Hibernoma
A Case Report

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ABSTRACT: Hibernoma is a rare soft-tissue tumor clinically presenting as a firm, freely movable, nontender mass, most commonly in the interscapular region. It is slow growing and usually asymptomatic. Examination of the overlying skin may demonstrate evidence of hyper-vascularity. On gross examination, the tumor is encapsulated and highly vascular, with its color varying from tan to reddish brown. Microscopic examination is usually diagnostic, demonstrating the characteristic multivacuolated oval or polygonal cells. Because of its benign character, treatment consists of simple excision. This article describes a case of a patient with hibernoma.

Introduction

Hibernoma is a rare soft-tissue tumor composed of multiloculated cells that are morphologically similar to those of the hibernating gland of animals. Although Merkel1 in 1906 was the first to describe a tumor composed of brown adipose tissue, Gery,2 in 1914, suggested the name “hibernoma,” citing the tumor’s morphologic similarity to the hibernating gland. To date, approximately 80 cases have been reported in the world literature.3

Case Report

A 65-year-old white man was seen for a routine annual physical examination at which time a large soft-tissue mass was noted over the left paraspinal muscles. The patient said that the mass had been present for a long time, but he had noted that its size had increased substantially during the past 3 months. He had no discomfort because of the mass. His past medical history was otherwise unremarkable.

Physical examination revealed that the mass was well localized to the left paraspinal muscle region from the lower thoracic spinal column to the lower lumbar segments. The mass was soft and nontender and did not seem to involve the skin or subcutaneous tissues. There was a full range of motion of the spinal column. The remainder of the physical examination was unremarkable.

A computed tomography scan demonstrated a soft-tissue lesion in the left paraspinal muscles (Fig. 1A). Uniform fat densities were observed interspersed with areas of increased soft-tissue densities—findings which suggest of a low-grade liposarcoma (Fig. 1B).

A biopsy specimen was taken through a longitudinal paramedian incision. Grossly, the lesion was myxomatous with a yellow hue (Fig. 2). The lesion was extremely vascular. Findings on microscopic sections were consistent with those of hibernoma (Fig. 3). The mass was excised and the postoperative course was unremarkable.

Discussion

Hibernoma has remained virtually unknown to most practicing orthopedic surgeons because of the paucity of cases, with only one case reported in the orthopedic literature.4 It has been only recently that strong evidence supporting the relationship of hibernomas to brown fat has been elucidated.5-9 It now is well accepted that there are two specific types of adipose tissue based on morphologic, embryologic, and ultrastructural criteria: white adipose tissue

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(WAT) and brown adipose tissue (BAT). Velsch, in 1670, was the first to describe brown fat in animals. In 1817, Jacobson was the first to differentiate the then unknown tissue, from the thymus in the thoracic cavity of animals and correctly describe it as brown adipose tissue. In 1846, Barkow considered the brown adipose tissue as "glands without ducts" and coined the term "hibernating gland." The presence of brown fat in humans was first described by Hatai in 1902, with his description of the "interscapular gland" in human embryos, suggesting their relationship to the hibernating gland of animals.

Hibernomas have since been reported by numerous authors. The usual locations (in descending order of frequency) are the interscapular region, thigh, axilla, mediastinum, and neck. The lesion also has been reported infrequently in other locations. Interestingly, not all of the locations are sites where brown adipose tissue has been previously described.

In 1949, Selye and Timiras observed that brown fat undergoes specific anatomic alterations during stress. They postulated that brown fat could be used as a sensitive indicator of the disease of adaptation. Emery and Dinsdale have proposed that brown fat is involved in thermogenesis. Some studies have shown decreased brown fat activity in obese persons. These studies proposed that the lack of caloric expenditure by brown fat thermogenesis contributes to the obesity. Although many more theories exist, we are still unaware of the exact function of brown adipose tissue.

It is now accepted that brown and white adipose tissues are distinct histologically, although they are believed to have a common origin from endothelial ingrowths into mesenchyme. Although some authors have proposed that brown adipose tissue is a stage in the development of white adipose tissue, evidence from recent studies has shown that brown adipose tissue is histologically different. In 1972, Levine was the first to comment on the unique ultrastructure of brown adipose tissue. He noted a significantly greater number of mitochondria in brown adipocytes than in white adipocytes. He also noted that organelles, such as endoplasmic reticulum and Golgi complex, were virtually absent from the brown adipocytes. In 1983, Fleishman and Schwartz made a further observation, citing the presence of peripheral amorphous periodic acid-Schiff-positive masses in brown adipocytes. In 1965, Angervall et al. using thin-layer chromatography, demonstrated a higher concentration of cholesterol and phospholipids in brown adipose tissue and hibernomas than in lipomas. They also demonstrated similar chromatographic patterns between hibernomas and brown adipose tissue.

Clinically, the hibernoma is a firm, freely movable, usually nontender soft-tissue mass. It is usually very slow growing, although rapid growth periods may occur, and some tumors have been present 20 years before significant symptoms arise. They are usually asymptomatic. However, pain due to local expansion, cough due to intrathoracic location, and
Tracheal compression secondary to cervical location have been reported. Several studies have shown a slight female preponderance.

Grossly, the tumor is tan to reddish brown, encapsulated, and highly vascular. Histologically, the hibernoma is composed of multivacuolated eosinophilic cells arranged in a distinct lobular pattern. The cells are oval or polygonal, with intravacuolar cytoplasmic lipofuscin pigment granules. The nucleus may be central or eccentric with a well-defined nuclear membrane of uniformly distributed chromatin condensed onto the nuclear membrane. One or more prominent nucleoli also may be present. These characteristics are easily discernible from those of the lardaceous, avascular lipoma, which is composed of large, round, univacuolated cells having a peripherally located flattened nucleus.

Hibernoma is a hypervascular lesion, with the overlying skin often reflecting this as increased warmth over the mass, whereas lipoma, fibroma, and neurofibroma are generally hypovascular, and thus demonstrate a lower temperature over the mass. In 1983, Hertzanu et al described the use of computed tomography to diagnose hibernoma and to differentiate it from the white fatty tumors. They found that, on CT, hibernomas consisted of a homogeneous fat density with well-defined borders and had postcontrast enhancement. Lipomas, however, lacked postcontrast enhancement. Angiolipomas of the noninfiltrating type demonstrated densities on CT greater than those of normal fat. The infiltrating type of angiolipoma was similar, but it was also locally aggressive into muscle and fascia and periodically showed local bony destruction. Liposarcoma was the most difficult to differentiate from hibernoma. Poorly differentiated liposarcoma was seen as fatty, nonhomogeneous, infiltrating, poorly margined masses, with frequent calcification and fibrosis, and significant postcontrast enhancement. Well-differentiated liposarcoma, however, was usually well defined and more homogeneous, lacked calcification, and had postcontrast enhancement, similar to that seen with hibernoma. Hertzanu et al concluded
that a lesion demonstrating a fatty, homogeneous, well-defined lesion with postcontrast enhancement on CT scan required a biopsy to differentiate between hibernoma and well-differentiated liposarcoma. It has been debated for a long time whether malignant hibernoma exists. In several cases in the early literature, it was claimed that there might be a malignant counterpart to the benign hibernoma, but the lesions were later discounted as being other distinct sarcomas.27,33 Most authors have since regarded the hibernoma as a benign lesion having no propensity to recur after resection and no potential for local or distant metastasis.

References