

Evaluation of 95 Cases with Mediastinal Tumors

Reza Bagheri¹, Reza Afghani^{2*}, Seyed Ziaollah Haghi¹, Seyed Hossein Fattahi Masoum³, Soroush Zarehparvar Moghaddam⁴, Saeed Akhlaghi⁵

¹ Thoracic Surgeon, Cardio-Thoracic Surgery & Transplant Research Center, Imam Reza Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

² Fellowship of Thoracic Surgery, Endoscopic and Minimally Invasive Surgery Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

³ Thoracic Surgeon, Endoscopic & Minimally Invasive Surgery Research Center, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

⁴ Medical Student, Cardio-Thoracic Surgery & Transplant Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

⁵ Statistician, Faculty of Medicine, Vascular and Endovascular Surgery Research Center, Imam Reza Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

ARTICLE INFO

Article type:
Original article

Article history:
Received: 9 Nov 2014
Revised: 24 Nov 2014
Accepted: 3 Dec 2014

Keywords:
Adjuvant Therapy
Compartment
Mediastinal Mass
Surgical Resection

ABSTRACT

Introduction: Mediastinum contains different vital structures that are located in the anterior and middle or posterior compartments. Various types of mediastinal masses or tumors can be seen in the mediastinum.

Materials and Methods: This case series study was performed on 95 patients who had referred to Mashhad University of Medical Sciences between 1990 and 2010 were reviewed. The Inclusion criteria were as follows: Having primary mediastinal masses; Exact tissue pathology; Having received suitable treatment as well as having completed a 3-year follow-up after surgery; The major variables were age, sex, clinical symptoms, mass location, diagnostic procedures, imaging studies, tissue pathology, postoperative complications, mortality and a long-term survival. The patients were followed up for 3 years after the surgery.

Results: Ninety-five patients enrolled in the study with M/F=51/44 and the mean age of 35.4±16.52 years. Moreover, anterior mediastinum was the compartment mostly involved in case of 66 patients with the lymphoma (n=39) as the most prevalent tumor of anterior mediastinum. Mediastinal cysts (n=10) in the middle part and neurogenic tumors (n=19) in the posterior mediastinum were the other prevalent tumors in the patients' compartments. Transthoracic Needle Biopsy was used in the diagnosis of 37 cases. Furthermore, 43 patients underwent surgery alone, 7 cases underwent surgery followed by receiving adjuvant therapy and 45 cases received adjuvant therapy alone.

Complications emerged in 15 cases and 9 patients expired before the completion of the 3-year follow-up. Three of the mortalities happened during the patients' hospital treatment.

Conclusion: In case of anterior mediastinum, pre-operation clinical diagnosis is essential while most of the posterior mediastinal tumors do not require any pre-operation clinical diagnosis. Surgery, surgery-chemoradiotherapy and chemoradiotherapy are the major methods of treatment for such tumors. For another thing, male gender was defined as a poor prognostic factor.

► Please cite this paper as:

Bagheri R, Afghani R, Haghi SZ, Fattahi Masoum SH, Zarehparvar Moghaddam S, Akhlaghi S. Evaluation of 95 Cases with Mediastinal Tumors. J Cardiothorac Med. 2015; 3(1):249-253.

Introduction

Mediastinum is located in the central part of the chest cavity splitting into the anterior, middle and posterior compartments (1). Every compartment has its own structures; so, the

*Corresponding author: Reza Afghani, Endoscopic and Minimally Invasive Surgery Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: +98 513 8594083; Fax: +98 513 8436199; Mobile: 09155206845; Email: ctstrc@mums.ac.ir

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masses originating from these structures are different and each cyst or tumor has a tendency for a specific compartment.

Mediastinal primary masses as well as tumors and metastatic tumors arise in all three parts of the mediastinum and include benign to malignant lesions (2). The types of primary mediastinal masses vary with the patient's age. For instance, the neurogenic tumor is the most prevalent tumor in infants and children while thymoma and lymphoma appear to be the most prevalent masses in adults (3, 4).

One half to two thirds of the mediastinal masses in children are asymptomatic in contrast to adults in whom one third to one half of the masses appear as symptomatic (5). Various imaging techniques are used in order to evaluate the mediastinal masses. Accurate evaluation must be taken into account before beginning the treatment because every mass requires its own particular type of treatment. Pre-treatment diagnosis is likely to affect the right choice of treatment specially in case of anterior mediastinum (6). The aim of this study was to evaluate 95 cases of mediastinal mass in terms of pathology, diagnostic procedure, type of treatment, possible complications and three years of follow-up.

