DIAGNOSTIC IMAGING OF THE MEDIASTINUM MASSES

ABSTRACT OF Ph.D Thesis

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1. BACKGROUND AND THE REASONS FOR CHOOSING THE SUBJECT OF THE THESIS

The paper aims to highlight the value of radio-imagistic explorations in the diagnosis and monitoring of mediastinal masses by revealing the evolutionary interrelationships of morphological and anatomical clinical detection, highlighting their importance in the staging and evaluation of tumor pathology or nontumorale posterapeutică with mediastinal location.

The main objectives of this study are:
• Reveal the radio-imaging diagnostic criteria (radiographic, ultrasound, computed tomography and magnetic resonance imaging) of mediastinal masses;
• Study the "pattern" of extension of various morbid entities with primary or secondary location;
• Detection of morphological and anatomical interrelationships clinical imaging aspects;
• Highlighting of topo-etiological correlation of mediastinal masses;
• Highlighting the impact of diagnosis and mediastinal masses on the evolutionary stage therapeutic conduct;
• Check empowerment diagnostic imaging methods in each part of the analysis and determination of the actual extension mediastinal various morbid processes;
• Establishing a correlation between morphological aspects, etiology, clinical aspects and prevalence of mediastinal masses.

2. MATERIAL AND METHODS

Because of the wide variability of masses etiopathogenic mediastinal crucial therapeutic and prognostic implications of their diagnosis as early as possible corollary, this study has proposed a retrospective statistical analysis of 504 cases examined in the Department of Radiology and Medical Imaging - Emergency Hospital Craiova between 2005 - 2009, It has investigated the clinical-biological, radiology, ultrasound, computer tomography, magnetic resonance and, in some cases the histological diagnosis, sheet extension, behavior therapy and, in some cases, post-therapy evaluation.

3. A SYNTHESIS OF THE MAIN RESULTS

Sharing the layout of mediastinal masses imaging and display components during these investigations, have allowed their classification: vascular masses (37 cases -7, 34% of all cases examined), fluid-looking mass, cyst - 3.37% - 17 cases, mass with heterogeneous content, Mixed - 1.78% - 9 cases; masses containing fat -2.18% -11 cases, tables containing tissue, solid - 85, 31% - 430 cases.

Vascular origin with mediastinal masses were represented by a brahiocefalic arterial trunk aneurysm and right common carotid artery - 2.70% of total vascular lesions identified ateromatoasă origin, the aorta with dextropoziţie malpoziţii of the stick and descending aorta (5, 40%), other aberrant mediastinal vessels - arteries lusoria -5.40% and by 5.40% dilated pulmonary arteries, with and without thrombosis, secondary to cardio-pulmonary changes responsible for increasing pulmonary arterial flow and / or impaired lung function, have also mentioned, esophageal varices secondary to portal hypertension were identified during computed tomography examinations completely random, but by their presence resulted in the presence of vascular masses localized to the posterior mediastinum and space inframediastinal -21.62%. 
Breakdown by age and sex fluids mediastinal masses, cystic and pseudochoistic, showed, in addition to the prevalence of these types of injuries and damage to male age groups 40-49 and 50-59 years (each with 29, 41% of cases), followed in descending order of frequency by age group 30-39 years (23.52% of total fluid mass) and then those of 10-19 years, 60-69 years of 70-79 years, each case - 5.88%.

Another category of mediastinal masses with mixed content - nine cases - characterized by spontaneous and signal density tissue, fat, fluid ± calcification - 1.78%, with the parent tumor stem cells that have been identified only in benign variants and were extremely rare - 3 cases - 0.59% of all cases under study, respectively, 33.33% of mixed masses, we have included in this
category and six cases of hiatal hernia (1.19% of all mediastinal masses and 66.67% of those with mixed content) which, by the look shown in the imaging investigations, due to concomitant fat hernierii peritoneal fluid and gastric contents for the presence of gastric parietal structures showed a mixed question of mass location in the posterior mediastinum.

Masses containing fat were present in 11 cases of all patients examined - 2.18%, of which 90.90% were represented by benign lesions, respectively lipomas (27.27% - 3 cases) and mediastinal lipomatosis (63 63% - 7cazuri) and, malignant lesions - liposarcoma, was identified only in one case (9.09%) containing fatty mediastinal masses, benign (lipoma, lipomatosis) has been identified mainly in female patients ( 72.72%), mainly affecting the age groups 50-59 years and 60-69 years respectively. In terms of malignant lesions were present only in one individual and can not draw conclusions on the distribution of these types of injuries by age and sex.

