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ANTERIOR MEDIASTINAL TERATOMAS: AN OVERVIEW

Pathology

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ABSTRACT

The thoracic mediastinum houses a wide range of tissues any of which can undergo benign or malignant transformation. The anterior mediastinum represents the most common extra-gonadal site of occurrence of germ cell tumors1. This study takes into account three patients, all females in their third decade of life, presenting with cough and chest pain, who were subsequently diagnosed to have anterior mediastinal teratomas after detailed work-up including radiological & biochemical investigations. Diagnosis was confirmed by histo-pathology. An understanding of the anatomical relationships of different structures of the mediastinum with each other, as well as the embryology of the area would be helpful to diagnose and provide an insight into the frequency of occurrence of anterior mediastinal teratomas.

KEYWORDS

mediastinum, teratoma, CT

INTRODUCTION

The prerequisite of any discussion of masses and tumors found in the mediastinum is a proper delineation of its boundaries and an understanding of the structures present within it as well as their relationship with each other.

The thoracic mediastinum is commonly defined as the region between the two pleural sacs, bounded anteriorly by the sternum and posteriorly by the thoracic vertebral column, and extending vertically from the thoracic inlet to the diaphragm[2]. Strictly speaking, it is the visceral compartment between the two lungs and includes the mediastinal pleura.

The mediastinum is divided into superior and inferior mediastina by a plane that crosses the manubriosternal joint and the lower surface of the fourth thoracic vertebra[2]. The inferior mediastinum is subdivided further by the pericardium and heart into anterior, middle and posterior parts[3].

The anterior mediastinum lies between the sternal body and pericardium. It narrows above the fourth costal cartilages where the pleural sacs converge, and contains loose connective tissue, the sternopericardial ligaments, a few lymph nodes, the mediastinal branches of the internal thoracic artery, and sometimes part of the thymus gland or its degenerated remains[2].

The thymus is an example of a gland which is prominent after birth but rapidly diminishes after puberty. Thus part of the gland or its remnants may be found in the superior and anterior mediastina.

Case presentation

The **first patient**, a 20 year old female presented with chest pain and cough. X rays (Fig.-1) and CECT scan (Fig.-2) revealed an anterior mediastinal mass encroaching into the middle mediastinum along with pleural effusion. Tru-Cut Biopsy was done. Histopathology report of the mass revealed the finding of skin with hair follicles, sebaceous glands, intestinal glands, respiratory epithelium, cartilage, fibromuscular tissue and lymphoid tissue (Fig.-3 & Fig-4). A diagnosis of mature mediastinal teratoma was made

Fig.-1:X ray showing anterior mediastinal mass silhouetting right heart border

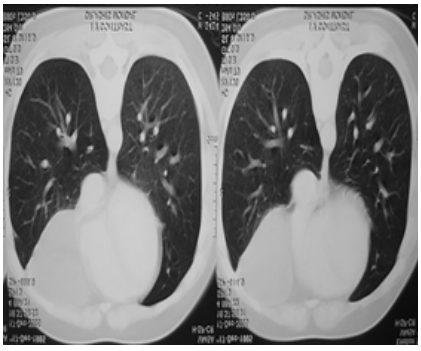

Fig.-2: CT Scan showing anterior mediastinal mass

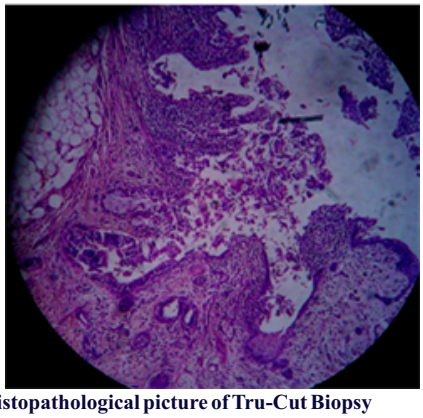

Fig.-3: Histopathological picture of Tru-Cut Biopsy

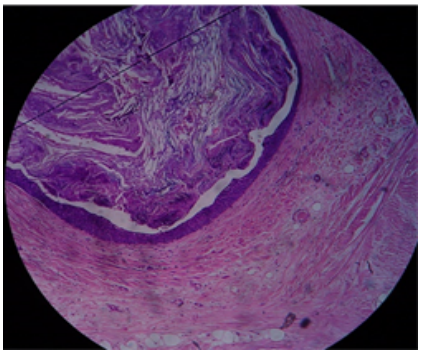

Fig.-4: Histopathological picture of Tru-Cut Biopsy

The **second patient**, another 20 year old female, presented with persistent right sided chest pain and intermittent fever of 2 months duration. Chest X-ray showed right lower zone non homogeneous opacity (Fig.-5). USG right hemithorax found a solid mass of heterogenous density. Later a CT scan thorax (plain) revealed a solid intrathoracic mass with an area of calcification (Fig.-5). On Tru-Cut Biopsy, macroscopically hair was identified in the biopsy specimen (Fig.-6) and microscopy showed the finding of ectodermal, mesodermal and endodermal elements in the form of skin, sebaceous glands, respiratory epithelium, cartilage and lymphoid tissue. A diagnosis of mature mediastinal teratoma was made (Fig.-7).

