INTRODUCTION
AND
AIM OF THE WORK

Neoplasms,vascular lesions, inflammatory masses and developmental abnormalities account for the vast majority of mediastinal masses. The clinical signs and symptoms of a mediastinal mass depend on its location, size, degree of vascular invasion or air way obstruction ***(Dennis and straub, 1985).***

Until recently conventional radiological studies such as straight chest examination, conventional tomography barium swallow and venacavography were the only available diagnostic procedures in cases of mediastinal masses prior to surgery.

In the last few years the advent of computed tomography (C.T), ultrasonography (U.S), digital substraction angiography (D.S.A) and magnetic resonance (M.R) had added a lot to the radiologist capabilities in the diagnosis and management of mediastinal masses. Also, the progress achieved in the field of guided needle biopsy increase the changes of pathological diagnosis without thoracotomy.

Many mediastinal lesions obscured on conventional films are clearly demonstrated by computed tomography, this is due to the fact that all anatomical structures in the mediastinum are surrounded by fatty connective tissues and with dynamic contrast studies, the vascular structures and mass lesions could be demonstrated ***(Siegel et al., 1982).***

[redacted]

RADIOLOGICAL ANATOMY OF THE MEDIASTINUM

Compartments of the mediastinum :

The mediastinum is interposed as a partition in the median portion of the thorax, separating the parietal pleural sacs of the two lungs. The upper limit is formed by the thoracic inlet and the lower border is the diaphragm. It extends from the sternum ventrally to the vertebral column dorsally and comprises all the thoracic viscera, except the lungs and pleurae, embedded in a thickening and expansion of the subserous fascia of the thorax. An imaginary plane extending from the sternal angle to the caudal border of the fourth thoracic vertebra subdivides the mediastinum into an upper and lower divisions.

The superior mediastinum is visualised as one anatomical space, the inferior division is subdivided by the heart into three spaces:anterior,middle and posterior. This anatomical classification is an artificial one because the superior mediastinum communicates freely with the other partition as well as with fascial planes of the neck. The absence of an anatomical barrier favours the spread of infection and neoplastic disease throughout the mediastinum and into the cervical region ***(Holesh, 1984).***

The superior mediastinum is bound anteriorly by the sternum, superiorly by the thoracic inlet, posteriorly by the upper four dorsal vertebrae and inferiorly by the plane extending from the sternal angle to the lower border of the 4th thoracic vertebra. Anteriorly it contains the thymus or its remnants, the brachiocephalic veins and the superior vena cava. The aortic arch and the great vessels are a little more posterior in front of the trachea. The vagi, left recurrent laryngeal and both phrenic nerves are in close relationship to the great vessels. The space between the trachea and the spine is occupied by the oesophagus and the thoracic duct. It also contains the azygos vein and the upper part of the hemiazygos system. The lymph nodes of the superior mediastinum are found adjacent to the large vessels, trachea and spine.

The anterior mediastinum is a shallow space bound anteriorly by the body of the sternum and posteriorly by the parietal pericardium and extends caudalward as far as the diaphragm. It contains the lower portion of the thymus, few lymph nodes and the left internal mammary artery with its accompanying lymph nodes. Occasionally aberrant thyroid tissue may be found.

The middle mediastinum is the broadest part of the interpleural septum. It contains the heart enclosed in the pericardium, the ascending aorta, the lower half of the superior vena cava, with the azygos vein opening into it, the pulmonary trunk dividing into its two branches, the Rt. and Lt. pulmonary veins, the hila of the lungs, the tracheal bifurcation, tracheobronchial lymph nodes and the phrenic nerves.

The posterior mediastinum is an irregularly shaped mass running parallel with the vertebral column, and, because of the slope of the diaphragm, extends caudally beyond the pericardium. It is bounded ventrally by the pericardium and, more caudally by the diaphragm; dorsally by the vertebral column from the lower border of the fourth to the twelfth thoracic vertebra and on either sid, by the mediastinal pleurae. It contains the thoracic part of the descending aorta, the azygos and hemiazygos veins, lower part of the oesophagus, the thoracic duct and posteriorly the paravertebral lymph nodes ***(Gray, 1973).***

Extending through all compartments of the mediastinum are the vagus and phrenic nerves, the sympathetic chain, the thoracic duct and the azygos and hemiazygos veins ***(Holesh, 1984).***

Viewed from the front as seen in a postero-anterior radiograph the mediastinum is bound on the right by the innominate vien, the superior vena cava, right main pulmonary artery and the right cardiac border. The left margin is formed by the left subclavian artery, the aortic knuckle, the main and left pulmonary arteries and the left cardiac border.

Mediastinal silhouette and major mediastinal lines and - interfaces : (Fig. 1)

With high KV. radiograph, it should be possible to see several mediastinal interfaces and lines.

*** The azygo-oesophageal interface (AOI):-**

Is a recess occupied by the Rt. lung, lying behind the heart and in front of the spine. Its configuration is seen in the figure and it becomes distorted (convex to the Rt.) in its mid portion with left atrial enlargement, and higher up with subcarinal adenopathy.

*** The left para spinal interface (LPSI):-**

Is parallel to and up to 1 cm to the left of the vertebral bodies. It becomes locally bowed by various lesions that arise in vertebrae or soft tissue (metastasis, abscess, haematoma, large lymph nodes or neural tumours). As the aorta lengthens with age, it bows outwards into the lung causes similar distortion of the LPSI.

