Case Report

J Korean Soc Radiol 2022;83(1):212-217
https://doi.org/10.3348/jksr.2021.0014
eISSN 2288-2928

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CT Findings of Thymic Epidermoid Cyst in the Anterior Mediastinum: A Case Report and Literature Review

전종격동에서 발생한 흉선 유표피 낭종의 CT 소견: 증례 보고와 문헌 고찰

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An epidermoid cyst is a benign tumor found anywhere in the body. However, the occurrence of epidermoid cysts in the thymus is extremely rare, with only six cases reported worldwide. The correct diagnosis of thymic epidermoid cysts is often difficult due to the unusual location and nonspecific imaging findings. Herein, we present a case of a thymic epidermoid cyst in a 37-year-old female with clinical information and chest CT findings. Further, we have reviewed previous literature reports describing imaging findings of thymic epidermoid cysts.

Index terms Thymus Neoplasm; Epidermoid Cyst; Tomography, X-Ray Computed; Radiography, Thoracic; Magnetic Resonance Imaging

Received January 21, 2021
Revised March 24, 2021
Accepted April 13, 2021

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INTRODUCTION

Epidermoid cysts are benign, slow-growing lesions that may be congenital or acquired. They can be found anywhere, and rare cases of epidermoid cysts have been reported within the spleen, kidney, gastrointestinal tract, and genitourinary system (1). Epidermoid cysts usually demonstrate nonspecific imaging findings such as a well-encapsulated mass of heterogeneous attenuation on CT, which may be misleading for radiologists (1). The thymus is a very unusual location for epidermoid cysts, with only six cases reported in the literature worldwide (2, 3). Therefore, in cases of epidermoid cysts located in the mediastinum, surgical resection may be necessary to exclude malignancy

and attain a definitive tissue diagnosis. Herein, we report a case of a thymic epidermoid cyst with CT findings and review of previous reports.