Mediastinal space replacement processes of solids, were the most common lesions identified at imaging examinations, they totaled 430 cases (85.31% of all cases examined), but with the substrate origins and very different morbid entities. Of these, first stood solid mediastinal masses, secondary, respectively, tumor adenopathy: metastatic 72.55% - 312 cases of malignant tumors derived from primitive to enter or extratoracă location, the first cancer was in broncho- central or peripheral lung location, located in different evolutionary stages, associated in some cases with direct invasion by contiguity mediastinal structures and thus the presence of solid mediastinal mass, tumor type, who employed this disease at a stage T4 , unresectable.

The presence of metastatic lymph nodes at mediastinal mass was present in 269 cases of lung cancer - 62.55%, other sites of primitive tumors with mediastinal nodal metastases were included: esophagus, thoracic and cardio-esophageal junction tuberozitară - 19 cases - 4.41%, uro-genital area - (4 cervical cancer, 2 seinalme, a prostate cancer, a bladder cancer, 1 case of renal tumor) - 9 cases - 2.09%, breast - 7 cases - 1.62%, naso-pharyngeal and laryngeal regions - 0.69% - 3 cases, the pancreas - 0.46% - 2 cases, and sternum, thyroid, mediastinal pleura, each of these locations are represented by one one case (0.23%) and in total accounting for 0.93% of mediastinal lymphadenopathy identified.

Adenopathy in Hodgkin lymphoma and a number nonhodgkiniene totaled 34 cases - 1.90% of cases, mediastinal lymph nodes for damage, to be present in 3 cases of chronic and acute lymphoid leukemia (0.69%).

Mediastinal adenopathy of non-tumor etiology were found at (9.06% - 39 cases). They were present in the lung nonspecific syndrome characterized by the presence of condensation, with lobar or segmental location, some grafted a subsequent poor outcome, characterized by the presence of lung abscess. Thus, mediastinal lymph nodes were identified during imaging investigations of such inflammatory processes, usually with fatal train, to 3.25% of all mediastinal masses identified nodes. Other etiologies included: pulmonary tuberculosis, both in primary and secondary stage, mediastinal lymph node hypertrophy was identified in 20 cases (4.65%) and sarcoidosis - -0.69% 3 cases with mediastinal and parenchymal lung determinations, pneumoconiozele - 2 cases - 0.46%.

Other solid mass departure point from the mediastinal structures, replacement processes were represented by space-thymic origin (2.09%) of solid mediastinal masses. Thymic mediastinal masses of benign characters - timoame hyperplasia and invasive - were present in 6 cases - 66.66% of the total replacement processes of space with thymic origin, top, 33.34% of malignant cases - 2 timoame invasive (22.22%) and a thymic seminoma (11.11%).

Other solid mediastinal masses identified were those with thyroid and parathyroid (8 cases - 1.85%) generated by the presence of thyroid gușilor multiheteronodulare, plunged in the mediastinum - 1.39% (6 cases), a parathyroid adenoma - 0.23% and a malignant thyroid mass,
invasive, lymph nodes associated with the origin in the parenchyma of thyroid - thyroid carcinoma 1 case - 0.23% of total solid mediastinal masses included in the study.

Esophageal carcinomas, already mentioned, were the starting point determinations of metastatic lymph nodes in 19 cases of them, resulting in the presence of solid mediastinal masses, located in the posterior mediastinum and space inframediastinal in 4.88% of total solid mediastinal masses - 21 cases.

Neurogenic tumors have rarely been identified - four cases -0.79% - single or multiple, were identified - three neurofibroame - 0.59%, of which one case was present as Plexiform, multiple thoraco-lumbo-sacral, in Recklinghausen neurofibromatosis associated with other locations pneumogastric and peripheral nerve, has been identified and localized upper thoracic neuroblastoma in the posterior mediastinum and paravertebral space - 0.20%.

To illustrate the location of mediastinal masses identified in the study group have divided mediastinum as topographical areas commonly known in the literature.

Such imaging investigations have identified the cervico-mediastinal junction following mediastinal masses (mediastinal mass 24).

