Primary Intrapulmonary Thymoma Appearing as a Solitary
Pulmonary Nodule: The “Master of Disguise” of Lung Tumors?:
Case Report

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Case report

Thymomas originate from thymic epithelial cells, and their incidence is 0.15/100,000 [1]. The vast majority of thymomas occur in the antero-superior mediastinum, but ectopic thymic tissue can be found in the neck, the trachea, the thyroid and parathyroid gland, the pericardium, the heart, the pleura, and the lung. McBurney et al. [2] were the first to report a case of PIT in 1951. Primary intrapulmonary thymomas (PITs) are very rare, and fewer than 50 cases have been reported in the literature. They are defined as tumors with the histopathological characteristics of thymomas, located either as subpleural lesions or surrounded by pulmonary parenchyma without evidence of a lesion in the antero-superior mediastinum. We report a case of PIT in a 74-year-old woman in whom pulmonary nodules were found incidentally.

A 74-year-old woman was admitted to our department due to multiple bilateral pulmonary nodules, which were found incidentally during pulmonary angiography performed for an episode of pulmonary embolism 5 years ago. They were located in the lingula (2 lesions) and in the right upper lobe (2 lesions, measuring 6 mm). According to her treating pulmonologist, she was followed up for the nodules, and on repeated chest computed tomography (CT) scans, a lingular lesion increased in size (from 9 to 25 mm) during this period, while the other nodules remained stable. She did not present with symptoms of myasthenia gravis or Good syndrome. The mediastinum was normal. She underwent 18-fluorodeoxyglucose positron emission tomography (18FDG-PET)-CT scanning, which showed mild uptake of the lingular nodule (maximum standardized uptake value [SUV\text{max}]=3.4) without mediastinal involvement. The other sub-centimetric nodules were negative on PET-CT (Fig. 1). She underwent wedge resection of the lingular lesion and the lesion in the left upper lobe. The macroscopic examination showed a well-circumscribed, encapsulated solid tumor measuring 2 cm in diameter (Fig. 2). A microscopic examination revealed a cellular neoplastic population of bland ovoid to spindled epithelioid cells with rare, scattered CD1a- immature T lymphocytes. The epithelioid neoplastic cells, following immunohistochemical investigation, stained positive for cytokeratin (CK AE1/AE3) and p63 and negative for CK7, TTF-1, synaptophysin, chromogranin, CD56, CD117, CD34, CD20, CD5, smooth
muscle actin, desmin, caldesmon, estrogen receptor, progesterone receptor, vimentin, and CD99. The differential diagnosis, based on the microscopic characteristics of the tumor cells, included intrapulmonary thymoma, solitary fibrous tumor, and carcinoid tumor (Fig. 3).

The macroscopic, microscopic, and immunohistochemical findings led to the diagnosis of intrapulmonary thymoma, type A. The left upper lobe nodule was a granuloma. The patient’s postoperative course was uneventful, and she was discharged home on the seventh postoperative day.

Based on an oncologic consultation, no adjuvant treatment was administered due to the absence of invasion. It was also decided to monitor the other nodules for potential resection in case of growth. The patient provided written informed consent for the publication of her clinical details and images.

Discussion

PIT is a rare intrapulmonary tumor, of which fewer than 50 cases have been reported in the literature. PITs are defined as tumors of thymic origin with the characteristic histological features of thymoma, situated below the visceral pleura or completely surrounded by lung parenchyma, without a mediastinal component. The first case was reported by McBurney et al. [2] in 1951. They can be solitary or multiple and they affect both sexes. They usually occur after the fifth decade of life, with a mean age of 57 years. PITs are usually asymptomatic and they are incidentally found on CT scans performed for other reasons. They produce symptoms when they grow large enough to compress or invade neighboring anatomical structures such as the bronchi, parietal pleura, and bronchial arteries, thereby producing pain, cough, bronchial obstruction, and hemoptysis. In addition, they can be associated with paraneoplastic syndromes (in the same way as mediastinal thymomas). The most common of these are myasthenia gravis and Good syndrome.

The pathogenesis of PIT is unknown. The most probable scenario accounting for PIT is that of embryologic rem-
nants. Normally, the thymus develops from a ventral sac- 
culation of the third pharyngeal pouch, and to a minor ex-
tent the fourth pharyngeal pouch, in the sixth week of 
gestation. During the eighth week, the thymic primordia 
enlarge towards their lower poles, forming 2 epithelial bars 
that fuse in the midline, moving caudally to reach the de-
finite position in the antero-superior mediastinum [3]. 
During the descent, the tail portion breaks in small frag-
ments that normally disappear. Occasionally, some rem-
nants may persist, producing ectopic thymic tissue and 
thymomas (located in the neck, thyroid and parathyroid 
glands, the pleura and the trachea) [4]. Another hypothesis 
is that PIT arises from stem cells. These cells can differen-
tiate along a variety of lines, thereby producing ectopic 
mature tissues in the lung parenchyma (thyroid, pancreatic 
adrenal tissue, etc.). Finally, Fukayama et al. [5] suggested 
that PIT is the result of a monodermal teratoma.

PIT appears on CT as a well-circumscribed, heteroge-
neous mass [6]. Our patient also presented with a cylindri-
cal mass with smooth borders. The radiological differential 
diagnosis of PIT includes low-grade malignant tumor, 
metastatic lung tumor, hamartoma, sclerosing hemangio-
ma, lipoma, and angiolipoma. PET-CT can be used for the 
preoperative workup, as for all solitary pulmonary nodules. 
The degree of 18FDG uptake seems to be related with the 
histologic subtype of the World Health Organization clas-
ification of epithelial tumors. Ishibashi et al. [7] men-
tioned that PIT shows mild or no hypermetabolism of 
18FDG. In our case, the SUV$_{max}$ was 3.4.

Preoperative histologic determination is difficult, and 
most PITs are diagnosed postoperatively. The diagnosis of 
PITs is particularly challenging on both biopsy specimens 
and intraoperative frozen sections, so PIT can be misdiag-
nosed. To differentiate a PIT from another intrathoracic 
tumor, the pathologist must rely on immunohistochemical 
staining combined with the gross and microscopic patterns 
of the tumor and the patient’s clinical history. Macroscopi-
cally, the examination shows a well-circumscribed and en-
capsulated nodule within the pulmonary parenchyma. 
PITs usually do not involve the visceral pleura. As with 
mediastinal thymomas, extension beyond the capsule sug-
gests invasiveness, implying a poor prognosis.

Due to the scarcity of available data due to the small 
number of reported cases, it is difficult to define the opti-
mal treatment strategy of PIT, and radical resection re-
mains the treatment of choice [3]. Depending on the size 
and the location of the lesion, the extent of resection rang-
es from wedge resection to pneumonectomy according to 
the largest review to date, authored by Myers et al. [4]. In 
case of incomplete resection, adjuvant radiotherapy should 
be considered. This treatment strategy is based in several 
retrospective studies of incompletely resected mediastinal 
thymomas. These studies showed reduced local relapse af-
after radiotherapy. The follow-up period must be relatively
long, given the substantial risk of recurrence.

In conclusion, PITs are exceedingly rare lesions. Their pathogenesis is currently not clearly understood. Complete resection appears sufficient in non-malignant tumors. In patients who undergo incomplete resection, adjuvant radiotherapy should be considered. Long-term follow-up is warranted because of the risk of late local relapse.

**Conflict of interest**

No potential conflict of interest relevant to this article was reported.

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