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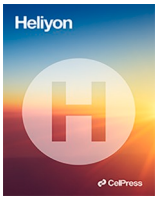

Case report

Intrapulmonary mature cystic teratoma: A case report with literature review

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ABSTRACT

Background: Mature intrapulmonary cystic teratomas are rare. The clinical manifestations are nonspecific and may mislead to other diseases. The radiographic findings are often perplexing. There are few complete reports on intrapulmonary teratomas, including patient history, radiologic and pathologic findings, patient management, and outcomes. We present a case report of an intrapulmonary mature cystic teratoma diagnosed at our hospital, along with an extensive review of the relevant literature.

Case presentation: A 47-year-old non-smoking female patient presented with hemoptysis and intermittent dyspnea for 5 months without fever or weight loss. Chest computed tomography revealed an inhomogeneous, hypodense, lobulated mass with internal fat, calcification, and soft tissue components. The patient underwent a left thoracotomy and left upper lobe lobectomy. Pathological examination revealed a cystic tumor containing various components, including fat, keratin debris, teeth, and hair. A diagnosis of intrapulmonary mature cystic teratoma was made. Three months after the operation, no recurrent tumor was identified, and the patient was scheduled for follow-up next year.

Conclusion: Intrapulmonary mature cystic teratomas are unusual. Owing to its general clinical symptoms and radiographic findings, it was misdiagnosed before surgery. After surgery, pathological and radiological findings confirmed the diagnosis. Therefore, intrapulmonary mature cystic teratomas should be considered in the differential diagnosis, and sufficient examinations should be conducted to rule out the condition.

1. Introduction

Most mature cystic teratomas, found primarily in reproductive organs, are classified as benign germ cell tumors and are unlikely to progress to malignancy [1–3]. Mature cystic teratomas can also be found in areas other than the reproductive organs, such as the mediastinum, head, neck, abdominal cavity, peritoneum, and sacrococcygeal region. However, the incidence of tumors outside the

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reproductive system is extremely low [4].

Mature intrapulmonary teratomas are rare [5]. Collier et al. [6] first described this tumor in 1839. Clinical manifestations such as cough, hemoptysis, and chest pain are nonspecific and can point toward other diseases [7]. Moreover, radiographic findings can be confusing, resulting in misdiagnosis [7]. There have been reports of intrapulmonary mature cystic teratomas; however, only a few of these are complete, with details about the clinical presentation, investigation, radiologic findings, pathological characteristics, and patient outcomes. Furthermore, the presence of mature cystic teratoma in intrapulmonary locations poses unique challenges and considerations. Herein, we present a case of an intrapulmonary mature cystic teratoma diagnosed at our hospital, as well as an extensive review of the existing literature to demonstrate the clinical presentation, radiological and pathological findings, and patient outcomes, as well as provide valuable insights into their histopathological characteristics, growth patterns, and potential complications within the lung tissue for a broader comprehension of teratoma biology and behavior in diverse anatomical sites and improved clinical decision-making and patient outcomes in cases involving pulmonary teratomas.

