Journal of BUON **13:** 127-129, 2008
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Hibernoma: A benign lipomatous tumor mimicking liposarcoma

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Summary

Hibernoma is a rare, benign, slow-growing soft tissue tumor. It was named after its resemblance to the brown fat found in hibernating animals. Due to its rich vascularity and magnetic resonance appearance, this tumor may mimic a liposarcoma before tissue diagnosis. Complete resection with meticulous hemostasis is enough for treatment. Malignant potential has not been demonstrated. Herein we present a case of hibernoma arising from the left groin in a young man. The clinical presentation, radiographic and histopathologic features of this rare benign soft tissue tumor are presented. This tumor is clinically important because it is indistinguishable from malignant lesions.

Key words: benign, diagnosis, hibernoma, magnetic resonance imaging, soft tissue tumor

Introduction

Hibernoma is a benign and slow-growing tumor of brown fat. Hibernomas were given this name due to similarities to the brown adipose tissue of hibernating animals. Its hypervascularity and magnetic resonance imaging (MRI) features resemble liposarcoma. Awareness of the radiographic appearances of this unusual benign lesion may allow for accurate preoperative diagnosis [1-8]. We present herein a case of hibernoma to emphasize MRI features including T1 and T2 signal isointensity to fat, chemical shift MR images and enhancement characteristics.

Case presentation

An 18-year-old male presented with a large painless left groin mass. He had noticed the mass 15 days ago. On physical examination the mass was nontender, soft and mobile. There was no redness or local increase in temperature of the overlying skin. The results of laboratory tests were normal. Radiographs showed no bone or soft tissue pathology. On MRI a mass with high signal intensity on spin-echo T1 (TR: 600, TE: 15) and T2 (TR: 4000, TE: 99) –weighted (W) images was identified. Its signal intensity was homogeneous and equal with fat, and some vascular flow void areas in the mass were identified. The mass was dark on fat saturated T2 W (TR: 765, TE: 26, FA: 20) and on out-of-phase T1W fast low angle shot (FLASH) (TR: 110, TE: 4.2, Flip angle: 90°) (Figure 1). After administration of gadolinium, the mass showed diffuse and homogeneous enhancement on fat saturated T1W coronal image (TR: 456, TE: 15) (Figure 2).

The patient underwent an open surgical biopsy and subsequent surgical resection. An encapsulated, hypervascular adipose tumor measuring 5×8×12 cm was resected. Macroscopically, the cut surface revealed a lobular architecture of yellow-brown color. Microscopically, a partially encapsulated mass with organoid arrangement of large cells with centrally located nucleus and abundant granular cytoplasm was noted. Among these multivacuolated brown fat cells loose fibrovascular septa with thick-walled vessels were detected. Morphological findings with S100 positive immunostaining were consistent with hibernoma (Figure 3).

No local recurrence occurred during 3-year follow-up.

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Received 25-07-2007; Accepted 27-09-2007

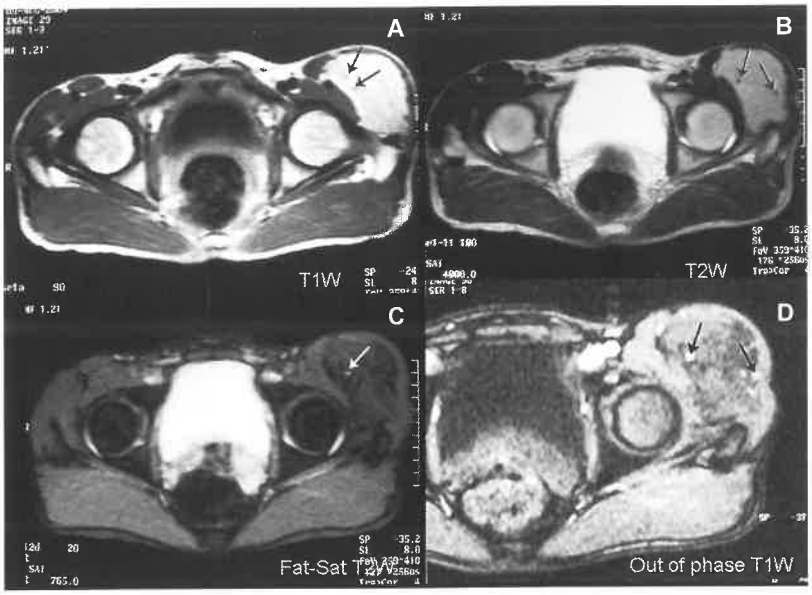


Figure 1. T1W (A), T2W (B), fat saturated T2W (C) and out-of-phase T1W FLASH (D) scans on transverse plane. A well-demarkated soft tissue mass is seen in the left groin. The mass was high in signal intensity and similar with subcutaneous fat in all sequences. Some flow void vascular channels (arrows) are observed within the mass. The mass was dark on fat saturated T2W and out-of-phase T1W images.



Figure 2. Fat saturated T1W coronal image. After i.v. administration of gadolinium, the mass enhanced avidly (arrows). There was no invasion or infiltration in the neighboring soft tissues.

