

Rapidly Growing Chest Wall Lipoma: Case Report and Calculating Volume Doubling Time

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ABSTRACT

Chest wall lipoma is a rare disease that might be asymptomatic and discovered incidentally. Chest wall lipomas are presumed to grow slowly, but no reports have evaluated the tumor volume doubling time (TVDT). The present study herein reports the case of a 35-year-old female patient with a relatively fast-growing chest wall lipoma.

Lipomas have their characteristic shape and grow very slowly, so they are rarely completely resected, even though they are monitored and repeated imaging studies are performed. Homogeneous very low density, clear margins, and no invasion to the surrounding structure are characteristic finding on imaging, but some patients without these characteristics here have been reported here. As there has been no report of TVDT for chest wall lipoma, comparison was not possible, but TDVT for lipoma in this patient ranged from 235-412 days. Compared with reports that patients with non-small cell lung cancer showed TVDT of less than 450 days, TVDT in the patient described here did not appear to be slow. Accumulation of knowledge about this rare disease will help to elucidate it further.

Keywords: lipoma, chest wall, liposarcoma, tumor volume doubling time, computed tomography.

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INTRODUCTION

Lipomas are benign tumors arising from soft tissues throughout the body. It occurs subcutaneously in most patients. Lipomas originate in the chest wall or pleura and rarely grow further within the thorax (1-6). Eppler *et al* reported that the frequency of lipomas originating in the chest wall and growing within the thorax was 6 (0.15%) out of 4,000 chest computed tomography (CT) screened cases (5). Liposarcoma is diagnosed when lipoblasts are mixed in with mature adipocytes, but it is difficult to distinguish it from benign lipoma only by imaging (1). Although liposarcoma originating from the chest wall is also rare (7-10), it should be differentiated from liposarcoma if it shows continuous growth. Although there are reports of patients with primary chest wall lipoma that formed a heterogeneous huge mass at the time of discovery (6), there were no reports of primary chest wall lipoma in which tumor volume doubling time (TDVT) was examined. Here, we report a patient in whom serial CT scans were performed due to a chest wall lesion that grew over time and, as a result, the TDVT could be examined. □

CASE REPORT

A 35-year-old woman was referred to our hospital due to abnormal opacity detected at an annual mass-screening. She had no sign and symptoms. She never smoked and had no history of chest trauma. Chest CT revealed a homogeneous of fat density measuring 18.1 x 10.1 mm on the left chest wall (Figure 1-A). There was no heterogeneous structure within the opacity, the margin was clear, and there was no infiltration into the surrounding structure. Since the possibility of lipoma was high on the images and the patient did not wish to have a resection, we decided to follow up with CT images. A chest CT scan six months later showed that the chest wall nodule had enlarged to 20.2 x 14.1 mm, although the opacity remained unchanged. The chest wall nodule to be enlarged to 21.9 x 16.4 mm in a CT scan taken 12 months later. Magnetic resonance imaging (MRI) and 18F-fluorodeoxyglucose (FDG)-positron emission tomography were performed because nodule enlargement was observed on CT. In MRI, a homogenous

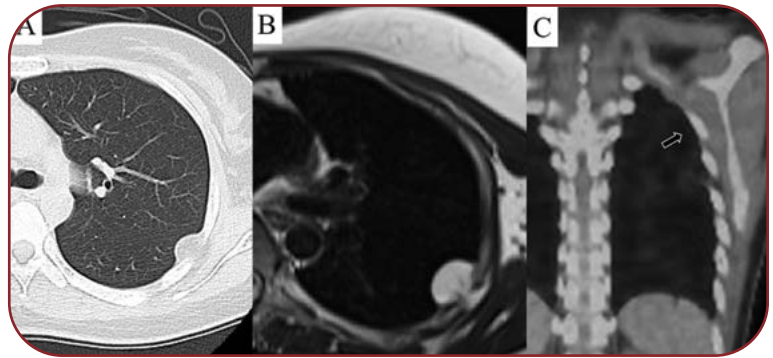


FIGURE 1. Chest CT scan taken at the time first presentation (A); MRI taken 12 months after the first presentation (B); and FDG-PET showing no FDG accumulation of chest wall lipoma (arrow, C)