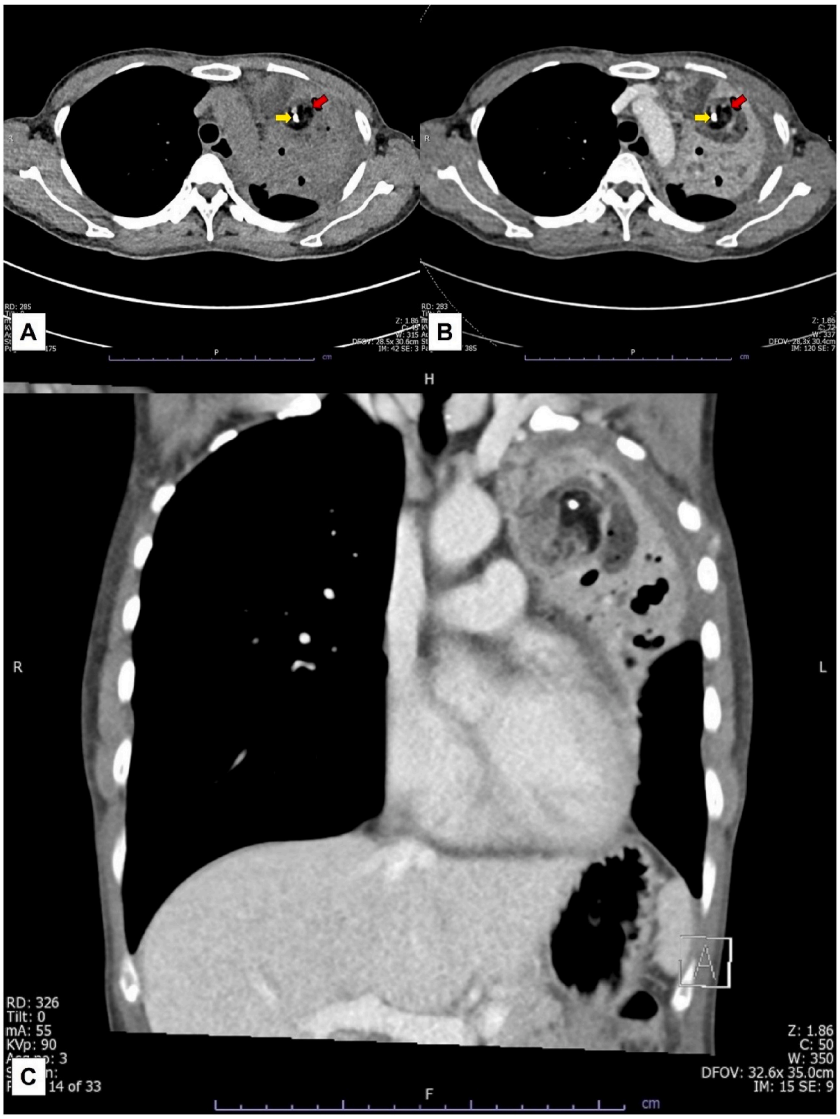

Fig. 1. Thoracic multidetector computed tomography (MDCT) of a 47-year-old female: (A) axial non-enhanced scan; (B) axial contrast-enhanced scan; and (C) coronal contrast-enhanced scan showing a large heterogeneous, enhancing mass with internal cavitation in the left upper lobe, approximately 7.4 cm × 3.7 cm in axial diameter. This mass contains fat components (red arrow) and a few calcifications (yellow arrow), in keeping with an intrapulmonary teratoma. Surrounding left upper lobe consolidation can also be observed. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

2. Case presentation

A 47-year-old nonsmoking woman presented with hemoptysis and intermittent dyspnea for 5 months without fever or weight loss. She had no underlying disease, allergic reactions to food, or history of alcohol consumption. On physical examination, vital signs showed a pulse rate of 84 beats per minute, respiratory rate of 20 beats per minute, and blood pressure of 111/50 mmHg. Left supraclavicular lymph node enlargement (approximately 1 cm in diameter) was observed. The patient visited a provincial hospital, where chest computed tomography (CT) was performed. The initial diagnosis was a germ cell tumor; however, the chest CT also indicated the possibility of lung cancer. The patient was, therefore, subjected to two video fiber optic bronchoscopies with bronchial brushing at the provincial hospital; however, the tumor type could not be identified due to the inadequate amount of tissue in the specimen. Subsequently, the patient was referred to our hospital for further investigation and the exclusion of lung cancer.

