

# Mediastinal Masses: Jordan University Hospital (10 Year Experience)

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## Abstract

**Background:** Mediastinal masses is one of the common diseases faced in thoracic surgical practice, patterns of histopathological distribution of these masses are similar in many reports in the literature, with verities of differences in patients and tumors characteristics.

**AIM:** To describe the most common clinical presentations and histological diagnosis of our patients that are treated by surgery, and to report the experience in our center in treating such patients with surgery.

**Methods:** By reviewing medical records of all patients diagnosed with mediastinal masses at Jordan University hospital over a period of 10 years; from 2005 to 2015. Data about Patients' demographic characteristics, preoperative and postoperative diagnosis and perioperative course were collected and analyzed.

**Results:** Over a period of 10 years; 100 patients treated with surgery for mediastinal masses at the thoracic surgery division of Jordan University Hospital. 50 % of patients had postoperative diagnosis of masses with thymic gland in origin and another 50 % diagnosed with other masses that were not thymic in origin. Thymic masses tend to occur in younger patients with an average age of 36 years compared with the non-thymic masses which were found in older patients with an average age of 42 years (p value of 0.04). Benign masses (75% of patients) were more common in the diagnosis compared with malignant ones (25 % of patients). No perioperative mortality was reported in our patients, with morbidity of 12%. Post-operative bleeding, pleural effusion and Deep Vein Thrombosis (DVT) being of the most common morbidity.

**Keywords:** Mass, Jordan, Mediastinal Masses

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## Introduction

The Mediastinum is the space located in the central part of the thorax and is surrounded by the two pleurae cavities at each side. The

thoracic inlet forms the upper border and the diaphragm represents the lower border<sup>1</sup>. The mediastinum consists of three compartments; the anterior, middle and posterior

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compartments. The anterior part contains the thymus gland, fat, and lymph nodes, the middle part contains the pericardium, the pericardium contains the heart, ascending aorta and the arch, brachiocephalic veins, trachea, bronchi, and lymph nodes, the posterior part consists of the descending aorta, esophagus, azygous vein, autonomic ganglia and nerves, thoracic lymph nodes, and fat.<sup>2,3</sup> Mediastinal masses comprise a wide range of histopathological and radiological types. The most frequent ones are thymoma, neurogenic tumors and benign cysts representing 60% of the patients with mediastinal masses.<sup>6</sup> Secondary mediastinal tumors are more common than the primary one.<sup>4</sup> Most frequently, the secondary tumors represent lymphatic invasion from primary sources such as lung cancer or infra-diaphragmatic organs such as pancreatic, gastro-esophageal and testicular cancer.<sup>3</sup> Masses in the anterior mediastinum include thymoma, lymphoma, germ cell tumors, thyroid gland lesions and parathyroid lesions, neuroendocrine tumors are also described. Masses in this area are more likely to be malignant than those in the other compartments.<sup>4</sup>

This article will review 100 cases of mediastinal masses. These cases were diagnosed and treated in the Jordan University hospital during a time period of 10 years from 2005 to 2015.

### Methods:

This study is a retrospective, single center, descriptive and cross-sectional study performed on 100 patients with mediastinal masses who underwent surgical resection over a 10-year period from 2005-2015. All the patients included in this study were referred to the thoracic surgery unit during the period

from 2005 to 2015.

Age and sex distribution, location, histological types of tumors, symptoms and post-operative complications were obtained from the patients' medical records. All resected masses had a definitive pathologic diagnosis. Ethical committee approval was obtained.

Data analysis was performed by Predictive Analytics SoftWare (PASW, ver. 18) program, using descriptive statistics indices such as frequency, mean, median, standard deviation and standard error. Descriptive values for categorical variables were computed as frequencies (count and percent), and as mean±SD for numerical variables. Mann-Whitney U test was used for differences among the results of histopathology, and Fisher-Freeman-Halton test was used for relations between the categorical variables and the results of histopathology. The statistical significance was determined at the 0.05 level.