• vascular mass represented a case of aneurysm right common carotid artery thrombosis and arterial trunk brahiocefalic;
• 7 with thyroid tissue masses
  - 6 cases of thyroid plunged Guse
  - 5 of the right and one left, of which 3 with extension to the area paratraheo esophageal, thyroid mass thyroid carcinoma tissue with the substrate;
  • A mass of parathyroid tissue origin lower left;
  • A mass fluid pseudochistic, having its origin in a cervico-mediastinal hematoma fuzat left anterior-lateral;
• 14 tables of location supraclavicular lymph tissue, tumor etiology, cancer metastatic from malignant pulmonary and extrapulmonary localization (6) or the result of determinations in LMH and NH lymphoma and CLL (8);

In the space prevascular identified 109 cases with mediastinal masses located at this area:

• 2 or pseudochistic cystic fluid masses represented by a thymic cyst and a post-traumatic mediastinal abscess;
• 3 mediastinal mass caused by the presence of joint appearance with embryonal tumors contingent fat tissue calcification ±;
• 7 mass represented by fat-containing mediastinal lipomatosis plump uniform;
• 97 cases of tissue mass, homogeneous or heterogeneous anatomic-pathologic and having different origins, as follows: four previous thyroid Guse, 9 tables thymic origin - 6 timoame noninvasive and thymic hyperplasia, two invasive timoame, a thymic seminoma;

84 having its origin in lymph tissue masses and masses thymic tissue damage caused by the presence of lymph nodes, direct extension or affect thymic lodge in various morbid entities classified as follows: 35 cases of malignant lung tumors in the lymph nodes prevascular ganglionic group (6) ± masses with direct invasion, 21 cases with nodal and / or the masses of this area from extrapulmonary localized malignant neoplasms, 23 cases of nodal in this area including the thymic level in the malignant lymphomas and leukemias;

7 cases with lymph masses netumorală etiology, respectively, 2 cases with nonspecific infections, three cases with this area of the lymph nodes tuberculous etiology of sarcoidosis and 2 cases.
In the cardio-phrenic angles were earlier identified the following types of mediastinal masses (31 cases):

- 3 cases with cystic mass represented by pleuro-pericardial cysts, two localized in the cardio-phrenic angle right and one location in the cardio-phrenic angle left;
- 8 plastic substrate having three lipomas lipomatoase to the left and right, four localized lipomatosis and liposarcoma in the cardio-phrenic angle right;
- 20 cases of tissue masses with pleuro-pulmonary origin, the result of direct extension of pulmonary and pleural neoplasms in this region - 17 cases, 1 case of parietal metastasis in breast cancer and two invasive timoame the extension of these regions;

In the cardio-phrenic angles have identified the following types of posterior mediastinal masses - 76 cases - with the following aspects:

- cystic masses and pseudochistic, grouping the six cases with abscess (4) and pancreatic pseudocysts (2);
- Masses mixed hiatal hernias represented this location - 3 cases;
- Lipomatose masses -3 cases with mediastinal lipomatosis presence of substrate;
- tissue masses that were grouped: Pleuro-pulmonary masses - 34 cases, lymph nodes with this location - 29 cases of tumor etiology - from metastatic lung tumors (18) or extrapulmonary (4) and seven cases of nodal lymphoma in the determinations malignant lymphoma, 1 case with neurofibroame pneumogastric Plexiform nerve, 6 cases of esophageal tumors in advanced evolutionary stages.

In the costo-vertebral angles were found following categories of mediastinal masses - 29 cases.

- Vascular Masses - 11 cases of descending aortic aneurysms - with and without thrombosis;
- cystic masses and pseudochistic - 3 abscesses - (a trauma by oesophageal rupture, oesophageal perforation and a secondary one discitic process of tuberculous etiology);
- tissue masses - which are neurogenic tumors (4 cases) such as neurofibromas, including Plexiform type in the Recklinghausen neurofibromatosis (NFI) and a neuroblastoma, primitive lung tumor mass - three cases with bone metastatic tumor masses infiltrating the soft tissues - 6 cases and lymphadenopathy in lung cancer cases -2;

In the space-esophageal peritraheo - there were a number of 394 cases with mediastinal masses:

- vascular mediastinal masses - 6.16% - 24 cases - 2.28% - 9 cases of thoracic aortic aneurysms, 0.25% if it brahiocefalic arterial trunk aneurysm, 0.50% - 2 cases of malpoziții aortic arch and descending aorta, 0.50% - 2 cases lusoria artery, 0.50% - 2 cases of dilatation of pulmonary arteries and 2.03% - 8 cases of esophageal varices;
- Weights and cystic fluid pseudochistic - 14.20% "- 11 cases - which are congenital cysts bronhogene - 0.50% - 2 cases, 12.70% - 5 cases of mediastinal abscess paraesofagiene, 0.50% - 2 pancreatic pseudocysts , 0.50% - 2 achalasia without esophageal dilatation include prestenotic;
- Joint Masses - 1.52% - represented by the 6 hiatal hernia;
- Tissue Masses - 89.55% - 409 cases - were grouped different pathological entities: esophageal cancer - 5.32% - 21 cases, neurogenic tumors - 0.25% - an appropriate starting point pneumogastric nerve , 1.02% - 4cazuri thyroid masses: three cases plunged aspect Guse and 1 case of thyroid carcinoma, 14.21% - 56 lung masses and 44.92% - 177 lymph tumor mass - point
departure from pulmonary and extrapulmonary tumors - 9, 64% - 38 cases, 17 lymphomas and leukemias 3 (5.07%); of lymphadenopathy netumora le: they were present at 3.04% - 12 cases of nonspecific infections, 4 82% - 19 cases of pulmonary tuberculosis, 0.50% - 2 cases of pneumoconiosis, 0.76% - 3 sarcoidosis.

In the sub-space and weight distribution retrocarinar mediastinal mediastinal mass distribution identified 79 cases) was as follows:

- Vascular Masses - 2 cases of esophageal varices;
- Joint Masses - 3 hiatal hernias;
- cystic masses and pseudochistic - six cases - three abscesses, a pancreatic pseudocyst, 2 cases of achalasia;

Tissue masses - 168 cases - were present mainly localized in the lymph masses subcarinar group (7) and periesofagian (8) with different etiologies: tumoral lymph nodes - the sites of lymph node metastases departure point from the lungs - 103 cases, or extrapulmonary malignant tumors - 28 cases, damage to these groups ganglion was present in 17 cases of lymphoma and leukemia; masses limfoganglionare netumorale this location have been identified in five cases with nonspecific infections, three cases of pulmonary tuberculosis, 2 cases with pneumoconiosis and two cases of sarcoidosis, other solid masses were represented by the home crowds with esophageal tumor itself - eight cases.

In the space distribution inframediastinal mediastinal masses identified illustrates the following aspects:

- vascular mediastinal masses identified were grouped four cases of thoracic aortic aneurysms that were associated with the abdominal aorta and the 8 cases of esophageal varices included in the study;
- cystic masses and pseudochistic - located at this level the presence of fluid masses caused by the extension of two pancreatic pseudocysts, a paratraheo-esophageal abscess and the presence of achalasia - 2 cases
- mixed masses - also present were determined by imaging identification of cases in the study included hiatal hernia - 6 cases;
- solid masses, tissue - are a heterogeneous group, has grouped the following types of mediastinal masses and this location: esophageal cancer - 7 cases, neurogenic tumors - a case of Recklinghausen neurofibromatosis with multiple Plexiform neurofibroame, multiple lymph nodes, metastases - 21 cases , resulting masses of pleuro-diaphragmatic extension - 4 cases of malignant lung and thymic tumors.

4. GENERAL CONCLUSIONS

Evaluation of the mediastinum with modern imaging methods is an important goal, applicable in many conditions affecting the anatomical region, in particular, mediastinal masses and the different processes of replacement space.

Radiology exam is completed with data provided by modern imaging that provides further characterization of primitive or secondary mediastinal masses, stationed at this area, characterized by richness and multiplicity of anatomical structures with different origins. In this context, stating with sectional imaging, origin, morphological aspects and anatomical relationships, contribute significantly to establishing the evolutionary status and future therapeutic conduct.
Inclusion of the replacement processes based on densities of spontaneous mediastinal space and signal characteristics highlighted during computed tomography examinations, magnetic resonance, in certain categories: vascular, fluid, solid tissue lipomatoase, etc., Is a first step their evaluation, a step that supplemented with other morphological features, developmental and other associated injuries or causal evidence, all these aspects are integrated into an evocative clinical context, will contribute decisively to establish their nature and evolutionary status, the prognostic implications immediate or delayed.

Due to highlight opportunities to all mediastinal compartments, tissue masses characterization based on morphology, density and spontaneous behavior posteontrast, computer tomography is the examination of choice in the evaluation of mediastinal masses. Native aspect posteontrast, anatomic relations, locating replacement processes mediastinal space, undoubtedly contributes to their classification into a particular category and affirmation morbid benign or malignant nature of these pathological processes. The skills of diagnosis, staging and follow-up post-therapy measurement, detailed examination of computer tomography to assess mediastinal masses.

