
Surgical management of mediastinal lesions

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ÖZET

Mediastinal lezyonların cerrahi tedavisi

Mediastinal tümörler ve kistler histolojik tanı gerektiren oldukça nadir lezyonlardır. Bu retrospektif çalışma, mediastinal lezyonların tanı ve tedavisinde kliniğimizin deneyimini aktarmaktadır. Yirmisekiz yıl süresince cerrahi olarak tedavi edilen, yaşları 6-84 arasında değişen 200 hastadaki mediastinal lezyonlar bu çalışmaya dahil edildi. Altmış hastada ön üst mediastinde belirgin olarak rezeke edilemeyen lezyon veya lenfadenopati vardı. Bu hastalara anterior mediastinotomi ve mediastinal kitleden biyopsi yapıldı. Bu hastalarda peroperatif ölüm saptanmadı. Beş (%8.3) hastada komplikasyon gözlemlendi. Tüm hastalarda histolojik tanı konuldu: Lenfoma (n= 21), metastatik karsinoma (n= 16), timik lezyonlar (n= 10), germ hücreli tümör (n= 3), diğer lezyonlar (n= 10). Geri kalan 140 hastada kitle rezeke edildi. Bir (%0.7) hastada peroperatif ölüm ve 21 (%15) komplikasyon gözlemlendi. Çıkarılan kitlelerin histolojik tanısı: Timik lezyonlar (n= 60), nöral tümörler (n= 21), tiroid lezyonları (n= 14), bronşiyal kistler (n= 12), perikardiyal kistler (n= 10), germ hücreli tümörler (n= 6), diğer lezyonlar (n= 17) idi. Sonuçlarımız uluslararası literatür ile uyumludur. Mediastinal lezyonlu hastalarda cerrahi, tercih edilen tedavidir. Cerrahi işlem, gerektiğinde düşük ameliyat riski ile lezyonun kesin tanı ve küratif eksizyonuna olanak sağlamaktadır.

Anahtar Kelimeler: Tümörler, kistler, mediasten, torakoskopi, video yardımlı torasik cerrahi (VATS).

SUMMARY

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Mediastinal tumors and cysts are relatively uncommon lesions requiring histologic confirmation. This retrospective study reports the experience of our department in the diagnosis and treatment of mediastinal lesions. Mediastinal lesions that were surgically treated in 200 patients aged 6-84 years, during a period of 28 years, were included in this series. Sixty patients had an apparently non-resectable lesion or lymphadenopathy of the anterior superior mediastinum. They had an anterior mediastinotomy and biopsy of the mediastinal lesion. No perioperative deaths were recorded in those patients. There were recorded 5 (8.3%) complications. Histological diagnosis was established in all patients: lymphoma (n= 21), metastatic carcinoma (n= 16), thymic lesions (n= 10), germ cell tumor (n= 3), other lesions (n= 10). The remainder 140 patients underwent a resection of the mediastinal lesion. One (0.7%) perioperative death and 21 (15%) complications were recorded. The histological diagnosis of the excised lesions was: thymic lesions (n= 60), neural tumors (n= 21), thyroid lesions (n= 14), bronchial cysts (n= 12), pericardial cysts (n= 10), germ cell tumors (n= 6), other lesions (n= 17). Our results are compared favorably with those reported in international literature. Surgery is the management of choice for patients with mediastinal lesions. It allows for establishing certain histological diagnosis and curative excision of the lesion, when it is necessary, with low operative risk.

Key Words: Tumors, cysts, mediastinum, thoracoscopy, video assisted thoracic surgery (VATS).

Neoplasms and cysts can arise from multiple anatomic structures in the mediastinum, their origin varies and they have multiple manifestations. Surgical intervention is the management of choice of those lesions targeting either for histologic establishment or for radical treatment (1).

In this retrospective study we present the experience of the Division of Thoracic Surgery of our Surgical Department (during a period of 28 years) in the diagnosis and treatment of mediastinal lesions emphasizing in the efficacy and safety of their surgical management.