### Results:

We describe the histopathological diagnosis of all of patients as (Thymic or non-thymic) in origin. Fifty patients (50 % of all patients) were of the thymic group (diagnosed postoperatively with thymic masses in origin) and fifty patients (50 % of all patients) being of the non-thymic group (masses of other histopathological tissues). Thymic and non-thymic masses diagnoses were similar in both genders (males 23 vs. 22) and females (27 vs. 28) (P=0.841), respectively. Ptosis, Myasthenia Gravis symptoms and generalized muscle Weakness were highest (P<0.001) in the Thymic group of patients, and Dyspnea was found highest in the Non-thymic patients. Concomitant malignancy association with the masses was statistically not significant with p

value of (P=0.297). Different Locations of the masses that are predetermined with preoperative imaging (preoperative CT scans done for all patients) differ between thymic vs. non-thymic groups with a significant p value of (P=0.022). Thymic masses were more

situated in the anterior and the middle mediastinum. The presences of non-thymic masses were higher in posterior mediastinum.

Table (1) shows the gender, most common symptoms and location distribution of both groups described.

**Table 1.** The prevalence of different Gender, Symptoms, Locations and concomitant malignancy in both histopathological groups

		Histopathology				P*
		Thymic (n=50)		Others (non-thymic) (n=50)		
		Count	%	Count	%	
<b>Gender</b>	Female	27	49,1	28	50,9	0.841
	Male	23	51,1	22	48,9	
<b>Symptoms</b>	Asymptomatic	3	37,5	5	62,5	<0.001
	Chest pain	6	42,9	8	57,1	
	Cough	6	46,2	7	53,8	
	Dyspnea	4	20,0	16	80,0	
	Ptosis	2	100,0	0	0,0	
	Weakness	5	62,5	3	37,5	
	Myasthenia Gravis	16	100,0	0	0,0	
	Swelling	0	0,0	3	100,0	
	Others	8	50,0	8	50,0	
<b>Concomitant malignancy</b>	Yes	1	25,0	3	75,0	0.297
	No	49	51,0	47	49,0	
<b>Location in mediastinum</b>	Ant	41	59,4	28	40,6	0.022
	Middle	3	42,9	4	57,1	
	Posterior	2	16,7	10	83,3	
	Multiple locations	4	33,3	8	66,7	

\*P value of< 0.05 considered significant

Thymus originated masses diagnosed with younger patients mean age of 36.2 years (P=0.043) compared with older patients in the non-thymic masses, mean age of 43.2 years. Postoperative hospital stay (in days) was not statistically different between the two groups, the maximum diameter and the volume of the mass as described by histopathological reports were comparable. Intraoperative bleeding (measured in milliliters ML) and the duration of the operation (in hours) were analyzed and

compared between the two groups of mediastinal thymic masses and non-thymic masses, all were comparable with insignificant P values. Table (2) illustrates the patient's age, the tumor characteristic and the perioperative course of the two groups.

Benign lesions were reported in 75 patients (75% of all patients); malignant tumors were reported in 25 patients. In a comparison between the benign and the malignant, the histopathological diagnoses variables of

(gender prevalence, most common symptoms and anatomical location) were analyzed. Malignant mediastinal tumors were diagnosed

equally between males and females (12 female patients' vs.13 males, P value of 0.417).

**Table 2.** Patient’s age and Tumor characteristic in each group.

	Histopathology						P*
	Thymic			Non-thymic			
	N	Mean	SD	N	Mean	SD	
<b>Age</b>	50	36,26	16,50	50	43,20	18,25	<b>0.043</b>
<b>The max diameter of cyst</b>	50	5,54	4,99	50	5,18	2,75	0.515
<b>Volume of mass</b>	50	158,6	407,72	50	151,2	263,61	0.400
<b>Intraoperative bleeding (ml)</b>	50	75,20	80,04	49	58,37	61,04	0.119
<b>Duration of operation (hrs)</b>	50	2,04	1,14	49	1,99	1,56	0.185
<b>Post op Hospital stay (days)</b>	50	4,72	2,35	50	4,00	2,63	0.057

\*P value of < 0.05 considered significant

Benign masses had more symptoms of Ptosis, muscular weakness, cough and Dyspnea, and more association with Myasthenia Gravis clinical diagnosis compared with malignant tumors but were not statistically significant. Tumors association with other malignancy was similar between

benign and malignant diseases of the mediastinum.

