

PET evaluation of fatty tumors in the extremity: Possibility of using the standardized uptake value (SUV) to differentiate benign tumors from liposarcoma

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Objective: The relative utility of various preoperative diagnostic imaging modalities, including PET (utilizing FDG and FMT), CT, and MR imaging, for evaluation of lipoma and liposarcoma, especially well-differentiated liposarcoma, was investigated. **Methods:** Imaging findings in 32 patients with histopathologically documented lipoma, including one with fibrolipoma and one with angiolioma, and 25 patients with liposarcomas whose subtypes included 10 well-differentiated, 10 myxoid, and 5 other types were reviewed retrospectively. Pre-operative imaging included FDG-PET ($n = 44$), FMT-PET ($n = 21$), CT ($n = 25$), and MR imaging ($n = 53$). **Results:** Statistically significant imaging features of MR images favoring a diagnosis of liposarcoma involved lesions containing less than 75% fat ($p < 0.001$) as well as the presence of septa ($p < 0.001$). As compared with well-differentiated liposarcoma, benign lesions were differentiated significantly only by the presence of septa ($p < 0.001$), which also provided significant differentiation on CT ($p < 0.05$). The mean SUVs for malignant tumors were significantly higher than those for benign lesions in both FDG- and FMT-PET analyses ($p < 0.0001$, $p = 0.0011$, respectively). By using a cut-off value for FDG- and FMT-PET set at 0.81 and 1.0 respectively, which provided the highest accuracy, benign lesions were differentiated significantly from liposarcomas ($p < 0.001$, and $p < 0.02$). Furthermore, benign tumors and the three subtypes of liposarcoma were divided significantly into four biological grades by FDG- and FMT-accumulation rates ($\rho = 0.793$, $p < 0.0001$; and $\rho = 0.745$, $p = 0.0009$, respectively). A cut-off value of 0.81 for FDG-PET provided significant differentiation between benign lesions and well-differentiated liposarcoma ($p < 0.01$). **Conclusions:** The presence of septa on MR images differentiated lipomas from liposarcoma, even well-differentiated type. PET analysis, especially FDG-PET, quantitatively provided not only the differentiation but also the metabolic separation among subtypes of liposarcoma. Interpretation of the visual diagnostic modalities requires extensive experience and carries a risk of ignoring a critical portion of malignancy. PET metabolic imaging may be an objective and useful modality for evaluating adipose tissue tumors preoperatively.

Key words: lipoma, liposarcoma, subtype, FDG-PET, FMT-PET