At our hospital, a thoracic multidetector CT scan including the upper abdomen (axial non-enhanced scan [Fig. 1 A], axial contrast-enhanced scan [Fig. 1 B], and coronal contrast-enhanced scan [Fig. 1 C]) revealed an inhomogenous hypodense mass measuring 7.4 cm × 3.7 cm in the anterior segments of the upper lobe of the left lung with a lobulated contour containing an internal fat component, foci of calcification, and enhancing soft tissue. The left main bronchus revealed a fluid-filled distal left main bronchus and atelectasis in the left upper lobe. A few enlarged intrathoracic lymph nodes, a 1.3 cm left supraclavicular lymph node, and several sub-centimeter left axillary lymph nodes were noted. Mild hepatomegaly and a prominent intrahepatic bile duct were observed. The heart, gallbladder, pancreas, spleen, adrenal glands, kidneys, and stomach were normal. Based on radiographic findings (presence of fat, calcification, and soft tissue density), intrapulmonary teratoma of the left upper lung was considered. Preoperative laboratory tests revealed mild anemia with leukocytosis (neutrophil predominance). The platelet count, coagulogram, blood electrolytes, and liver function tests were normal. Double-lumen intubation with general anesthesia was performed. The patient underwent a left

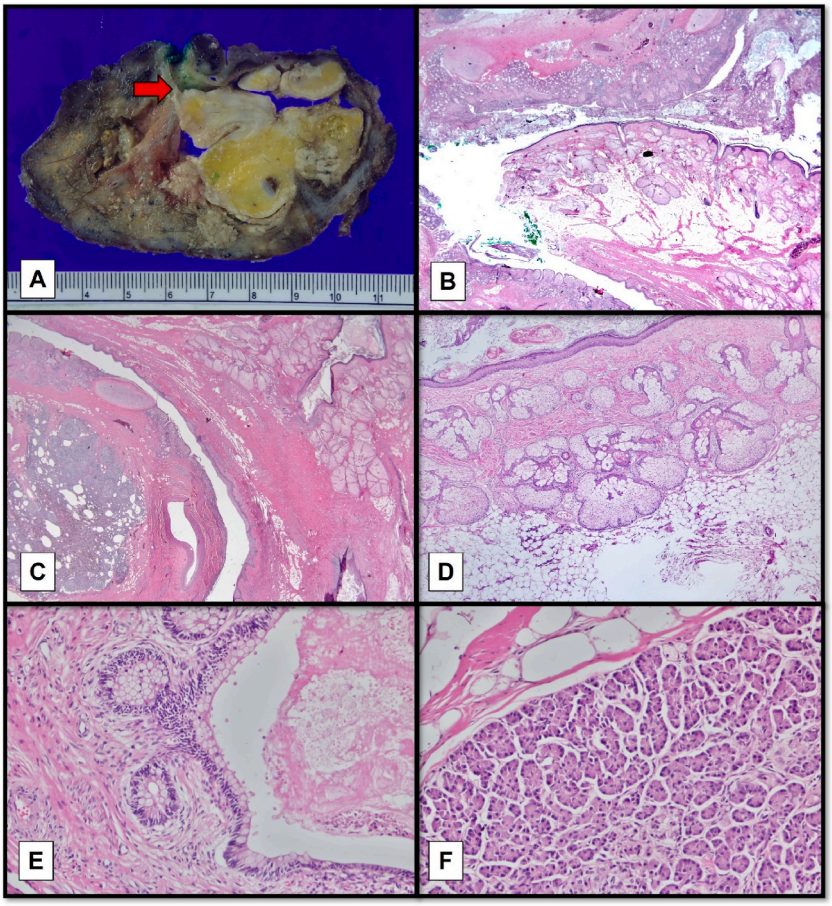

Fig. 2. Pathological findings of an intrapulmonary mature cystic teratoma: (A) Macroscopic findings showing a cystic tumor containing yellow fat, sebum, and hair connected to the left secondary bronchus (red arrow). (B and C) Low magnification showing the endobronchial growth of the tumor (H&E, 20 ×). (D) Medium magnification showing ectodermal (skin and sebaceous gland) and mesodermal components (adipose tissue) (H&E, 100 ×). (E) High magnification showing endodermal component (intestinal epithelium) (H&E, 200 ×). (F) High magnification showing endodermal component (pancreatic tissue) (H&E, 200 ×). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Table 1
Summary of reviewed literature.

