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Mediastinal Metastasis of Breast Cancer Mimicking a Primary Mediastinal Tumor

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection GABCDEF 1 **Takashi Yamashita**BCDEF 2 **Mana Watahiki**DE 1 **Katsuyuki Asai**

1 Division of General Thoracic Surgery, Hamamatsu Medical Center, Hamamatsu, Shizuoka, Japan

2 Division of Breast Surgery, Hamamatsu Medical Center, Hamamatsu, Shizuoka, Japan

Corresponding Author:

Takashi Yamashita, e-mail: takashiyamashita.md@gmail.com, t.yamashita@hmedc.or.jp

Conflict of interest:

None declared

Case series**Patients:****Female, 48-year-old • Female, 47-year-old****Final Diagnosis:****Metastatic breast cancer****Symptoms:****Edema of left upper limb • no symptom****Medication:**

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Clinical Procedure:**Median sternotomy • small incisional biopsy****Specialty:****Surgery****Objective:****Challenging differential diagnosis****Background:**

Breast cancer is becoming a common disease in women. It progresses slowly and may recur after a long time. Therefore, when a tumor is found in the chest of a patient with a history of breast cancer, an immediate concern is whether it is a primary tumor or a metastatic tumor. However, mediastinal metastasis is extremely unlikely to occur before lung metastasis, and breast cancer is not likely to have a solitary mediastinal metastasis. Additionally, patients should not undergo invasive procedures unnecessarily, so careful consideration is required.

Case Reports:

We present 2 cases. In case 1, a 48-year-old woman with a history of breast cancer had a mediastinal tumor. Based on imaging findings, cystic thymoma was suspected. Thoracoscopic intraoperative rapid biopsy showed a lymphocyte-predominant tumor tissue; therefore, the tumor was resected via a median sternotomy. The final pathological diagnosis was breast cancer metastasis. In case 2, a 47-year-old woman who underwent breast cancer resection 15 years earlier was referred for upper limb edema. Based on imaging findings, a left mediastinal vein occlusion due to mediastinal tumor was diagnosed. Our experience in case 1 suggested that a biopsy alone should be performed first. A tumor biopsy was performed through a small transverse neck incision in case 2, and the final diagnosis was metastatic breast cancer of the mediastinum.

Conclusions:

In patients with a suspected primary mediastinal tumor on imaging, the possibility of a metastatic tumor should be considered if they have a history of breast cancer, regardless of how long in the past it was.

MeSH Keywords:**Breast Neoplasms • Mediastinal Neoplasms • Thymoma • Thymus Neoplasms**

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Background

Breast cancer is becoming a common disease in women, and it can affect the clinical course in other systems. When a tumor is found in the chest, an immediate concern is whether it is a primary tumor or a metastatic tumor. The patient's history can be suggestive of the tumor's origin, and if the patient has a history of malignant tumor, it is natural to consider the possibility of metastatic tumor. However, if considerable time has passed since the last treatment for the previous cancer, it is less likely that the lesion will be considered metastatic. We believe that patients should not undergo invasive treatments unnecessarily yet should not lose an opportunity for treatment or a cure. As more patients with a history of breast cancer survive longer, the more difficult the disease will be to treat.

We report a case of a patient with metastatic mediastinal breast cancer for whom medical treatment was difficult and another case in which treatment was informed by experiences in the previous case. Our report presents 2 cases of mediastinal tumor and treatment strategies for patients with a history of breast cancer.

Case Reports

Case 1

A 48-year-old Asian woman received a diagnosis of stage IV cancer of the right breast with lumbar metastasis 3 years prior to presentation. A right mastectomy and axillary dissection were performed after preoperative chemotherapy (3 cycles of

