Significance of the “beak sign” in the Differential Diagnosis of Uterine Lipoleiomyoma from Ovarian Dermoid Cyst

SHUNJI ARIKAWA, MASAFUMI UCHIDA, MASAHARU SHINAGAWA, TATSUYUKI TOHNAN* AND NAOFUMI HAYABUCHI

Department of Radiology, Kurume University School of Medicine, Kurume 830-0011 and
*Department of Radiology, Chikugo City Hospital, Chikugo 833-0041, Japan

Received 11 April 2006, accepted 4 July 2006

Summary: A case of uterine lipoleiomyoma in a 72-year-old woman is presented. Although a series of imaging studies suggested a lipomatous tumor, diagnosis was difficult because the tumor appeared as a pedunculated mass extending from the uterine body. To distinguish the tumor from an ovarian lipomatous tumor, the “beak sign” in a magnetic resonance imaging study was diagnostic in this case. The purpose of this paper is to review lipomatous masses of the female pelvis, to discuss the differential diagnosis of the unusual imaging features, and to discuss imaging techniques to optimize pelvic mass characterization.

Key words uterus, lipoleiomyoma, beak-sign, CT, MRI

INTRODUCTION

Female intrapelvic masses are a challenging target for diagnostic imaging procedures, and the final diagnosis is usually obtained by surgical pathology. The current goal was to determine the parameters required to make a diagnosis based on imaging studies, rather than biopsy. Although rare, uterine lipoleiomyomas are distinctive because fatty tissue is identifiable by both computed tomography (CT) and magnetic resonance imaging (MRI). Although MRI is valuable in identifying the tumor, there are only five cases of lipoleiomyoma evaluated by MRI in the English literature [1-5]. In the present case, the tumor presented as a pedunculated mass extending from the uterine body, making it difficult to distinguish from an ovarian mature cystic teratoma. In this paper we document a case of lipoleiomyoma, emphasizing the diagnostic value of MRI.

CASE REPORT

A 72-year-old, gravida 3, para 3, postmenopausal woman presented with anemia and complained of a palpable mass in the lower abdomen. Transabdominal ultrasound images demonstrated a $12 \times 7 \times 9$-cm diffuse hyperechoic mass with a poorly-defined margin within the pelvic cavity. Non-enhanced CT showed a well-circumscribed oval lesion that contained an area of heterogeneic fat density (Fig. 1). MRI was performed with a 1.0 T unit. The mass was observed as an area of heterogeneous high-signal intensity on both T1- and T2-weighted MR images and had an amorphous hyposignal structure near its center (Fig. 2A, B). Short tau inversion recovery (STIR) images confirmed the existence of fat tissue in the mass (Fig. 2C). On T1-weighted MR images after administration of gadolinium-diethylene triamine pentaacetic acid (Magnevist; Schering AG, Berlin, Germany; total 10 mL), the tumor was visualized as a heterogeneous enhancement (Fig. 2D).
**Fig. 1.** Non-contrast CT demonstrates a well-defined hypodense mass. A soft tissue density component is also noted. The uterus was displaced on the right side of the pelvic space.

**Fig. 2.**
(A) Transaxial T1-weighted MR image (TR/TE, 491/14) demonstrating a heterogeneous high signal intensity mass with the “beak sign” (arrows) at its contact surface with the uterus in the mid pelvis.
(B) On transaxial T2-weighted MR image (TR/TE, 3100/100), the tumor shows inhomogeneous high signal intensity.
(C) Transaxial STIR image (TR/TE, 3100/100), fat-suppression technique. The area of high signal intensity observed on Figure 2A is significantly suppressed.
(D) Transaxial T1-weighted MR image (TR/TE, 491/14) after administration of gadolinium-diethylene triamine pentaacetic acid. Low signal intensity component near its center is slightly enhanced.
Fig. 3. Macroscopic appearance of the cut surface of the resected specimen. The mass is yellowish in color arising from the myometrium, mature fat, and soft tissue contiguous to the mass. A leiomyoma (arrow head) was also present in the uterine muscle.

