used.

Results

Socio-demographic characteristics

The study sample size was 139. Of those, 80 (57.6%) were males and 59 (42.4%) were females. The sample was aged 8-75 (mean (SD) = 42.8 (\pm 17.0)) years. Eleven were previously diagnosed with a primary malignancy unrelated to the mediastinum. Masses were in the anterior mediastinum in 49.6% (n=69), the superior mediastinum in 20.1% (n=28), the middle mediastinum in 15.1% (n=21) and the posterior mediastinum in 14.4% (n=20). Majority (65.5%, n=91) were excision biopsies. The rest (n=48, 34.5%) were core biopsies.

Histological findings

Commonest mass was due to lymphoma (n=27, 19.4%; Non-Hodgkin n=20, Hodgkin n=7) followed by thymic tumours (n=22, 15.8%; benign n=16, malignant n=6), germ cell tumours (11.5%, n=16), metastatic deposits (10.8%, n=15) developmental cysts (8.6%, n=12), non-neoplastic lymphadenitis (7.9%, n=11), neuroectodermal tumours (5.8%, n=8), soft tissue sarcomas (2.9%, n=4), leiomyoma (0.7%, n=1), spindle cell tumour (0.7%, n=1) and plasmacytoma (0.7%, n=1). Twenty-one (15.1%) specimens were either normal or inconclusive. The distribution of mediastinal masses according to the histological findings are summarized in the Table 1.

Results of the statistical analysis

A one-way Analysis of Variance (ANOVA) was used to

examine whether the presenting age differed with respect to the histological type of the mass. The independent variables included the various types of mediastinal masses. The miscellaneous (n=3) and inconclusive tumours (n=21) were excluded from the following statistical analyses (see Table 1). The dependent variable was the age of the patient at the diagnosis (see Table 1 for the means and standard deviations for each group). The test for normality, examining standardized skewness and the Shapiro-Wilks test, indicated the data were statistically normal. However, the Levene's F test revealed that the homogeneity of variance assumption was not met (p=.000). As such, the Welch's F test was used. The one-way between groups ANOVA revealed a statistically significant main effect, Welch's F (df=7, n=115) =10.09, p=.000, indicating that the average age at presentation significantly differs among histological types of mediastinal masses.

Post-hoc comparisons using the Turkey HSD test, showed that patients with germ cell tumours (mean=29.7 \pm 11.5years), developmental cysts (mean=38.8 \pm 16.5years) and lymphomas (mean=34.0 \pm 15.7 years) were younger compared to the patients with other masses. A Chi-square test for independence indicated no significant association between gender and the type of mediastinal mass, (χ^2 (df=7, n=115) = 6.561, p=.48).

Discussion

Mediastinal masses are comprised of a wide variety of pathological types ranging from benign to malignant tumours and non-neoplastic lesions. Clinical features of mediastinal masses vary widely depending on the histological subtype.

The majority (75.0%) of the mediastinal masses in our study population were neoplastic lesions, of them the majority were benign. This finding is in line with the studies in the region as well as in the west where more than two thirds of the mediastinal tumours are reported to be benign (1). However, an Indian study found that most of the neoplasms in their population were malignant (2). Furthermore, primary malignant mediastinal tumours are reported to be rare (6). According to the published studies (1, 7), the origins of most common anterior mediastinal masses are from thymic, germ cell or lymphatic tissues. Middle mediastinal masses are commonly originated from lymphatic tissues while rest of the middle mediastinal masses arise as developmental cysts and neurogenic tumours. Neurogenic tumours and masses arising from lymphatic, vascular and mesenchymal tissues encompass the posterior mediastinal masses. We observed a similar pattern in our study. Furthermore, nearly half of the masses were located within the anterior mediastinum while the rest were distributed among middle, posterior and superior compartments in the proportions of 15% - 20% each.

Table 1. Distribution of pathological types of mediastinal masses in the study population.

