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Case Report

Rapid growth of a mature mediastinal teratoma in a middle-aged woman: A case report

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ABSTRACT

A mediastinal mass was incidentally detected in a 42-year-old Japanese woman during a routine medical checkup. Computed tomography revealed a 7-cm, well-circumscribed multilocular cystic mass consistent with a mature cystic teratoma; however, no solid or cystic lesion had been detected at a voluntary complete medical checkup 1.5 years earlier. An anterior mediastinal tumor resection was performed, and the histopathological findings were compatible those of a mature teratoma. Although the mechanisms that underlie rapid growth of all tridermic components in a mature teratoma remain unclear, it is presumed that the mechanisms involve hemorrhage, rupture, inflammation caused by pancreatic enzymes, and estrogen hormone activity. We presented a rare case of a rapid formation of a mediastinal teratoma, which revealed that a mediastinal teratoma with all tridermic components could develop in a relatively short period.

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Introduction

Mediastinal mature teratoma, a slow-growing and benign primary germ-cell tumor, has the ability to grow rapidly in rare cases [1]. This type of tumor usually appears during the third to fourth decades of life [1]. According to previous reports, a rapid growth of teratoma is often accompanied with symptoms, which can cause complications due to the tumor [2–7]. Previous case reports [3–5] discussing rapid growth of mediastinal teratomas had indicated that they could not

detect any abnormalities in the earlier chest radiographs; however, a possibility for a small lesion that had existed already but was not detectable by radiography in the earlier stages cannot be excluded.

Here, we report a case of a patient with no symptoms who presented with a mature teratoma that was detected incidentally. By comparing recent computed tomography (CT) scans with those taken 1.5 years earlier, we confirmed rapid mass growth, which included all tridermic components and identified the teratoma as a new occupying lesion in the anterior mediastinum.

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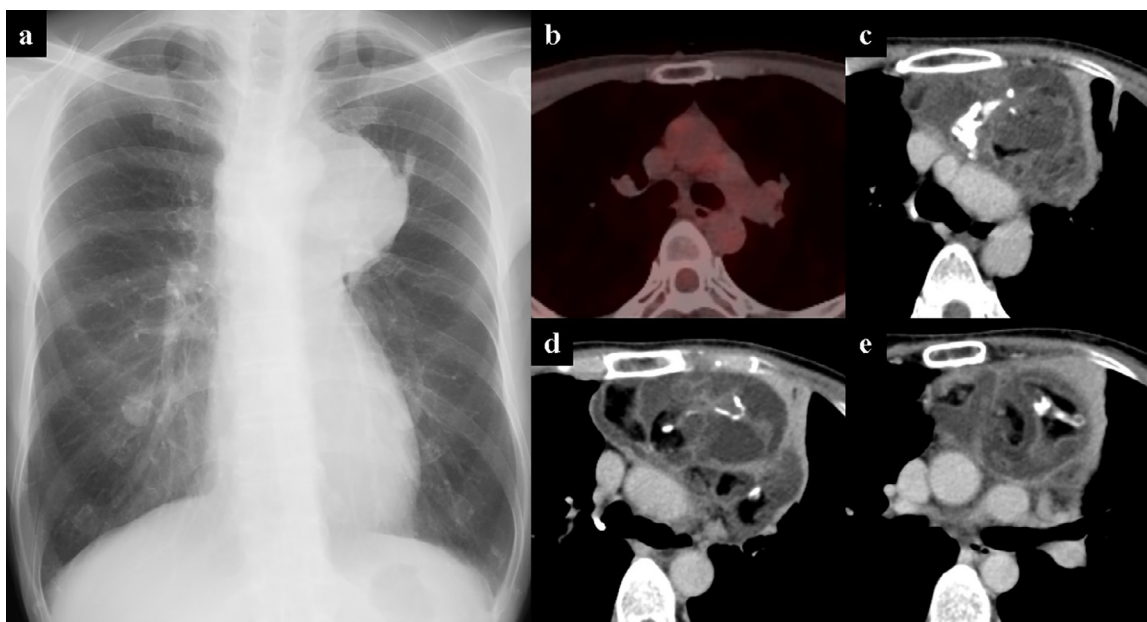