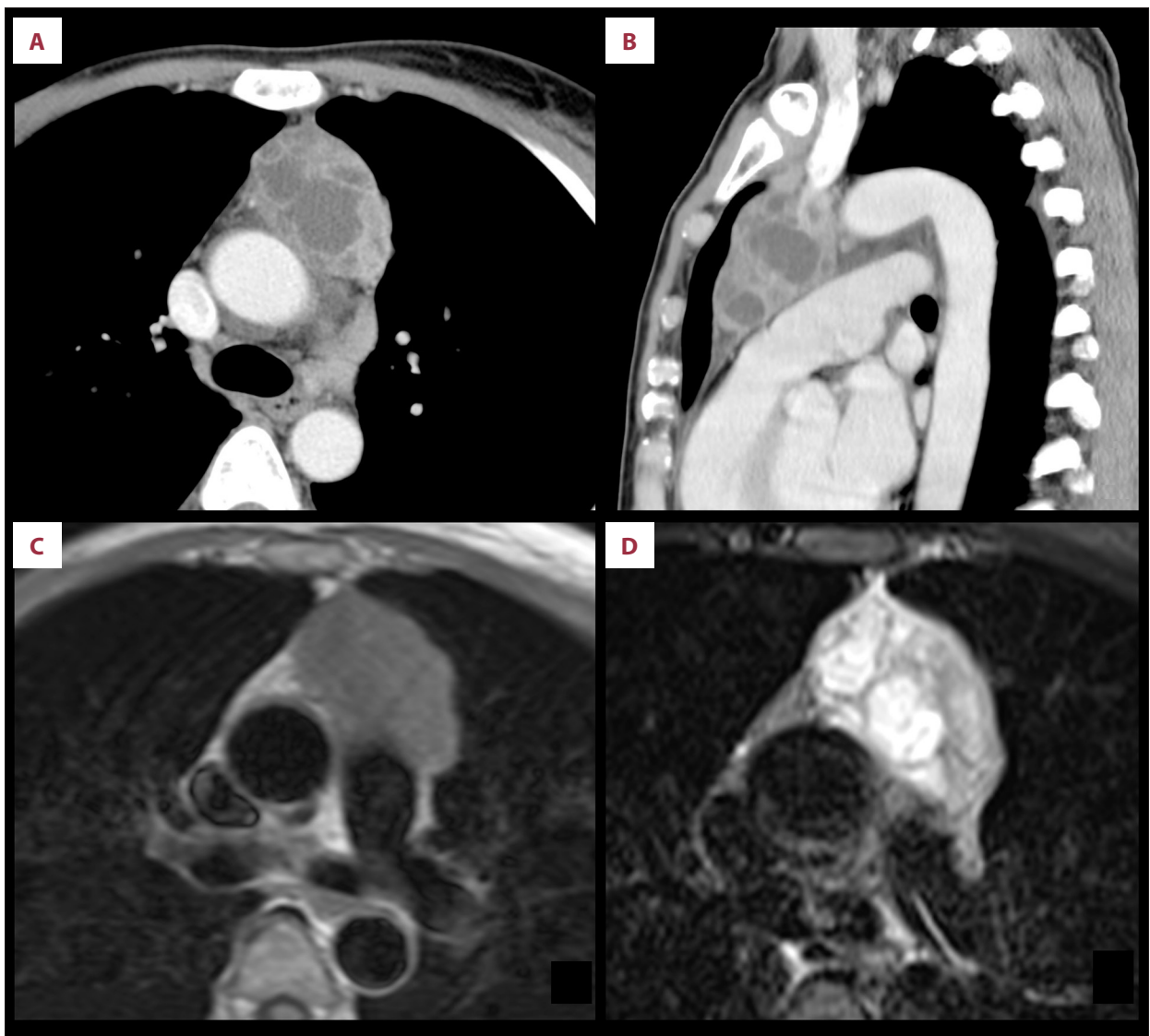


Figure 1. Case 1. Enhanced computed tomography images (A, B) and magnetic resonance imaging (C, D) show a cystic mediastinal tumor. The T2-weighted image (D) shows thick-walled internal septa that contain fluid.

