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Hibernoma of the Psoas Muscle: A Case Report[1]

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Hibernoma is a rare, benign, soft tissue tumor that is composed of brown fat. We report here on a case of hibernoma that arrose from the right psoas muscle along with the imaging features on computed tomography (CT), magnetic resonance imaging (MRI), and 2-deoxy-2 (F-18) fluoro-D-glucose positron emission tomography (FDG-PET). We suggest that a fat-containing mass with a curvilinear intratumoral vessel on the CT and MRI scans provides diagnostic clues for making the differential diagnosis of hibernoma, although these features may mimic malignancy.

Index words : Hibernoma,
Computed tomography (CT)
Magnetic resonance (MR)
Positron emission tomography (PET)
Soft tissue, neoplasma
Lipoma

Hibernoma is a rare, benign, soft tissue tumor that's composed of brown fat. It usually occurs in locations where normal brown fat is found such as the interscapular region, the axilla, the neck, the thorax, and the retroperitoneum (1).

However, to the best of our knowledge, no studies have reported the development of a hibernoma arising in the psoas muscle. Therefore, we present a case of hibernoma arising from the right psoas muscle and we discuss the tumor's imaging features on computed tomography (CT), magnetic resonance imaging (MRI), and 2-deoxy-2 (F-18) fluoro-D-glucose positron emission tomography (FDG-PET).

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Case Report

A 50-year-old woman was admitted to our hospital with a 7-day history of diarrhea and lower abdominal pain. She had no specific past medical history or significant laboratory findings. On physical examination, the abdomen was soft and she did not have any palpable soft tissue mass.

A radiograph of the abdomen showed no specific findings. For further evaluation, we performed contrast-enhanced CT scanning. On pre-contrast CT, a 3.8×3.5 cm, well-defined, lobulated mass with septa was seen arising from the right psoas muscle. This mass had a low-attenuation density that was consistent with fat (Fig. 1A). There were no calcifications or ossifications. A contrast-enhanced CT showed fat components with some contrast enhancing areas and an enhancing curvilinear structure that was suggestive of an intratumoral vessel (Fig. 1B).

