

## Oncology

## Intrascrotal hibernoma mimicking liposarcoma: A case study

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## ABSTRACT

Hibernoma is a rare benign lipomatous tumor derived from brown fat, which is typically found in infants. Specifically, intrascrotal hibernoma is extremely rare with only one case reported to date. We encountered the second case, which was successfully treated with surgical resection without any recurrence at 3 years.

The patient was first misdiagnosed with an intrascrotal liposarcoma preoperatively. Preoperative usefulness of imaging modalities to discriminate hibernomas and liposarcomas is limited due to lack of specific features of hibernomas with its rarity. Here, we report a case of intrascrotal hibernoma in addition to a current literature review.

## Introduction

Hibernoma is a rare benign lipomatous tumor derived from the remnants of brown fat, which is normally found in infants. Specifically, intrascrotal hibernoma is extremely rare with only one case reported to date.<sup>1</sup> Here, we report the second case of intrascrotal hibernoma, preoperatively misidentified as liposarcoma.

## Case presentation

A 32-year-old man with no medical history presented to our hospital with a mass and sporadic pain in his right scrotum. The mass was elastic hard and had mobility on palpitation. A blood test showed no abnormalities and no testicular germ cell tumor markers were identified; human chorionic gonadotropin,  $\alpha$ -fetoprotein, and lactate dehydrogenase were not elevated. Magnetic resonance imaging (MRI) revealed an 85-mm lobular tumor in his right scrotum, which showed high and low intensity on T1- and T2-weighted images, respectively, and high intensity on diffusion weighted imaging (Fig. 1a–c). In addition, a part of the tumor had a suppression effect on fat-saturated T1-weighted imaging (Fig. 1, d). Therefore, we suspected the mass was an intrascrotal liposarcoma and performed right high inguinal orchiectomy. The resected specimen showed a lobulated, fat-containing, elastic hard tumor, the color of which appeared yellowish brown, and which was located adjacent to the normal right testis (Fig. 2). Histopathological

examination with hematoxylin and eosin (HE) staining demonstrated three principle cells of hibernomas: cells with eosinophilic granular cytoplasm containing lipid vacuoles, large univacuolated adipocytes, and multivacuolated adipocytes, without cancerous cells (Fig. 3, a). Therefore, we made a diagnosis of hibernoma. However, considering intrascrotal hibernoma is extremely rare, we performed an immunohistological examination and fluorescence in situ hybridization (FISH) to reinforce the diagnosis of hibernoma. The immunohistological examination showed that the specimen was positive for S-100 protein and negative for classification determinant 34 (CD34), cyclin-dependent kinase 4 (CDK4), and murine double minute 2 (MDM2). FISH showed no amplification of the MDM2 gene (Fig. 3, b–d). These results were consistent with those of previous studies on hibernomas, thereby confirming the definitive diagnosis of intrascrotal hibernoma. Till date, there has been no recurrence three years after the resection.

## Discussion

Brown fat is observed in hibernating animals, involved with heat production to maintain body temperature.<sup>1</sup> In humans, the volume of brown fat regresses with aging and remnant tissue is located mainly at the neck and axilla in adult.<sup>1</sup> Hibernoma is a benign lipomatous rare tumor derived from residual brown fat.<sup>2</sup> According to the report by Furlong et al. the thigh was the most common site for hibernoma development even the thigh is not a common site of brown fat,