CASE REPORT

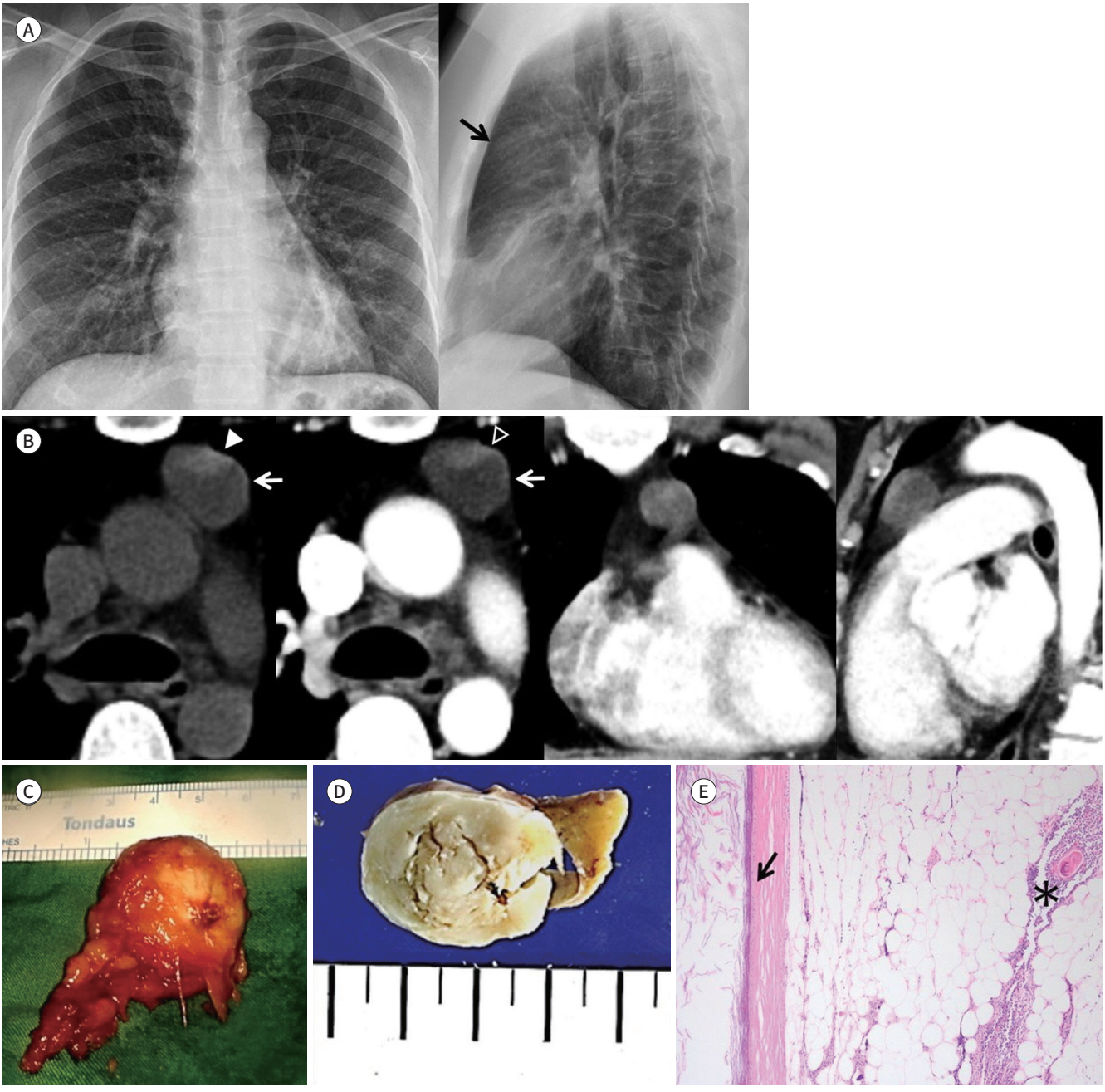
A 37-year-old female visited the emergency center at our institution with fever (38.9°C), cough, and sputum that had started 3 days prior. The patient had no underlying diseases. Chest radiography showed a focal consolidation in the left lower lung zone, suggesting pneumonia. Incidentally, on the left lateral chest radiograph, there was a suspicious nodular opacity in the anterior mediastinum (Fig. 1A).

For further evaluation, contrast-enhanced chest CT was performed on the same day. Chest CT revealed peribronchial consolidation and nodules in the lingular division of the left upper lobe and both lower lobes, suggesting bronchopneumonia. Moreover, there was a 2.8 cm sized, oval shaped, well-defined mass with suspicious thin walls at the left side, located in the anterior mediastinum (Fig. 1B). The lesion showed a heterogeneous attenuation on the precontrast CT images (range, 22–95 Hounsfield unit), composed mainly of low attenuated areas and focal high-attenuation areas at the peripheral portion. It did not contain any calcification or fat components. On postcontrast CT images, no definite contrast enhancement of the mass was observed. There was no evidence of invasion to the adjacent structures or enlarged lymph nodes in the thorax. Based on the CT imaging findings, complicated cysts, dermoid cysts, and thymic neoplasms were included in the differential diagnosis. As the mass had internal high-attenuation area, there seemed to be a possibility of a cystic lesion with complications, such as hemorrhage or infection. Dermoid cysts usually appear as cystic masses and may contain intrinsic fat attenuation and macroscopic calcification (4, 5); therefore, it was also included in the differential diagnosis, even though there was no macroscopic fat or calcification in our case. Lastly, although thymomas typically present as well-defined masses with homogeneous enhancement, heterogeneity can be seen in about one-third of thymomas due to necrosis, cystic change, or hemorrhage (4). In particular, cystic thymomas appear as cystic masses with enhancing mural nodules or septae (4). Likewise, thymic carcinoma could present as a cystic mass, although it is rare (6). Shinohara et al. (6) reported a case of thymic carcinoma with cystic change, which had no solid component detected on CT images, due to malignant components too small to be detected by CT. Therefore, even with a mass not showing definite enhancement in our case, the finding of heterogeneous attenuation with low or high-attenuation areas within the mass could not exclude the possibility of thymic neoplasm with cystic change.