*** The para-aortic interface (PAI):**

Is formed by the left-hand aspect of the descending aorta. It is commonly distorted by aortic unfolding or aneurysm and by adjacent posterior mediastinal adenopathy.

*** The Paratracheal line (PTL):**

At the level of this line the right mediastinum should be more transradient than the left *(Wilson, 1991)*.

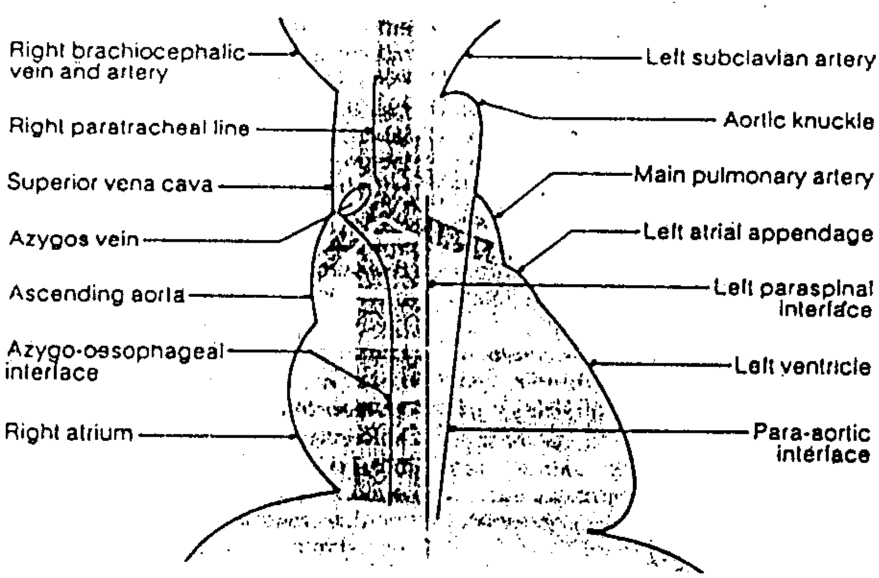


Fig. (1): Mediastinal silhouette and major mediastinal lines and interfaces (Wilson, 1991).

Computed tomography :

To demonstrate the cross sectional relationships in various regions of the thorax, nine basic mediastinal levels have been selected to provide an orderly demonstration of the major structural associations. These levels, in caudal order, are illustrated below (Figs. from 5 to 13).

Fat, with its characteristic C.T. number, always can be recognised and distinguished from other mediastinal structures. In most adult patients sufficient fat is present to sharply outline and allow identification of structures that can not be separated out by conventional radiographic techniques. Generally the aorta and great vessels, superior vena cava and major venous channels, and the central pulmonary vessels all can be seen with regularity and confidence even without intravenous contrast administ-ration. The diameter of the ascending aorta, which is larger than the descending aorta by a factor of approximately 1.5, is approximately 3.5 cm in the adult; measurements more than 4.5 cm should be considered abnormal. The pulmonary artery, which lies to the left and slightly anterior to the ascending aorta, has a diameter of approximately 3 cm. The normal pulmonary artery is smaller than the ascending aorta. The intrapericardial portions of the great vessels can be evaluated for possible displacement by masses, to demonstrate their relationship to one another as in suspected transposition, and to assess their size as in possible pulmonary artery hypertension.

If doubt persists that something in the mediastinum represents a vascular structure, scans after the intravenous injection of iodenated contrast medium should be performed since the CT. number of the major arteries and veins can be increased well beyond the range of other mediastinal components. With proper contrast administration, enhancement of the major vessels is always grossly obvious, and there is no need to carefully measure attenuation values.

The superior vena cava, which has an ovoid shape or elliptical configuration oriented in the antero-posterior direction, produces a slight convexity to the Rt. superior mediastinum, the azygos vein intimately contacts the trachea as it arches anteriorly to enter the dorsal aspect of the superior vena cava. The presence of an azygous lobe, found in approximately 1% of the population, may cause some alteration to the contour of the right mediastinum. In such instances the azygous arch is laterally displaced and usually more cephalad than normal, and enters the posterolateral aspect of the superior vena cava ***(Kreel and Thornton, 1992).***

Mediastinal lymph nodes :

The normal mediastinal lymph nodes are reliably imaged by C.T. due to the presence of mediastinal fat that greatly facilitates the C.T. depiction of lymph nodes, a capability not available on convensional linear tomography. Dense foci of calcification may serve as more obvious markers in some patients with prior granulomatus disease ***(Genereux and Howie, 1984).***

The CT. criteria by which a lymph node may be identified includes a round or oval soft tissue density, with or without central or eccentric radiolucent fat ***(Schnyder and Gamsu, 1981)***. The mediastinal lymph nodes relates most commonly and closely to the posterior aspect of the left innominate vein (retro-innominate space), circumference of the main bronchi (pre-carinal sub-carinal compartment) and beneath and to the left of the aortic arch (aorto-pulmonary window).

The reported range of normal lymph node size has varied considerably. ***Rea et al. (1981)*** indicated that normal mediastinal lymph nodes were not seen on a thoracic C.T. whereas ***Baron et al., (1982)*** reported that nodes were normal if they were less than 10mm and abnormal if greater than 20mm. in their shortest diameter.

