

Pelvic tumors with normal-appearing shapes of ovaries and uterus presenting as an emergency (Review)

ATSUSHI IMAI¹, SATOSHI ICHIGO¹, HIROSHI TAKAGI¹, KAZUTOSHI MATSUNAMI¹,
SADAYOSHI WATANABE¹, TAKAYUKI MURASE² and TSUNEO IKEDA²

Departments of ¹Obstetrics and Gynecology and ²Pathology, Matsunami General Hospital, Kasamatsu, Gifu 501-6062, Japan

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Abstract. Abdominal pain with an associated pelvic mass is a common problem in everyday practice. Concerns about ectopic pregnancy, torsion of an enlarged ovary or malignancy usually dominate the diagnostic evaluation. On physical and imaging examination, when a palpable painful mass is present in the pelvis and the two ovaries and uterus are detected in their normal anatomical locations, the content and origin of the lesions may be significant in narrowing the pre-operative differential diagnosis. Thus, the emergent pelvic indications discussed in this review should be considered. The causes of acute abdominal pain are few in number and therefore an accurate diagnosis may be most frequently made at the time of exploratory laparotomy.

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1. Introduction

Abdominopelvic pain with an associated pelvic mass is a common emergency. These patients create a management dilemma for most emergency physicians. This problem usually

stems from the inability of the physical examination to reliably differentiate between a potential surgical problem (i.e., torsion of an enlarged ovary, pelvic abscess) and a non-surgical etiology (i.e., ovarian cyst, uterine myoma). Ultrasonography (US), magnetic resonance (MR) and/or computed tomography (CT) are the gold standard imaging modalities used to differentiate pelvic masses in female patients presenting with abdominopelvic pain as an emergency.

Ovarian tumors and uterine myoma constitute the most common masses in the female pelvis (1,2). The torsion of enlarged ovaries is one of the most common surgical gynecological emergencies (1). The differential diagnosis includes twisted exophytic ovarian fibroma, pedunculated myoma, peritoneal lipoma and accessory ovary although it should be noted that these conditions rarely cause acute abdominopelvic pain. The purpose of this review was to summarize the differential diagnosis of pelvic masses associated with acute abdominal pain when normal-appearing ovaries and uterus are detected.

2. Ovarian fibroma

Ovarian fibromas are the most commonly encountered subtype of sex cord-stromal tumors, accounting for 4-5% of all ovarian tumors (3-6). It is well known that MR imaging is useful in diagnosing ovarian fibromas, due to the characteristically low T1- and T2-weighted signal intensities of the tumors, caused by the presence of densely packed connective tissue (3-6). The main differential diagnosis of a solid adnexal mass with T2 hypointensity includes a uterine pedunculated myoma and an ovarian fibroma. In a retrospective analysis, crescent-shaped ovarian tissue may be detected along the periphery of the tumor in approximately 50% of ovarian fibroma cases and a normal-appearing ovary closely attached to the tumor in certain lesions may be misdiagnosed as a subserosal leiomyoma (5-8). Thus, careful evaluation of the ipsilateral ovary may aid the differentiation between ovarian fibroma and uterine leiomyoma. The cystic degeneration of fibromas has been reported to lead to the pre-operative misdiagnosis of malignant ovarian epithelial and collision tumors in certain cases (5,6). Larger or twisted tumors may result in various MR imaging findings which reflect the degenerative changes, including cystic degeneration, edematous changes, hemorrhagic infarction or necrosis as a result of torsion and myxomatous changes (4,9). Oh *et al* (5) reported that the ipsilateral ovaries

Correspondence to: Dr Atsushi Imai, Institute of Endocrine-Related Cancer, Matsunami General Hospital, Kasamatsu, Gifu 501-6062, Japan
E-mail: aimai@matsunami-hsp.org.jp