No.	Author	Year	Age	Sex	Site	Presentation	Size (cm)	Radiologic finding	Gross pathology	Histopathology	Management	Outcome
1	Mardani et al. [7]	2022	27	F	LUL	Progressive dyspnea and chest pain with non-productive cough, chills, fever, and orthopnea	13.0	Massive left-side pleural effusion with no apparent focal opacities	Grayish multi-lobulated firm intrapulmonary cystic mass	Cystic lesion consisted of pancreatic tissue, mucinous epithelium, respiratory epithelium, epidermal tissue with sebaceous glands, adipose tissue, smooth muscle, and cartilage	Posterolateral thoracotomy	Uneventful
2	Awad et al. [11]	2022	34	M	RUL	Fever, sweating, dry cough, shortness of breath, chest pain	N/A	Right-sided central irregular parenchymal mass	Cystic mass	Squamous epithelium lining hair follicles, sebaceous glands, keratin debris, fatty and fibromuscular tissue. No immature tissue	Right thoracotomy	N/A
3	Kakamed et al. [15]	2021	26	M	Left lobe	Recurrent pneumonia	N/A	Complete left lung collapse with consolidations and air bronchogram	N/A	Mature bone with muscle and adipose tissue	Left pneumonectomy	Uneventful
4	Agarwal et al. [16]	2007	28	M	LUL	Cough with expectoration, hemoptysis, and worsening breathlessness. Trichoptysis	8.0	Heterogeneous mass lesion in the left upper lobe and lingula, with solid and cystic components with attenuation values that correspond to calcium and fat	Encapsulated cystic mass	Mature elements that represented all three germ cell layers	Left pneumonectomy	Uneventful
5	Kang et al. [17]	2013	60	M	RML	Cough and expectoration of hair	6.2	Fat-containing mass with an air component and direct bronchial communication.	N/A	N/A	N/A	N/A
6	Mondal et al. [18]	2012	22	M	RML	Intermittent episodes of cough and hemoptysis, with occasional right-sided chest pain	5.4	Rounded, well-defined cystic mass containing fluid and fat in the middle lobe of the right lung	Well-circumscribed cystic mass on the inner side of the middle lobe with sebaceous material and tufts of hairs were found in the cystic lesion	A variety of cell lines consisting of squamous epithelium, hair follicles, sebaceous glands, fatty tissue, benign glands, and fibromuscular tissue, and collection of lymphoid cells with occasional lymphoid follicles	Right anterolateral thoracotomy	Uneventful
7	Saini et al. [29]	2006	38	M	LUL	Intermittent episodes of cough and hemoptysis	7.5	Well-defined solid lesion occupying the anterior segment of the left upper lobe and the superior segment of the lingular lobe	Mass containing soft tissue elements, fat, well-circumscribed, encapsulated cystic areas filled with hair and sebaceous material, and foci of calcification	Squamous epithelium and sebaceous glands, cartilage, pancreatic tissue, gastric glands	Thoracotomy and enucleation of the lesion	N/A
8	Bawazir et al. [30]	2019	35	F	RUL	Dry cough	14.5	Cystic mass in the right upper lung zone	Cystic mass containing soft yellow material	N/A	Right thoracotomy	N/A

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Table 1 (*continued*)