Materials and Methods

This case series study was performed on Ninety-five patients with mediastinal masses who had referred to Ghaem and Omid Hospitals in Mashhad between 1990 and 2010 were reviewed. The inclusion criteria were as follows:

Table 1. Clinical characteristics of patients

variable	n	percentage
Location of tumor in mediastinum		
anterior	66	68.42%
middle	10	10.52%
posterior	19	20%
sex		
male	51	53.68%
female	44	43.31%
Radiologic modality		
CX ray	95	100%
CX ray+CT scan	95	100%
CX ray+CT scan+MRI	6	6.31%
Pathologic Diagnostic approach		
TTNB	37	38.94%
chamberlain	30	31.57%
surgical resection	28	29.47%
Treatment approach		
surgery	43	45.26%
surgery+adjuvant therapy	7	7.36%
adjuvant therapy	45	45.26%
Complications		
wound infection	7	7.36%
atelectasis	6	6.31%
pulmonary emboli	2	2.1%
3 years survival		
mortality	3	5.26%
< 3years	6	6.31%
3years<	86	9.52%

1) having primary mediastinal masses;2) exact tissue pathology; 3) having received suitable treatment as well as having completed a 3-year follow-up after the surgery;

In this regard, patients with unknown tissue pathology, mediastinal metastatic lesions, rejecting treatment and those who did not participate in the three years of follow-up were excluded from the study.

The patients' data were reviewed in terms of age, sex, clinical symptoms, mass location, diagnostic procedures, imaging studies, tissue pathology, postoperative complications, mortality and long-term survival. Afterwards, they were followed up for 3 years after the surgery. All data were processed by SPSS software, version 11.5. This article is approved by the regional Ethics Committee of Mashhad University of Medical Sciences (project number: 900470).

Results

This study was conducted on 95 patients consisting of 51(53.68%) men and 44(43.31%) women. The mean age of the patients was 35.4±16.52 years. Table 1 Show patients characteristics.

Among the three compartments of mediastinal, anterior mediastinum was the most recurrent site for the mediastinal masses of 66 (68.42%) patients, Lymphoma of 39 (41.05%) patients and thymic tumors of 17 (17.89%) patients while cysts were most likely to be found in the middle compartment of 10 (10.52%) patients and neurogenic tumors in posterior compartment of 19 (20%) patients.

The most common presenting symptoms of the patients were dyspnea, chest pain, fever and weight loss. Other symptoms included neck mass, dysphagia, back pain and hoarseness (Table 2).

Chest X-ray and Computed Tomography scan were performed on all patients. In addition to chest X-ray and CT scan, MRI was conducted in 6 patients with neurogenic tumors which raised the suspicion of possible spine involvement (Figure 1 and Figure 2).

In all the patients with germ cell tumor, beta-human chorionic gonadotropin (B-HCG) and alpha-fetoprotein (AFP) levels were measured

Table 2. Symptoms of mediastinal tumor

symptom	n	percentage
Dyspnea	37	42.04%
Cough	33	37.50%
Chest pain	32	36.36%
Fever & weight loss	22	25%
Neck mass	12	13.36%
Dysphagia	4	4.54%
Back pain	2	2.27%
hoarseness	1	1.13%

