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CASE REPORT

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Imaging Findings of a Hibernoma of the Neck

SUMMARY: Hibernoma is an uncommon benign fatty tumor that arises from the vestiges of fetal brown fat. We present a case report of a hibernoma of the neck in an asymptomatic 19-year-old girl and describe the important imaging findings. Computed tomography (CT) shows a well defined hypodense mass with septations. Magnetic resonance imaging (MRI) shows intermediate T1 and bright T2 signal of the mass and also demonstrates the characteristic marked contrast enhancement.

Hibernoma is a rare benign tumor of brown fat origin. Hibernomas mainly occur in adults, slightly predominant in women, and are commonly seen in the subcutaneous regions of the back, especially periscapular and interscapular region, neck, axilla, shoulder, thorax, thigh, and retroperitoneum.¹⁻⁴

A hibernoma usually manifests as a slowly growing, painless, soft-tissue mass. From a macroscopic perspective, it is well-defined, soft, and mobile and the color varies from tan to red brown, depending on the amount of intracellular lipid.⁴⁻⁶ Microscopic examination reveals the tumor to be characterized by multivacuolated cells with eccentric nuclei, univacuolated cells with peripheral nuclei, and smaller round cells.^{5,6} The treatment consists of complete surgical resection and the postoperative prognosis is excellent.³

Case Report

A 19-year-old woman was referred for diagnostic radiologic examinations because of a painless slow-growing mass in her posterior left neck. The patient did not report difficulty in swallowing or breathing. On physical examination of the region, a soft, rubbery, and freely mobile mass was palpated. This lesion measured approximately 9 cm in its maximum diameter. It seemed to be within the subcutaneous fat but not attached to the adjacent musculature. CT (Fig 1) showed a $7.5 \times 3.5 \times 5.0$ -cm well-defined lobulated mass with septations in the posterior neck subcutaneous area, slightly eccentric to the left and superficial to the muscles. It presented with an intermediate attenuation between fat and muscle attenuation. Subsequent MR imaging (Fig 2) confirmed the location of the tumor that measured $3.3 \times 8.1 \times 8.3$ cm and showed multilobulated septations with intermediate T1 and bright T2 signal intensity. It also demonstrated bright signal intensity with fat saturation. There was no invasion of the underlying paraspinal musculature. The lesion showed a mild, heterogeneous, predominantly superficial enhancement after contrast injection. No pathologic cervical lymphadenopathy was seen.

Elective surgery was scheduled and performed. The mass was completely excised and examined histopathologically. On gross examination, the tumor was lobulated, well-demarcated, and measured 10 cm in its greatest dimension. Its cut surface was soft, spongy, and tan. On microscopic examination, the tumor was composed of large numbers of brown fat cells with round centrally placed nuclei, prominent nucleoli, and abundant and finely vacuolated (ie, granular) cytoplasm. Interspersed among these granular cells were occasional cells



Fig 1. The unenhanced CT scan shows a well-defined mass superficially located in the posterior neck subcutaneous area, slightly eccentric to the left. It presents with an intermediate attenuation between fat and muscle attenuation.

with coarsely vacuolated cytoplasm representing a transition toward white fat (Fig 3).

Discussion

Hibernomas are uncommon benign, slow-growing soft-tissue tumors consisting of brown fat. Gery⁷ proposed the term “hibernoma” because of its resemblance to the brown fat in hibernating animals.^{7,8} It is believed that the brown adipose tissue has a role in thermoregulation.

These tumors usually arise from areas in which vestiges of brown fetal fat persist beyond fetal life, such as the neck, axilla, back, and mediastinum.¹ Recently, the thigh has been described as a very common location.²

Hibernomas usually occur between the ages of 20 and 40 and have a slight female prevalence. They grow slowly and usually present with painless enlargement. Symptoms related to the compression of adjacent structures rarely develop.^{3,5}

Hibernomas are typically fatty, hypervascular lesions that are grossly similar to lipomas. They are well-defined, encapsulated, and mobile masses. Their color varies from tan to red brown, depending on the amount of intracellular lipid. The diameter usually ranges from 5 to 10 cm, but they may reach up to 20 cm.³

Among the diagnostic procedures, CT, MR imaging, and angiography can provide helpful information. Hibernomas are usually depicted as heterogeneous masses with marked contrast enhancement. The CT and MR imaging examinations show a well-demarcated mass with signal intensity intermediate between subcutaneous fat and muscle and that enhances after contrast injection. Although they present as brown fat, the imaging characteristics on T1- and T2-weighted