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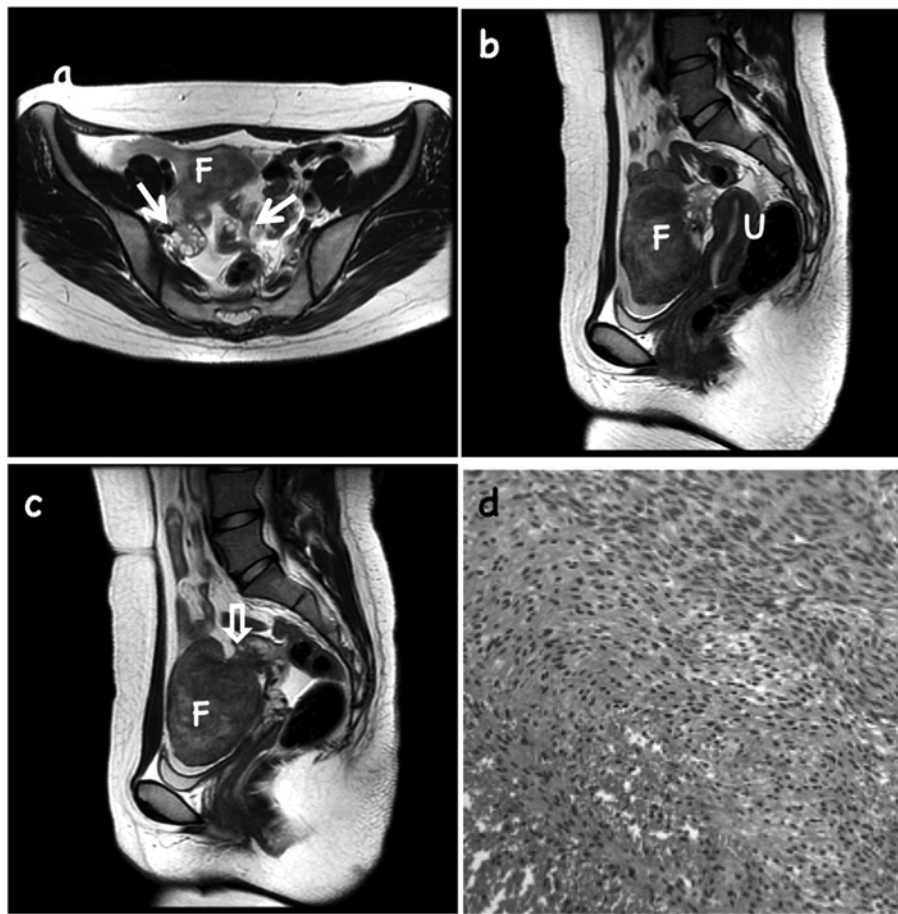


Figure 1. A 21-year-old female with ovarian fibroma. The possible diagnosis was verified by ultrasonographic morphology and MR imaging when the patient was admitted to hospital due to a pelvic mass. (a) Axial and (b and c) sagittal T2-weighted MR images show a left ovarian fibroma (F) with normal-appearing uterus (U). Note the exophytic growth of the fibroma connected to the normal-appearing ipsilateral left ovary (arrow) by a pedicle-like structure (open arrow). The contralateral ovary (arrow) is also observed in the right adnexa. While treatment was considered, the patient was admitted to the emergency clinic with sudden onset of abdominal pain. At emergency surgery, the tumor was twisted 180° in a clockwise direction with macroscopic findings suggestive of hemorrhagic change. The mass was completely excised. (d) Histopathological specimen shows abundant spindle-shaped cells and intrapapillary congestion due to torsion. MR, magnetic resonance.

were identified in half of the ovarian fibroma cases included in the study. The ovaries had a preserved, normal-appearing ovoid shape, suggesting the exophytic growth of the fibroma from the periphery of the ovary. Considering the high incidence (50%) of a long pedicle in ovarian fibromas reported by certain groups (5,6,10), the exophytic growth of fibromas is not uncommon. Torsion may occur incidentally (Fig. 1).

The remaining ovary on the same side as the fibroma is commonly detected on MR imaging, especially in premenopausal women, as is the exophytic growth of fibroma from the periphery of the ovary. Careful evaluation of the relationship between the ipsilateral ovary and an adnexal mass may be a significant clue in the differential diagnosis of ovarian fibroma from uterine leiomyoma, in addition to the characteristic morphology and signal intensities (5).

3. Fat-containing tumors in the pelvic cavity

There are numerous types of fat-containing lesions which may be found in the intraperitoneal cavity and retroperitoneal space and treatment varies according to the classification. Mesenteric panniculitis and pseudolipoma of Glisson's capsule may be

treated medically or not at all. Adrenal adenoma, myelolipoma, angiomyolipoma, ovarian teratoma and lipoma may be surgically resected when the lesions reach a large size or begin to cause symptoms, whereas liposarcoma and retroperitoneal teratoma should be resected at an earlier stage (11). Stalk torsion of a lipoma may present with acute abdominal pain and is an indication for emergency surgery (Fig. 2) (12,13).