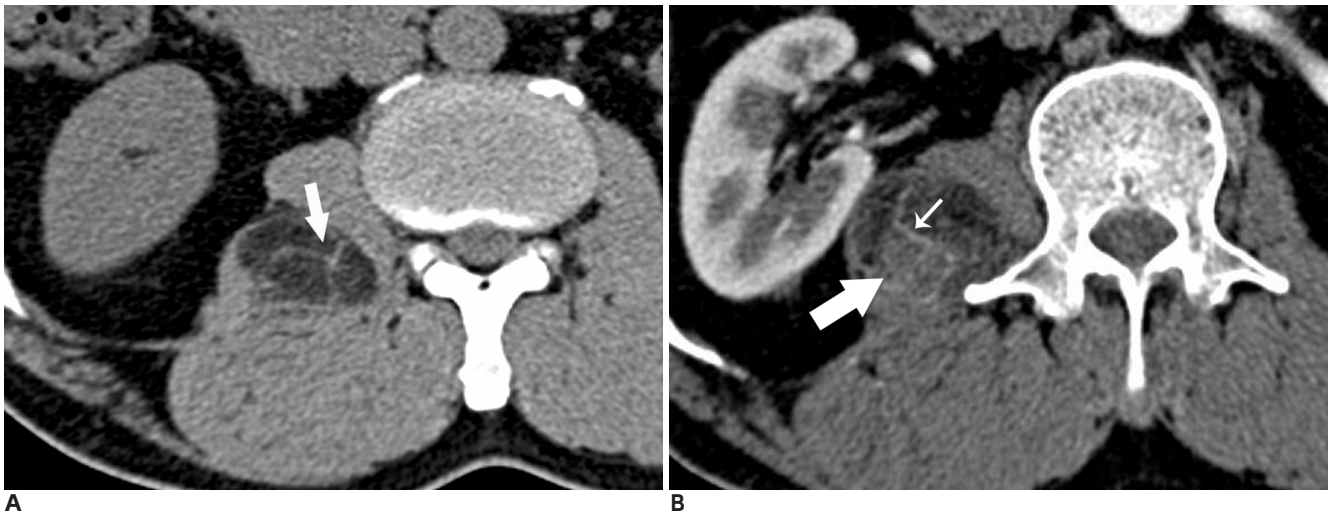
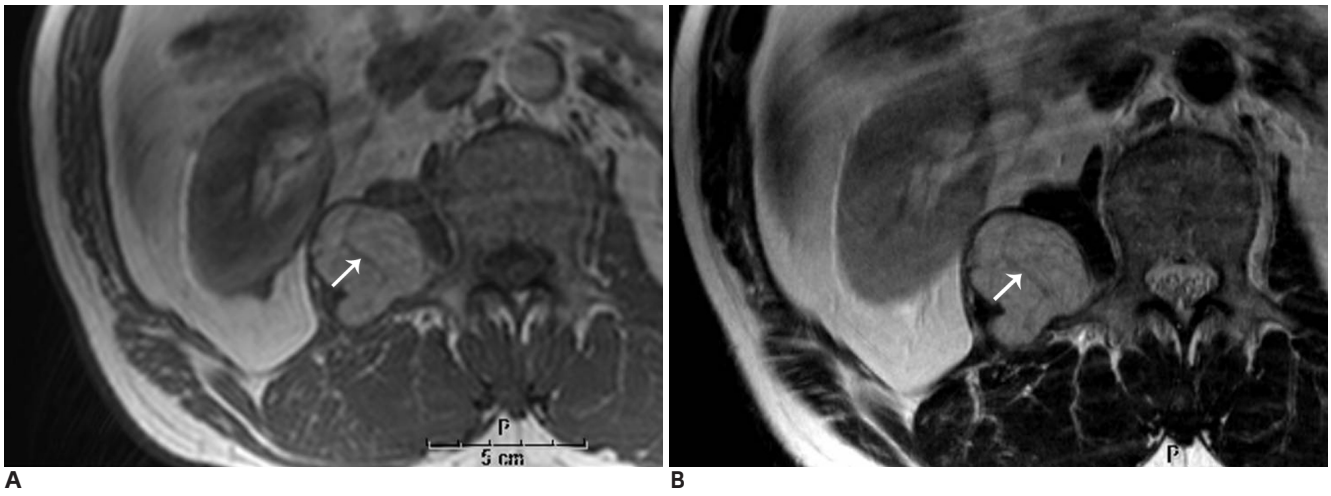


Fig. 1. A. An axial pre-contrast CT scan demonstrates a 3.8×3.5 cm well-defined lobulated, fat-containing mass with septa (arrow) arising from the right psoas muscle. The measured mean CT attenuation value (in Hounsfield units) of the mass was 67.
B. An axial contrast-enhanced CT scan demonstrates some contrast enhancing areas (large arrow) and an enhancing curvilinear structure that is suggestive of an intratumoral vessel (small arrow).



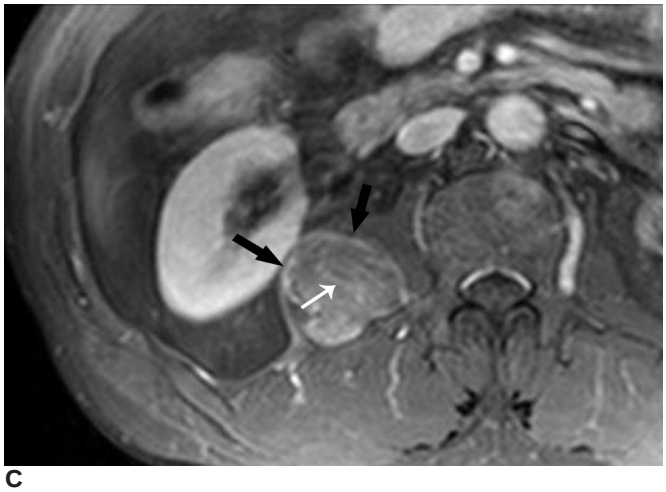


Fig. 2. A, B. The axial T1-weighted (**A**) and T2-weighted (**B**) images show a high signal intensity mass as compared with muscle, and it had curvilinear areas of signal void (arrows) on all the sequences.
C. A post-gadolinium T1-weighted fat-saturated image shows moderate contrast enhancement within the tumor, demonstrating a thin enhancing capsule (black arrows) and an enhancing curvilinear structure that is suggestive of intratumoral vessel (small arrow).