Fig. 1 – Chest radiograph and contrast-enhanced computed tomography (CT) scans of the chest obtained at the initial presentation and CT scans obtained 1.5 years earlier. (a) Chest radiograph obtained at the initial presentation shows a mass in the left hilum. (b) Axial fluorodeoxyglucose positron emission tomography (FDG-PET)/CT for a complete medical checkup 1.5 years earlier shows the absence of a solid or cystic lesion and no hypometabolic activity of the lesion is recognized in the anterior mediastinum. (c-e) Axial CT scans obtained at the most recent visit showing a 7 cm, well-circumscribed multilocular cystic mass with solid component in the anterior mediastinum. The tumor contains fluid, high fat density, and calcification. The tumor is indicated by the heterogeneous enhancement.

Case report

A 42-year-old Japanese woman was referred with a mediastinal mass, which was discovered during a routine medical checkup. She had no symptoms of neither fever, cough, dyspnea, chest pain, nor hemoptysis. She had no past medical history. She never smoked. Routine laboratory investigations were within normal limits and the levels of serum tumor markers, including squamous cell carcinoma antigen, carcinoembryonic antigen, carbohydrate antigen, neuron-specific enolase, alpha-fetoprotein, and human chorionic gonadotropin were normal. Chest CT revealed a multilocular tumor with a solid component of 7 cm in diameter in the anterior mediastinum; in addition, a mature fat component and calcification were detected in the tumor. Moreover, the adjacent left upper lung lobe collapsed partially. Contrast-enhanced CT showed a heterogeneous enhancement within the tumor (Fig. 1). Magnetic resonance imaging was performed for further investigation. The tumor mainly consisted of cystic and mature fat components (Fig. 2). No metastatic lesion was detected on the whole-body survey. The imaging findings were consistent with a mature cystic teratoma; however, fluorodeoxyglucose positron emission tomography/CT that was performed for a complete medical checkup 1.5 years earlier as an option available at additional costs for clients who

select this extra examination, revealed neither solid nor cystic lesion in the anterior mediastinum (Fig. 1b). Since the tumor appeared in a short period of time and its size was increased rapidly, the possibility of an immature teratoma was also considered. An anterior mediastinal tumor resection using a median sternotomy approach and partial lobectomy due to adhesion between the tumor and the lung were performed. Gross specimens demonstrated a $7 \times 7 \times 5$ cm yellowish solid mass with multiple cystic components. The tumor was covered with a thick fibrous wall and contained fat, hair, and calcifications (Fig. 3). Contour of the tumor was smooth and there was no evidence of rupture. Microscopically, the histopathological findings were consistent with a mature teratoma. The dermis consisted of squamous epithelium with sweat glands and sebaceous glands, central nerve fiber, bone, cartilage, smooth muscle, connective tissue, respiratory epithelium, fat tissue, intestinal epithelium, and pancreatic gland tissue (Fig. 4). The foreign granuloma and inflammatory changes with lymphocyte infiltration were also observed in some areas inside the tumor, suggesting the presence of intratumoral inflammation. Inflammatory changes were also observed in the adjacent lung tissue; however, the foreign granuloma was not detectable. Immature neuroepithelial tissue was not identified. There was no local recurrence of either lung or liver tumor during the 2 years following the surgery.