Lipomas are commonly observed benign fat-containing soft-tissue tumors which may occur singly or, as in lipomatosis, in larger numbers, and have either a superficial or deep localization. Lipomas are mostly diagnosed in patients aged 40-60 years and, in adults, are often located in the trunk. However, previous studies have reported cases of deep lipomas located in the thorax, mediastinum, chest wall and retroperitoneum. Cases of intraperitoneal lipoma are extremely rare (12,14,15).

When visualised with US, adipose tissues, with some exceptions, are typically hyperechoic. Fat tissues in CT scans have a low attenuation, ranging from -10 to -100 Hounsfield units (HUs). However, in certain cases it is difficult to reliably identify fat tissues using CT, as the mean CT number increases if the proportion of fat in a voxel is low (11,16). Finally, MR

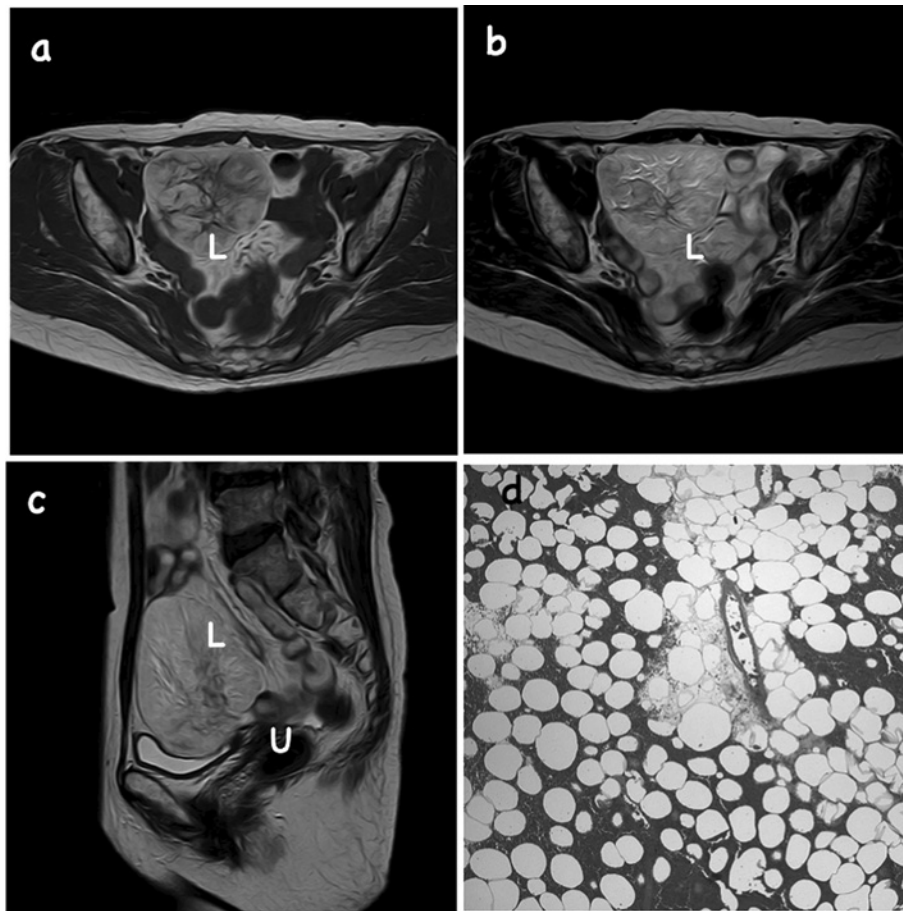


Figure 2. Lipoma of the parietal peritoneum in a 53-year-old postmenopausal female presenting with acute abdominal pain. (a) Axial T1-weighted, (b) T2-weighted and (c) sagittal T2-weighted MR images show a solid mass (L) occupying the pelvic cavity and an atrophic normal-appearing uterus (U). Torsion of an ovarian tumor was suspected due to the slightly higher signal intensity on the T1-weighted image (a), which reflected hemorrhage, and the absence of contrast enhancement. Retrospectively, the identification of normal ovaries may have been hindered by age and menopause. Diagnostic surgery revealed a dark red, twisted (540° rotation) solid mass originating from the parietal peritoneum into the median pelvic cavity. (d) Pathologically, the tumor was diagnosed as a lipoma. The tumor was composed of a well-formed fibrous capsule and mature fat cells. The nuclei of the cells were necrotic due to torsion. MR, magnetic resonance.