Table (3) illustrates the different characteristics described and a comparison between benign and malignant tumors in our patients.

**Table 3.** The patients’ Gender, symptoms and tumor contaminant malignancy and anatomical location differences comparing Malignant and benign masses

		Histopathology				P*
		Malignant (n=25)		Benign (n=75)		
		Count	%	Count	%	
Gender	Female	12	21,8	43	78,2	0.417
	Male	13	28,9	32	71,1	
Symptoms	Asymptomatic	2	25,0	6	75,0	0.446
	Chest pain	6	42,9	8	57,1	
	Cough	3	23,1	10	76,9	
	Dyspnea	4	20,0	16	80,0	
	Ptosis	0	0,0	2	100,0	
	Weakness	1	12,5	7	87,5	
	Myasthenia Gravis	2	12,5	14	87,5	
	Swelling	2	66,7	1	33,3	
Concomitant malignancy	Yes	2	50,0	2	50,0	0.272
	No	23	24,0	73	76,0	
Location in mediastinum	Anterior	18	26,1	51	73,9	0.699
	Middle	1	14,3	6	85,7	
	Posterior	2	16,7	10	83,3	
	Multiple locations	4	33,3	8	66,7	

\*P value of < 0.05 considered significant

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Benign tumors were more commonly diagnosed in the anterior mediastinum (51 benign tumor vs 18 malignant), in the middle mediastinum (6 benign vs. one malignant tumor) and in the posterior mediastinum (10 benign vs. 2 malignant) but no statistical difference was found. Malignant and benign Tumors were diagnosed in comparable age groups (mean ages 36.8 years vs. 40.7 years

respectively) with p value of 0.368. Malignant tumors were similar in size with their benign counterpart, with comparable mass volume (p value of 0.19). Operative course in terms of intraoperative bleeding (p value of 0.275), duration of surgery (p value of 0.320) and postoperative stay (p value of 0.454) were also comparable with insignificant differences as detailed in table (4).

**Table 4.** Patients’ age and Tumor characteristic in malignant vs. benign tumors.

	Histopathology						P*
	Malignant			Benign			
	N	Mean	SD	N	Mean	SD	
Age	25	36,80	19,61	75	40,71	16,99	0.368
The max diameter of tumor	25	5,36	2,41	75	5,36	4,43	0.299
Volume of mass	25	116,2	121,1	75	167,8	388,2	0.198
Intraoperative bleeding (ml)	25	57	61	75	70	75	0.275
Duration of operation (hrs)	25	1,85	1,29	75	2,07	1,38	0.320
Post op Hospital stay (days)	25	4,16	2,76	75	4,43	2,43	0.454

\*P value of < 0.05 considered significant

The thymic masses form 50% of all cases, benign tumors of the thymus; thymoma, thymic hyperplasia and thymolipoma form 92% of all resected tumors. Malignant thymic squamous cell carcinoma forms only 8% of the thymic tumors (4% of all patients). Table (5)

illustrates the different histopathological diagnoses. Malignant tumors were found in 25% of the patients, and the most common histopathological type was lymphoma 4% (10% of all patients), followed by metastatic lesions 20% and other less common tumors.