MRI was performed based on the preliminary diagnosis of liposarcoma versus other soft tissue tumors. On the T1-weighted axial images, the signal intensity of the tumor was considerably higher than that of muscle, but it was lower than that of subcutaneous fat (Fig. 2A). On the T2-weighted axial images, the signal intensity of the tumor was high with mild heterogeneity, but overall, it was lower than that of subcutaneous fat (Fig. 2B). On all the sequences, the curvilinear areas of signal void that enhanced after administration of gadolinium contrast material represented the intratumoral vessel within the mass (Fig. 2C). The mass enhanced moderately with a thin enhancing capsule after administration of gadolinium contrast material (Fig. 2C).

FDG-PET scanning was subsequently obtained with a maximum standard uptake value of 2.8, and this value can not exclude hypermetabolic, tumor including liposarcoma (Fig. 3). There was no evidence of other abnormal hypermetabolic lesions that would suggest metastasis.

The patient underwent open biopsy of the mass, which grossly revealed a vascular, encapsulated, fatty tumor with some brownish pigmentation (Fig. 4). Microscopically, the tumor was composed of a mixture of brown and white adipose cells, and this was consistent with a hibernoma. Following pathological review, the patient underwent definitive, wide excision of the mass.

Discussion

Hibernomas are benign tumors derived from brown fat and they often present as painless, slowly enlarging masses. According to a recent report of 170 cases by Furlong et al. (1) from the Armed Forces Institute of Pathology, the predilection sites for hibernomas include the interscapular area, the axilla, neck, mediastinum, retroperitoneum and thigh. Although more than 100 cases have been reported, to the best of our knowledge, this current case is the only report in the English literature that involves a hibernoma arising from the psoas muscle.

The differential diagnosis of hibernomas includes both benign and malignant neoplasm. Preoperative assessment is important because the other possible diagnoses include malignant lesions, and particularly liposarcomas for which the treatment and possibility of recurrence differ significantly from those for a benign hibernoma.

Preoperative radiologic imaging is used to define the size of the tumor, assess its vascularity and to identify local invasion. Multiple imaging modalities, including CT, MRI and PET, have been used to describe the appearance of the hibernoma (2 - 8).

On pre-contrast CT, a low-attenuation mass with septa is characteristic and this was evident in our case. After intravenous contrast administration, enhancement is seen within the septa and it may also be more diffusely present within the mass (2 - 4). In our case, some enhancement was seen within the mass along with a curvilinear structure that was suggestive of an intratumoral vessel.

On MRI, unlike simple lipomas, hibernomas do not demonstrate signal intensities that are indicative of sub-

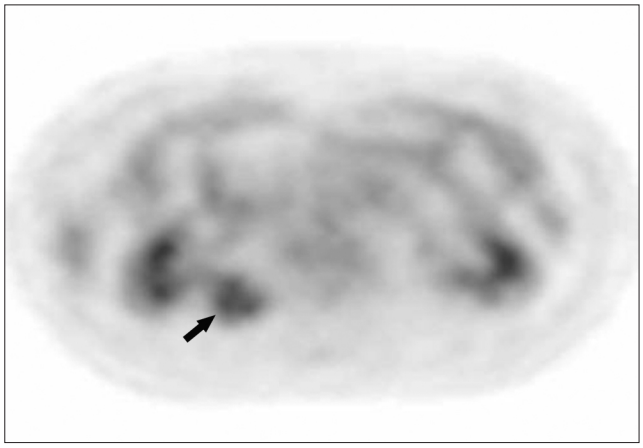


Fig. 3. FDG-PET image shows moderate hypermetabolic activity (arrow) at the right psoas muscle area with a maximum standard uptake value of 2.8.