No.	Author	Year	Age	Sex	Site	Presentation	Size (cm)	Radiologic finding	Gross pathology	Histopathology	Management	Outcome
9	Ditah et al. [31]	2016	19	F	RML	Hemoptysis and chronic non-productive cough with recurrent pneumonia	N/A	Large heterogeneous lung mass in the right middle lobe with extensive surrounding bronchiectasis and abnormally large systemic arteries supplying the mass	Mass with hair and sebaceous material	Benign thymic tissue and mature components including dermal, respiratory, gastrointestinal, thymic, cartilage, and pancreatic tissue	Thoracotomy to right middle lobectomy	Free of disease
10	Li et al. [32]	2017	52	F	LUL	Intermittent hemoptysis	5.5	Cavitary lesion with heterogeneous components	Solid-cystic mass containing yellow sebaceous material, hair, and skin	Squamous epithelium, sebaceous glands, hair follicles, mature adipose tissue, smooth muscles, cartilage, and respiratory epithelium without any malignant cells	Posterolateral thoracotomy to left upper lobectomy	Free of disease
11	Day and Taylor [33]	1975	19	F	RUL	Intermittent pain in the right chest, cough with purulent sputum, and right-sided pleuritic pain	6.0	Round shadow adjacent to the right hilum	Encapsulated partially cystic mass with a variable yellow and white appearance and sebaceous material	Keratinizing stratified squamous epithelium with hyperplastic sebaceous glands, apocrine and eccrine sweat glands, and occasional hair follicles admixed with smooth muscle fat and thymic tissue	Right thoracotomy	N/A
12	Ram et al. [34]	2018	26	M	RLL	Cough and hemoptysis	14.8	Multilobulated cystic lesion	Tuft of hair and jelly-like mucoid substance	N/A	Right posterolateral thoracotomy	N/A
13	Bateson et al. [35]	1966	49	M	LUL	Left pleuritic chest pain with productive cough	6.0	Lobulated mass and irregular margin	Round mass with fleshy yellow and white tissue, hair, and cystic spaces filled with gelatinous material	Skin and skin appendage, primitive bronchial cartilage covered by respiratory epithelium, intestinal epithelium, and pancreatic tissue	Left posterolateral thoracotomy	Uneventful
14	Badar et al. [36]	2013	20	F	Lingular lobe	Recurrent hemoptysis and cough	4.8	An irregular mass with inhomogeneous density containing fat, soft tissue, and foci of calcification	Ruptured cystic structure with a bunch of hairs	Respiratory epithelium, apocrine and eccrine sweat glands, stratified squamous epithelium, and mesodermal element	Lobectomy of the left lingular lobe	N/A
15	Präuer et al. [37]	1983	14	M	RUL	Intermittent chest pain with non-productive cough	13.0	Solid mass of varying density, Calcification, and cystic areas	Nodular tumor with several cavities containing sebaceous material and hair surrounded by areas of hyaline tissue, bone, and cartilage	Cavities lined by squamous epithelium with sebaceous glands and hair follicles, respiratory, and intestinal epithelium. Connective tissue, hyaline cartilage, and fat tissue are also seen	Posterolateral thoracotomy	Uneventful
16	Khan et al. [38]	2005	18	F	RML	Cough	7.0	Heterogeneous cystic lesion in the right upper and middle lung zones with a peripheral solid	A ball of hair attached to an intrapulmonary solid mass resembling a human embryo	A cyst lined by stratified squamous epithelium exhibiting extensive keratinization with the presence of sebaceous	Right upper and middle lobectomy	Recovered postoperatively

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Table 1 (*continued*)

No.	Author	Year	Age	Sex	Site	Presentation	Size (cm)	Radiologic finding	Gross pathology	Histopathology	Management	Outcome
								component in the right upper lobe		glands and hair follicles, with cholesterol clefts and extensive foreign body giant cell reaction		
17	Joo et al. [39]	1999	49	M	LUL	Cough and hemoptysis	5.0	Intrapulmonary mass of heterogenous density. No calcification	Firm nodular mass with skin, subcutaneous tissue with mucus-filled cysts, and yellowish areas	Keratinized stratified squamous epithelium with hair follicles hyperplastic sebaceous glands, apocrine and eccrine sweat glands, areas of mature cartilage, fat, foregut mucosa with smooth muscle coat, endo, and exocrine pancreatic tissue	Segmentectomy of the anterior segment of the left upper lobe	N/A
18	Eren et al. [40]	2002	18	M	LUL	Left-side pain, cough, expectoration, and fever	6.0	Round hypodense cystic thoracic mass	Mass with a grayish-white outer surface and dense fluid on the cut section	Stratified epithelium on the fibro-collagen stroma mixing with hair follicles, sebaceous and eccrine glands	Left anterolateral thoracotomy	Uneventful
19	Jiménez García et al. [41]	2018	13	M	LUL	Cough, expectoration, and recurrent hemoptysis	8.8	Lobulated and regular contour with heterogenous content; liquid densities, fat, soft parts, and calcium	Encapsulated clear brown-colored tumor with sebaceous material and hairs on the internal surface of the mass	Stratified squamous epithelium, sebaceous glands, hair follicles, adipose tissue, smooth muscle, cartilage, respiratory epithelium, and pancreatic tissue associated with areas of dystrophic calcifications and foreign body inflammatory reaction	Left upper lobectomy	N/A
20	Dar et al. [42]	2011	2	M	Left lung	Progressively aggravating dyspnea at rest, cough, intermittent fever, and recurrent chest infections	N/A	Huge mass occupying the entire left hemithorax with mediastinal shift to the opposite side	Cystic tumor arising from the left lung	Stratified squamous and respiratory epithelium, mature adipose tissue, cartilage, and connective tissue	Left-sided thoracotomy to pneumonectomy	N/A
21	Faria et al. [43]	2007	49	M	LUL	Chest pain in the left anterolateral region and bloody sputum	5.0	Nodular opacities in the middle third of the left hemithorax	Nodule with a smooth, brownish surface	Mature epithelial tissues (pancreatic, epidermis, sebaceous glands) and mature mesenchymal tissues (bone and cartilage)	left inframammary thoracotomy	Uneventful
22	Sawant et al. [44]	2012	39	M	RUL	Cough and hemoptysis	8.9	Large parenchymal opacity in RUL	Solid mass with hair and dull-gray tan tissue	Sweat and sebaceous glands, and hair follicles along with multiple cystic areas	Right upper and middle lobectomy	Free of disease