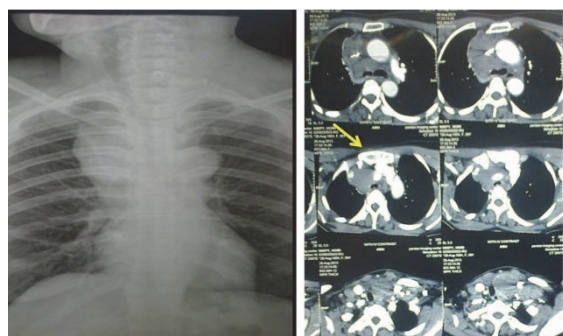


Figure1. Chest X-ray and CT-scan of a patient with non-Hodgkins lymphoma

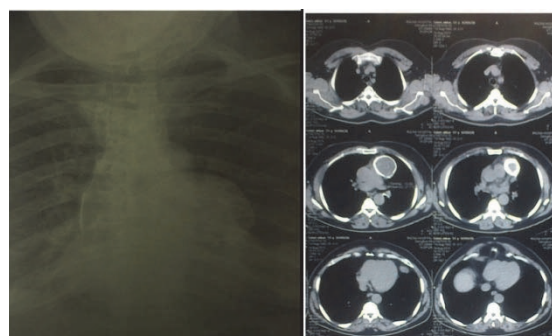


Figure2. Chest X-ray and CT scan of a patient with thymic carcinoma

Table 3. Clinical outcome of patients based on pathology type

Pathologic type	n	Mediastinal compartment	<3years follow up	Hospital mortality
Lymphoma	39	anterior	4	1
Thymoma	14	anterior	-	-
Thymic carcinoma	2	anterior	1	1
Thymic cyst	1	anterior	-	-
Teratoma	4	anterior	-	-
Seminoma	3	anterior	-	-
Non seminoma	3	anterior	-	-
Bronchogenic cyst	4	middle	-	-
Pericardial cyst	4	middle	-	-
Enteric cyst	2	middle	-	-
Schwannoma	8	posterior	-	-
Neurofibroma	8	posterior	-	-
ganglioneuroblastoma	2	posterior	1	-
neuroblastoma	1	posterior	-	1

which were proven to be elevated only in case of non-seminomatous germ cell tumors.

On the other hand, in 37 cases, transthoracic needle biopsy (TTNB) was applied for diagnosis. The results indicated that 35 cases had anterior mediastinal mass and 2 had posterior mediastinal mass.

Of the 35 cases of anterior mediastinum, 19 lymphoma, 10 thymoma, 2 thymic carcinoma, 1 seminoma, 1 non-seminoma and 2 teratoma were diagnosed by TTNB. Furthermore, two of the neurogenic tumors of the posterior mediastinum were diagnosed by TTNB to be due to vertebral involvement.

The diagnosis of 2 lymphoma, 4 thymoma and 2 cases of each seminoma, non-seminoma and teratoma got through the Chamberlain procedure. One case of thymic cyst, all middle mediastinum cysts and the remaining neurogenic tumors were diagnosed after surgical resection.

Pathologic results after diagnostic evaluations and surgery were as follow: out of 39 cases of lymphoma, 29 were Hodgkins and 10 were non-Hodgkins. Thymic tumors accounted for 14 thymoma, 2 thymic carcinoma and one thymic cyst. Furthermore, out of 10 cases of germ cell tumors, 4 were tratoma, 3 were seminoma and 3 were non-seminoma. Also, 19 cases of neurogenic tumors located in posterior mediastinum consisted of schwannoma (n=8), neurofibroma (n=8), ganglioneuroblastoma (n=2) and

neuroblastoma (n=1). Additionally, 10 cases of mediastinal masses in the middle compartment were all proven to be cystic and consisting of bronchogenic cyst (n=4), pericardial cyst (n=4) and enteric cyst (n=2) (Table 3).

Treatment options for these patients were surgery alone, surgery followed by adjuvant therapy and adjuvant therapy alone. Given the options, 39 cases of lymphoma underwent adjuvant therapy, 10 out of the 14 patients with thymoma and also the patient with thymic cyst had surgery alone and 4 patients with thymoma and 1 thymic carcinoma opted for adjuvant therapy in addition to the surgery.

On 6 cases of seminoma and non-seminomatous germ cell tumor, adjuvant therapy alone was performed and 4 patients with teratoma were resected. Moreover, 17 cases of neurogenic tumors underwent surgery alone and 2 other patients received adjuvant therapy after the surgery because of their vertebral involvement. Resection was the main procedure done to the mediastinal cysts in the middle mediastinum.

After the treatment was completed, 7 patients including four women and three men encountered wound infection, 6 of them consisting of four women and two men had atelectasis and pulmonary emboly was detected in 2 cases, one per each gender.

It is noteworthy that in this study, no differences were observed in the comparison between male and female subjects regarding the treatment complications. Nevertheless, 9 of the detected complications occurred in the patients over 40 years of age.

For another thing, 9 patients survived no longer than 3 years. Among them, 3 encountered hospital mortality during the treatment. The three patients with hospital mortality were a 9-year-old boy with non-Hodgkin lymphoma who underwent chemotherapy, a 5 year child with ganglioneuroblastoma who underwent thoracotomy and a 59-year-old man with thymic carcinoma who underwent sternotomy.

On the other hand, in 4 cases who were all lymphoma, recurrence was observed. All cases of

recurrence were treated by adjuvant therapy. Interestingly, the subjects who experienced mortality or survivals of less than 3 years were predominantly male and the ones who survived for more than 3 years were female ($p=0.003$).

