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Case report

Recurrent intrathoracic dedifferentiated liposarcoma: A case report and literature review

Umair Ashraf[a], Rizwan Ahmed Dudekula[a], Swathi Roy[b], Joshua Burack[c], Sandeep Malik[d], Misbahuddin Khaja[a,*]

[a] Division of Pulmonary and Critical Care Medicine, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, 1650 Grand Concourse, Bronx, NY 10457, USA
[b] Department of Medicine, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, 1650 Grand Concourse, Bronx, NY 10457, USA
[c] Department of Surgery, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, 1650 Grand Concourse, Bronx, NY 10457, USA
[d] Division of Hematology and Oncology, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, 1650 Grand Concourse, Bronx, NY 10457, USA

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ABSTRACT

Background: Liposarcoma (LPS) is the second most common type of soft tissue sarcoma, accounting for approximately 15–20% of all the sarcomas. Primary intrathoracic LPS, however, is quite rare. LPS is a malignant mesenchymal tumor, comprised of lipogenic tissue with varying degrees of atypia. It can be subclassified into well-differentiated LPS (WDLPS), myxoid LPS (MLPS)/round cell LPS, pleomorphic LPS (PLPs), and dedifferentiated LPS (DDLPS), based on the histology.

Case presentation: A 76-year-old male patient initially presented to the emergency room with a complaint of precordial chest pain for one month. Computed tomography (CT) of his chest showed a large, 8 cm × 8 cm x 10 cm, supradiaphragmatic, complex solid mass in the lower left hemithorax, along the anterior chest wall. Chest wall mass excision revealed dedifferentiated LPS, with excision of margins. Positron emission tomography (PET) scan did not show metastatic disease. Seven months later, he presented with shortness of breath, and CT of the chest showed large, left pleural-based masses, causing compression of surrounding structures. He was not a candidate for surgical resection. This patient subsequently failed chemotherapy and opted for hospice.

Conclusion: Intrathoracic LPS is a rare tumor. Recurrence is higher with dedifferentiated histology forms. Radical surgery with excision of margins is the primary recommended treatment.

1. Introduction

Liposarcoma (LPS) is a malignant tumor of the connective tissue that forms in deep soft tissues and accounts for 20% of all mesenchymal malignancies [1]. It is the second most common soft tissue sarcoma and can arise from skeletal and extraskeletal connective tissues. The annual incidence of this disease is 2.5 cases per million, and LPS accounts for 17% of all soft tissue sarcomas, 3% of which are in the head and neck area, and 10–15% are retroperitoneal sarcomas. As LPS of lung are rare, frequency has not been defined.

There are five categories of LPS: well-differentiated, myxoid, round cell, pleomorphic, and dedifferentiated. LPS most commonly forms on the extremities, but rare sites, such as the chest, neck, retroperitoneum, and subcutaneous tissue can also be involved. It frequently occurs in middle age and older adults, and the etiology of LPS is not known [2].

2. Case Presentation

A 76-year-old male patient initially presented to the emergency room with a complaint of precordial chest pain for one month, associated with fatigue and intermittent dysphagia. He denied hemoptysis, weakness, weight loss, or loss of appetite. He was a non-smoker, and his past medical history included hypertension.

Physical examination revealed a thin built male with no apparent respiratory distress, who was afebrile, with a pulse rate of 82 beats per minute, respiratory rate of 20 breaths per minute, blood pressure 112/70 mmHg, and oxygen saturation of 94% on room air. On lung examination, he had decreased breath sounds on the left lung base, with

* Corresponding author.
E-mail addresses: uashraf1@bronxleb.org (U. Ashraf), rdudekul@bronxleb.org (R.A. Dudekula), sroy@bronxleb.org (S. Roy), JBurack@bronxleb.org (J. Burack), skmalik@bronxleb.org (S. Malik), drkhaja@yahoo.com (M. Khaja).