Abbreviation: M = male; F = female; RUL = right upper lobe; RML = right middle lobe; RLL = right lower lobe; LUL = left upper lobe; LLL = left lower lobe; N/A = data not available.

thoracotomy and left upper lobe lobectomy. Macroscopic examination (Fig. 2A) revealed an intrapulmonary cystic mass with variable solid components, including fat, keratinous debris, teeth, and hair. Histopathology revealed an endobronchial growth of the tumor (Fig. 2 B and C) with mature squamous epithelium, sebaceous glands, and adipose tissue (Fig. 2 D) admixed with intestinal epithelium (Fig. 2 E) and pancreatic tissue (Fig. 2 F). Neither reactive epithelial change nor any precursor lesion of malignancy was noted. No further immunohistochemical stains, for example, p40 or thyroid transcription factor-1 (TTF-1), were performed. The diagnosis of intrapulmonary mature cystic teratoma was concluded. The patient received routine post-operative care, and no complications were observed following the surgical removal of the pulmonary tumor. Three months after the surgery, no recurrent tumors were identified, the pulmonary function tests of the patient were unremarkable, and the patient was scheduled for follow-up with a CT scan a year later.

3. Discussion

This was a case of a 47-year-old nonsmoking woman who presented with hemoptysis and intermittent dyspnea. Radiological findings revealed an inhomogeneous hypodense mass comprising fat, teeth, and soft tissue. The tumor originated in the upper part of the left lung. Pathological findings revealed that the intrapulmonary mass was composed of tissue components originating from all three germ cell layers, including mature squamous epithelium with sebaceous glands, intestinal glandular epithelium, pancreatic tissue, and adipose tissue. Thus, the diagnosis was concluded as an intrapulmonary mature cystic teratoma.

As benign germ cell tumors, mature cystic teratomas are found predominantly in the reproductive organs [8]. They can also develop in other areas, including the mediastinum, head, neck, peritoneum, and coccyx [9]. However, mature cystic teratomas are rarely found outside the reproductive organs [8]. The mediastinum is the most frequent extragonadal location [10]. An intrapulmonary teratoma was first described in 1839 by Mohr [6] and is very rare, with fewer than 100 known examples as of 2022 [11]. The pathogenesis of a mature cystic teratoma can be explained by the aberrant transformation of primordial germ cells during embryogenesis [12]. Asano et al. [13] reported that no sex predilection exists in intrapulmonary mature cystic teratomas. According to Dasbaksi et al., the upper lobe is the common site of intrapulmonary mature cystic teratomas for unknown reasons [14].