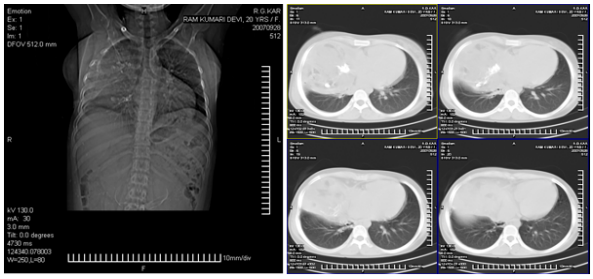

Fig.-5: CT Scan showing Anterior Mediastinal heterogenous mass

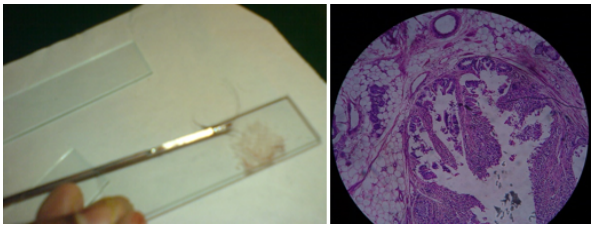

Fig.-6:Tru-Cut Biopsy showing presence of hair in the mass
Fig.-7: L.P. view showing squamous epithelium, adipose tissues & glands

The **third patient**, a 22 year old female presented with symptoms of cough and chest pain. CT scan revealed an anterior mediastinal mass encroaching into the superior mediastinum.Gross examination revealed a mass containing cheesy material (Fig.-8). Histopathology revealed the finding of adipose tissue, squamous epithelium, intestinal epithelium, fibromuscular tissue and a predominance of glandular tissue. A diagnosis of mediastinal teratoma was made (Fig.-9 & Fig.-10).

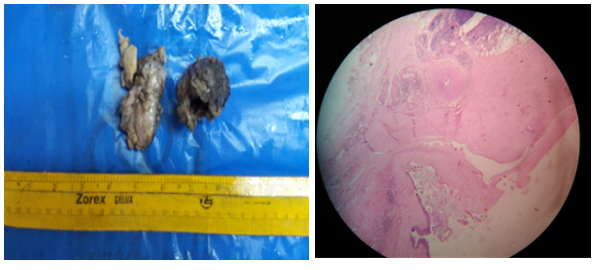

Fig.-8: Gross appearence
Fig.-9: L. P. view showing a cyst lined by Squamous epithelium and wall containing fibrocartillaginous tissue

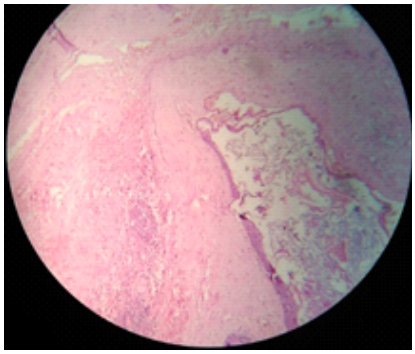

Fig.-10: L. P. view showing a cyst lined by Squamous epithelium and wall containing fibrocartillaginous tissue

DISCUSSION:

The vast majority of germ cell tumors are found in the mediastinum[4] , about 5-10% of all germ cell tumor are found in mediastinum and out of these extragonadal germ cell tumors, 95% are located in the anterior mediastinum[5].

The most common tumors found in the anterior mediastinum are of thymic, lymphatic, or germ cell origin. They account for 3-12% of mediastinal tumours[5].

Out of all mediastinal tumors in adults, germ cell tumors rank fourth in frequency, following neurogenic tumors, thymic tumors, and lymphomas. Among germ cell tumors, most common are teratomas followed by seminomas. About 10% of mediastinal tumors in adults are germ cell tumors, and about 85% of these are benign[4].

Benign germ cell tumors are referred to as benign teratomas or dermoids if they primarily are solid in consistency[4].The gross and histopathology findings of this study also corroborates the diagnosis of benign mature teratoma.

95% of the extragonadal germ cell tumors are located in the anterior mediastinum[5]. All of the teratomas in this study were found in the anterior mediastinum mainly.

The most frequent lesions encountered in the mediastinum are thymoma, neurogenic tumours and benign cysts, altogether representing 60% of patients with mediastinal masses[6,7]. Neurogenic tumours, germ cell neoplasms and foregut cysts represent 80% of childhood lesions, whereas primary thymic neoplasms, thyroid masses and lymphomas are the most common in adults[6,7]. Mediastinal teratomas are most commonly found in young adults with no sex predilection[8,1]. All the patients in this study were females in their third decade of life.

Mature mediastinal teratomas are benign, do not infilterate adjacent organs, and can be resected completely with good results[9]. After complete resection of mediastinal cysts & benign tumors the prognosis is generally excellent[10].

There are several theories regarding the embryology of benign teratomas. One theory suggests that benign teratomas are derived from cells from the region of the third branchial cleft or pouch. Another states that benign teratomas arise from totipotent cells, which are capable of forming tissues from at least 2 of the 3 primitive germ cell layers but reside in an inappropriate anatomic location for the cell types present. The third theory states that these tumors arise from germinal nests of cells located along the urogenital ridge which are displaced along midline structures during their migration from the yolk endoderm to the gonad during early embryological development [4] .The third theory provides a probable explanation of the increased frequency of occurrence of anterior mediastinal teratomas.

CONCLUSION:

Since mediastinum is the most common extra-gonadal site of all germ tumors a thorough anatomical knowledge of the region would be useful to the clinicians in arriving at the diagnosis, performing the biopsy and planning the management. Also, an insight of the concerned embryogenesis would provide an explanation as to the increased frequency of occurrence of anterior mediastinal teratomas among all mediastinal teratomas.

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