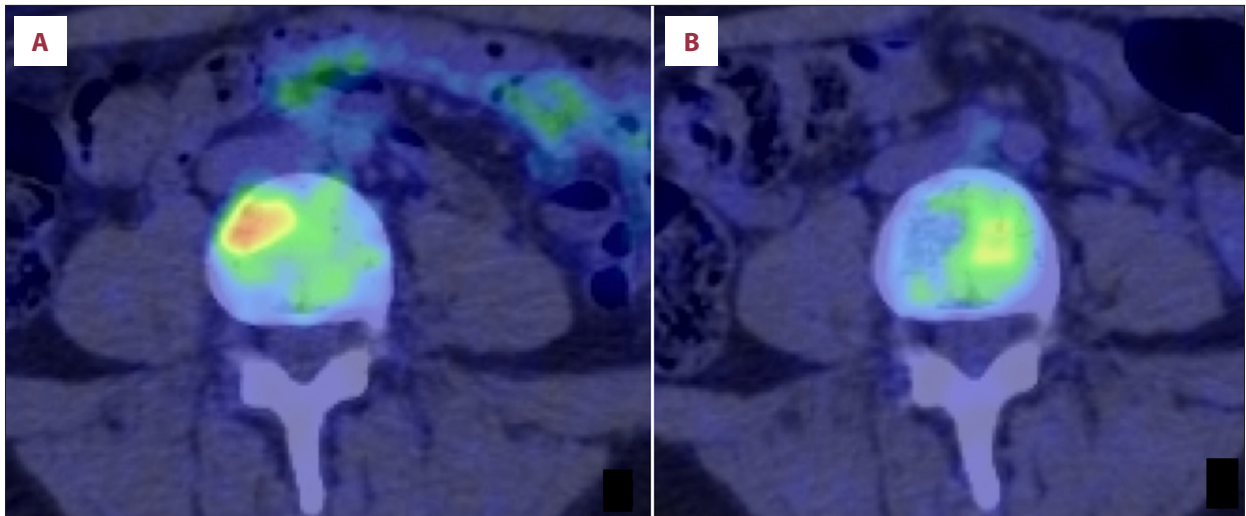


Figure 2. Positron emission tomography-computed tomography (PET-CT) of case 1. [18F] 2-Fluoro-2deoxy-D-glucose accumulation that was visible on PET-CT before the treatment (A) had disappeared (B).