Discussion

The mediastinum is defined as the space between the two lungs which is restricted superiorly by the thoracic inlet and inferiorly by the diaphragm.

The anterior limit is the posterior surface of the sternum and it is posteriorly confined by the anterior surface of the vertebrae (5,7). Thus, the mediastinum is divided into three compartments: anterior, middle and posterior (5).

Mediastinal masses can be benign or malignant in behavior, solid or cystic in nature and they can involve every compartment of the mediastinum (8). Mediastinal tumors are known to be relatively uncommon (5). They can be seen in a wide age range but they are more prevalent between the ages of 30 and 50 years.

The prevalence of such tumors vary with respect to the mediastinal compartments. However, the types of mediastinal tumors are usually associated with the patient's age.

In children, the most commonly involved compartment is the posterior mediastinum and there is a tendency for the tumors to be benign whereas in adults, the anterior mediastinum is the compartment mostly involved and there is a tendency for the tumors to be malignant in many cases (9).

Thymoma is the most prevalent tumor of the anterior mediastinum in adults while cysts are recognized to be the most common masses of the middle compartment and neurogenic tumors are frequent in the posterior mediastinum (10, 11).

Overall, lymphoma is the most prevailing tumor of the mediastinum (12, 13). Among the three compartments, anterior mediastinum is the most common site for tumoral involvement (14). In case they emerge, the signs and symptoms of masses depend on the benignity or the malignancy of the tumor, the size of the tumor, the presence or absence of infection and the biochemical products of the mass. To mention a few symptoms, there could be dyspnea, coughing, chest pain, fever and weight loss (15).

The signs and symptoms are a result of the compression of vital structures, direct invasion of adjacent structures, constitutional symptoms or endocrine hormone. In this study, 96.8% of the patients were symptomatic and only three of them were asymptomatic. Furthermore, the majority of our mediastinal masses were proven to be tumoral and the chances of being symptomatic was higher in comparison to the

benign, small size, cystic lesions of the mediastinum which explains the difference observed in the cases.

On the other hand, the first modality to evaluate the patients with mediastinal mass was Chest X-ray. In case of asymptomatic patients, these masses were discovered during the Chest X-ray which was performed for other reasons (1).

For another thing, the CT scan was the most effective tool in the accurate evaluation of the mediastinal mass (12). MRI also supplied additional information especially on vessels and neural foramina (16).

Having adequate knowledge of the radiologic features of mediastinal masses largely facilitates achieving the most accurate diagnosis and differentiation of these masses. Based on the site and nature of the mass during the radiologic evaluation, one can select the appropriate approach to the diagnosis and treatment.

To achieve the pathology and the type of mediastinal mass, different approaches have been adopted based on the location of the mass. The tissue diagnosis is particularly important in case of anterior mediastinal masses because it guides us to the proper treatment. However, complete resection can result in the definitive diagnosis and treatment in case of the middle and posterior compartment masses (6). Radiology guided needle biopsy and endoscopic needle biopsy, anterior mediastinotomy, mediastinoscopy, video-assisted thoracic surgery (VATS) and certain open approaches like sternotomy and thoracotomy are among the available techniques for obtaining tissue diagnosis (17).

Conclusion

We conclude that having adequate knowledge of the mediastinal compartments and special masses of every compartment will help us in the differential diagnosis. Obviously, CT scan is an effective tool in evaluating mediastinal masses.

Moreover, appropriate approaches for sampling the mass should be chosen based on the location of the mass. In this regard, proper treatments need to be selected based on the pathology, benignity and malignancy of the masses and regional and distant spread of the tumor.

The tumor types have a close association with long-term survival. Mediastinal tumors are among the uncommon ones. Lymphoma in the anterior mediastinum is the most prevailing tumor and pre-operation clinical diagnosis is essential in that case. Also, the most prevalent tumors of the posterior compartment are neurogenic tumors which do not require pre-operation clinical diagnosis. Surgery, surgery-

chemoradiotherapy and chemotherapy are the major treatments for these tumors. Finally, male gender was recognized as a poor prognostic factor in case of malignant mediastinal tumors.

Acknowledgments

This paper has been extracted from the results of a medical student's thesis that was done in the Cardio-thoracic Surgery and Transplant Research Centre. The research was supported and approved by the deputy of research of Mashhad University of Medical Sciences, Iran. We would like to thank Mrs. Elham Lotfian and sima Beigoli for their kind assistance in the preparation of the paper.

Conflict of Interest

The authors declare no conflicts of interest.

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