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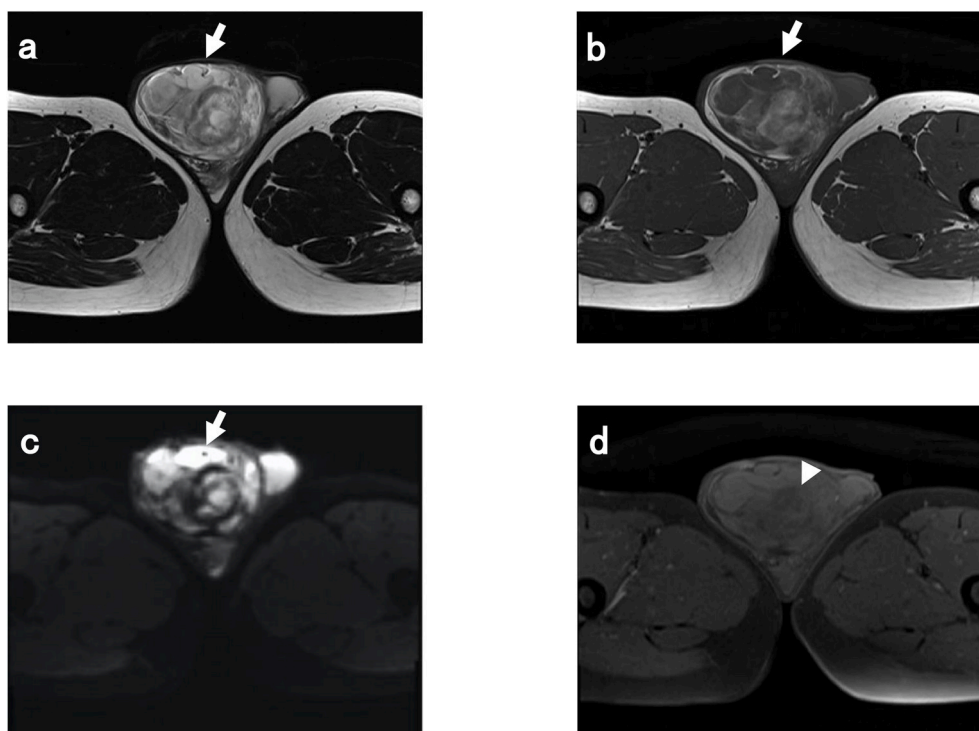
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**Fig. 1.** MRI imaging (a) T2 weighted image (b) T1 weighted image (c) diffusion weighted image (d) fat suppression T1 weighted image. MRI indicated a lobular tumor in his scrotum (arrow), which showed high and low intensity on T1- and T2-weighted images, respectively, and high intensity on a diffusion weighted image. Fat-suppressed T1-weighted imaging showed an intratumoral fat component (arrowhead).



**Fig. 2.** Macroscopic findings of the tumor. Resected specimen showed lobulated, fat-containing, and an elastic hard tumor, the color of which appeared yellowish brown, and which was located adjacent to the normal right testis. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

suggesting that hibernomas could occur anywhere in the body.<sup>1,3</sup>

Preoperative imaging modalities are not efficacious enough to distinguish hibernomas from other lipomatous tumors including liposarcomas,<sup>4,5</sup> due to a lack of specific imaging features of hibernomas indicating its rarity. However, the usefulness of positron emission tomography/computed tomography (PET/CT) for the diagnosis of hibernomas has been recently focused on radiographic findings indicating that standard uptake values (SUV) of hibernomas are higher than those of liposarcomas. This is attributed to high metabolic activation of glucose in hibernoma cells.<sup>5</sup> On the other hand, it has been reported that the limited usefulness of PET-CT to make the diagnosis of hibernoma is due to its SUV variation.<sup>5</sup> Therefore, further imaging studies with accumulating cases are needed to make a preoperative diagnosis of