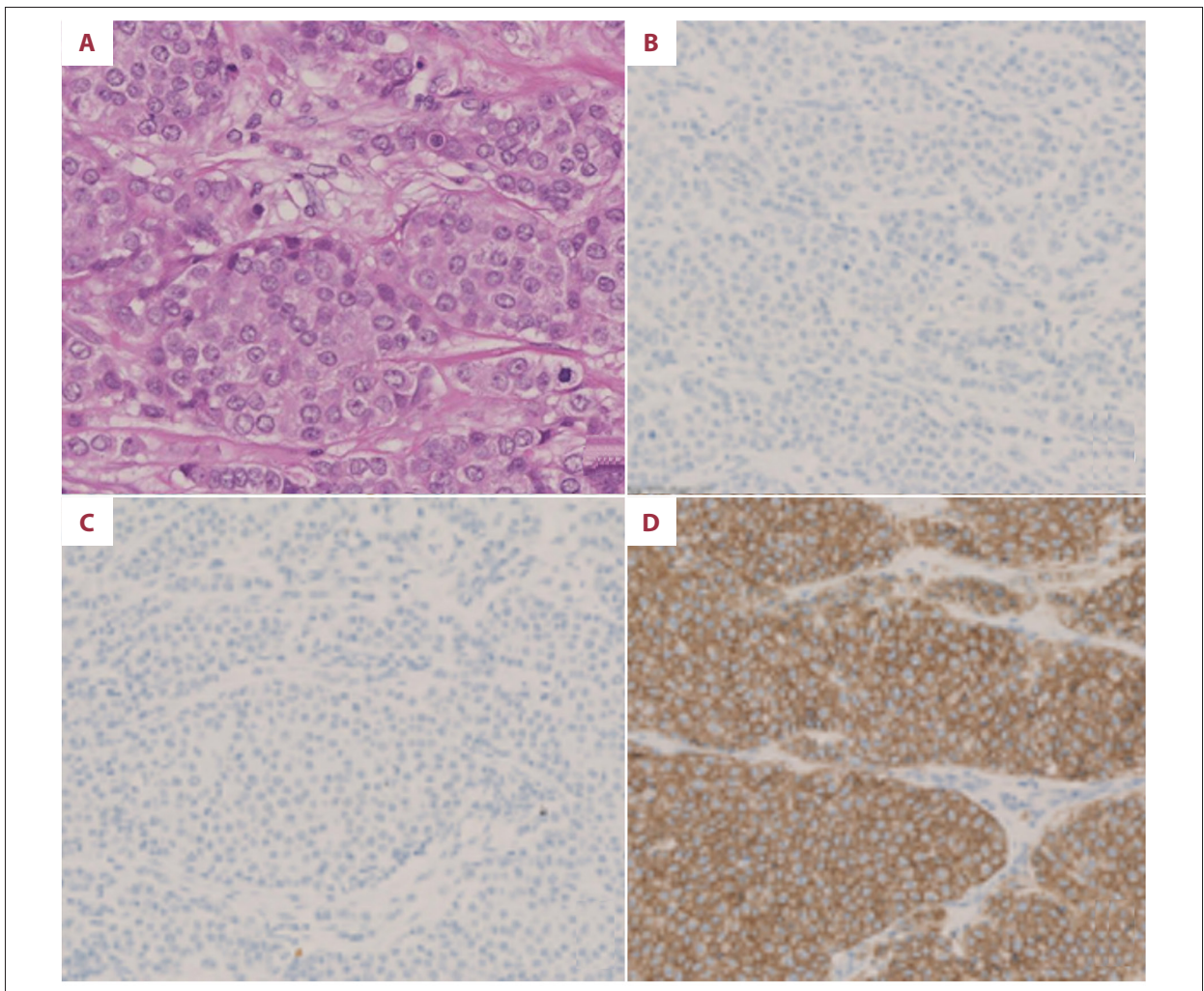


Figure 3. Pathological findings of case 1. The tumor was identified as adenocarcinoma (A). Immunostaining was negative for estrogen receptor (ER) (B) and progesterone receptor (PR) (C), and positive for human epidermal growth factor receptor 2 (HER2) (D).

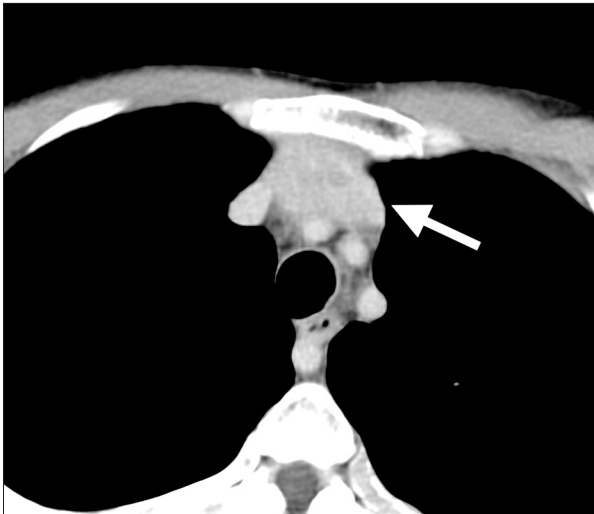


Figure 4. Case 2. Enhanced computer tomography image shows a mediastinal tumor (arrow). The tumor invaded the left brachiocephalic vein, and thrombotic occlusion can be seen in the image.

epirubicin/cyclophosphamide [EC] 100 mg/m² and 3 cycles of docetaxel 60 mg/m²) in the previous hospital. The tumor was invasive ductal carcinoma, locus C. It was strongly positive for human epidermal growth factor receptor 2 (HER2) and negative for estrogen receptor (ER) and progesterone receptor (PR). The patient received adjuvant chemotherapy (3 cycles of EC 80 mg/m², triweekly trastuzumab for 19 cycles, and 5'-deoxy-5-fluorouridine 600 mg/d for 5 months). The patient was a hepatitis B carrier. She did not have a history of cigarette, alcohol, or illicit substance use.

The patient was referred to our hospital after she noticed edema in her upper and lower limbs and underwent chest imaging that revealed a cystic thymoma (Figure 1). The lumbar metastatic lesion was judged to be controlled because [18F] 2-fluoro-2-deoxy-D-glucose accumulation on positron emission tomography-computed tomography before treatment had disappeared (Figure 2), and breast cancer markers were not elevated. Whole-body analysis revealed a nodule suspected to be a metastatic liver tumor in the right lobe. Based on biopsy, it was diagnosed as breast cancer metastasis.