imaging has a higher sensitivity for microscopic fat than CT and US imaging (Fig. 2) (17). In T1-weighted MR images, adipose tissue appears hyperintense and in T2-weighted fast spin and gradient-echo images, fat appears immediate- to hyperintense. MR is based on differences in the resonance frequencies of protons in different environments, in fat and water for instance, and methods such as in-phase/opposed-phase chemical shift imaging and the frequency-selective fat suppression technique mean that fat may be more reliably identified using MR images than CT or US (11,18).

Although cases of lipoma in the parietal peritoneum are rare, this type of tumor should be considered in the differential diagnosis of patients who present with an abdominal mass and acute abdomen.

4. Pedunculated myoma

Although uterine myomas are the most common type of tumor in females of reproductive age, the acute torsion of a subserosal uterine leiomyoma is a rare complication (2,19). The torsion of the vascular pedicle of a subserosal leiomyoma may cause ischemic gangrene and peritonitis (2,20,21). The diagnosis is difficult and is usually made during exploratory laparotomy.

There are a number of techniques that may be used in the identification of subserosal leiomyoma. The tumor may appear as a lesion lateral to the uterus in transvaginal US, but the pedicle of the subserous leiomyoma may be thin and invisible to US, meaning that a definitive diagnosis is rarely made using this technique (22). A CT scan may be performed as an alternative investigation and certain authors have reported signs which distinguish between ovarian and uterine masses, including a pedunculated myoma node (22,23). MR imaging is another non-invasive method used to detect and analyze uterine leiomyomas. This method is more sensitive and specific than US, has a good contrast resolution and produces a characteristic signal for uterine leiomyomas (2,21,24). Non-complicated myomas appear hypointense and homogenous in T2-weighted images and isointense in T1-weighted images compared with the myometrium (25,26). Necrotic leiomyomas, however, have a heterogeneous and hyperintense T2 signal and a hyper- or isointense T1 signal, dependent on whether the necrosis is due to hemorrhage or ischemia. MR imaging also aids diagnosis by facilitating the study of the anatomy and topography of the pelvis. Following a definitive or suspected diagnosis, surgical exploration is indicated and the lesion is typically resolved by excision (19,26).