The manifestations of intrapulmonary mature cystic teratomas differ according to the tumor site, size, and histological features [7]. Cough, hemoptysis, chest discomfort, dyspnea, and trichoptysis are among the several clinical manifestations of mature cystic teratoma [15]. According to our literature analysis shown in Table 1, the most prevalent clinical manifestation is cough followed by hemoptysis; however, trichoptysis is considered to be a pathognomic of intrapulmonary mature cystic teratoma [7]. In 2007, Agarwal et al. [16] described a 28-year-old male patient who presented with trichoptysis, and hair-like endobronchial growth in the left main bronchus was detected using fiberoptic bronchoscopy. The patient underwent left pneumonectomy with total tumor excision, and pathological findings revealed a mature cystic teratoma in the left upper lung. In 2013, Kang et al. [17] described a case of an intrapulmonary mature cystic teratoma of the right middle lung in a 60-year-old male patient who presented with trichoptysis. Based on clinical and radiological data, an intrapulmonary teratoma was diagnosed. Some studies have reported fever and recurrent pneumonia as other clinical manifestations [18,19]. In the present case, the female patient presented with hemoptysis and dyspnea. No complaints of fever, weight loss, or trichoptysis were reported. Based on clinical manifestations, several differential diagnoses, including fungal infection, tuberculosis, a lung abscess or another tumor, and tumor-like lesions such as pulmonary hamartoma or a bronchogenic cyst, were considered.

Chest CT is a standard diagnostic tool because it reveals the precise location, extent, and composition of the tumor and other mediastinal masses [20,21]. In most intrapulmonary cystic teratomas, radiologic findings reveal cystic lesions containing fat, soft tissue, and calcification. CT can distinguish teratomas from other tumors by lobulated cystic formations with peripheral translucency [22]. Additionally, the presence of air in the mass may suggest a connection between the cyst and the bronchial tree [22]. In some cases, CT scans may reveal nonspecific features. Kakamad et al. [15] reported a mature cystic teratoma in a male patient who presented with complete left lung collapse accompanied by consolidation and an air bronchogram indicating the presence of pneumonia associated with the tumor. Moreover, the air present in the mass may indicate a connection between the cyst and the bronchial tree [22]. In the present case, an inhomogeneous hypodense mass with a lobulated contour containing internal fat, teeth, and enhanced soft tissue components was observed on the CT scan. The tumor was in the left upper lobe and extended into the left main bronchus, causing atelectasis of the left upper lobe. These findings indicated that the tumor originated from the lungs as opposed to an extrapulmonary location. In considering recent developments, magnetic resonance imaging (MRI) has emerged as a valuable adjunct to CT examinations in the context of mediastinal lesion diagnosis [11,20]. In addition, MRI has exhibited a higher level of accuracy in evaluating the spread of tumor capsules, infiltration of neighboring structures, and deterioration of adipose planes compared to CT scans [20]. The preoperative diagnosis of intrapulmonary teratoma might be difficult due to the nonspecific nature of the symptoms [16]. Fiberoptic bronchoscopy is probably the most effective approach for evaluating patients prior to surgery [16]. In the study by Freund et al., Transbronchial cryobiopsy (TBCB) has been increasingly recognized as a more effective diagnostic method compared to transbronchial forceps biopsy (TBFB), particularly for fibrotic interstitial lung disorders. Furthermore, the combined use of cryobiopsy and forceps biopsy might enhance the diagnostic effectiveness in many pulmonary diseases [23,24]. Consequently, the use of cryobiopsy may result in a greater rate of successful diagnosis in intrapulmonary mature cystic teratoma [24].

Laboratory tests, including complete blood count, electrolyte levels, and coagulogram, were normal in most patients with intrapulmonary mature cystic teratomas, except for an increase in white blood cells in infected individuals [21,25]. In this case, a complete blood count revealed leukocytosis and neutrophil predominance, indicating the presence of an infection.