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Abbreviation

LPS	Liposarcoma
WDLPS	well-differentiated LPS
DDLPS	dedifferentiated LPS
CT	Computed Tomography
MRI	Magnetic Resonance Imaging

clubbing present. However, cardiac, abdominal, central nervous system, and skin examination revealed no abnormal findings.

Chest X-ray showed a well-marginated, supra-diaphragmatic round opacity at the left lower zone. (Fig. 1).

The patient underwent CT-guided biopsy of the left thoracic mass, which showed dedifferentiated LPS (Fig. 3A and B).

A positron emission tomography (PET) scan showed a left, lower chest wall hypermetabolic mass, with a standardized update value (SUV) of 6.2. The thoracic surgery team was consulted, and the patient underwent complete excision of chest wall mass. The biopsy confirmed dedifferentiated LPS and gross pathology of the excised tumor revealed sarcomatoid and lipomatous tissue (Fig. 4).

A chest CT performed 3-months later showed no residual tumor or metastasis (Fig. 2B). However, the patient presented 7-months later with shortness of breath, and chest CT showed a large left pleural-based mass, causing compression of surrounding structures, and a new right middle lobe lung lesion (Fig. 2C). CT guided biopsy of new lesion was done and was consistent with dedifferentiated LPS. Because he was not a surgical candidate at this time, the patient was started on doxorubicin chemotherapy, which he received for eight cycles. Because of myelosuppression, he was started on eribulin, as a second-line chemotherapeutic agent. The patient failed chemotherapy because of continuous respiratory and gastrointestinal symptoms, and he later opted for hospice care.

3. Discussion

LPS was first described in 1860 by Virchow. This malignant tumor of the connective tissue is the second most common type of soft tissue sarcoma and accounts for approximately 15–20% of all reported sarcomas. LPS originates from primitive mesenchymal cells, and the World Health Organization has classified soft tissue tumors into five categories of LPS: well-differentiated, myxoid, pleomorphic, round cell, and dedifferentiated [4]. A mutation in chromosome band 12q13 has been linked to the development of LPS, which involves a chromosomal translocation of the FUS-CHOP fusion gene [5].

Patients with LPS are usually asymptomatic, and symptoms are dependent on local invasion of organs. Some individuals present with pain by compression neurovascular structures, and those with LPS having pleural, lung, or mediastinal invasion may present with shortness of breath. Here, the patient reported precordial chest pain for one month, associated with fatigue and intermittent dysphagia. Pleural sarcomas are insidious and are not accessible on examination [6]. Metastasis to the pleural, mediastinal lymph nodes, lung, kidneys, adrenal gland, and bone has been reported [7].

The most common LPS subtype is WDLPS; this has a slow progression, is insensitive to radiation and chemotherapy, and shows local recurrence. WDLPS occurs in the deep soft tissues of the retroperitoneum and extremities and consists of adipocytes, containing lipoblasts, with intracytoplasmic vacuoles. Hypercellular forms of WDLPS may have similar findings as DDLPS, showing morphologic and cytogenetic similarities, they but differ in biologic behavior [9].

In this study, tumor biopsy and gross pathology analysis indicated DDLPS. In contrast to WDLPS, DDLPS is aggressive and prone to metastasize [8]. DDLPS involves a malignant adipocytic tumor that forms from an atypical lipomatous tumor or WDLPS. It occurs in 10% of patients with the WDLPS subtype. The most common site of occurrence is the retroperitoneum, but this type of tumor can also be found on the extremities, head, neck, trunk, subcutaneous tissue, lung, and pleura. Macroscopically, DDLPS appears as large multi-nodular masses, with some fatty and non-fatty solid components. The main histologic hallmark is a transition from an atypical lipomatous tumor or well-differentiated tumor to non-lipogenic sarcoma.