Glazer et al. (1985) after their study on 100 adults who underwent thoracic CT., identify mediastinal lymph nodes as non-enhancing soft tissue densities in characteristic sites. These characteristic sites depend on the node maping scheme devised by the American thoracic society.

The American thoracic Society Definitions of Regional lymph node station: (Fig. 2)

X- supraclavicular nodes.

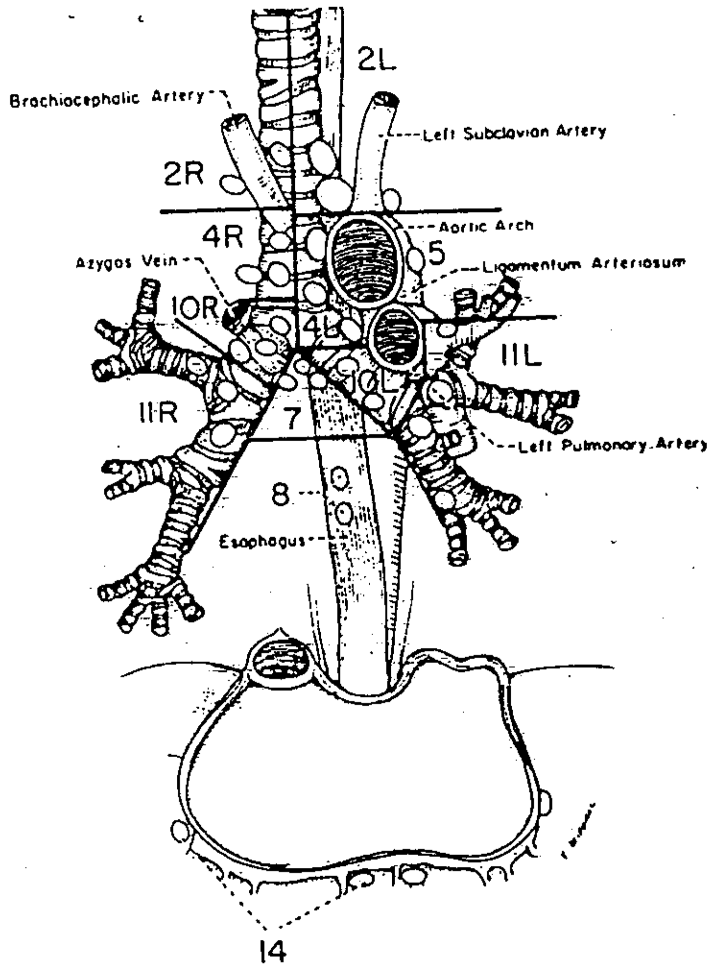
2R Right upper paratracheaal nodes."nodes to the Rt. of the midline of the trachea, between the apex of the lung to caudal margin of innominate artery margin".

2L Left upper paratracheal nodes:

"nodes to the left of the midline line of the trachea between the apex of the lung to the top of the aortic arch.

4R- Right lower paratracheal.

"to the right of midline of the trachea, between the caudal margin of innominate artery to the level of the cephalic border of azygos vein.



society lymph node maping

Fig. (2): American thoracic society lymph node maping scheme (Glazer et al., 1985).

4L- The left lower paratracheal nodes

"nodes to the left of the midline of the trachea, between the top of the aortic arch and the level of the carina.

5- Aortopulmonary nodes

"Subaortic and paraarotic nodes lateral to the ligamentum arteriosum or the left pulmonary artery proximal to the first branch of left pulmonary artery.

6- Anterior mediastinal nodes anterior to the ascending aorta or innominate artery.

7- Subcarinal nodes

Nodes arising caudal to the carina but not associated with the lower - lobe bronchi or arteries within the lung.

8- Para-oesophageal nodes

nodes dorsal to the posterior wall of the trachea and to the right or to the left of the midline of the oesophagus.

9- Right or left pulmonary ligament nodes:

nodes within the right or left pulmonary ligament.

10 R- Right tracheo-bronchial nodes to the Rt of the midline of the trachea from the cephalic border of azygos vein to the origin of the right upper, lobe bronchus

10L- Left peribronchial

nodes to the left of the midline of the trachea, between the carina and the left upper lobe bronchus medial to the ligamentum arteriosum.

11- Intra-pulmonary nodes

Those distal to the main stem bronchi or secondary carina ***(Glazer et al., 1985).***

The oesophagus :

The relationships of the oesophagus in the mediastinum are most easily understood from seven representive levels (Fig. 3). The levels will be described as follows : level I, sternoclavicular joints; level II, upper mediastinum; level III, aortic arch; level IV azygos arch; level V, carina; level VI retroatrial; level VII, low thoracic ***(Godwin, 1984).***

Level I: Sternoclavicular joints :

Level I separates the cervical from the thoracic esophagus. In the neck, the esophagus usually lies in the midline. As the oesophagus enters the chest, it moves toward the left, lying posterolateral to the trachea and posteromedial to the left subclavian artery.

Level II: Upper mediastinum :

The oesophagus remains posterolateral to the trachea slightly to the left of the midline, and immediately anterior to the spine. The posterior wall of the trachea in this area is usually convex. It may be flat but should not be concave because extension into the trachea is one criterion for invasivness of the oesophageal cancer.

