CASE REPORT

An unusual breast lesion: the ultrasonographic, mammographic, MRI and nuclear medicine findings of mammary hibernoma

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ABSTRACT. We report the case of a 42-year-old woman being treated for an ovarian cancer who was diagnosed at the age of 40. A CT–positron emission tomography (PET) scan performed as follow-up documented abnormal uptake in the right breast. Mammograms were negative for malignancy, while a focal hyperechoic lesion was observed on ultrasonography in the same breast. Thus, she was referred to our institution for breast MRI, which showed a focal area of enhancement with atypical features. Percutaneous biopsy was performed, and a mammary hibernoma was diagnosed. Radiological and pathological correlation was provided. To our knowledge, this is the only report that describes the features of this rare tumour on four different imaging modalities (mammography, ultrasonography, MRI and CT–PET).

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An asymptomatic 42-year-old woman with ovarian clear cell adenocarcinoma, who was treated with surgery and chemotherapy at the age of 40 years, underwent CT–positron emission tomography (PET) with F18-fluorodeoxyglucose (¹⁸F-FDG) for re-staging. CT–PET revealed abnormal uptake in the lumbar aortic nodal chains and a focal capitation area in the inferior inner quadrant of the right breast (Figure 1). At this site, the maximal standardised uptake value corrected for body weight (SUV_{bw_max}) was 14.9. As there was a suspicion of malignancy, further radiological examinations were required. The patient did not have a family history of breast cancer.

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Standard craniocaudal and mediolateral oblique mammograms of the right breast did not demonstrate any mass, architectural distortion or calcifications; there were no changes from routine annual mammograms obtained during the previous two years.

Focused ultrasound examination of the inferior inner quadrant of the right breast revealed a hyperechoic longitudinally oriented area, with a maximum diameter of 19 mm (Figure 2).

Because of the pathological history of the patient and the findings on CT–PET, MRI of the breast was requested to exclude a breast neoplasm.

MRI examination was performed using a 1.5 Tesla scanner with pre- and post-gadolinium *T*₁ weighted three-dimensional fast low-angle shot (3D-FLASH) sequences. Pre-contrast *T*₁ weighted images showed a partially ill-defined mass with signal intensity similar (*i.e.* slightly hypointense) to subcutaneous fat in the inferior inner quadrant of the right breast, measuring 18 × 18 × 31 mm (Figure 3a). After rapid intravenous administration of gadolinium (0.1 mmol kg⁻¹ Gd-DTPA followed by a 20 ml saline flush), the mass enhanced rapidly with a moderate enhancement rate (32% at 1 min 40 s) and washout enhancement pattern (Figure 3b–d).

The subsequent ultrasonographic examination confirmed the presence of a hyperechoic vascularised area in a well-defined hypoechoic fatty lobule, measuring 30 × 16 mm and corresponding to the MR finding. A core needle biopsy (14 gauge) was performed with ultrasonographic guidance; no haemorrhage was observed. A histological diagnosis of mammary hibernoma was established.

Discussion

Hibernoma is an unusual soft-tissue tumour originating from brown fat. Brown fat is different from common white fat tissue owing to its microscopic findings and hypervascularisation. Brown fat tissue is thought to play a role in endocrine and thermoregulation functions, and is more prevalent in foetal and neonatal ages. The amount of brown fat tissue decreases with age; despite this, however, hibernoma usually occurs in adults, potentially at any site where brown fat persists [1–4]. Most cases present as asymptomatic, slow-growing,

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large subcutaneous masses. The most common sites are the extremities, trunk, shoulder and neck; only three cases of mammary hibernoma have been described in the literature [3–5]. Hibernomas usually represent an occasional finding on imaging examinations. On ultrasound, hibernoma is typically described as a well-defined echoic mass [1]. On MRI, this lesion demonstrates signal intensity similar to subcutaneous fat (usually intermediate between that of skeletal muscle and subcutaneous fat)

Little is known about the nuclear medicine findings of hibernoma: ^{18}F -FDG uptake in brown fat tissue, initially

Figure 2. Ultrasonography revealed a hyperechoic longitudinally oriented area, with a maximum diameter of 19 mm, on the inferior inner quadrant of the right breast.

referred to as muscle, was first described in 1996 [8] as a symmetrical uptake in the shoulders, neck and trunk [9]. Hibernoma is metabolically active on ^{18}F -FDG CT-PET, demonstrating uptake values similar to those described for liposarcomas. CT-PET findings of hibernoma are indistinguishable from malignancy, often leading to a false-positive interpretation. Biopsy is required to exclude a malignant aetiology [10–13]. To our knowledge, this is the first case of a mammary hibernoma being imaged by CT-PET.

In our case, the differential diagnosis based on the imaging findings (particularly the homogeneous hyperechogenicity on breast ultrasound and hyperintensity similar to fat tissue on MRI) included lipoma, haemangioma or low-grade liposarcoma. Because of the pathological history of the patient, the high uptake value on CT-PET, the hypervascularisation of the lesion and the washout pattern demonstrated on MRI, a malignancy could not be excluded.

On microscopic examination, hibernomas contain coarsely multivacuolated fat cells with small central nuclei and no atypias, as observed in our case. On immunohistochemistry, the abundant vessels and the increased content of mitochondria that also distinguish hibernomas from typical benign lipomas composed of white adipose

(a)

(b)

(c)

(d)

Figure 3. (a) MRI showed an ill-defined mass with signal intensity similar (*i.e.* slightly hypointense) to subcutaneous fat on pre-contrast T_1 weighted images at the same site as the CT-positron emission tomography and ultrasound findings. (b–d) After intravenous administration of gadolinium, the lesion appeared as an enhancing mass with a washout enhancement pattern (curve Type III).

tissue were noted. Hibernomas are usually treated with local excision and are not expected to recur [3, 4]. As our patient was asymptomatic and a malignant nature of the lesion was excluded, she did not undergo any surgery. However, owing to the iliac and interaortic-caval nodal involvement documented on CT-PET, she underwent lymphadenectomy and further cycles of chemotherapy.

In conclusion, mammary hibernoma, although rare, may be included in the differential diagnosis of breast lesions containing fat; in these cases, diagnostic biopsy is recommended because it is difficult to distinguish hibernoma from hypervascular malignant or benign soft-tissue tumours on the basis of imaging findings only.

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