MATERIALS and METHODS

During the period January 1977-December 2004 we had admitted for surgical management 420 patients with mediastinal lesions and lymphadenopathy in our department. A large part of those patients (n= 220) were not included in this study because they had either mediastinal lymphadenopathy easily biopsied by cervical mediastinoscopy (n= 148) or already known carcinoma presenting in various organs and tissues (n= 72).

The materials of our study are the remaining 200 patients. Data of patients' files (including history, manifestations, preoperative tests, surgical findings, histologic reports and postoperative follow up) were recorded.

Statistical analysis was performed using one way variant analysis by SPSS 10.

RESULTS

Patients' age ranged from 6 to 84 years (mean age: 41 years). Their clinical manifestations are reported in Table 1. Comparing all symptoms between patients with benign disease and those with malignant one, there is a statistically significant difference only in asymptomatic cases, where benign ones are much more ($p < 0.001$).

The diagnostic (mainly radiologic) tests used in our study included: chest radiogram in all patients (n= 200), computer tomography (n= 121), magnetic resonance imaging (MRI) (n= 12), angiography (n= 14), ultrasonography (n= 4), scintigraphy (n= 6), bronchoscopy (n= 11), oesophagoscopy (n= 5), fine needle aspiration cytology (n= 3), and computed tomography guided needle biopsy (n= 7).

Based on preoperative radiologic data, 60 of the 200 patients had an apparently malignant mediastinal mass (with metastases or invasion of contiguous organs) or presented lymph node enlargement in the anterior superior mediastinum. Those 60 cases had had a biopsy (not a radical excision) by anterior mediastinotomy on the right or the left side of the sternum (n= 56), or by video assisted thoracic surgery (n= 4), and in most of them (n= 53) the lesions were located in the anterior superior mediastinum. Thirty-nine of them were male and 21 female. We should mention that the period of the study is quite prolonged (28 years), almost all cases were operated by the same thoracic surgeon (the first aut-

Table 1. Clinical manifestations presented by our patients (n= 200).

Symptoms	Study patients		Benign lesions	Malignant lesions
	n	%		
Dyspnoea*	30	15	14	16
Cough*	24	12	11	13
Chest pain*	20	10	9	11
Anorexia*	16	8	6	10
Miscellaneous* (vein compression, haemoptysis, hoarseness, fever)	22	11	10	12
Asymptomatic	88	44	70	18
Total	200	100	120	80

* One patient could present more than one symptoms.

hor of the study), computed tomography guided needle biopsy was initiated in our hospital in 2001 when fully qualified radiologists were employed, and video assisted thoracic surgery has been used in our department since 2000 for a limited number of cases (n= 4). Therefore, it is obvious that the anterior mediastinotomy was the management of choice for that group of patients, even though the above-mentioned new techniques are replacing it gradually as the first diagnostic step during the last years. The histologic findings of the 60 cases are reported in Table 2. The perioperative mortality was 0%, while only 5 (8.3%) patients presented complications: haemothorax (n= 1), haemorrhage (n= 1), wound infection (n= 2), and respiratory insufficiency (n= 1). Among them only two were serious, including one patient presenting intraoperative haemorrhage due to internal mammary vein injury (successfully controlled by ligation of the bleeding vessel), and another one with superior vena cava syndrome presenting acute respiratory insufficiency shortly after the operation due to trachea obstruction (large doses of corticoids were necessary). The postoperative hospital stay ranged from one to five days (mean time: 3.2 days).

The remainder 140 cases had a resectable mediastinal lesion and they had had a radical surgical management by sternotomy or lateral thoracotomy. Sixty-two were male and 78 female. The histology reports of those cases are shown

Table 2. Histologic diagnosis of mediastinal lesions of patients that had had an anterior mediastinoscopy and biopsy of those lesions (n= 60).