It had not metastasized from the mediastinal tumor, so we decided to perform a surgical intervention for the mediastinal tumor because it was suspected to be a primary lesion. We planned to conduct an intraoperative rapid diagnosis of the mediastinal tumor and to resect it if the diagnosis supported that it was a primary tumor.

Surgery and pathological results

Thoracoscopic biopsy was performed. Rapid diagnosis revealed a lymphocyte-predominant tumor tissue, which could

not be used to differentiate between lymphoma and lymphocytic thymoma. The operation was continued because the tumor was clinically likely to be a thymoma. Initially, the operation was performed under thoracoscopy, but the tumor was invading the left brachiocephalic vein and left phrenic nerve. Therefore, open resection was performed by switching to median sternotomy. The patient was discharged on postoperative day 10 without any complications. The tumor was identified as adenocarcinoma and was strongly positive for HER2 and negative for ER and PR, which mirrored the primary lesion (Figure 3). The final diagnosis was metastatic breast cancer of the mediastinum.

Systemic treatment was considered necessary because of remaining metastatic lesions in the liver, but the patient refused treatment and interrupted consultation. We ultimately lost contact with her.

Case 2

A 47-year-old Asian woman presented with a medical history including breast cancer. She was a former smoker with 100 pack-years, and she drank alcohol occasionally. She had no history of illicit substance use. Fifteen years earlier, she received a diagnosis of stage I cancer of the right breast and underwent right partial mastectomy and axillary dissection. The tumor was papillotubular carcinoma. It was positive for ER and PR and negative for HER2. The patient received postoperative radiotherapy and endocrine therapy (goserelin for 2 years and tamoxifen for 5 years). At the final consultation 5 years prior to her current presentation, she showed no recurrence.

She was referred to the outpatient department because she was experiencing left upper limb edema and precordial pain. An anterior mediastinal tumor was found to be invading the left brachiocephalic vein directly and causing a thrombotic occlusion (Figure 4). Among laboratory tests, only the CA15-3 level was slightly elevated (41.2 U/mL). Resection was not the first choice of treatment even if the tumor was a primary tumor. Additionally, based on case 1, we viewed a minimally invasive diagnostic modality as being paramount; therefore, we planned a biopsy first.

Surgery and pathological results

A tumor biopsy was performed through a small transverse neck incision, and rapid diagnosis only confirmed the presence of the tumor tissue. The patient was discharged on postoperative day 2 without any complications. The tumor was an adenocarcinoma that was positive for ER and negative for PR and HER2 (Figure 5), and the final diagnosis was metastatic breast cancer of the mediastinum. The patient received endocrine therapy (goserelin and tamoxifen) for 1 year, but progressive