**Table 5.** Histopathological type’s frequencies and percentages

Histopathology	Frequency	Percentage
<i>Thymic 50%</i>		
<i>Thymoma</i>	9	9,0
<i>Thymic hyperplasia</i>	27	27,0
<i>Thymolipoma</i>	10	10,0
<i>Thymic SCC</i>	4	4,0
<i>Non thymic 50%</i>		
Fibro sarcoma	3	3,0
Sarcoidosis	8	8,0
Granuloma	3	3,0
Lymphoma	10	10,0
Bronchogenic cyst	9	9,0

Histopathology	Frequency	Percentage
Retrosternal goiter	5	5,0
Teratoma	3	3,0
Hemangioma	2	2,0
Metastasis	5	5,0
ANEURYSM	2	2,0
Total	100	100,0

Post-operative complications were reported in 12% of patients. 88% of patients had an uneventful post-operative course. Different complications were described in the patients' medical records as bleeding, DVT, pleural effusion or vocal cord injury. Interestingly, each of these complications occurred in a frequency of 2%. Zero mortality was reported in all surgeries.

**Table 6.** Post-op complications frequencies.

	Frequency	Percent
Bleeding	2	2,0
DVT	2	2,0
VOCAL CORD INJURY	2	2,0
PLEURAL EFFUSION	2	2,0
NONE	88	88
OTHERS	4	4,0
Total	100	100,0

**Discussion:**

Primary mediastinal tumors represent 3% of tumors that originate in the chest.<sup>1</sup>In our study, the incidence of malignant lesions was 25%, which is less than the rates of malignant tumors reported in other studies. Vaziri et al. reported malignant tumors in 68% of all treated patients.<sup>7</sup>Akshatha Rao Aroor et al. reported higher malignant tumors for patients treated with surgery for mediastinal masses.<sup>4</sup>The most common masses in our series was of thymic origin (50% of the cases). The distribution of these tumors was as

follows: 27% had thymic hyperplasia, 10% had thymolipoma, 9% thymoma, and 4% had thymic squamous cell carcinoma. This is comparable to other reports by Akshatha Rao Aroor et al. who reported 40% of all masses were of thymic origin.<sup>4</sup>Thymic hyperplasia can be classified according to histopathology appearance into true thymic hyperplasia and follicular (lymphoid) hyperplasia.<sup>5</sup> It's estimated that it occurs in 10-25% of patients who had chemotherapy.<sup>5</sup>While the lymphoid hyperplasia is found mostly in patients with an autoimmune disease like myasthenia gravis.<sup>6</sup>Thymoma is found in 9% of the cases in our study and according to our results, thymoma is more common in the younger patients. Benveniste MFK et al. reported that thymoma was found in patients older than 40 years old.<sup>8</sup>Myasthenia Graves symptoms were described in 32% of thymic tumors patients, comparable to other reports as 30% to 50% of patients with a thymoma have myasthenia gravis.<sup>2</sup>Lymphoma accounts for 10% of the mediastinal masses in our study. This result is comparable to results from other studies. Dutta et al. reported that lymphoma rates of 8% and Sabiston et al. stated that 16% of mediastinal masses are of different subtype of lymphoma. However, Baram et al. study found that the incidence was 33%.<sup>11</sup>Bronchogenic cysts are found in 9% of our cases, the origin of those cysts is thought to be from an abnormal budding from the anterior surface of the tracheobronchial tree during the early

development of the respiratory system.<sup>10,13</sup> Masses of cystic nature account for 12-18% of the mediastinal masses with bronchogenic cysts that constitute the majority of them.<sup>6</sup> Diagnosed incidentally or as part of imaging workup for related symptoms; different imaging studies can help in diagnosis of mediastinal masses.<sup>9</sup> Preoperative imaging is used usually to plan surgical treatment and to characterize the masses and its extension before the surgery.<sup>12</sup> Computed tomography (CT) scans of the chest used to evaluate abnormalities seen on plain radiographs if any abnormalities were found. As our local practice guidelines recommend, usually CT scans with Intravenous contrast is the best study to evaluate masses or related symptoms.<sup>12</sup> Others reported the benefits of PET scans in diagnosis or work up of patients suspected to have mediastinal masses.<sup>5</sup> It is not available in our center, not routinely ordered. No 30-day mortality reported among our

patients, mortality reported in different reports of over 40% with sepsis, superior vena cava syndrome and massive pleural effusion are of the most common associated conditions during hospitalization of patient treated for mediastinal masses.<sup>14</sup>

### Conclusion

Mediastinal masses are not common; however, they represent a wide range of histological types. Less malignant tumors and more benign tumors of thymic origin were diagnosed among our patients. Masses from thymic origin account for the majority of the masses followed by lymphoma and bronchogenic cysts. These results are based in a single center experience. This means that a wide national study is needed to describe the national trend among Jordanian people, as our center is not the only referral center in Jordan for mediastinal masses treatment.