According to a review by Iwasaki et al., the size of an intrapulmonary mature cystic teratoma ranges from a few centimeters to 30 cm in diameter [26]. In the reviewed literature (Table 1), the majority of mature cystic teratomas are solid cystic masses with hair, bone, and fatty tissue on macroscopic examination. Moeller et al. reported that in approximately 42 % of patients, the tumors were

continuous with the bronchi and displayed an endobronchial component, resulting in hemoptysis or expectoration of hair or sebaceous material [27]. Microscopic findings revealed that the tumor contained tissues from all three germ cell layers: ectodermal (skin, sebaceous glands, hair, and teeth), mesodermal (bone, cartilage, muscle, and fat), and endodermal (respiratory epithelium, gastrointestinal mucosa, and pancreatic tissue). Malignant intrapulmonary teratomas manifest in the presence of embryonic elements, such as neural tissue [28]. In our case, the tumor consisted of fat, keratinous debris, teeth, and hair and showed a connection with the left bronchial lumen. Histopathology revealed a mature squamous epithelium with sebaceous glands admixed with gastrointestinal epithelium, pancreatic tissue, and adipose tissue. No immature tissues, such as neural tubes, immature cartilage, or other embryonic tissues, were observed. These findings were consistent with those of a mature cystic teratoma. Although our case showed characteristics of teratoma, there should be some differential diagnoses from imaging, including abscess, fungal ball, or bronchogenic cyst [7].

Mature cystic teratomas are benign tumors, and the recommended therapy is tumor resection [29]. In most of the studies reviewed (Table 1), patients were cured without complications. However, tumor rupture is a notable complication. It is hypothesized that the rupture may be caused by proteolytic or digestive enzymes secreted by the tumor [30]. In the present case, the collaborative decision-making process during the multidisciplinary team conference played a pivotal role in determining the treatment approach. Subsequent deliberations focused on weighing the risks and benefits of various treatment options, including surgical resection, chemotherapy, and other interventions. This consideration was based on the patient's overall health status, preferences, and the potential impact of treatment on their quality of life. The patient underwent left upper lobe resection with no tumor recurrence after a 3-month follow-up.

In our case, the critical role of comprehensive and interdisciplinary approaches in evaluating complex pulmonary lesions emphasized the need for collaboration between clinicians, radiologists, and pathologists to achieve accurate diagnoses and tailored treatment plans. The successful diagnosis and management of intrapulmonary teratoma remind us of the importance of considering rare differential diagnoses in evaluating cystic lung lesions. Fostering multidisciplinary collaborations and regular tumor boards can improve diagnostic certainty and optimize treatment decision-making for similar rare pulmonary diseases.

4. Conclusion

Mature intrapulmonary cystic teratomas are rare. It should be included in the differential diagnosis of all cystic lesions because of its generic clinical symptoms and radiographic findings, which may lead to misdiagnosis before surgery. A postoperative pathological investigation with radiological correlation provides a definitive diagnosis. This case report underscores the need for a comprehensive evaluation of clinical presentation, radiographic features, and histopathological findings to establish a definitive diagnosis. This approach not only minimizes the risk of misdiagnosis and inappropriate management but also promotes optimal patient outcomes through tailored treatment strategies.

Ethics statement

This case report was approved by the Faculty of Medicine, Chiang Mai University Human Research Ethics Committee (approval number: PAT-2566-0008). This research was conducted in accordance with the Good Clinical Practice (ICH GCP). In this case report, the patient was de-identified, and the need for written consent was waived after an ethics committee review. The authors obtained verbal consent from the patient via telephone.

Data availability statement

Data will be made available on request. Further inquiries can be directed to the corresponding author.

CRediT authorship contribution statement

Chanakrit Boonplod: Writing – original draft, Visualization, Resources, Methodology, Investigation, Data curation, Conceptualization. **Yutthaphan Wannasopha:** Writing – review & editing, Resources, Investigation. **Apichat Tantraworasin:** Writing – review & editing, Resources, Investigation. **Sarawut Kongkarnka:** Writing – review & editing, Supervision, Resources, Methodology, Investigation. **Komson Wannasai:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

Declaration of Ai and Ai-assisted technologies in the writing process

During the preparation of this work, the author(s) used editage (https://app.hindawi.editage.com) for proofreading and language editing. After using this service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to

influence the work reported in this paper.

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