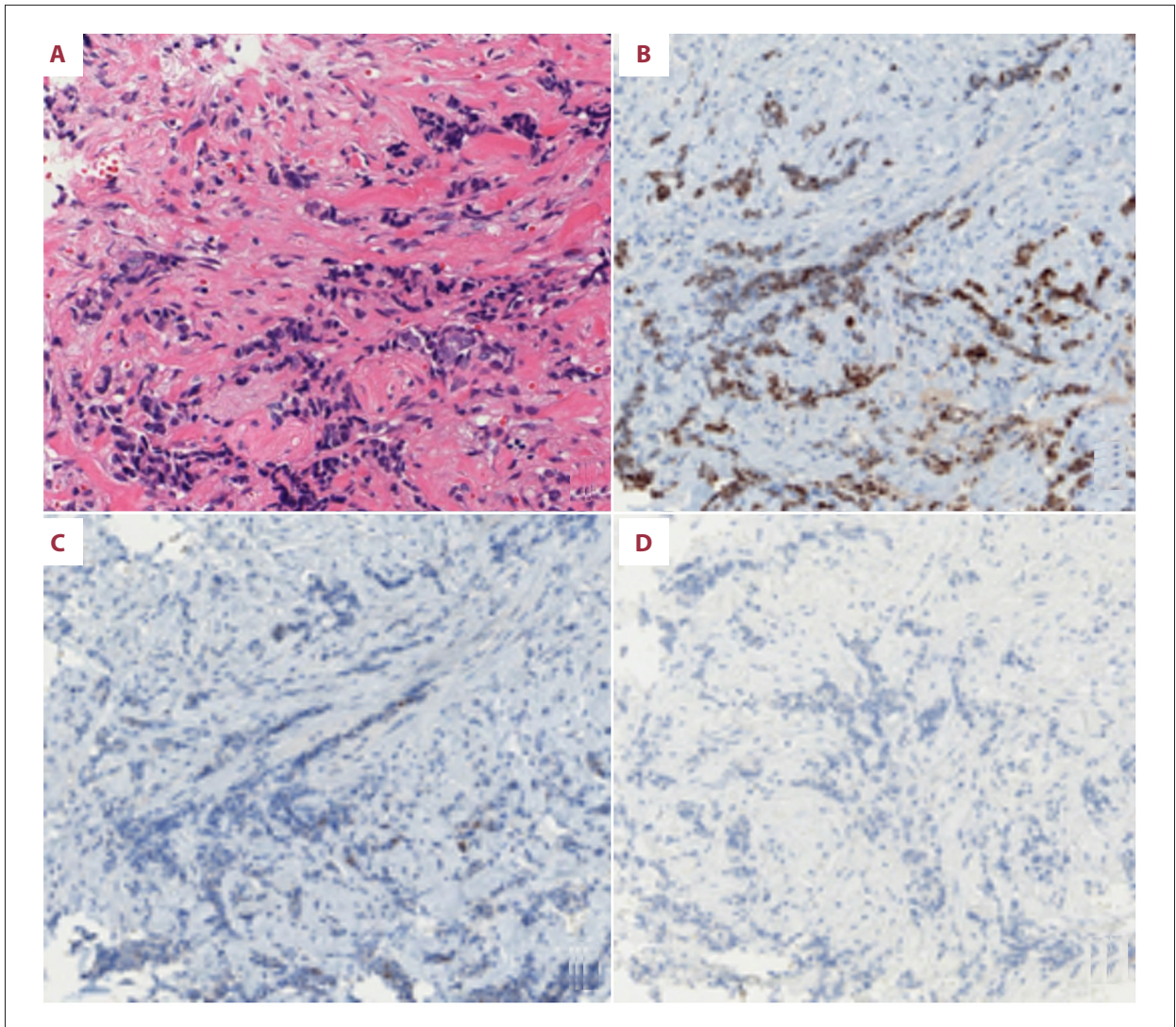


Figure 5. Pathological findings of case 2. The tumor was an adenocarcinoma (A). Immunostaining was positive for estrogen receptor (ER) (B), and negative for progesterone receptor (PR) (C) and human epidermal growth factor receptor 2 (HER2) (D).

disease then developed. The patient's treatment regimen was changed to goserelin, fulvestrant, and palbociclib. She is currently continuing this treatment, 16 months after the biopsy.

Discussion

Hess et al. [1] reported that 6% of breast cancers metastasize to the mediastinum and then to the axillary lymph nodes, bone, liver, lungs, sternoclavicular lymph nodes, brain, and pleura. The mediastinum is a less common metastatic site for breast cancer, but 11% of metastatic tumors in the mediastinum are breast cancers, followed by lung and kidney cancers [1]. In addition, the postoperative recurrence rate of breast cancer is 4.4% after >10 years [2], and according to Japanese statistics, 0.1% after >20 years [3]. Recent improvements in

treatment outcomes suggest that recurrence can occur over a longer period. Given the low frequency of primary mediastinal tumors, breast cancer metastasis should be considered if the patient has a history of breast cancer. If breast cancer has also spread to other organs at the same time, especially to the lung, a mediastinal tumor is more likely to be breast cancer [4]. In these cases, the treatment should be as minimally invasive as possible. Although breast cancer does metastasize to the mediastinum, solitary mediastinal metastases are rarely reported [5] and differential diagnosis from primary mediastinal tumor will be difficult.

If the relapse is in the form of mediastinal oligometastasis, it remains unclear whether resection is the appropriate action to take. However, it has been reported to be effective [6], which should be taken into account.