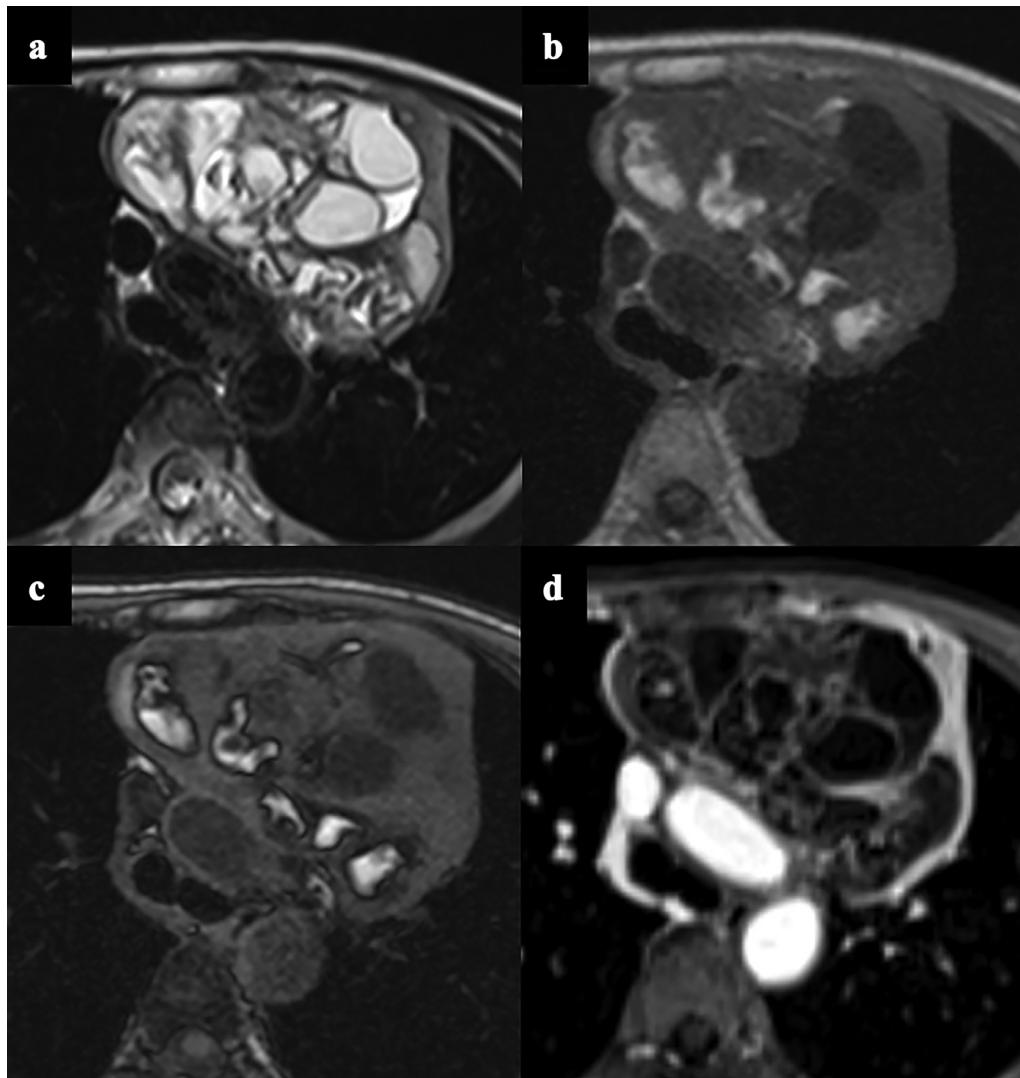


Fig. 2 – Magnetic resonance imaging of the chest. (a) T2-weighted image showing a multilocular mass with markedly high signal intensity. (b, c) T1-weighted image showing high-intensity components which present low signal intensity on T1-weighted image with fat-suppression, suggesting intracystic mature fat. (d) Contrast-enhanced MRI showing heterogeneous enhancement of the cystic wall.

Discussion

Mature teratomas are the most common histologic types of germ-cell tumors [1], and teratomas are the third-most common mediastinal tumors that typically occur during the third to fourth decades of life with approximately equal frequency in men and women [1,8]. Histologic examination of mature teratomas reveal malignant transformation in less than 1% of cases, which is usually characterized by malignant degeneration of the squamous epithelium [1]. It is believed that these lesions consist of primordial germ cells which stray into midline extragonadal areas on migration during embryonic development [9].

Most patients with teratomas in the mediastinum are asymptomatic and therefore, these neoplasms are usually discovered incidentally [10,11]. The patient may present with

symptoms such as chest pain, hemoptysis, dyspnea, fever, and pleural effusion related to compression of neighboring organs, and rupture [12–15].

Mediastinal mature teratomas typically manifest on CT as a heterogeneous anterior mediastinal mass containing soft-tissue, fluid, fat, or calcium attenuation, or any combination of the 4. Fluid-containing cystic components with fat and calcification occur frequently. Cystic lesions without fat or calcifications were seen in 15% of tumors [16]. According to the previous study by Moeller [16], soft-tissue attenuation was observed in 100%, fluid in 88%, fat in 76%, and calcifications in 53% of the patients.

