

Mediastinal Masses: Review of 105 Cases

Mohammad Vaziri^{1*}, Abdolreza Pazooki², and Leila Zahedi-Shoolami³

¹ Department of Thoracic Surgery, Hazrat Rasool Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

² Department of Surgery, Hazrat Rasool Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

³ General Practitioner and Researcher, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Received: 14 Oct. 2007; Received in revised form: 6 Apr. 2008; Accepted: 14 May 2008

Abstract- There has been a highly significant increase in the number of patients with malignant mediastinal tumors in the last four decades. Since these lesions are infrequently encountered and there are very few reports in Iran concerning this issue, we performed this study to review our institutional experience of mediastinal masses and to compare differences in the clinical spectrum between our study population and other patients studied by various reports. This was a retrospective, descriptive and cross sectional study conducted on 105 patients with mediastinal masses who underwent surgical resection over a 5-year period from 1999 to 2003 in three major hospitals in Tehran. A total of 105 patients with mediastinal masses including 65 males (62%) and 40 females (38%) with a mean age of 34 years (range, 2-80 years) who had undergone surgery entered the study. Most mediastinal tumors (47%) were identified in the third and fifth decades of life and the most common malignancy during the first four decades of life was malignant lymphoma. Considering the location of mediastinal masses, the anterior mediastinum was the most common site (65%) followed by paravertebral sulci (21%) and visceral mediastinum (14%). The highest rate of malignancy was observed in visceral mediastinum (73% malignancy rate). Histopathologic evaluation of resected masses revealed twenty two types of tumors of which sixty percent were malignant. Nonspecific symptoms such as dyspnea (41%) and cough (40%) constituted the most presenting complaints. Twelve percent of patients were completely asymptomatic. The most common complication observed in this series of mediastinal masses was Superior Vena Cava (SVC) syndrome. There was no postoperative complication. Crude mortality rate of the whole series was 16%. The prevalence of tumors in our series varied from some previously published reports. We demonstrated definite differences in histologic distribution, age range, malignancy rate and diagnostic methods of mediastinal tumors between our study population and other reported cases which should be considered in the evaluation and planning of therapeutic modalities for mediastinal masses encountered in our current practice.

© 2009 Tehran University of Medical Sciences. All rights reserved.

Acta Medica Iranica 2009; 47(4): 297-300.

Key words: Mediastinal mass, malignancy

Introduction

Mediastinal masses include a wide variety of tumors and remain an interesting diagnostic challenge and therefore, a standardized diagnostic and therapeutic workup is instrumental. These lesions afflicting people of all ages, are only infrequently encountered particularly when compared with new cases of carcinoma of the lung seen per year. Nonetheless, the significant increase in the number of patients with malignant mediastinal tumors from the 1950 onward (1) necessitates acquaintance with the clinical features of the various lesions. There are few if any recent reports concerning the characteristics and

changing patterns of mediastinal tumors in Iran. Thus, we reviewed all cases of mediastinal masses diagnosed and treated over a 5-year period between 1999-2003 in three major hospitals in Tehran to determine the presenting features- location- histology- diagnostic methods- relationship of age to the type of lesion and benignity versus malignancy in these unusual tumors.

Patients and Methods

This study was a retrospective, descriptive and cross sectional study performed on 105 patients with mediastinal masses who underwent surgical resection over a

* **Corresponding Author:** Mohammad Vaziri

Department of Thoracic Surgery, Hazrat Rasool Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
Tel: +98 912 1711348, Fax: +98 21 66509056, E-mail: dr_m_vaziri@yahoo.com

5-year period from 1999 to 2003. The study population was selected via a census method. All patients referring to three major and referral thoracic surgery centers in Tehran, namely Imam Khomeini hospital (Tehran University of Medical Sciences), Chamran Hospital and Army 505 hospital during 1999 to 2003 entered the study.

Age and sex distribution, location, histologic types of tumors, symptoms and signs, associated diseases, complications and mortality rate were recorded from patients' files. All resected masses had a definitive pathologic diagnosis.