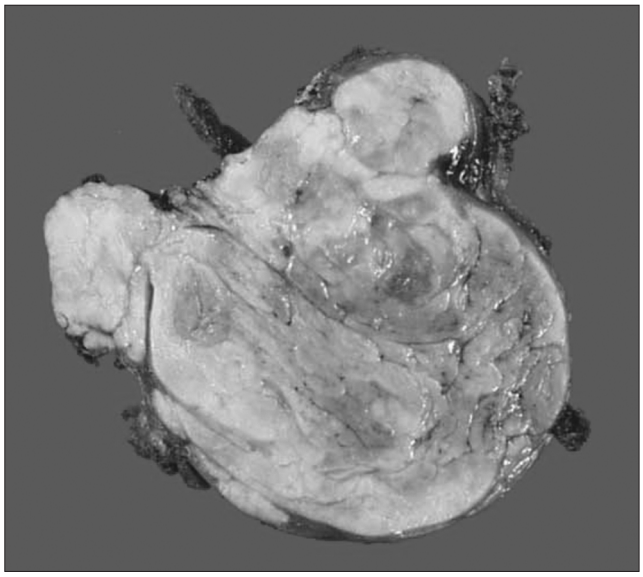


Fig. 4. Gross pathologic specimen shows yellowish fatty tumor with some pinkish and brownish pigmentation.

cutaneous fat on both T1-and T2- weighted images. Mild heterogeneity and internal septations have been noted on many sequences, which were probably due to vascular tissue intermixed with the fatty components of the tumor (3 - 5). On the T1-weighted images, this type of lesion is at least partially hypointense to subcutaneous fat, and on the T2-weighted images, most authors agree that this type of lesion is nearly isointense to subcutaneous fat, although hypointensity has been noted (3 - 5). In our case, the mass was partially hypointense to subcutaneous fat with mild heterogeneity on both the T1- and T2-weighted images. Several studies have reported prominent branching or serpentine vascular structures (low signal intensity on all MR pulse sequences) within the lesions (6, 7). Although these features may initially suggest a well-differentiated liposarcoma, this type of vascularity is never apparent in liposarcomas and it is an important differentiating feature. In our case, a curvilinear signal void area was seen in the mass, which had low signal intensity on both the T1- and T2-weighted images. The intratumoral vessel enhanced after the administration of gadolinium contrast material.

Uptake of FDG in brown adipose tissue has already been reported on in previous studies (9, 10). Brown fat is noted to primarily function in non-shivering thermogenesis, and it's highly metabolically active nature that is thought to account for the high uptake of FDG (9, 10). According to a report by Lin et al. (8), hibernoma shows an increased uptake of FDG, which is suggestive of a malignancy. In our case, high metabolic activity was seen in the hibernoma, but it was not as high as that reported in the previous study by Lin et al. FDG-PET tends to falsely indicate a malignant potential for these lesions, as their highly vascular, highly metabolically active state results in an increased uptake of FDG.

In conclusion, we suggest that a fat-containing mass with curvilinear intratumoral vessels seen on CT and MRI scans provides diagnostic clues for the differential diagnosis of hibernoma, although these features may mimic malignancy.

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대요근에서 발생한 동면선종: 증례 보고[1]

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동면선종은 갈색지방으로 이루어진 드문 양성 연부조직종양이다. 본 저자들은 우측 대요근에서 발생한 동면선종의 컴퓨터단층촬영(CT), 자기공명영상 (MRI) 및 18 FDG- 양전자단층촬영의 영상소견을 증례 보고하고자 한다. 본 증례를 통하여 지방 성분을 포함한 종양이 악성을 시사하는 소견이 있다고 하더라도 종양 내의 특징적인 혈관을 컴퓨터단층촬영(CT) 및 자기공명영상(MRI) 에서 관찰한다면 동면선종을 감별진단에 포함해야 하겠다.