In order to obtain a definitive diagnosis and exclude malignancy, the patient underwent thoracoscopic surgery for resection of the anterior mediastinal lesion. During surgery, the lesion showed a relatively spherical shape and a well-encapsulated structure (Fig. 1C). There was no adhesion to adjacent fat tissues. Gross examination of the surgical specimen revealed a unilocular cyst measuring 2.5 cm × 2 cm × 2 cm, filled with keratin debris within normal thymic tissues (Fig. 1D). Microscopically, the cyst was lined by keratinized stratified squamous epithelium and diagnosed as an epidermoid cyst (Fig. 1E).

This study was approved by the Institutional Review Board of our institution and the re-

Fig. 1. Images of a thymic epidermoid cyst in a 37-year-old female.
A. Posteroanterior chest radiograph shows consolidation in the left lower lung area, suggesting pneumonia. The lateral chest radiograph (left) shows a suspicious nodular opacity in the anterior mediastinum (arrow).
B. Axial, coronal, and sagittal chest CT images demonstrate a 2.8 cm oval-shaped, well-defined mass with suspicious thin walls (arrows) in the anterior mediastinum. On the axial non-enhanced CT image, the mass shows a heterogeneous attenuation and the peripheral portion of the mass reveals a focal high attenuation (arrowhead). On the axial contrast-enhanced CT images, no definite contrast enhancement is observed in any part of the mass (open arrowhead). In addition, there is no evidence of the surrounding mediastinal fat invasion.
C. Surgical specimen shows a spherical, well-encapsulated, hard mass within the retrosternal area.
D. The mass measures 2.5 cm × 2 cm × 2 cm and is a well-encapsulated unilocular cyst, full of abundant keratin debris.
E. Histological finding shows that the cyst is lined by keratinized squamous epithelium (arrow) within the thymic tissue (asterisk) (hematoxylin and eosin stain, × 100).



quirement for informed consent was waived (IRB No. HKS 2021-04-028).

DISCUSSION

Epidermoid cysts of the mediastinum are very rare and mostly present in the posterior mediastinum (3). However, in this case epidermoid cyst was located in the thymus of the anterior mediastinum, and to the best of our knowledge, this is the seventh reported case of thymic epidermoid cyst worldwide.

Histopathologically, a typical epidermoid cyst is lined with stratified squamous epithelium that resembles the epidermis, includes a granular layer, and is filled with keratinous material, showing a laminated arrangement (1). Epidermoid cysts are benign. However, approximately 1% of epidermoid cysts undergo malignant transformation to squamous cell carcinoma and basal cell carcinoma (1).

The exact etiology of thymic epidermoid cysts remains unknown (5). These cysts are regarded as sequestration cysts formed by the proliferation of epidermal cells that arise from the ectoderm in an unusual location within the thymus, and may be congenital or acquired (5). Acquired thymic epidermoid cysts are considered to be the result of epidermal tissue migration into the anterior mediastinum with subsequent proliferation within the thymus (5, 7). A few case reports have assumed that traumatic or surgical implantation of epidermal cells within the anterior mediastinum results in rare presentation of epidermoid cysts (7, 8). For congenital epidermoid cysts, they might be potentially formed in the thymus, as in other locations (5). In our case, the patient had neither penetrating injuries nor a history of surgery.