Our literature search resulted in 6 case reports that described rapidly growing mature teratomas [2–7], and we evaluated the clinical features described in these cases. This group consisted of 3 men and 3 women with a mean age of 20 years (range, 11–35). All 6 patients presented with symptoms, such

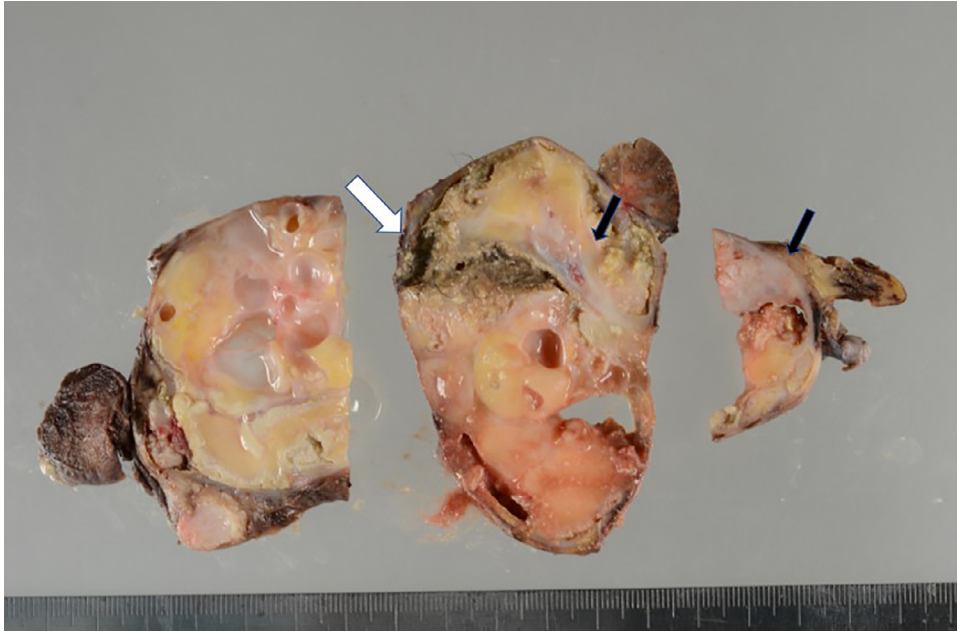


Fig. 3 – Sectioned gross specimen. Gross specimens demonstrating a 7 × 7 × 5 cm yellowish solid mass with multiple cystic components and covered with thick fibrous wall and contains fat, hair (white arrow), and calcifications (black arrow).