Histologic diagnosis	Patients	
	n	%
Lymphoma	21	35
Metastatic carcinoma	16	26.6
Thymic lesions (thymoma)	10	16.6
Germ cell tumor	3	5
Lymph node infection	2	3.3
Mesothelioma	3	5
Sarcoidosis	1	1.7
Thymus gland	1	1.7
Sarcoma	1	1.7
Embryonic cancer	1	1.7
Eosinophilic lymph node invasion	1	1.7
Total	60	100

in Table 3. The rare diagnoses include: amartoma (n= 1), mixed rib tumor (n= 1), hydatid cyst (n= 1), neuroendocrine malignant tumor invading lymph nodes (n= 1) and leiomyosarcoma (n= 1). One of the 140 patients, a 78 year old woman with severe myasthenia gravis, died intraoperatively due to cardiac arrest (mortality= 0.7%), after the general anesthesia induction and before performing any surgical manipulation. Twenty-one patients (15%) presented complications: wound infection (n= 6), pleural effusion

Table 3. Histologic diagnosis of resected mediastinal tumors and cysts (n= 140).

Histologic diagnosis	Patients	
	n	%
Thymic lesions	60	42.8
• Thymoma	20	14.3
• Thymic hyperplasia	30	21.4
• Thymic cysts	8	5.7
Neural tumors	21	15
Thyroid diseases	14	10
• Mediastinal goiter	11	7.9
Bronchial cysts	12	8.6
Pericardial cysts	10	7.1
Germ cell tumors	6	4.3
Undifferentiated carcinomas	4	2.9
Ectopic parathyroid adenoma	3	2.1
Mesenchymal tumors	3	2.1
Desmoid tumors	2	1.4
Other rare lesions	5	3.7
Total	140	100

(n= 4), bronchopneumonia (n= 3), postoperative hemorrhage (n= 2), respiratory insufficiency (n= 2), subcutaneous haematoma (n= 1), vagus nerve injury (n= 1), pulmonary embolism (n= 1), and pneumothorax (n= 1). The most important one was a severe postoperative haemorrhage that was handled conservatively. The postoperative hospital stay ranged from 5 to 12 days (mean time= 8.7 days).

The specific location of these lesions in the mediastinal departments is reported in Table 4.

DISCUSSION

Mediastinal tumors and cysts are not very common lesions. Their clinical manifestations could be caused by the compression or the invasion of the contiguous organs and tissues. On the other hand a large part of the patients are asymptomatic and the lesions in such cases are usually benign, while malignant disease is usually found in symptomatic cases (2-6). Our findings are in accordance with those reports (Table 1).

The preoperative diagnosis of mediastinal tumors is in many instances uncertain, even though it could be based on many diagnostic means (7,8). Patient's detailed history is necessary. Clinical examination reveals abnormal findings in some cases such as superior vena cava syndrome.

Imaging is an essential part of the work up of all mediastinal lesions, and is very often the only investigation needed before initiating therapy. The first step is the chest radiogram that reveals the presence of the mediastinal lesion. Computed tomography (CT) scan is the radiologic test of choice: the images clearly demonstrate the precise anatomical location of the lesion and its relationship to adjacent structures, define important characteristics such as whether the lesion is solid or cystic, heterogeneous or homogeneous, or contains fat, fluid, or calcium, and reveal features that are consistent with either a benign or malignant diagnosis, such as well defi-

Table 4. Specific location of the radically resected mediastinal masses and cysts in the mediastinum.

Location in mediastinum	Patients		Common mediastinal lesions	
	n	%	Examples	Number of cases
Anterior superior	88	62.9	Thymic lesions	60
			Mediastinal goiters	11
Middle	27	19.3	Bronchial cysts	12
			Pericardial cysts	10
Posterior	25	17.8	Neural tumors	21
			Mesenchymal tumors	3
Total	140	100		

ned tissue planes or evidence of local invasion (8-10). All our patients after 1988 had a chest CT (n= 121).