DDLPS may display a low-grade or high-grade morphology [10]. Low-grade dedifferentiation is characterized by the presence of uniform fibroblastic spindle cells, with mild nuclear atypia. These are often organized in a fascicular pattern and exhibit cellularity that is intermediate between well-differentiated sclerosing LPS and usual high-grade areas. The high grade dedifferentiated component has mitotic rate of > 5% mitoses/10 high power field, cellular and typically a non lipogenic with significant short fascicles of pleomorphic spindle cells. The local recurrence rate from DDLPS is 40%, and distant metastasis is seen in 20% of cases [11]. These are typically high-grade, and show rapid recurrence, with a high potential for metastasis and death [12].

WDLPS may show similar findings as lipoma on MRIs and CT scans. However, because dedifferentiated LPS has little fat, it can be difficult to differentiate from soft tissue sarcomas. In spite of this, MRI remains the gold standard for preoperative evaluation and assessment of local vessel invasion. CT scan of the chest may be useful for identifying metastatic lesions in the lung, liver, and peritoneum [13].

The standard of care for LPS is surgical resection with microscopically negative margins, while adjuvant or neoadjuvant radiotherapy and chemotherapy should be added based on type, location, and grade of the tumor. Radical surgery has better survival then non-radical surgery [14], and the chemotherapeutic agents used in the treatment of LSP are Doxorubicin and ifosfamide [15]. In one study, performed by Gronchi et al., neoadjuvant chemotherapy did not show any benefit over standard chemotherapy [16]. In recurrent disease, the use of preoperative radiation therapy can also convert a non-resectable tumor to a resectable form [17]. Of note, a retrospective analysis by Chen et al. found that overall survival was worse for dedifferentiated as compared to well-differentiated LPS [18].

4. Conclusion

Intrathoracic LPS is a rare tumor. Recurrence is higher with dedifferentiated histology forms. Radical surgery and histology of the LPS

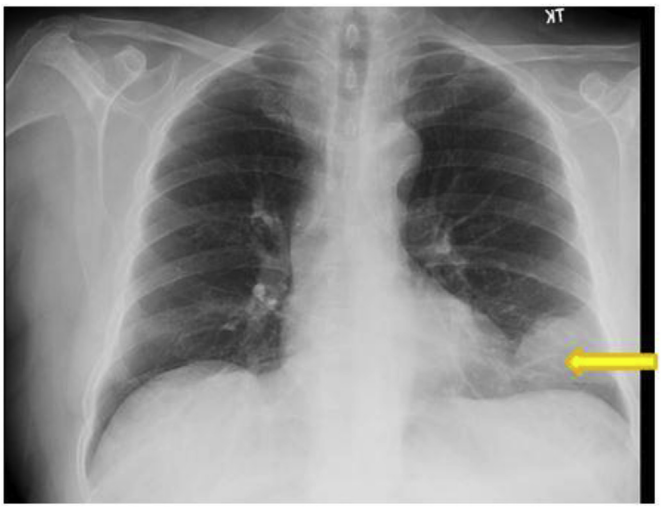

Fig. 1. Chest X-ray showing a well-marginated, supra-diaphragmatic round opacity at the left lower zone. Computed tomography (CT) of his chest further revealed a large, 8 cm × 8 cm x 10 cm, supradiaphragmatic, complex solid mass in the lower left hemithorax, along the anterior chest wall, with incidental cystic lesion of liver (Fig. 2A).

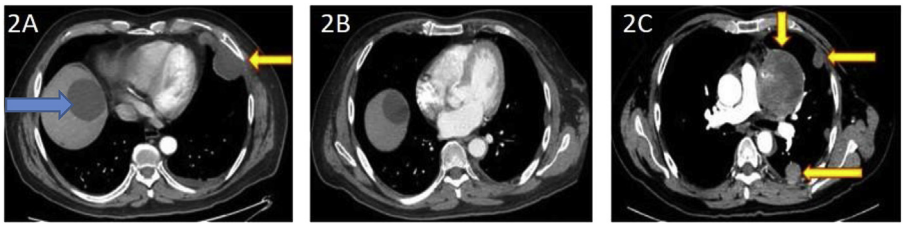

Fig. 2. (A) Initial CT with arrow indicating a supra-diaphragmatic, complex solid mass (Yellow arrow) with incidental cystic lesion of liver (Blue Arrow). (B) CT performed three months after surgery, showing resolution of the tumor. (C) CT at seven months post-surgery, with arrows demonstrating new pleural lesions and a mediastinal mass.