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## الأورام المنصفية و علاجها في مستشفى الجامعة الاردنية على مدى 10 سنوات

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### الملخص

تعتبر الأورام المنصفية من أكثر الأمراض شيوعا في عيادات الصدر الجراحية. أثبتت الدراسات السابقة أن علم أمراض الأنسجة المتعلق بهذه الأورام يعتبر متشابه مع موجود بعض الفروقات والاختلافات المتعلقة بطبيعة الأورام و خصائص المرضى المختلفة. إن الهدف من هذه الدراسة هو وصف الحالة السريرية الإكلينيكية والتشخيص النسيجي المرضي الخاص بالمرضى الذين تمت معالجتهم جراحيا في مستشفانا والذين يمثلون عينة هذه الدراسة. بالإضافة إلى ذلك، تهدف هذه الدراسة الى نقل خبرة مستشفانا بمعالجة هذا نوع من المرضى جراحيا.

من الأهمية بمكان الإشارة إلى أن بيانات هذه الدراسة تم جمعها بالرجوع إلى السجلات الطبية الخاصة بالمرضى الذين تم تشخيصهم بالأورام والكتل المنصفية في مستشفى الجامعة الأردنية على مدار عشر سنوات من عام 2005 إلى عام 2015. ومن الجدير بالذكر أن طبيعة بيانات عينة هذه الدراسة من المرضى التي تم جمعها وتحليلها من سجلات مستشفى الجامعة الأردنية تتعلق بخصائص و معلومات المرضى الديمغرافية. بالإضافة إلى ذلك فإن معلومات التشخيص السابق واللاحق للعملية الجراحية وجرى العناية بالمرضى السابقة واللاحقة للعملية الجراحية تم جمعها وتحليلها من السجلات الطبية الخاصة بالمرضى.

تظهر البيانات والسجلات الطبية لمستشفى الجامعة الأردنية أن 100 مريض مصابين بالأورام المنصفية تمت معالجتهم جراحيا في قسم جراحة الصدر في مستشفى الجامعة الأردنية. من الجدير بالذكر أن 50% من المرضى تم تشخيصهم بأورام متعلقة بالغدة الصعترية. كما أن النصف الآخر من عينة هذه الدراسة الذين يمثلون نسبة الـ 50% المتبقية تم تشخيصهم بأورام غير متصلة بالغدة الصعترية. أظهرت نتائج هذه الدراسة أن أورام الغدة الصعترية تكثر الحدوث في المرضى الأصغر سنا الذين يبلغ متوسط أعمارهم 36 عاما. كما أظهرت نتائج هذه الدراسة أن الأورام الغير متعلقة بالغدة الصعترية تكثر الحدوث في المرضى الأكبر سنا الذين يبلغ متوسط أعمارهم 42 عاما (p value of 0.04)

أظهرت نتائج هذه الدراسة أن الأورام الحميدة كانت أكثر شيوعا بنسبة 75% من المرضى مقارنة بالأورام الخبيثة التي شكلت 25% من المرضى. من الجدير بالذكر أنه في عينة هذه الدراسة لم تسجل اية حالة وفاة قبل إجراء العملية الجراحية مع وجود نسبة 12% من المضاعفات. كما أظهرت نتائج هذه الدراسة أن المضاعفات الأكثر حدوثا بعد إجراء العملية الجراحية كانت النزيف التابع لإجراء العملية والارتشاح البلوري وتختنر وتجلط الأوردة العميقة.

الكلمات الدالة: ورم ، ورم منصفي ، الأردن.