MRI, as an alternative to CT scan, has several advantages (11). Because it demonstrates flowing blood and the spinal cord exceptionally well, it is the preferred study for evaluation of suspected vascular lesions and for lesions that may extend into the spinal canal. MRI is also indicated for those patients who should not receive contrast, either because of a contrast allergy or because they are thought to have a thyroid malignancy and may require radioiodine therapy. Moreover MRI images can be helpful in assessing three-dimensional relationships, particularly when evaluating the potential communication of mediastinal cysts with the pericardium, bronchus, or esophagus. The specificity and sensitivity of CT and MRI scan are referred to be very high (90-95%) (10,11).

In rare cases, when the lesion comes from or invades the great chest vessels, or the heart, angiography could be diagnostic (11). Furthermore, ultrasound (US) or scintigraphy could be useful for specific lesions such as mediastinal goiters (7). The common blood tests are always used in patients with mediastinal lesions, while specific tests as a-feto-protein (aFP), b-human-chorionic-gonadotrophin (bHCG) and anti-acetylcholine receptor antibody levels are performed when it is necessary (7,9). Bronchoscopy and esophagoscopy are rarely used and they are not always diagnostic. Needle aspiration cytology or histology (usually CT-guided) is very helpful, but sometimes is not accurate (12-15). All the above-mentioned tests were used occasionally in our study. Recent articles are in favour of endoscopic US and US-guided fine needle aspiration (FNA), because they can easily access subcarinal and posterior mediastinal lesions (12,16). In our series the use of CT guided needle biopsies is limited, and has been performed since 2001.

Lesion biopsy is the most reliable mean for definite diagnosis. It could be achieved by transcervical mediastinoscopy, anterior mediastinotomy,

sternotomy, thoracoscopy (17), lateral thoracotomy or minimal access surgery as video assisted thoracic surgery (VATS) is (18). The procedure of choice for diagnosis establishment depends on the lesion location, its characteristics and patient's clinical manifestations. A patient with advanced paratracheal lymphadenopathy undergoes a transcervical mediastinoscopy. If a mass of the anterior superior mediastinum is present and it is obviously lymphadenopathy, or has metastasised or invaded contiguous organs (and therefore is not respectable) it is submitted to biopsy by anterior mediastinotomy. If the lesion is respectable the thoracic surgical procedure should be planned in a way that permits the radical excision of the lesion regardless of the benign or malignant preoperative findings. By radical excision, definite histologic diagnosis and treatment in the vast majority of the patients is achieved (1,7).

During the last years the use of VATS for biopsy or resection of mediastinal lesions is gaining wide acceptance (19). This method has great advantages for excision of cysts or small benign masses and for biopsy of posterior mediastinal lesions that are not handled by transcervical mediastinoscopy and anterior mediastinotomy. This method should not be used for the resection of large and mainly malignant masses that are contiguous to large vessels (20,21). VATS has been used occasionally in our department during the very last years.

Our histologic data are similar to those referred by other authors (3,7,9). Anterior mediastinotomy and lesion biopsy have led to histologic diagnosis in all our patients that underwent that procedure. In all our patients that had had an operation targeting to the lesion excision we achieved radical excision (respectability 100%). Perioperative and postoperative mortality was 0% for cases with biopsy and 0.7% for cases with resection. Furthermore, complications were noticed in 8.3% and 15% of our patients respectively. Our results are among the best referred in the international literature. Biegrad et al. refer in their series of 129 cases, a mortality rate 1.5% and a postoperative morbidity rate (complications that

required reoperation) 8%, while Ovrum et al. refer a mortality and morbidity rate 3.3% and 7% respectively in their series of 91 patients (5,9).

In conclusion, surgery is the management of choice for patients with a mediastinal lesion (22). With minimal operative risk we gain definite histologic diagnosis and radical excision of the lesion when it is necessary.

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