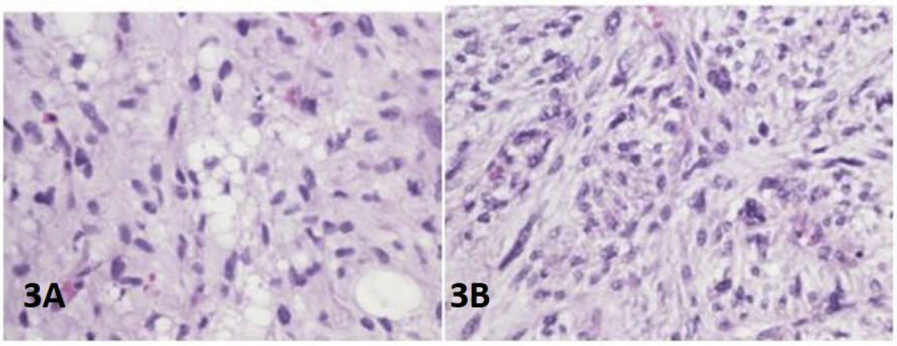

Fig. 3. (A) Histopathology of dedifferentiated liposarcoma (LPS), showing numerous lipoblasts (hematoxylin and eosin [H&E] staining, magnification x 100). (B) Dedifferentiated LPS showing large pleomorphic cells arranged in a storiform pattern (H&E staining, magnification x 400).

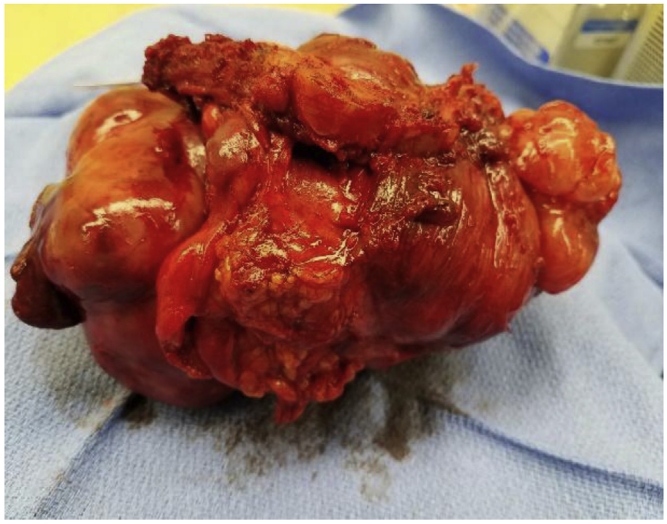

Fig. 4. Gross pathology specimen of the excised tumor, showing sarcomatoid and lipomatous tissue.

define prognosis, and recurrence occurs due to incomplete removal of tumor tissue. Thus, it is critical to completely resect the primary intrathoracic LPS.

Conflict of interest/author disclosure

None of the authors have a financial relationship with a commercial entity that has an interest in the subject of the manuscript. No financial support was used for this case report.

Authors contributions

M Khaja, U Ashraf and R Dudekula searched the literature and wrote the manuscript. M Khaja and S Malik conceived and edited the manuscript. M Khaja, J Burack supervised the patient treatment. S Roy was involved in patient care. All authors have made significant contributions to the manuscript and have reviewed it before submission. All authors have confirmed that the manuscript is not under consideration for review at any other Journal. All authors have read and approved the final manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rmcr.2019.02.016.

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