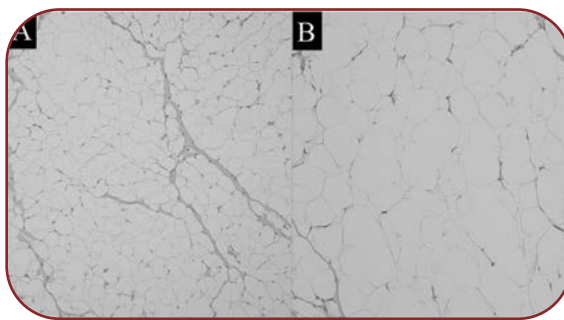


FIGURE 2. Pathological findings of the resected tumor: it consisted only of mature adipocytes, with no atypical adipocytes or adipocytes exhibiting cell cleavage; (A) low magnification (x100); and (B) high magnification (x200)

high-intensity area similar to adipose tissue on T2-weighted image (Figure 1-B), and the nodule had no FDG uptake (Figure 1-C). However, the chest wall nodule further enlarged to 25.3 x 16.9 mm, but the opacity was unchanged in a CT scan taken 17 months after the initial presentation. There were no subjective symptoms from the first visit to that time. We evaluated that the increase between 12 and 17 months after the first visit was more pronounced than before (Figure 2). After further consultation with the patient, we decided to perform resection in order to clarify whether or not there was a mixture of areas showing liposarcoma.

Under general anesthesia, three-port video-assisted thoracic surgery was performed. The nodule had no adhesions to the lung, and it was resected as an en bloc without resecting the ribs. Pathologically, only mature adipocytes were observed, and there were no atypical fat cells or adipocytes showing cell cleavage (Figure 2). Since the resected specimen margin was suffi-

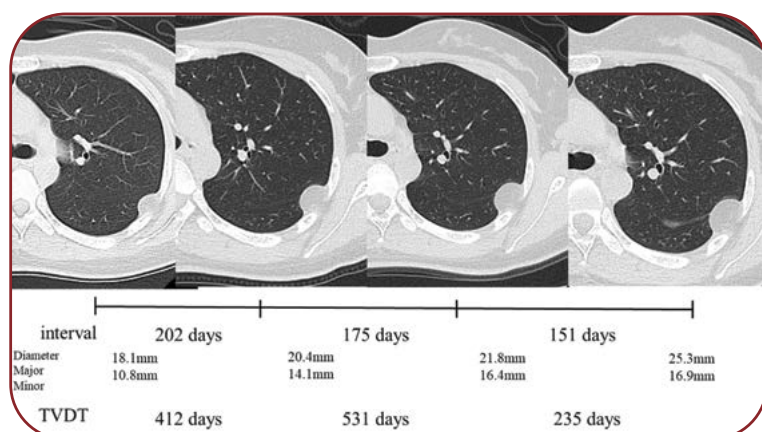


FIGURE 3. Chest CT scans taken several times of the clinical course of the patients, CT scan interval, and tumor volume doubling time calculated using Schwartz formula

ciently far from the nodule, it was judged to be a complete resection. Pathologically, it was confirmed to be a primary lipoma of the chest wall. The postoperative course was good.

The TVDT was calculated based on chest CT scans that were recorded four times during the clinical course, using a modification of the following Schwartz formula of exponential growth (11), where V1 and V2 were the largest diameters on the CT scan measured at two different times, and it was the time interval between two measurements: $TVDT = (tx \log 2) / [3 \times \log (V2/V1)]$. The TVDT of the chest wall lipoma in this patient is shown in Figure 3. It was calculated as 235–412 days. □