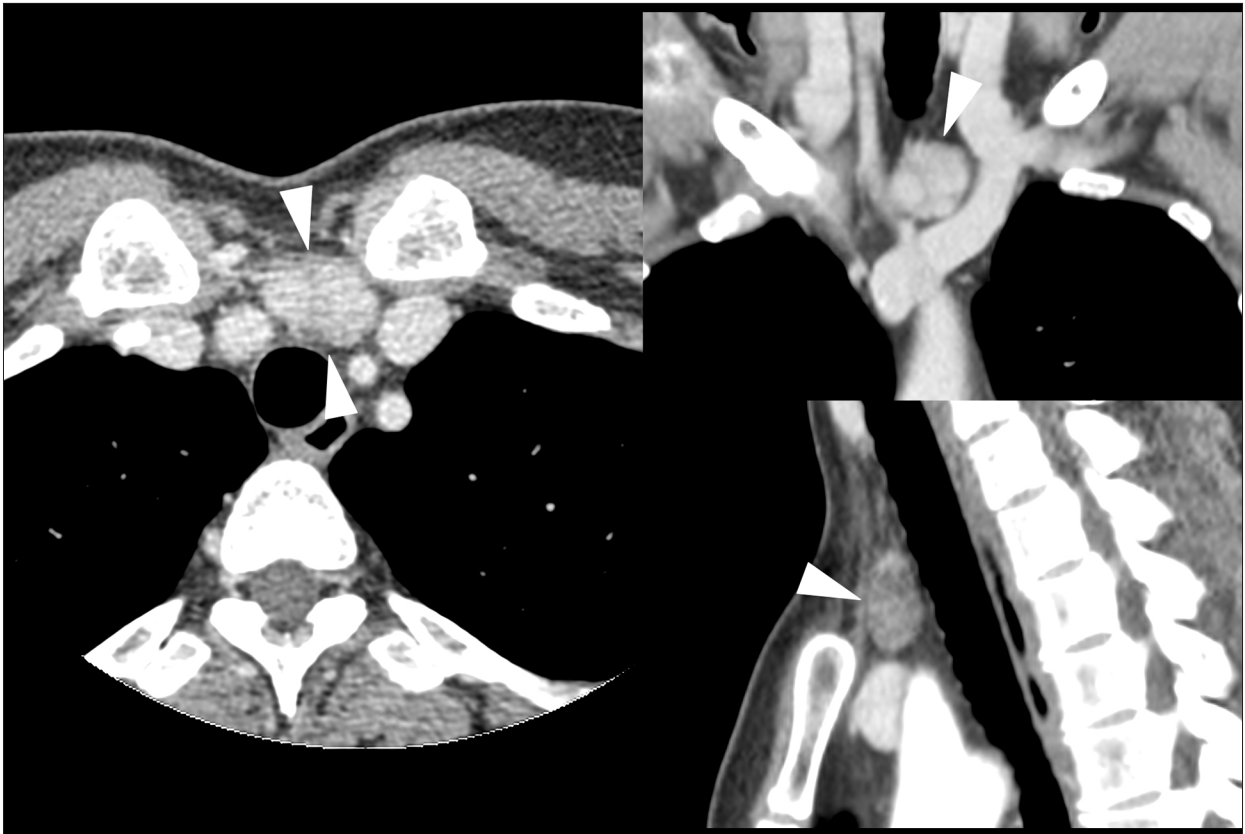


Figure 6. Additional case. Enhanced computer tomography image showing a tumor that was 3 cm in size in the superior portion of the mediastinum (arrow head). It appeared to be metastasis of breast cancer rather than thymoma.

In another case in our experience, which involved a 47-year-old woman with a diagnosis of stage I cancer of the right breast, chest imaging at the time of diagnosis revealed a mediastinal tumor in the superior portion of the mediastinum (Figure 6). We performed tumorectomy through a small transverse neck incision. Although thymoma rarely occurs in the superior portion of the mediastinum [7], the final pathological diagnosis was in fact thymoma, in contrast to the 2 cases presented in the current report. Consequently, we note that a history of breast cancer does not seem to preclude the possibility of thymoma occurring. In any case, it is important to avoid unnecessary

invasive procedures and their postoperative disadvantages in patients with metastatic breast cancer of the mediastinum.

Conclusions

In patients suspected to have a primary mediastinal tumor on imaging, the possibility of metastatic tumor should also be considered if the patients have a history of breast cancer, regardless of how long in the past it was.

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