Fig. 4. Microscopic appearance of uterine lipoleiomyoma (hematoxylin-eosin, ×100). The tumor comprises a mixture of mature adipose tissue and smooth muscle cells. Their nuclear atypia is not significant and mitosis is rare.

series of imaging studies suggested a lipomatosus tumor. The "beak sign", which was demonstrated in an MR image (Fig. 2A), strongly suggested that the mass was a uterine tumor. Based on these findings, a diagnosis of lipoleiomyoma was considered to be most likely. To confirm the pathologic diagnosis, surgery comprising a total abdominal hysterectomy was performed and proved that the pedunculated tumor was directly connected to the left anterior wall of the uterine body. A cut surface revealed yellowish fatty tissue that almost completely occupied the pedunculated mass (Fig. 3). Histologic examination revealed that the tumor consisted mainly of mature lipocytes; smooth muscle and fibrous tissue were also present, confirming the diagnosis of lipoleiomyoma (Fig. 4).

DISCUSSION

Uterine lipoleiomyoma is composed of a variable mixture of smooth muscle and mature fat tissue, and is a rare benign neoplasm. The reported incidence varies from 0.03% to 0.2% [6]. Uterine lipoleiomyomas typically occur most frequently in postmenopausal women from 50 to 70 years old, and 90% of the patients are older than 40 years of age [7]. Most lipoleiomyomas are located within the posterior wall of the uterus and are generally associated with leiomyomas [6,7]. Their clinical presentation and course are nearly identical to those of uterine leiomyomas.

Pathologically, lipomatous tumors of the uterus are categorized in three groups [7]: pure lipomas, which are composed of mature fat cells and encapsulated; lipoleiomyomas, which are mixed tumors containing various compositions of mesodermal tissue such as fat, muscle, and connective tissue; and the rarest group is malignant neoplasms, which consist of less differentiated fat cells that have undergone sarcomatous changes. The histogenesis of these lipoleiomyomatous tumors has been the subject of long-time controversy. The two most popular theories are relatively widely accepted, one being ‘lipomatous’ metaplasia of smooth muscle cells and the other is that the fat cells originate from misplaced embryonic fat cells or stromal mesenchymal cells [8]. Shintaku [8], in one of his five cases, and Demopoulos et al. [9], in four of their seven cases, however, reported cases that contained many anomalous arteries, resembling renal angiomyolipoma, in addition to smooth muscle fibers and fat cells. It is difficult to explain the presence of anomalous arteries on the basis of the ‘lipomatous’ metaplasia theory.

Generally, leiomyomas typically demonstrate distinct low signal intensity relative to that of the myometrium on T2-weighted MR images and intermediate signal intensity on T1-weighted MR images [10]. In contrast, the imaging features of uterine lipoleiomyomas demonstrate the presence of fat. The ultrasonographic appearance is a hyperechoic mass partly encased by a hypoechoic ring [6]. CT shows a
large, encapsulated, heterogeneous, predominantly fat density [7]. In MRI, the fatty tissue demonstrates a signal intensity similar to that of subcutaneous fat with all pulse sequences [10]. Further, STIR images and chemical shift images are an effective way to validate the fat tissue in MRI [7,10].

The differential diagnosis includes benign ovarian mature cystic teratoma, benign pelvic lipoma, liposarcoma, extra-adrenal myelolipoma, lipoblastic lymphadenopathy, retroperitoneal cystic hamartoma, angiomyolipoma, and pelvic fibrolipomatosis [6,7,11,12]. The most common fat-containing female pelvic tumor is an ovarian teratoma. Ovarian mature cystic teratomas comprise approximately 20% of ovarian tumors and contain fat, fluid, and calcifications [7]. If a fat-containing pelvic mass can be clearly identified to be of uterine origin, a diagnosis of a lipomatous uterine tumor can be made. As in our case, however, diagnosis might be more difficult if the mass is pedunculated or is a well-defined exophytic hyperintense mass of the uterine wall, because it would mimic the more common ovarian fatty tumors. The “beak sign” [13] is a useful radiologic sign that is helpful in determining tumor origin. The term “beak sign” is applied when a mass that deforms the edge of an adjacent organ has a “beak” shape, suggesting that the mass arises from that organ [13]. In our case, the fat-containing huge mass deformed the edge of the uterus into a “beak” shape, which suggested that the mass arises from the uterus. The “beak sign” is a useful radiologic sign for distinguishing uterine lipoleiomyomas from other fat-containing ovarian tumors.

REFERENCES