Level III: Aortic arch :

The aorta shifts the oesophagus and trachea back toward the midline the relationship of the oesophagus to the trachea remains the same, with the oesphagus posterior and slightly lateral. The left lateral wall of the oesophagus is often directly in contact with the medial aspect of the posterior portion of the aortic arch, occasionally without an identifiable intervening fat plane.

Level IV: Azygos arch

Level IV is usually 1 or 2cm caudal to the aortic arch. Since the aortic arch is often used as the dividing line between the upper and middle thirds of the oesophagus, this section is often the first level of the mid-oesophagus and it identifies the pretracheal retrocaval space. The oesophagus remains approximately in the midline, postero-lateral to the trachea and medial to the descending aorta.

Level V : The carina

The oesophagus remains midline immediately behind the carina and left main bronchus. The normal mediastinum often lack a fat plane between the oesophagus and the trachea and bronchi. The azygos vein is posterior and to the left. The posterior wall of the main bronchi are generally convex but may be flat in normal persons.

Level VI: Retro-atrial

About 4 cm below the carina, the left atrium lies anterior to the oesophagus. The oesophagus remains approximately in the midline or slightly to the left. The aorta is immediately posterolateral to the oesophagus.

Level VII: Low thoracic.

At level VII, the oesophagus has shifted anteriorly toward the diaphragmatic hiatus. The esophagus therefore, is anterior to the descending aorta and usually completely surrounded by fat.

In summary, the oesophagus lies in the midline in the neck, shifts to the left in the upper mediastinum, and returns near to the midline at the level of the carina.Inferiorly it remains in the midline line but moves anteriorly in the lower thorax before passing through the hiatus. The oesophagus is often in direct contact with the trachea in the upper thorax, with the aorta and left bronchus in the mid thorax, and with the left atrium in the lower thorax ***(Halverson el al., 1984).***

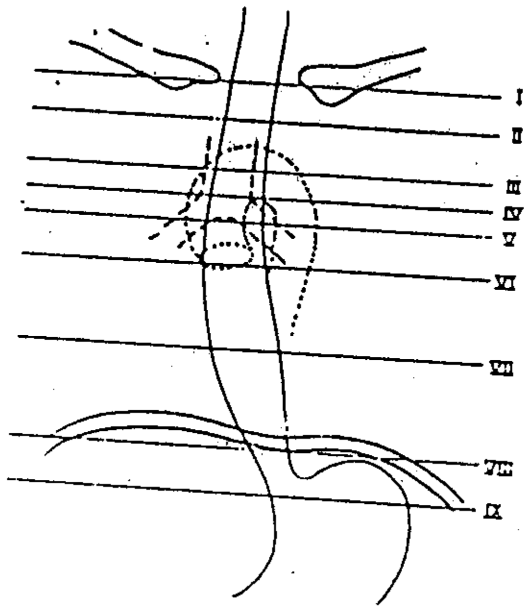


Fig. (3): Anteroposterior diagram of the thorax and upper abdomen domenstrating the locations of the nine representative sections of the oesophagus (Godwin, 1984).

Normal thymus :

In children the thymus gland is visible on conventional radiographs because of its large size relative to the rest of the chest and because of its soft tissue density. After puberty, the thymic parenchyma atrophies and is replaced by fat.This atrophy is gradual but most pronounced between the ages of 30 and 40 years ***(Moore et al, 1983)***. Because of atrophy, the adult thymus is usually invisible on radiographs. CT. however, with its superior density discrimination, clearly distinguishes the gland from adjacent mediastinal structures and shows the changes in thymic composition and size with aging. Before fatty atrophy the thymus has a characteristic shape and density on CT. scans: It appears as a solid bilobed or triangular structure just anterior to the aortic arch, sometimes extending from the left brachiocephalic vein down to the root of great vessels. After the age of forty, the thymus retains roughly the same size and shape as it had just after puberty but consists primarily of fat with scattered small islands of residual parenchyma ***(Thorvinger et aL, 1987).***

Potential spaces of the mediastinum C.T.Mediastinography)

In interpreting radiographs of a mediastinal space occupying lesion, an accurate knowledge of the potential space for its expansion and the anatomic route for its extension to the neighbouring areas helps in understanding and predicting the site of origin and extent of the lesion in relation to the surrounding structures. ***Sone et al. (1982)*** described and illustrated computed tomographic images after pneumomediastinography (retro-sternal technique with 350-500 ml oxygen), demonstrated the pathways between the mediastinal structures for the spread of gas from one region to another. They showed the potential spaces in the mediastinum that may be distended by bleeding, infection, mediastinal lipomatosis and to some extent pliable tumours (e.g. cystic lesion, lipoma and lymphangioma).

Some compartments were clearly seen on CT.images after pneumo-mediastinography. The heart, major vessels, trachea, oesophagus, and mediastinal pleurae form their boundaries. The cardiovascular structures divide the mediastinum into central and anterior zones. The trachea and oesophagus divide the central zone into left side and right side compartments. The transversely oriented structures, (the left brachiocephalic vein and the aortic arch, and the tracheal bifurcatin with the main bronchi) divide the central zone into supracarinal (supra-arch and retrocaval) and subcarinal areas from above to below in that order.