Data analysis was performed by SPSS Software (v.11.05), using descriptive statistics indices such as frequency, mean, median, standard deviation and standard error. The statistical significance was determined at the 0.05 level.

Results

A total of 105 patients with mediastinal masses including 65 males (62%) and 40 females (38%) with a mean age of 34 years (range, 2-80 years) who had undergone surgery entered the study.

Most mediastinal tumors (47%) were identified in the third and fifth decades of life. The highest incidence of malignancy occurred in the eighth (80%) and second (79%) decades and the most common malignancy during the first four decades of life was malignant lymphoma (Table 1).

Considering the location of mediastinal masses, the anterior mediastinum was the most common site (65%) followed by paravertebral sulci (21%) and visceral mediastinum (14%). It is to be noted that the highest rate of malignancy was observed in visceral mediastinum (73% malignancy rate) with malignant lymphoma as the most common tumor observed in this location (Table 2).

Table 1. Frequency of mediastinal tumors in different age decades

Age Range	Frequency (percent)	Malignancy Rate
First Decade	4 (3.8%)	50%
Second Decade	19 (18%)	79%
Third Decade	28 (26.6%)	71.5%
Fourth Decade	14 (13.3%)	64%
Fifth Decade	22 (21%)	50%
Sixth Decade	7 (6.6%)	71.5%
Seventh Decade	5 (4.7%)	60%
Eight Decade	5 (4.7%)	80%

Table 2. Location of mediastinal tumors and their malignancy rates

Location	Frequency (percent)	Malignancy Rate
Anterior Mediastinum	68 (65%)	67%
Visceral Mediastinum	15 (14%)	73%
Paravertebral Sulci	22 (21%)	32%

Table 3. Histologic types of mediastinal tumors

Histology	Frequency (percent)
Lymphoma	33 (31.5%)
Hodgkin	11 (10.5%)
Schwannoma	11 (10.5%)
Teratoma	8 (7.5%)
Thymoma	8 (7.5%)
Undifferentiated Carcinoma	4 (3.7%)
Intrathoracic Goiter	4 (3.7%)
Bronchogenic Cyst	2 (1.8%)
Thymic Squamous Cell Carcinoma	2 (1.8%)
Spindle Cell Sarcoma	2 (1.8%)
Ganglioneuroma	2 (1.8%)
Pleomorphic Sarcoma	2 (1.8%)
PNET	2 (1.8%)
Thymic Hyperplasia	2 (1.8%)
Neurogenic Sarcoma	1 (0.9%)
Lipoma	1 (0.9%)
Carcinoid Tumor	1 (0.9%)
Liposarcoma	1 (0.9%)
Chondrosarcoma	1 (0.9%)
Thymic Cyst	1 (0.9%)
Foregut Cyst	1 (0.9%)
Germ Cell Tumor	1 (0.9%)
Castleman Disease	1 (0.9%)

Table 4. Frequency of signs and symptoms in patients with mediastinal tumors

Sign & Symptoms	Frequency (percent)
Dyspnea	43 (41%)
Cough	42 (40%)
Weight Loss	21 (20%)
Pain	30 (28%)
Fever	15 (14%)
Pleural Effusion	13 (12%)
Asymptomatic	13 (12%)

Histopathologic evaluation of resected masses revealed twenty two types of different tumors of which the most common ones in decreasing order of frequency are: Malignant lymphoma (31.5%), Hodgkin (10.5%), Schwannoma (10.5%), Teratoma (7.5%) and Thymoma (7.5%). Sixty percent (60%) of all cases in this series of mediastinal masses were malignant (Table 3).