Category of tumour	Type of Tumour	Frequency (Percentage)	Gender		Age	
			Male	Female	Mean±SD	Range
Lymphoma			14	13	34.0±15.7	11-75
	Non-Hodgkin Lymphoma	20 (14%)				
	Hodgkin Lymphoma	7 (4.9%)				
Thymic tumours			14	8	50.4±15.1	13-73
	Thymoma	15				
	Thymic Carcinoma	6 (4.2%)				
	Thymic Hyperplasia	1 (0.7%)				
Germ Cell Tumours			12	4	29.7±11.5	13-53
	Teratoma	6 (4.2%)				
	Seminoma	4 (2.8%)				
	Germ Cell Tumours with Malignant Round Cells	3 (2.1%)				
	Yolk Sac	2 (1.4%)				
	Embryonal carcinoma	1 (0.7%)				
Metastatic Deposits			10	5	55.3±8.6	35-69
	Lung Non-small cell carcinoma	5 (%)				
	Lung small cell carcinoma	3 (2.1%)				
	Breast adenocarcinoma	3 (2.1%)				
	Colon adenocarcinoma	1 (0.7%)				
	Thyroid medullary carcinoma	1 (0.7%)				
	Adenocarcinoma of Unknown primary	1 (0.7%)				
	Squamous carcinoma of unknown primary	1 (0.7%)				
Non-neoplastic lymphadenitis			6	5	52.5±6.4	41-62
	Sarcoid	10 (7.0%)				
	Castleman Disease	1 (0.7%)				
Developmental Cysts			6	6	38.8±16.5	19-68
	Bronchogenic cyst	5 (3.5%)				
	Thymic Cyst	4				
	Pericardial Cyst	2 (1.4%)				
	Mesothelial inclusion cyst	1 (0.7%)				
Non-neoplastic lymphadenitis			6	5	52.5±6.4	41-62
	Sarcoid	10 (7.0%)				
	Castleman Disease	1 (0.7%)				
Developmental Cysts			6	6	38.8±16.5	19-68
	Bronchogenic cyst	5 (3.5%)				
	Thymic Cyst	4				
	Pericardial Cyst	2 (1.4%)				
	Mesothelial inclusion cyst	1 (0.7%)				
Neuroectodermal tumours			3	5	47.1±21.7	8-68
	Schwannoma	7 (4.9%)				
	Ganglioneuroma	1 (0.7%)				
Soft Tissue Sarcoma			1	3	50.3±16.8	30-65
	Myxoid liposarcoma	2 (1.4%)				
	Leiomyosarcoma	1 (0.7%)				
	Sinovial Sarcoma	1 (0.7%)				
Miscellaneous			1	2		
	Benign spindle cell tumour	3 (%)				
	Leiomyoma	1 (0.7%)				
	Plasmacytoma	1 (0.7%)				
Normal or inconclusive		21 (14.7%)	13	8		

Baram et al. conducted a descriptive cross-sectional study in Iraq among 85 patients and found a similar distribution pattern of mediastinal masses (7). Moreover, two Indian studies concluded that the commonest site of the primary mediastinal tumours were in the anterior mediastinum (6, 8).

The mean age of presentation of mediastinal masses in our study population was 25 to 55 years. We also found a statistically non-significant slight male predominance, where male to female ratio was approximately 1.3:1. However, lymphoma (mean age = 34 years) and germ cell tumours (mean age = 29.7 years) were seen among relatively younger age groups compared to rest of the study population. Recent studies conducted in India (8), Nepal (9), Thailand (10) and Iran (11) reported comparable figures for the presenting age of lymphoma and germ cell tumours. Early detection and histological diagnosis are paramount in managing lymphoma and germ cell tumours since most of them respond dramatically to chemotherapeutic management as the primary modality of treatment (12, 13). Of the non-neoplastic lesions, developmental cysts were commonly observed in the younger age groups (mean age = 38.8 years). These cysts commonly originated from the precursors of bronchial and thymic tissues. These findings are in accordance with the published data (1). Nevertheless, there were no inflammatory masses of tuberculous origin in this study, irrespective of the fact that Sri Lanka is an endemic country for tuberculosis. One of the possible reasons would be that the tertiary care hospitals in Sri Lanka are frequently treating patients with tuberculous masses in the mediastinum and these cases are not referred to the NHRD often.

The histological assessment was conducted by a single pathologist. However the sections were not reviewed again for the study, which may have introduced an observer bias.

Conclusions

Clinical and pathological characteristics of mediastinal masses of this study were comparable to the published data globally. Lymphoma accounted for the commonest mediastinal tumour in this population. Germ cell tumours, developmental cysts and lymphomas were commonly found among the young.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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