*** Anterior (pre-cardiovascular) zone : (Fig. 4a)**

This zone is bounded anterior by the sternum and the anterior ends of the clavicles and ribs and laterally by mediastinal pleurae. The posterior boundaries are formed by the major vessels above and by the heart below i.e at the highest level by anterior surface of right brachiocephalic vein, right innominate artery, left carotid artery, and left brachiocephalic vein, at a mid level by the anterior surface of the superior vena cava, the ascending aorta, the pulmonary artery, and the descending aorta and at the lowest level by the anterior and lateral surfaces of the heart.

Gas introduced by retrosternal access extends through this zone from the thoracic inlet above to the diaphragm below. At the thoracic inlet level, this space is narrow anteroposterioly and is confined laterally by the brachiocephalic veins. At the level of the aortic arch and the upper half of the heart, this region, bordered laterally only by the mediastinal pleurae, shows greater distensibility, and extends for laterally surrounding the cardiovascular structures. The thymus is located in this zone the gas extends superiorly from this zone into the anterior part of the space surrounding the cervical trachea and the oesophagus and posteriorly into the paratracheal space at the supraaortic arch level passing between the mediastinal major vessels.

*** Central (Retro cardiovascular) :**

Supracarinal : (Fig. 4b)

This area can be subdivided conveniently into right and paratracheal compartment.

The right is an easily distensible compartment bounded laterally only by the mediastinal pleura, posteriorly by the thoracic vertebra and anteriorly by the right brachio-cephalic above and superior vena cava below The right innominate artery passes at a higher level through this area transversely. At a lower level than the aortic arch, the trachea is abundantly cushioned in fatty tissue on the Right anterior aspect.

The left paratracheal compartment is bounded medially by the trachea and the oesophagus and laterally by the left carotid and subclavian artery, the aortic arch, the aortic pulmonary window and the intrapericardial part of the left pulmonary artery from above to below in that order.

Subcarinal area :

This area is narrow space bounded superiorly by the main bronchi, anteriorly by the intrapericardial pulmonary arteries, pulmonary veins, and the posterior wall of the heart, and laterally by the azygos vein and posterior mediastinal pleura on the right side and descending aorta with posterior mediastinal pleura on the left the oesophagus passes through this space in front of and to the left of the thoracic vertebra ***(Sone et aL, 1982).***

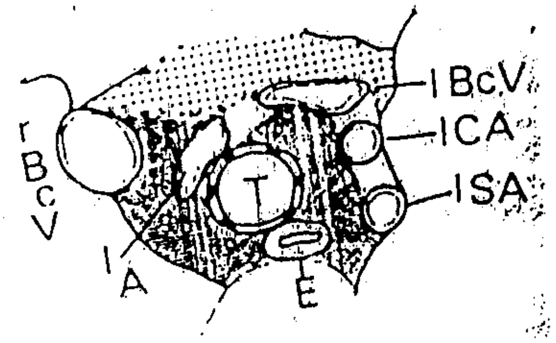


Fig. (4a): Representative diagram for CT.pneumomediastinography at the level of supravascular arch region of mediastinum. Anterior zone (dotted area). In central zone (hatched area). In central zone (hatched area, an easily distensible potential space is revealed on right side of trachea bordered laterally by mediastinal pleura. Potential space on left side is narrower than the right is located between trachea (T) and oesophegus (E) and left carotid (ICA) and subclavian artries (ISA). rbcV = right brachiocephalic vein IBcV = left cephalic vein, IA = innominate artrey (Sone et al., 1982).

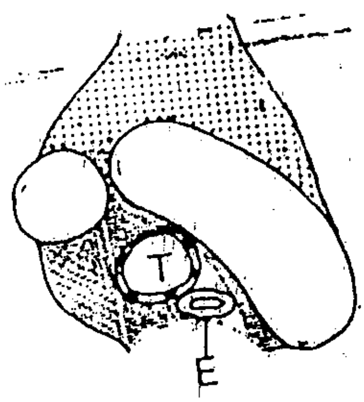


Fig. (4b) :Representative diagram of CT pneumomediastinography at the level of aortic arch. Left paratracheal compartment of central zone (left half hatched area) is narrow at this level, limited by trachea (T) and oesophagus (E) medially and aortic arch laterally (Sone et al., 1982).

Fig. (5): Normal anatomy-sternal notch.

At this level through the lung apices six major mediastinal vessels usually can be defined: the paired carotid arteries (c), jugular veins (j), and subclavian arteries (arrow). The carotid arteries are round, discrete structures adjacent to the trachea (T), frequently the right carotid artery is anterior to that on the left, although they may be in the same coronal plane. The internal jugular veins usually are anterior to the subclavian arteries and may be quite large. Depending on the exact scan level the subclavian arteries may be seen in cross section in a somewhat longitudinal orientation proceeding along the anteromedial surface of the lung apex toward the axilla. The esophagus (e) is posterior to the trachea.

Fig. (6): Normal anatomy-sternoclavicular junction.

Through the manubrium (m) and its articulation with the head of the clavicle (l), five vessels are usually noted anterior and lateral to the trachea (T); the right brachiocephalic vein (rb), brachiocephalic artery (i), left carotid artery (c), left subclavian artery (arrow) are virtually always seen in cross section; the left brachiocephalic vein (lb) may be seen in longitudinal orientation as it crosses the midline to join the right brachiocephalic vein before it forms the superior vena cava at a slightly lower level. The brachiocephalic artery is normally the largest of the three vessels of the aortic arch and the left carotid the smallest.