Nonspecific symptoms such as dyspnea (41%) and cough (40%) constituted the most commonly presenting complaints followed by pain (28%), weight loss (20%), fever (14%) and pleural effusion (12%). Twelve percent (12%) of patients were completely asymptomatic. (Table 4). Schwannoma, Teratoma, encapsulated Thymoma and Intrathoracic goiter constituted the asymptomatic cases. A number of unrelated associated diseases were observed simultaneously among some patients with mediastinal tumors including: sternal osteochondroma associated with Schwannoma, Neurofibromatosis associated with Ganglioneuroma and Nasopharyngeal carcinoma associated with intrathoracic goiter.

The most common complication observed in this series of mediastinal tumors was Superior Vena Cava (SVC) syndrome. Other complications presenting simultaneously with some primary tumors are as follows : brachial plexus involvement (PNET), Horner syndrome (Neurosarcoma), intratumoral bleeding (pleomorphic sarcoma), spontaneous hemothorax (ganglioneuroma). There was no postoperative complication.

Crude mortality rate of the whole series was 16%.

Discussion

Numerous tumors and cysts occur in the mediastinum and affect people of all ages, nonetheless, they are uncommon and with an average of eight cases seen per year, they represent 3% of tumors within the chest (1).

In this study we encountered important differences in histologic distribution, malignancy rate, age range and diagnostic methods of mediastinal tumors between our patients and other reported series.

We demonstrated higher malignancy rate (60% of all cases), significant predominance of lymphoma (42% of all masses), higher occurrence rate in middle-age adults (47.6%), increased use of invasive diagnostic methods (51% of cases) and finally, very high incidence of SVC syndrome at presentation (10%) in our patients.

The precise nature of a lesion in the mediastinum cannot be determined without histologic examination of the tissue and an extensive resection without a preoperative diagnosis is not indicated (2). Evaluation of mediastinal masses often involves an array of imaging proce-

dures and biopsy techniques including CT scan, PET imaging (3), cervical mediastinoscopy (for superior mediastinal tumors), needle biopsy guided by ultrasonography or CT (4) , anterior mediastinotomy (5) (for tumors adherent to the anterior chest wall, or, located in the aorto-pulmonary window), endoscopic ultrasound guided biopsy (6) (for solid lesions adjacent to the esophagus) and finally, thoracoscopy (7,8) (particularly in tumors with difficult access, tumors with proximity to neurovascular structures and multiple lesions).

Surprisingly, half of our patients underwent an invasive procedure for purely diagnostic purposes including Chamberlain procedure in 37% and thoracotomy in 14% of cases.

Reasonably, this trend should be criticized and replaced by imaging-guided techniques.

Most mediastinal tumors in this series were identified in the third decade of life (26.6%) followed by the fifth decade (21%) and the second decade (18%). From the first to fourth decade, lymphoma was the most common malignant tumor. We found Hodgkin disease in one-fourth (25%) of lymphomas and non-Hodgkin's lymphoma in the remainder. Although thymoma has been reported to represent 11% to 38% of primary mediastinal masses (9,10) it occurred only in 7.5% of our patients. The most common tumor in our series even in the first decade of life, was malignant non-Hodgkin lymphoma (31.5% of all cases).

In collected series of mediastinal masses, 25% to 49% of these lesions are malignant (9,11,12) but 60% of all lesions in our patients were malignant. It is to be noted that the incidence of benignity versus malignancy varies with the lesion under consideration, the location of the mass and the hospital referral patterns. We found the lowest incidence of malignancy in children with 10 years of age and younger (50%) and the highest incidence in patients in the eighth and second decades of life (80%).

The most common location of mediastinal masses in this series was the anterior mediastinum (65% of all cases with 67% incidence of malignancy) which was due to high prevalence of lymphoma in our patients. Other studies have reported that anterior mediastinal neoplasms account for 50% of all mediastinal masses with thymomas being the most common (13).

We encountered a number of interesting associated diseases with some mediastinal masses including: sternal osteochondroma with schwannoma, nasopharyngeal carcinoma with intrathoracic goiter and neurofibromatosis with ganglioneuroma. Another important feature in our patients was the high rate of complications encoun-

tered at the time of presentation (16% of all cases). This was mainly due to delayed referral and diagnosis in the context of nonspecific symptoms. Superior vena cava (SVC) syndrome was seen in 10% of patients which should be seriously considered by practitioners.