Continuous improvement, the appearance of multislice computer tomography, magnetic resonance imaging development, increased capacity assessment of vascular pathology, with true classical valences comparable to angiography. Thus, the use of angiographic type protocols allows a detailed characterization of localized masses and mediastinal vascular pathology.

The pathology of vascular origin with this mass were 7.34%, dilated thoracic aorta and their branches, representing 62.16% of vascular disease, and 4.56% of all mediastinal masses identified. Other diseases identified represented aberrant vascular structures, vascular structures or aberrant mediastinal malpoziții were successfully characterized by correlating data from sectional imaging.

Fluid masses, cystic and pseudochistic 3.37%, the result of septic complications with mediastinal localization of the inflammatory processes or subdiafragmatic starting point, the existence of congenital cysts, could be stated and differentiated from other mediastinal lesions and, surveillance and monitoring the performance of certain of these injuries, including post-therapy, which included performing interventional maneuvers, contributed significantly to influence or change behavior treatment of these lesions.

Body fat, or mixed etiology frequently benign, are rare pathological entity that can be characterized morphologically by sectional imaging, the discovery of such processes requires replacement of space tumor matrix analysis, analysis can be performed, sensitive, by computer tomography and magnetic resonance, possibly complementary, differentiated malignant variants, which may be present;

Replacement processes of the type solid mediastinal space, tissue, were the most common mediastinal masses identified -85.31% of cases, the tumor metastatic lymphadenopathy they represented 72.55% of all cases examined, malignant neoplasms were the lung most common cause of lymph-node mediastinal metastases - 62.55%, followed by cancer with intra- or extratoracică location - 8.53%, lymphomas and leukemias - 7.34% netumorale lymphadenopathy were also present at 7.73 %;

Evaluation of mediastinal determinations for malignant neoplasm, particularly lung cancer, staging is an important requirement for this condition, if MRI has the advantage of more accurate detection of increased local invasion and mediastinal lymph pathological, CT allows a higher assessment parenchymal lung tumor volume and issues to be monitored, also with those mentioned.

Hodgkin's lymphoma and non-Hodgkin's malignant, mediastinal lymph leukemia caused damage to a percentage 8.53% of the cases included in the study, initial staging, histological confirmation of using interventional imaging methods, supervision and evaluation of evolving
post-therapy, the same objective conditions, are important aspects of the role of imaging methods in diagnosis and supervision of these entities evolving morbidity.

It is already known role of MRI in monitoring postterapeutic malignant lymphoma by quantifying the residual tumor tissue and differentiate it from the fibrotic, inactive. The issues highlighted in this paper illustrates the potentialities of this method in the evaluation of malignant lymphomas, especially after specific treatment each evolutionary stage.

In the same context we must emphasize the valences of ultrasound, which allows a detailed morphological analysis of peripheral lymph nodes, including Doppler angioarchitecture and if normal-sized lymph nodes, these issues combined sectional imaging obtained by contributing significantly to differentiate malignant from benign adenopathies in appreciation evolutionary status of the various morbid entities.

In case of thymic lesions, those with thyroid, imaging methods have shown to accurately type and extent of injuries identified for malignant lesions, helping to change behavior therapy and follow it.

If the masses and particularly mixed embryonal tumors, characterization of their imaging, both CT and MRI allowed the assertion of benign nature and differentiation from other pathological statuses.

Evaluation of neurogenic tumor imaging was performed at 0.79% of all mediastinal masses identified valences remember MRI characterization of tumor matrix and tissue contrast ratios due to higher local procurement multiplanar.

In case of esophageal tumor esophagoscopy objectified - 4.16% of cases, corroborating imaging methods should be emphasized: EUS, CT, MRI in staging these tumors and evidence of major complications.

masses containing fat - found in both benign and malignant variants have been characterized imaging to 2.18% of the cases, stating their nature and the rise of malignant entities have been key aspects of the study.

The end of this study should emphasize the value of modern imaging methods in evaluating mediastinal and various diseases confined to this level, the need for corroboration of data obtained through various imaging techniques and, last but not least, the permanent integration of data obtained in the clinical context, any consultation interdisciplinary.

**KEY WORDS**

Computed tomography, magnetic resonance imaging, medical imaging, vascular lesions, mediastinal cystic masses and pseudochistic fluid, mediastinal fat mass, mediastinal mass containing mixed solid tissue masses.