Fig. (7): Normal anatomy-aortic arch.

At this level the superior vena cava (S) is often the only vascular structure ther than the arch (A).

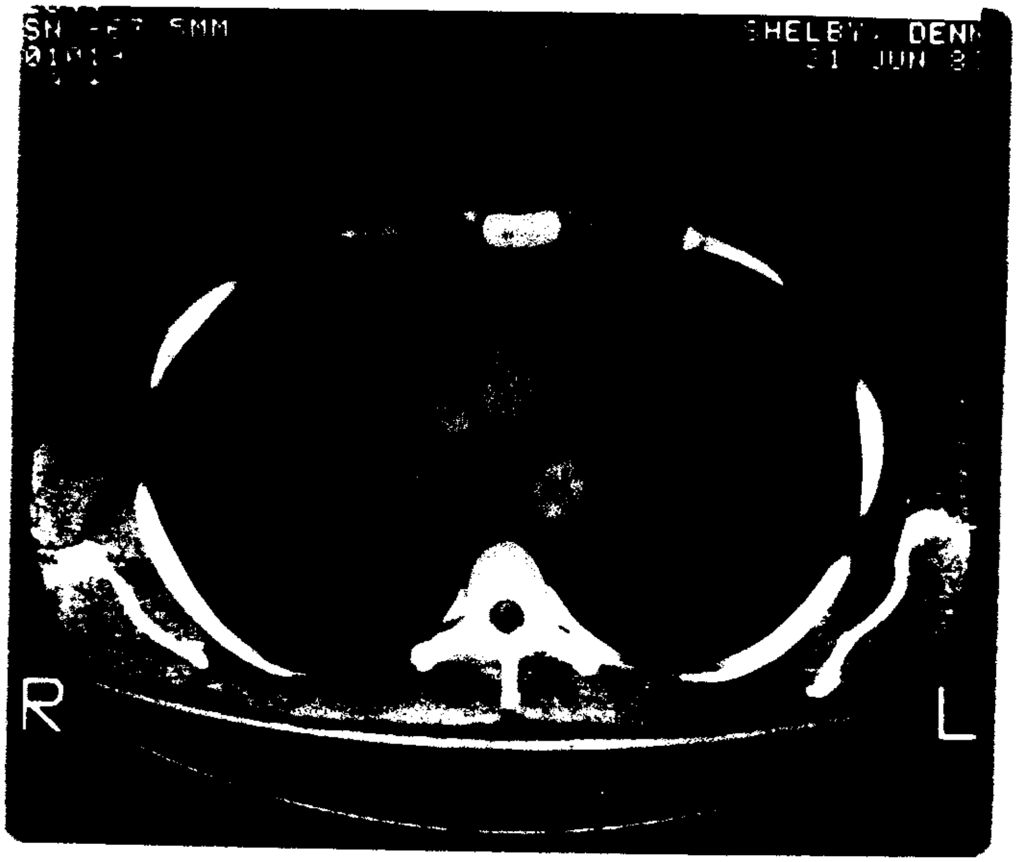


Fig. (8): Normal anatomy-aortopulmonary window.

Just cephalad to the carina and immediately cauded to the aortic arch, the distal trachea is frequently flanked by the azygos arch (arrow) on the right and fat in the aortopulmonary window on the left. The azygos vein (v) arches anteriorly from its prevertebral location and courses intimately around the trachea (T) to enter the superior vena cava (S) posteriorly. a, ascending aorta, d, descending aorta.

Fig. (9): Normal anatomy-left pulmonary artery.

The left pulmonary artery (L), proceeding posteriorly just cephalad to the left mainstem bronchus, forms the left lateral margin of the mediastinum at this cross-sectional level. The right upper lobe bronchus is usually clearly seen at this level. The following vascular structures may be appreciated; ascending aorta (a), descending aorta (d), superior vena cava (S), and the right upper lobe pulmonary artery or truncus anterior (t).

Fig. (10): Normal anatomy-right pulmonary artery.

At this level, the right pulmonary artery (R) is seen extending posteriorly and to the right from the main pulmonary artery (M) to course just posterior to the superior vena cava (S) and anterior to the bronchus intermedius (b). The left lower lobe pulmonary artery (P) is posterior to the left mainstem bronchus. Lung inserts into the azygo-esophageal recess immediately behind the bronchus intermedius. Also, lung frequently inserts into a notch between the left lower lobe pulmonary artery and the descending aorta (d). Arrows, superior pulmonary veins; a, ascending aorta.

Fig. (11): Normal anatomy-left atrium.

The right atrium (RA) as well as the root of the aorta (a) and the main pulmonary artery (M) are seen at this level. The inferior pulmonary veins may be seen coursing into the left atrium (LA). The azygos vein (arrow) and descending aorta (d) are visible.

