A case of dedifferentiated liposarcoma showing a biphasic pattern on 2-deoxy-2-F18-fluoro-D-glucose positron emission tomography/computed tomography

Manabu Hoshi,¹ Naoto Oebisu,¹ Jun Takada,¹ Kenichi Wakasa,² Hiroaki Nakamura¹

Departments of ¹Orthopedic Surgery and ²Diagnostic Pathology, Osaka City University Graduate School of Medicine, Osaka, Japan

Abstract

Integrated 2-deoxy-2-F18-fluoro-D-glucose positron emission tomography combined with computed tomography (FDG-PET/CT) has been used in the field of soft tissue sarcoma. We report an 81-year-old man with dedifferentiated liposarcoma in the left thigh, which was composed of well-differentiated liposarcoma and pleomorphic malignant fibrous histiocytoma. As well as other radiological modalities, FDG-PET was able to demonstrate a biphasic pattern composed of well-differentiated liposarcoma and dedifferentiated area, being consistent with the histological grade of malignancy.

Case Report

This case involves an 81-year-old male who suffered from a gradual buildup of a mass on his left thigh over a thirty year period. The tumor suddenly increased in size three months before he visited a clinic: he was immediately referred to our hospital. At the first visit to our hospital, physical examination revealed an elastic hard mass of size 40×20 cm in the left thigh. Magnetic resonance imaging (MRI) demonstrated two components of the tumor, which occupied the intermedius and vastus medialis of the quadriceps femoris. One component was of low-to-intermediate signal intensity on T1-weighted sequences with heterogeneously high signal intensity on T2-weighted sequence, mainly in the deeper region. The other was of high signal intensity on T1-weighted and T2-weighted sequences, consistent with a lipomatous tumor, mainly in the distal portion (Figure 1A,B), and the former lesion was remarkably enhanced with contrast material (Figure 1C). The tumor had a thick septum with a well-defined border. The borderline of these tumors was relatively distinct. FDG-PET showed the biphasic pattern composed of two components. The proximal component showed high FDG uptake (SUVmax; 2.3), while the distal component disclosed low FDG uptake (SUVmax; 0.7) (Figure 1D). The patient underwent a needle biopsy. Pathologically, a pleomorphic sarcoma was found and a wide resection of the tumor was carried out.²³ Macroscopic evaluation of the resected specimen confirmed the radiological imaging of these two distinctively separated lesions, which were composed of a yellow fat-like mass and a firm and multi-nodular white mass (Figure 2A). The microscopic feature of the yellow component was a proliferation of fat cells including multilobular loboplasts, representing well-differentiated liposarcoma. That of the white component was pleomorphic cell sarcoma, resembling pleomorphic malignant fibrous histiocytoma (Figure 2B). The final pathological diagnosis was recognized as dedifferentiated liposarcoma. Systemic chemotherapy was not carried out, due to the advanced age of this patient. No recurrence and no distant metastases were detected three months after the surgery.

Discussion and Conclusions

Liposarcoma is a malignant soft tissue sarcoma that occurs in adults, and makes up 16-18% of all soft tissue sarcomas.¹ Liposarcoma is generally classified into four subtypes: well differentiated, dedifferentiated, myxoid/round, and pleomorphic. According to the World Health Organization,¹ dedifferentiated liposarcoma is defined as malignant adipocytic neoplasm showing transition from atypical lipoma to well-differentiated liposarcoma to non-lipogenic sarcoma of variable histological grade. Therefore, this definition may show the coexistence of both fatty and non-fatty solid components.

Currently, radiological findings of liposarcomas, based on CT and MRI, are analyzed in detail. These findings have been shown to have a close relationship to pathology.²⁻⁷ The other newly appearing sarcomatous signals arose from the radiological feature characteristic of well-differentiated liposarcoma.⁸ The well-differentiated and dedifferentiated components had abrupt transitions between their borders. The term biphasic pattern in liposarcoma has been generally adopted to explain dedifferentiated liposarcoma. FDG-PET can determine tumor functions of high metabolism and an increased rate of glucose utilization compared with normal tissues. The high capacity of glucose utilization is a possible reflection of the tumor’s malignant nature. High maximum standardized uptake value (SUVmax) is one of the informative biomarkers measured with this modality for the differ-
ential diagnosis between low and high grade soft tissue tumors. Microscopically, the fatty lesions of well-differentiated liposarcoma presented low FDG uptake, and the latter component of the anaplastic zones of spindle and pleomorphic cell lesions, being judged as pleomorphic malignant fibrous histiocytoma, presented high FDG uptake. The higher the pathological grade of tumor is, the higher their SUV in FDG-PET/CT is. FDG-PET could also show the biphasic pattern in liposarcoma, as well as other radiological modalities.

With respect to treatment of dedifferentiated liposarcoma, wide resection with negative surgical margins is important, while the role of systemic chemotherapy is controversial. The follow-up period is too short to make a comment about the surgical result of this case. Our group previously reported on surgical margins for newly appearing dedifferentiated high grade regions, and concluded that a wide margin resection should be performed. Further careful follow-up is necessary for this case.

Using macroscopic and microscopic techniques, we identified two components in the dedifferentiated liposarcoma of our patient. The first was a well-differentiated liposarcoma. The second was pleomorphic malignant fibrous histiocytoma. This FDG-PET finding of a biphasic pattern in dedifferentiated liposarcoma was identical to the various kinds of radiological findings.

References


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