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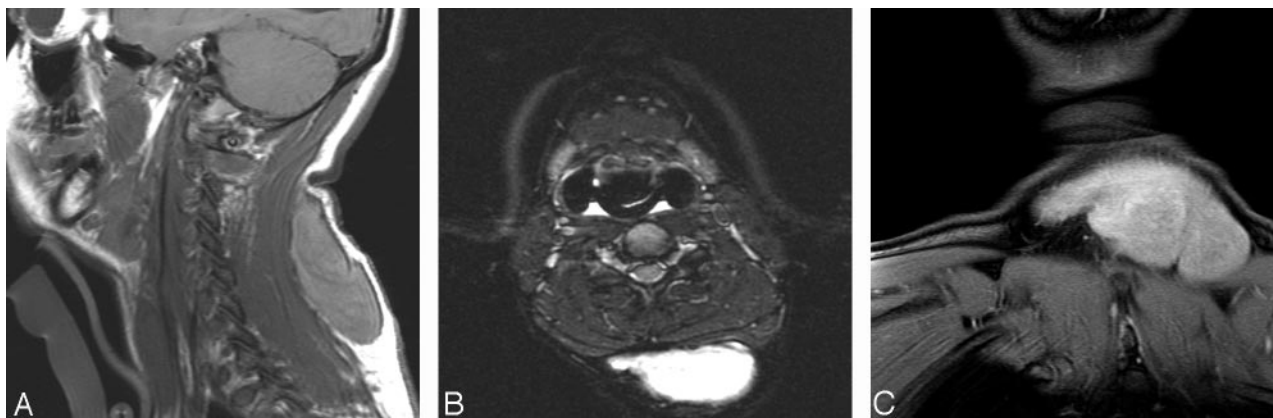


Fig 2. A, Sagittal T1-weighted pre-contrast MR image shows a posterior subcutaneous soft tissue mass crossing the midline but slightly eccentric to the left. The mass shows multilobulated septations with intermediate T1 signal intensity.

B, On the axial T2-weighted image with fat suppression, this mass demonstrates bright signal intensity.

C, The coronal T1-weighted postcontrast image with fat suppression shows a lesion with mild heterogeneous enhancement. No pathologic cervical lymphadenopathy is seen.

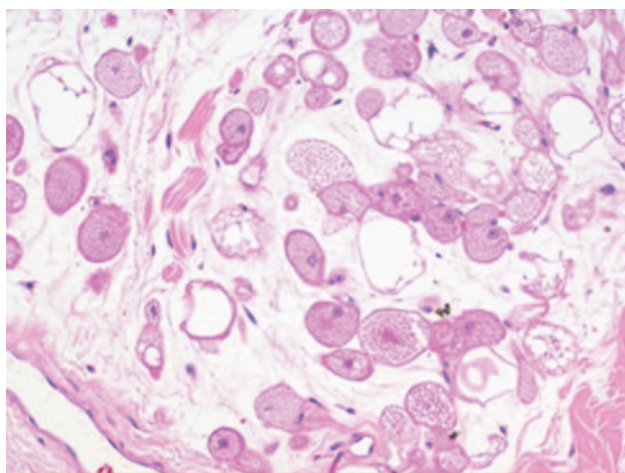


Fig 3. Hibernoma is composed of brown fat cells. At higher power, the predominant cell type is characterized by finely vacuolated cytoplasm imparting a granular appearance.

images demonstrate high signal intensity but slightly less than that of the subcutaneous fat. On fat suppression sequences, there may be incomplete fat suppression because of the nature and amount of lipids.⁶ On MR imaging, flow voids can be identified, though not in this case.

Upon microscopic examination, the tumors are characterized by cells of various degrees of differentiation. Multivacuolar adipocytes and brown fat cells with granular eosinophilic cytoplasm are interspersed with univacuolar adipocytes. Hypervascularity combined with abundant mitochondria give hibernomas their color. There are 4 histologic variants (typical, myxoid, lipomalike, and spindle cell), all of them with a benign course.⁴

For differential diagnoses, one should consider well-differentiated liposarcoma, which has decreased vascularity⁴ and usually presents as a predominantly fatty mass having irregu-

larly thickened, linear, and/or nodular septa. The nonadipose areas demonstrate a nonspecific decreased signal intensity on T1-weighted images and variably increased signal intensity on T2-weighted or fluid-sensitive images and increased attenuation on CT.⁸ Rhabdomyomas are readily distinguished by the complete absence of lipid vacuoles in the cytoplasm.³ Myxoid liposarcomas are distinguishable because of their hypervascularity and common existence of the prominent “plexiform” capillary pattern and characteristic molecular translocation t(12;16).⁴ Resolving hematomas present with high signal intensity on T1-weighted MR images. In the pediatric population, one should consider rhabdomyosarcoma and lymphoma. The former can be distinguished by its association with bone destruction and the latter by the isoattenuated pattern in CT and isointensity to muscle on T1-weighted images.⁹

The treatment of hibernomas consists of complete surgical resection and local recurrence does not occur.⁴ There are no reports of metastases or malignant transformation.

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