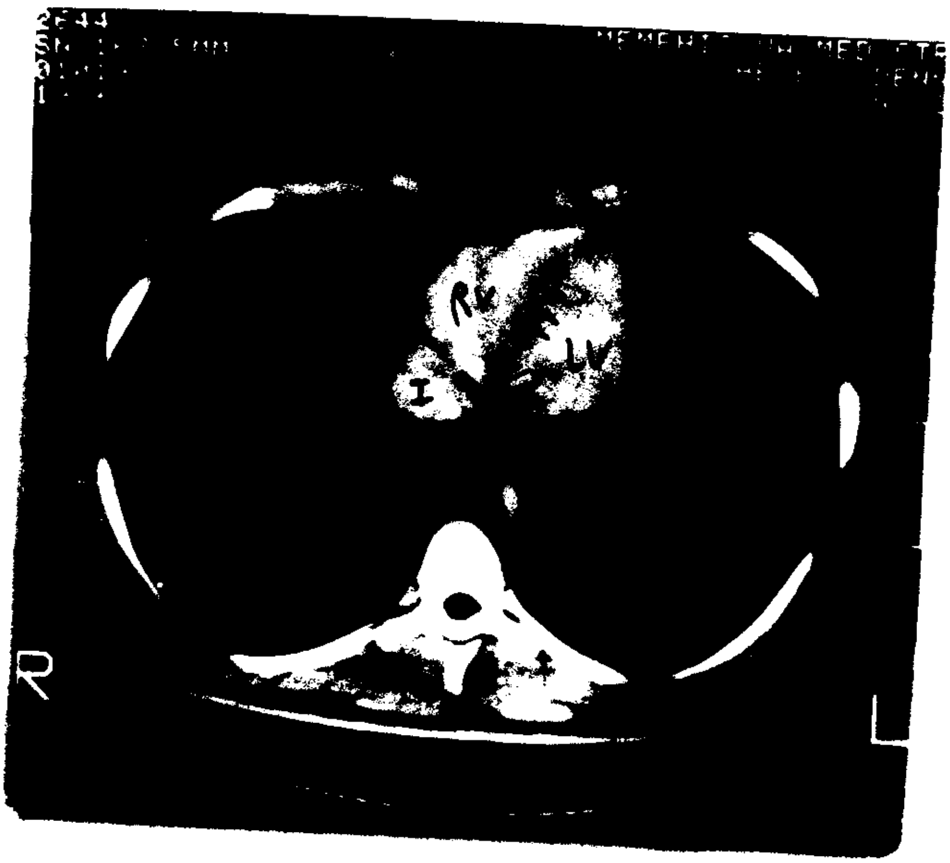


Fig. (12): Normal anatomy-Cardiac ventricles.

At the ventricular level the interventricular septum (arrows) is well demarcated between the opacified ventricles. The coronary sinus (long arrow), the main venous drainage of the cardiac muscle, may be seen as a tongue-like structure posterior to the right ventricle (RV) and adjacent to the inferior vena cava (I). The distal esophagus is anterior and sometimes medial to the descending aorta (d). LV, left ventricle.

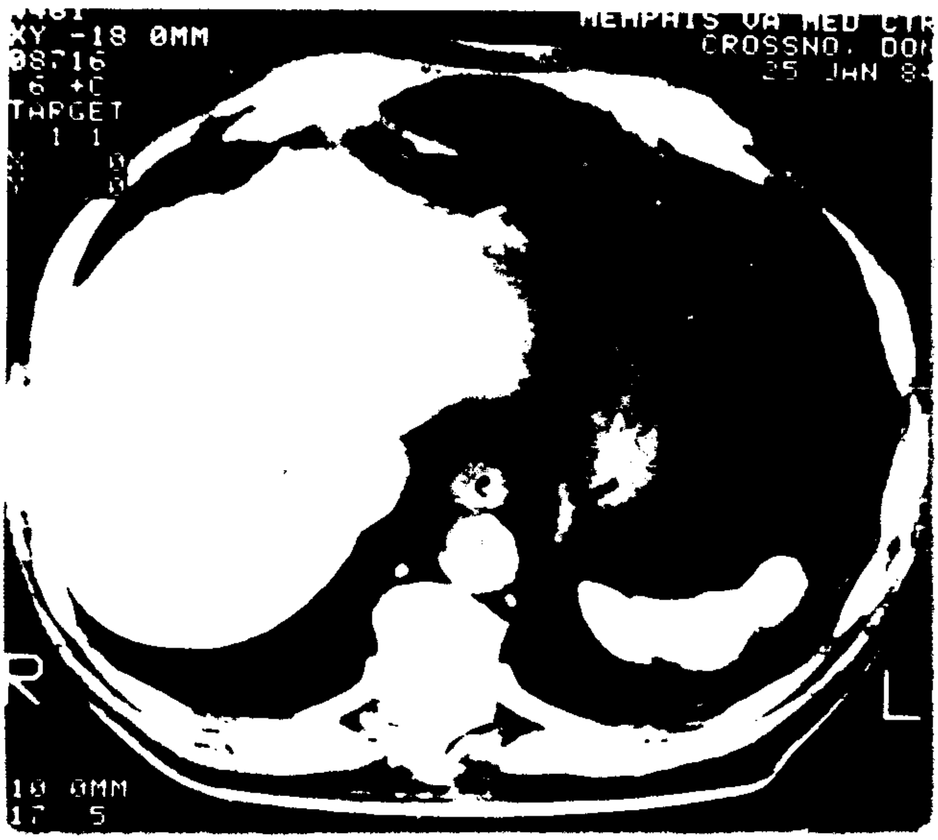


Fig. (13): Normal anatomy-retrocrural space.

The diaphragmatic crura demarcate the inferior extent of the posterior mediastinum. In the retrocrural space lie the distal esophagus (e), the descending aorta (d), azygous and hemiazygous veins (short arrows), and surrounding fat. Long arrow, left diaphragmatic crus.