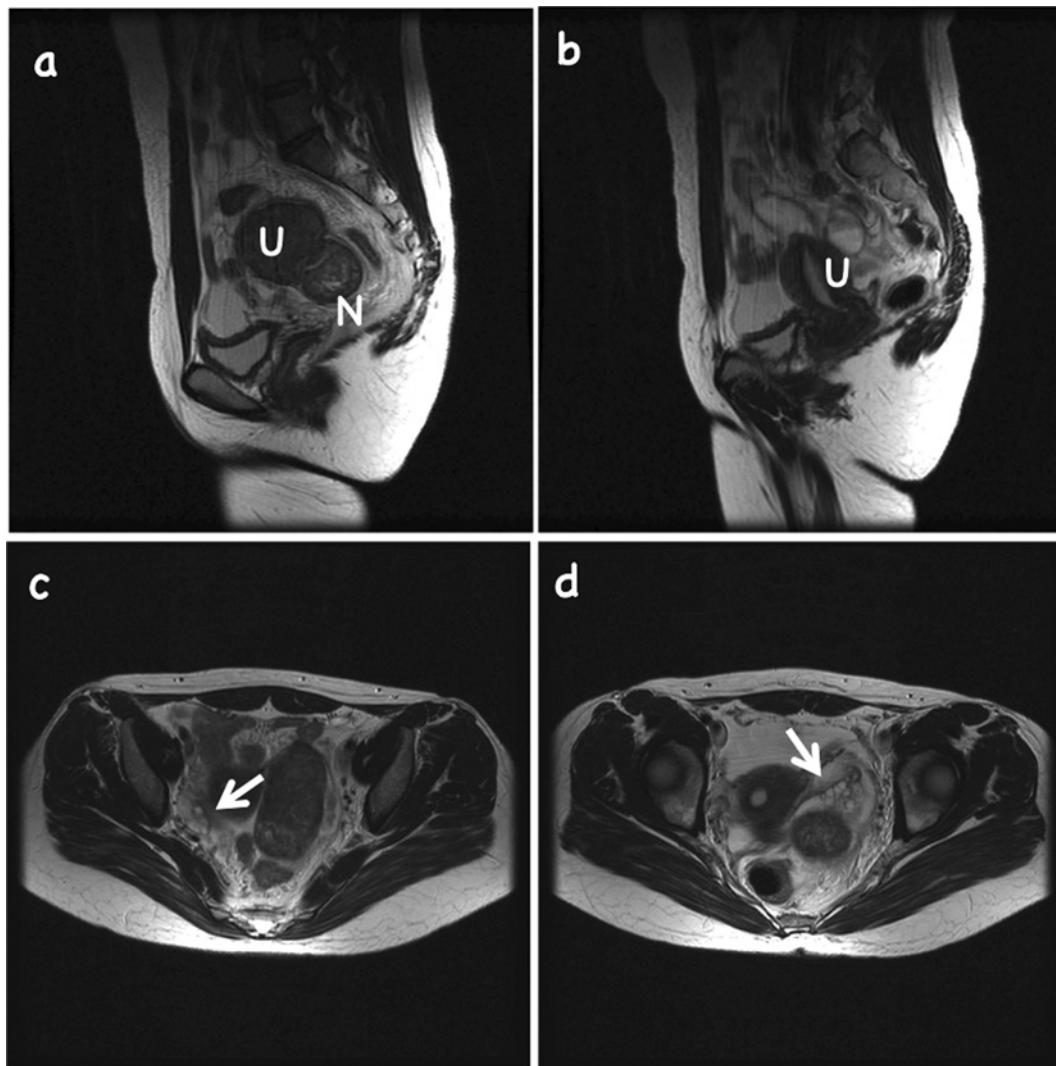


Figure 3. A 36-year-old female with torsion of a subserous myoma. The patient suffered from lower abdominal pain. (a,b) Sagittal and (c,d) axial T2-weighted MR images show a solid region (N) attached close to the uterine posterior wall with slightly higher signal intensity than that of the uterine corpus (U). Note the normal-appearing oval shape of bilateral ovaries (arrows). The uterine corpus (U) also appears to be normal. The pre-operative differentiated diagnosis was the acute torsion of a subserosal pedunculated node. Emergency laparotomy revealed a peduncle-like structure between the myoma node and uterus. MR, magnetic resonance.

5. Tumor within an accessory ovary

With an estimated incidence of between 1/29,000 and 1/700,000 gynecological admissions, ectopic ovarian tissue is rarely observed. It is difficult to make a narrower estimate of the incidence due to the lack of a clear and uncontroversial classification system. A definition of an accessory ovary as being in close proximity to, and having an association with, a eutopic ovary and its blood supply was proposed by Wharton (27). Accessory ovaries are commonly attached to a Fallopian tube or the ligamentous structure of the ovarian-uterine complex (28,29). Wharton also defined a supernumerary ovary as ovarian tissue which has a separate blood supply and is located at a distance from the eutopic ovaries. Supernumerary ovaries may be located at any point along the embryological migratory path of the ovarian primordium, including the mesentery, retroperitoneal space and omentum (30). Certain studies have described cases of tumors and/or their torsion arising from an accessory ovary (31,32). These tumors may preserve the normal oval shape of the ovary.

6. Pelvic hematoma

Nelson (33) reported an unusual cause of a pelvic mass caused by domestic violence. If the social history and high incidence of domestic violence had been considered, the cause of the mass may have been diagnosed earlier. Instead, the patient was tested for other diagnostic entities which occur relatively infrequently.

7. Other problems

Abdominopelvic problems which originate from the gastrointestinal tract have been documented in previous studies (34-37). Two cases with torsion of a wandering spleen detected by pelvic CT have been reported (38). In cases of acute abdomen with a palpable painful abdominal mass and the absence of the spleen from its normal location, torsion of a wandering spleen should be considered in the differential diagnosis.

8. Conclusion

The conditions discussed in this review, although extremely rare, must be considered in the differential diagnosis of acute abdomen when a palpable painful pelvic mass is present on physical and imaging examinations and the two ovaries and uterus are detected in their normal anatomical locations on radiological examination. An accurate diagnosis may be most frequently made at the time of exploratory laparotomy.

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