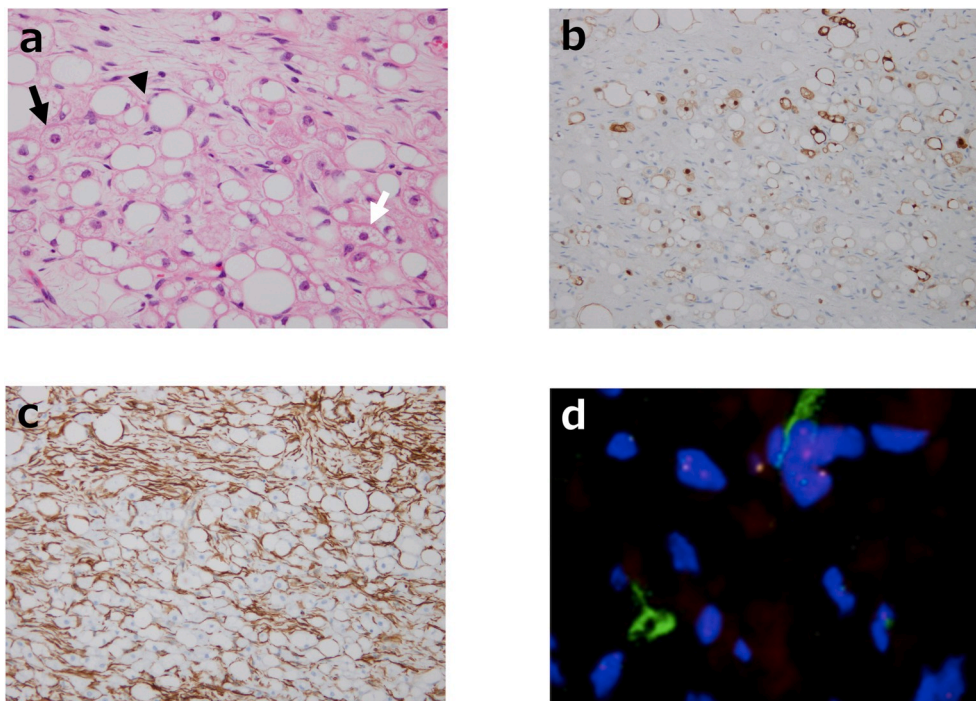
hibernoma radiographically.

A definitive diagnosis of hibernoma is made histopathologically with HE staining based on the existence of three types of cells: 1) cells with eosinophilic granular cytoplasm containing lipid vacuoles, 2) large cells containing scarce granular eosinophilic cytoplasm and multiple lipid vacuoles, and 3) large univacuolated adipocytes.<sup>2</sup> In addition, immunohistological examination is useful to distinguish hibernomas from other lipomatous tumors. Hibernomas are immunohistologically positive for S-100 protein while negative for CDK4 and MDM2, both of which are positive in liposarcoma.<sup>3,4</sup> Most hibernoma cases are also negative for CD34. In this case, the three types of cells on HE-stained specimens were present, and immunohistological examination demonstrated a positive and negative staining with S-100 protein and with CD34, CDK4 and MDM2, respectively. FISH test results on MDM2 gene expression were consistent with that of immunohistological examination, showing no amplification of the MDM2 gene. Therefore, we made a definitive diagnosis of intrascrotal hibernoma.

The best treatment for hibernomas is surgical resection with negative resection margins, which is similar to the treatment for lipomatous tumors. Incomplete resection of hibernoma may result in possible local recurrence.<sup>2,4</sup> The present case demonstrates successful treatment since no recurrence three years after the resection with negative margins has been observed. However, longer follow-up will be needed as patients with hibernomas have been reported to be at risk for late recurrence.<sup>2,4</sup>

## Conclusions

We encountered the second case of intrascrotal hibernoma, preoperatively suspected of being a liposarcoma. Preoperative discrimination of hibernomas and lipomatous tumors is difficult due to limited usefulness of imaging modalities with a small number of hibernoma cases, especially intrascrotal hibernomas. Therefore, a histopathological examination is needed to make a definitive diagnosis of hibernomas, and immunohistochemical and FISH analyses should also be performed to confirm the definitive diagnosis, especially in cases of intrascrotal



**Fig. 3.** Histopathological examination. (a) Hematoxylin-Eosin staining (b, c) immunopathological examination (b) S-100 protein (c) CD34 (d) FISH examination of MDM2. (a) Histopathological examination demonstrated three principle cells of hibernoma. (black arrow, cells with eosinophilic granular cytoplasm containing lipid vacuoles; black arrowhead, large univacuolated adipocytes; white arrow, multivacuolated adipocytes) (b, c) Immunohistological examination showed that the specimen was positive and negative for S-100 protein and for CD34 respectively, while spindle cells surrounding the hibernoma cells were positive for CD34. (d) FISH testing showed no amplification of MDM2 genes.

hibernoma because of its rarity.

#### Consent

The authors obtained written informed consent from the patient for publication of this case report and any accompanying images.

#### Author contributions

Drafting of the manuscript: M.H. Revision of the manuscript: S.N, K.S, and A.Y. Supervision: T.O. and S.U. All authors have read and approved the final manuscript.

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#### Declaration of competing interest

None.

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