A significant and previously unreported complication was the occurrence of massive spontaneous hemothorax due to ruptured Ganglioneuroma in a young woman with Neurofibromatosis (14).

In conclusion, the prevalence of tumors in our series varied from some previously published reports. The rates of non-surgical tumors such as lymphoma are higher and the rates of traditionally surgical diseases such as thymoma and neurogenic tumors are lower. The relatively large number of patients in our study, the recent period under examination and the absence of selection bias suggest that our results can be representative of the actual distribution of mediastinal masses in Iran. Multi-institutional approaches may improve our experience and understanding of the changing pattern of mediastinal tumors.

References

1. Shields TW. Overview of primary mediastinal tumors and cysts. In: Shields TW, Locicero J, Ponn RB, Rusch VW, editors. *General Thoracic Surgery*. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2005. p. 2489-93.
2. Bacha EA, Chapelier AR, Macchiarini P, Fadel E, Dartevelle PG. Surgery for invasive primary mediastinal tumors. *Ann Thorac Surg* 1998; 66(1): 234-9.
3. Kubota K, Yamada S, Kondo T, Yamada K, Fukuda H, Fujiwara T. PET imaging of primary mediastinal tumours. *Br J Cancer* 1996; 73(7): 882-6.
4. Hoerbelt R, Keunecke L, Grimm H, Schwemmle K, Padberg W. The value of a noninvasive diagnostic approach to mediastinal masses. *Ann Thorac Surg* 2003; 75(4): 1086-90.
5. Rendina EA, Venuta F, De Giacomo T, Ciccone AM, Moretti MS, Ibrahim M, et al. Biopsy of anterior mediastinal masses under local anesthesia. *Ann Thorac Surg* 2002; 74(5): 1720-2.
6. Larsen SS, Krasnik M, Vilmann P, Jacobsen GK, Pedersen JH, Faurschou P, et al. Endoscopic ultrasound guided biopsy of mediastinal lesions has a major impact on patient management. *Thorax* 2002; 57(2): 98-103.
7. Kern JA, Daniel TM, Tribble CG, Silen ML, Rodgers BM. Thoracoscopic diagnosis and treatment of mediastinal masses. *Ann Thorac Surg* 1993; 56(1): 92-6.
8. Cirino LM, Milanez de Campos JR, Fernandez A, Samano MN, Fernandez PP, Filomeno LT, et al. Diagnosis and treatment of mediastinal tumors by thoracoscopy. *Chest* 2000; 117(6): 1787-92.
9. Wongsangiem M, Tangthangtham A. Primary tumors of the mediastinum: 190 cases analysis (1975-1995). *J Med Assoc Thai* 1996; 79(11): 689-97.
10. Takeda S, Miyoshi S, Akashi A, Ohta M, Minami M, Okumura M, et al. Clinical spectrum of primary mediastinal tumors: a comparison of adult and pediatric populations at a single Japanese institution. *J Surg Oncol* 2003; 83(1): 24-30.
11. Temes R, Chavez T, Mapel D, Ketai L, Crowell R, Key C, et al. Primary mediastinal malignancies: findings in 219 patients. *West J Med* 1999; 170(3): 161-6.
12. Azarow KS, Pearl RH, Zurcher R, Edwards FH, Cohen AJ. Primary mediastinal masses. A comparison of adult and pediatric populations. *J Thorac Cardiovasc Surg* 1993; 106(1): 67-72.
13. Strollo DC, Rosado de Christenson ML, Jett JR. Primary mediastinal tumors. Part 1: tumors of the anterior mediastinum. *Chest* 1997; 112(2): 511-22.
14. Vaziri M, Mehrazma M. Massive spontaneous hemothorax associated with Von Recklinghausen's disease. *Ann Thorac Surg* 2006; 82(4): 1500-1.