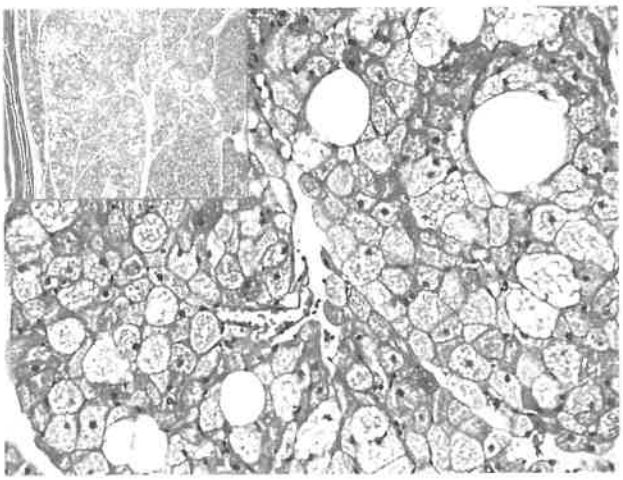


Figure 3. Large granular brown fat cells with centrally located nucleus and vacuolated cytoplasm (H&E × 100). Inset: Lobular architecture of polygonal brown fat cells beside the muscle bundles (H&E × 12.5).

Discussion

Common sites of origin of hibernoma include the periscapular-interscapular region, axilla, the neck, shoulder, retroperitoneum and the mediastinum. All of these sites contain residual brown fat in the adult. Several recent cases have disclosed hibernomas arising from the thigh. The peak incidence is in the third decade of life with a slight predominance of females, but in the literature there have been conflicting reports concerning gender. Hibernomas generally present as a slow-growing, pliable, subcutaneous mass, which may be mobile and is usually nontender. Localized warmth over the mass may be apparent due to its hypervascular nature, in contrast with the findings in lipoma, in which the overlying skin may actually be cooler than the surrounding skin [1-3].

Hibernomas, are described as a high-intensity and well-defined mass in both T1W and T2W. Mild heterogeneity and internal septations are noted, which are probably due to vascular tissue intermixed with the fatty components of the tumor, most commonly seen on T2W images. In most cases, it is reported that the intensity is similar, but not usually equal to subcutaneous fat. On fat-suppressed pulse sequences, the tumor demonstrates partial signal loss consistent with fatty elements [2,4]. However, a case has been reported which was not suppressed on short T1 inversion recovery images [5]. After injection of gadolinium hibernomas usually enhance inhomogeneously or peripherally [2,6]. The MRI features of our case were quite different from those in the relevant literature. The mass had equal signal intensity on both T1W and T2W images and fat-suppressed T2W images and out-of-phase images, mimicking a lipoma. However, intratumoral vessels and avidly and

homogeneous enhancement of the tumor suggested a well-differentiated liposarcoma.

In- and out-of-phase imaging (chemical shift MRI) are routinely used to depict microscopic fat, which is helpful for distinguishing adrenal adenomas from adrenal carcinomas. Because of the different chemical environments of ^{1}H in fat (CH_2) and water (H_2O), ^{1}H nuclei precess at different rates. If microscopic fat is present, its signal is nulled on the out-of-phase images [7]. We did not encounter in- or out-of-phase images of hibernomas in the literature.

Computed tomography may reveal fat-containing mass. As hibernomas are vascular tumors, Doppler ultrasound, conventional and MR angiography may demonstrate large feeding vessels [2]. Positron emission tomography (PET) scanning suggests metabolic activity [6].

Commonly, hibernomas are intramuscular with an insinuating border extending between adjacent muscles without invasion [4].

A mass with increased T1 signal intensity and large intratumoral vessels indicates the presence of a hibernoma. But angiolipoma, lipoma, hemangioma, hemangiopericytoma, liposarcoma, alveolar soft part sarcoma and clear cell sarcoma should be considered in differential diagnosis. None of these lesions typically contain large intratumoral vessels, typically seen in hibernomas. Alveolar soft part sarcoma can have high T1 signal and large intratumoral vessels but appears more heterogeneous than hibernoma. Hemangiopericytoma shows large intratumoral vessels but does not demonstrate uniform high T1 signal [2,4].

A definite diagnosis is needed to exclude the possibility of a malignant neoplasm. Biopsy has not been recommended in suspected cases due to the tumor's hypervascularity [1,6]. At surgery, tumors may be encapsulated or adherent to skeletal muscles without invasion. Complete resection with meticulous hemostasis is generally regarded as curative. Postoperative hematoma or local recurrence after incomplete resection have been reported [1,3].

Hibernomas are grossly similar to lipomas. Microscopically they have lobulated architecture. The cellular constituents include large nonvacuolated cells that contain numerous eosinophilic granules, cells containing numerous vacuoles of variable size, and cells resembling mature fat [2,8].

In conclusion, hibernomas have characteristic but nonspecific MRI features. We presented a case of hibernoma of the groin, which is a rare location, and emphasized that MRI features may not be pathognomonic.

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