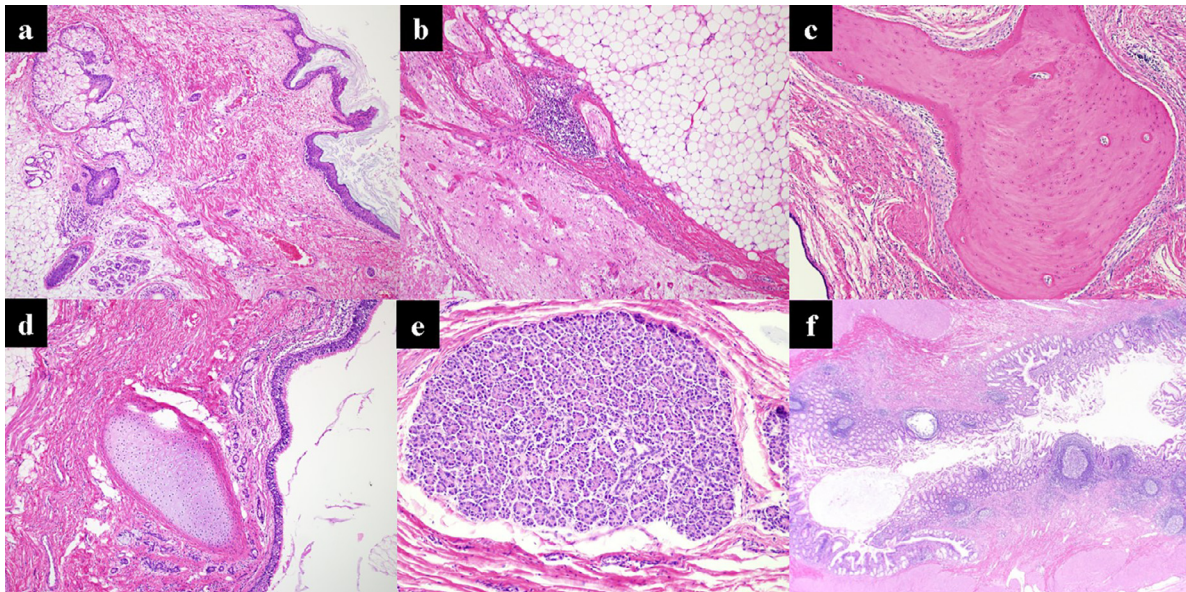


Fig. 4 – Histopathological findings of the tumorous surgical specimen. Hematoxylin and eosin staining. Lower magnification (40 x) of the tumor shows skin, sebaceous glands, and connective tissue (a), central nerve fibers and fat tissue, bone (c), and cartilage (d), and pancreatic tissue (e). (f) Loupe image of the tumor shows intestinal epithelium. (g) Higher magnification (100x) of the adjacent lung structure shows the foreign granuloma and inflammatory changes with lymphocyte infiltration in some areas inside the tumor. (h) Inflammatory changes were also observed in the adjacent lung tissue; however, the foreign granuloma had no changes.

as chest pain, chest discomfort, dyspnea, and cough. Although three case reports did not mention tumor sizes, in the remaining 3 cases resected tumors ranged in size from 12 to 20 cm in diameter. The median increase in time was 14 months (range, 5 days-3 years). In 3 cases, the previous chest radio-

graphs that were performed approximately 1 year before the initial visit, showed no obvious abnormal lesions. However, a possibility for a small lesion that had already existed and was undetectable by the initial radiographic examination, cannot be excluded. Tumors were detected as a large cystic masses

in 2 cases, and as multilocular masses with solid components in 4 cases according to the published images. A rapid increase in mediastinal teratoma sizes that occurred as early as within 14 months was observed mainly in young adults, and clinical symptoms and cystic changes in the tumors were observed in all cases.

These previous reports estimated the mechanisms that controlled rapid growth of the teratoma in the mediastinum which included hemorrhage [2], inflammation caused by pancreatic enzymes [4,5,7], rupture [4,17], and estrogen hormone activity [3]. Some researchers considered pancreatic enzymes as a cause of inflammation, which resulted in tumor enlargement, as observed in previous reports [4,5,7]. Several factors have been suggested as a cause of rupture: ischemia and necrosis due to tumor enlargement, infection, and inflammation caused by sebaceous materials or digestive enzymes including amylase derived from tumors [17]. In addition, sweat and sebaceous secretion of the skin, secretion of the respiratory epithelium, exocrine secretion by the salivary and secretion of intestinal tissues also occur in the tumor – all these may result in increase in size in the cystic components. In the present case, due to the inflammatory changes observed in the resected tissue and adjacent lung tissue, we speculated that pancreatic or digestive enzymes might partially affect inflammation and cause the rapid growth of the tumor. In many parts of the body, development of a teratoma or dermoid cyst with rapid growth were reported [18]. According to the previous literature reports on ovarian dermoid cysts, estrogens stimulate sebaceous tissues within the cysts, which influences the growth rate [19,20]. The exact mechanisms of the rapid growth of all tridermic components in a mature teratoma are not known; however, it is presumed that various factors such as those mentioned above are involved. Although it is believed that teratomas consist of primordial germ cells which deviated into midline extragonadal areas while migrating during embryonic development [9], there are a few reports discussing the *de novo* growth of a teratoma in patients [18,21].

This is a rare case that confirmed a rapid growth of all tridermic components in a teratoma without any indication of an occupying lesion in the anterior mediastinum on a CT performed 1.5 years earlier. In conclusion, mature mediastinal teratomas can occasionally grow rapidly in relatively short periods.

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