Magnetic resonance imaging of mediastinum :

Nuclear magnetic resonance imaging is based on the property of all nuclei with an odd number of particles, protons, neutrons or both, to act like magnets spinning in randum directions. The most abundant of the naturally occurring spinning nuclei in the human body is the hydrogen nucleus, hydrogen proton has a charge and spin. If the protons are exposed to a radiosignal of a specific frequency in the externally applied magnetic field, they will absorb energy and change the direction of their spins and align themselves against the magnetic field, the extra energy is quickly radiated away as electromagnetic energy of the same frequency as the radiofrequency (FR) source and the protons realign then spin with the external magnetic field. The protons continue to absorb emit-absorb emit, i.e. to resonate, as long as the radio-waves have the correct energy. The energy (radiosignal) that is radiated back by the resonating proteins is picked-up by an RF coil producing the appropriate signal data to form images by a computer system ***(Sutton, 1993).***

Magnetic resonance is a non invasive imaging modality which allows direct multiplana imaging (axial, coronal and sagittal), and the possibility of biochemical information in vivo ***(Pauster et al., 1984).*** The MRI imaging using the spin-echo and inversion recovery techniques provides an excellent demonstration of normal intrathoracic anatomy. Because of the absence of NMR signal from rapidly flowing blood, vascular lesions can be easily diagnosed without the use of contrast agents, and the mediastinal and hilar masses can be easily distinguished from normal and abnormal vessels. On basis of T1 values, mediastinal masses can be distinguished from normal mediastinal tissues, and using T1 and T2 values fluid within masses can be detected. Although MRI appears to offer no great advantage relative to CT. in the diagnosis of mediastinal mass, small hilar masses are much more easily distinguished from normal hilar structures using NMR. Another significant advantage of NMR is its ability to directly image in the sagittal and coronal planes with good spatial resolution. In some patients, this can be helpful in the assessment of mediastinal mass ***(Webb and Gamsu, 1984).***

Although the recommended use of MR may change rapidly, the current feeling is that MR should be used as a procedure complementary to computed tomography in those patients with allergy to iodnatedd contrast material and to aid in defining equivocal lesions as seen on computed tomography, such as small central hilar bronchogenic carcinomas ***(Fisher, 1989).***

MR may be the method of choice for evaluating some types of vascular disease in the mediastinum. Superior vena caval patency is easily ascertained by MR. The delineation of lesion extent and caval involvement, as well as remaining patent channels, is better appreciated on MR than on CT. ***(Webb et al., 1984).***

Dissection of thoracic aorta can be seen with MRI without using contrast medium. The intimal flap and at times the true and false lumina can be differentiated ***(Sutton, 1993).***

*** Comparison of CT. and MRI :**

CT. and MRI are competitive in many aspects. Both depict cross-sectional anatomy, often demonstrating similar information not readily apparent on plain chest radiograph. In selected cases, either C.T and MRI supersedes the other modality in defining the extent and type of disease present.

CT. has the following advantages:

1- Utilizes shorter scan times.
2- It is not limited by pacemarkers, clips or life support devices.
3- It is not limited by poor patient condition.
4- It is useful for directing biopsy or drainage procedures.
5- Calcifications are readily seen.

The advantages of MRI include the following:

(1) No contrast medium is required.
(2) No ionizing radiation is utilized.
(3) Normal hilar structures are easily distinguished from masses.
(4) Thoracic aneurysms can be identified including false lumina and intimal flaps.

The disadvantages of MRI include the following in :

(1) Long scan time is necessary.
(2) Patients with pacemakers cannot be scanned.
(3) Biopsies are impossible.
(4) Calcification is not consistently visible.

(Cohen, 1984).

Mediastinal ultrasonography :

Ultrasonography is rarely used for mediastinal disorders because CT. is superior to ultrasonography in detection of mediastinal masses but if the CT. is not available and if the mass is in contact with intercostal spaces U.S. could be used to differentiate between cystic, solid and mixed masses ***(Armstrong, 1992).***

Superior mediastinum is easily approached by positioning the transducer in the suprasternal notch and care must be taken to differentiate a mass from blood vessels and cardiac structures. Differentiation is facilitated by using the Mmode type of display which records motion.

Anterior mediastinal masses projecting to either the right or left of the sternum, making ultrasonic readings easily obtainable as long as the lung is not interposed between chest wall and surface of the mass.

Middle mediastinal masses are difficult to examine. Evaluation is sometimes possible using suprasternal approach.

Posterior mediastinal mass can be evaluated by placing the transducer in the posterior interspaces ***(Jaffe, 1981).***

Jack-Haller and his Colleagues (1980) carried out a study on 29 patients with mediastinal and juxta cardiac mass and juxta diaphragmatic abnormalities. Using a 6 mm. diam. 5 MHZ, short focus transducer, and in some patients more than one transducer were used to characterize acoustic features of a disease process. Finally they conclude that :

1) Satisfactory sonographic images were obtained in more than 90% of cases, the required informations were obtained at lower cost and without exposure to additional ionizing radiation.

2) Approach is usually necessary. Some lesions may be inaccessible. A suitable acoustic window must be found.
3) Sonography gives helpful localization for percutaneous aspiration or drainage of pleural fluid, and also biopsy.