DISCUSSION

In CT scan, lipomas are usually homogeneous low density opacities with a smooth margin, and their CT value of -50 to -150 HU (1, 3). Although only a case, however, a patient with chest wall lipoma with linear opacities has been reported despite being predominantly fat dense (6). On MRI, lipomas are reported to have homogeneous high-intensity areas similar to adipose tissue on T1- and T2-weighted images (12). On the other hand, liposarcoma shows vague borders and heterogeneous internal density and often presents septums inside the tumor on CT examination (3, 4, 7, 13, 14). However, an exception has been reported in a patient with liposarcoma without involvement of surrounding tissue (7). The CT value of liposarcoma was around -20 to -40 HU, and the internal concen-

tration was evaluated to be slightly higher than that of lipoma (9). There was also an exception to this, and a patient with homogeneous density well-differentiated liposarcoma with CT values ranging from -120 HU to -109 HU was reported. (2). In MRI of liposarcoma, thick septa and nodular structures mainly showed low signal on T1-weighted and T2-weighted images, and these structures were evaluated to have a contrast-enhancing effect (15). FDG-PET is also useful for differentiation, but there is a case report of a patient diagnosed with liposarcoma despite having a low SUV value (16). Based on these results, provisional diagnosis may be possible, but when lipoma is suspected, it may be necessary to observe changes in imaging over time. In other words, even with advances in diagnostic imaging technology, we have no choice but to conclude that at present it is difficult to completely distinguish between lipoma and liposarcoma by diagnostic imaging. The pathological findings of well-differentiated liposarcoma are characterized by the presence of stromal cells with atypia along with the predominantly mature adipocytes (3, 4, 17). Therefore, definitive diagnosis of lipoma should be made pathologically at the cellular level, and it is necessary to pathologically evaluate not only a part of the tumor but the whole tumor.

In addition to morphological features, many patients with liposarcoma have a chronological feature of rapid growth, and TVDT has been investigated (18-21). It should be noted that most of the numerical values are calculated based on Schultz formula (18-21), assuming that the tumor grows while maintaining a nearly spherical shape. It is presumed that TVDT varies depending on the degree of differentiation, malignancy, and site of occurrence (20, 21). Median TVDT for liposarcoma has been reported in several case reports, ranging from eight to 25 days, and generally less than 200 days (18-21). On the other hand, in the report that measured the TVDT for lipoma, as far as we could search in the literature, there was only one case of primary renal angiomyolipoma, and the TVDT was 231-675 days (22). To our best knowledge, there have been no reports of measuring TVDT in lipoma originating from the chest wall. The median TVDT in 140 lung adenocarcinoma and 44 lung squamous cell lung cancer that we previously examined using screening data was 177

and 133 days, respectively (23). Five percent and 2.3% of patients had a TVDT greater than 400 days, respectively (23). Lillington noted that the VDTs of most benign pulmonary nodules were more than 450 days (24), whereas those of malignant lesions were usually less than 400 days. Spratt *et al* reported that a tumor with a VDT slower than 500 days was usually benign (25). In comparison with these results, the TVDT of this chest wall lipoma patient was evaluated as a benign tumor, but it was by no means a long TVDT.

If there are no morphologically characteristic findings of liposarcoma on CT or MRI images, in many cases tissue sampling and resection are not performed, although reexamination such as CT is performed over time. In such cases, many patients will not have a pathological definitive diagnosis of lipoma. This situation is presumed to be the reason why there have been no reports on TVDT measurement for lipomas. In the patient described here, the enlargement occurred over time, and although the image findings were morphologically typical of lipoma, resection was performed, and the pathological diagnosis was confirmed, and TVDT was able to be measured.

CONCLUSION

We reported a case of chest wall lipoma that was detected of growth over time on chest CT. It should be noted that some lipoma patients show an increase in TVDT, although not as rapidly as in liposarcoma. The cut-off value of TVDT that is useful for differentiating lipoma from liposarcoma is unknown, but accumulation of clinical information may be useful. ■

Statement of ethics: This study was approved by the institutional ethics committee of our institute (NO 1639). Written comprehensive informed consent at the time of admission for obtaining pathological specimens was obtained from the patient.

Conflicts of interest: none declared.

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Authors' contributions: MU, TK and HS designed the study; MU, TK, KI, NT and HS collected the data; MU, TK, SO and HS analyzed the data; and MU, TK and HS prepared the manuscript. All Authors approved the final version for submission.

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