When the imaging findings of previously reported cases of thymic epidermoid cysts were reviewed, all cases showed nonspecific imaging findings on CT and MRI (Table 1). Our case showed a non-enhancing heterogeneous attenuated mass with a focal area of high attenuation in the peripheral portion of the mass, located in the anterior mediastinal area on CT images; there were no calcifications or fat components. Monaco et al. (8) also reported a case of thymic epidermoid cyst showing high-attenuation foci within the mass on CT images. Epidermoid cysts usually include debris, keratin, and cholesterol (9). In particular, epidermoid cysts with high protein content may appear as high-attenuation lesions on CT images (9). There-

Table 1. Reports of Thymic Epidermoid Cyst Image Findings in the Anterior Mediastinum in Literature

Reference	Age	Sex	Size (cm)	Shape	History of Trauma	Imaging Findings
Rodrigues et al. (2019) (3)	52	Female	3.3	Oval	(-)	MRI: heterogeneous SI
Abe et al. (2019) (2)	68	Male	3.5	Round	(-)	CT: slightly heterogeneous attenuation without contrast enhancement MRI: low SI on T1WI and mixture of high and low SI on T2WI
Qureshi et al. (2016) (5)	35	Female	5.0	Oval	Not mentioned	CT: homogenous attenuation MRI: non-enhancing, heterogeneous SI with cystic component and no macroscopic fat
Monaco et al. (2015) (8)	65	Male	4.7	Oval	(+)	CT: heterogeneous attenuation with internal high-attenuation foci

SI = signal intensity, T1WI = T1-weighted image, T2WI = T2-weighted image

fore, we suppose that the focal area of high attenuation within the mass may correlate with the high protein content in thymic epidermoid cysts.

Out of the four reported cases of thymic epidermoid cysts with available images, three cases underwent MRI evaluation for characterization of the anterior mediastinal mass. All cases showed heterogeneous signal intensity, and one of them demonstrated a cystic component. Qureshi et al. (5) mentioned that in retrospect, MRI was the most suggestive imaging test for an epidermoid cyst in their case. Currently, MRI is a useful modality for evaluating mediastinal masses. It can differentiate cystic components from solid lesions, evaluate invasion of adjacent structures, and characterize internal components, such as hemorrhage or fat (10). Furthermore, epidermoid cysts can show restricted diffusion on diffusion-weighted imaging, particularly in the brain (5). Therefore, MRI might have been a helpful imaging tool in our case.

As thymic epidermoid cysts are rare, information is limited regarding the specific radiologic findings, which makes it difficult for radiologists to diagnose correctly. Herein, by presenting the seventh reported case of a thymic epidermoid cyst and reviewing the previously reported cases, we found that it usually appears as an oval or round non-enhancing mass with heterogeneous attenuation/signal intensity on CT/MR images. Despite its rarity and nonspecific imaging findings, it would be meaningful to be aware of the fact that epidermoid cyst may develop within the thymus and appear as an anterior mediastinal mass with above-mentioned imaging findings.

Author Contributions

Conceptualization, M.J.W., K.Y.N.; data curation, K.J.H., W.J.Y., K.J.W.; investigation, K.J.H.; methodology, M.J.W., K.Y.N., W.J.Y.; project administration, M.J.W., K.Y.N., W.J.Y., K.J.W.; resources, K.J.H., M.J.W., software, K.J.H., K.Y.N.; supervision, M.J.W.; visualization, M.J.W., K.Y.N.; writing—original draft, K.J.H., M.J.W., K.Y.N.; and writing—review & editing, M.J.W., K.Y.N.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Funding

None

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전종격동에서 발생한 흉선 유표피 낭종의 CT 소견: 증례 보고와 문헌 고찰

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유표피 낭종은 신체 부위 어디에서나 생길 수 있는 양성 종양이다. 그러나 흉선에서 발생하는 유표피 낭종은 매우 드문 것으로 알려져 있으며, 지금까지 전 세계적으로 6개의 사례가 보고되어 있다. 흉선의 유표피 낭종은 위치적 희귀성과 비특이적인 영상의학적 소견으로 인해 정확한 진단을 내리는 데 어려움이 있다. 이에, 우리는 37세 여자 환자에서 발생한 흉선의 유표피 낭종의 임상적 소견과 흉부 전산화단층촬영의 영상의학적 소견에 대해 보고하고, 현재까지 보고된 흉선의 유표피 낭종의 영상의학적 소견에 대하여 논의하고자 한다.

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