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Superficial Endometriosis Mimicking Soft Tissue Tumors: A Case Series of Clinical and Characteristic MRI Findings in Eight Patients

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Purpose: Differentiating superficial endometriosis from soft tissue tumor is important because these two conditions required quite different therapeutic strategies. The purpose of this study was to evaluate the radiological imaging findings and clinical features of superficial endometriosis mimicking soft tissue tumor and to clarify the distinction between these two diseases.

Patients and Methods: In this retrospective study, 8 women (mean age, 40.1, range, 31–51) who were pathologically diagnosed with endometriosis and underwent excisional biopsy were identified. Demographic, clinical, and radiographic findings were reviewed.

Results: All patients had history or coexisting obstetric or gynecologic disorder, such as ovarian cyst, uterine myoma, or cesarean section. Five patients complained of painful mass lesions during menstruation. On magnetic resonance imaging, although 6 of 8 patients exhibited lesions isointense to muscle on both T1- and T2-weighted images, a consistent and diagnostically important finding was the presence of distinct small hyperintense foci within the lesions on both sequences. Only one patient had cystic hyperintense lesion on T2-weighted image with fluid-fluid level feature.

Conclusion: We showed the clinical and radiographic findings of superficial endometriosis. Painful mass during menstruation is an important finding distinguishing soft tissue tumor from superficial endometriosis. Magnetic resonance imaging shows small foci or fluid-fluid level and is useful in clarifying the suspicion of superficial endometriosis to avoid misdiagnosis.

Keywords: extragenital endometriosis, magnetic resonance imaging, superficial endometriosis, soft tissue tumor, fluid-fluid level

Introduction

Endometriosis is defined as the presence of endometrial tissue (glands and stroma) outside the uterus.[1] Endometriosis affects approximately 10% of women of reproductive age and is therefore considered a relatively common disease.[2] This lesion may develop anywhere within the pelvis and on other extrapelvic peritoneal surfaces.[3] The most common sites of implantation are the pelvic viscera and peritoneum. Meanwhile, superficial endometriosis arising from the abdominal wall is extremely rare. Most cases of superficial or abdominal wall endometriosis arise in surgical scars following cesarean section, and the incidence of abdominal wall endometriosis after cesarean section has been reported to range from 0.03% to 0.4%.[4] However, cases of superficial endometriosis arising in the body surface without an association with cesarean section have also been reported.[5] Because superficial endometriosis may present as a palpable mass, clinicians are more likely to watch for signs suggestive of soft tissue tumor.[6] It is important to distinguish superficial endometriosis from soft tissue tumor because these two conditions required quite different therapeutic strategies. Difficulty in differentiating superficial endometriosis from soft tissue tumors carries the risk of unnecessary biopsy or overly aggressive surgical excision. While MRI features of endometriosis in typical locations have been reported, descriptions of ectopic endometriosis, especially involving superficial body surface sites, are relatively scarce.[7]

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The aim of this study was to retrospectively evaluate the radiological imaging findings and clinical features of superficial endometriosis mimicking soft tissue tumor in eight patients who were diagnosed by surgical resection and to clarify the distinction between these two diseases.

Patients and Methods

We identified and retrospectively reviewed the records of eight patients with superficial endometriosis who underwent excisional biopsy in our institutions from 2010 to 2018. This study was approved by the research ethics committee of Niigata University Graduate School of Medical and Dental Sciences and Niigata Cancer Center Hospital (Approval no. 2018-0005). This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained to publish the case details from each patient. Patients' age ranged from 31 to 51 years (mean, 40.1 years). Definitive diagnosis was made by pathological examination of excisional biopsy samples. Clinical features including the involved site, pain site, hardness, or mobility as well as histopathological and radiological features were recorded for each patient. All patients had undergone magnetic resonance imaging (MRI), and three were also studied by X-ray imaging. Computed tomography (CT) was performed in four patients. All patients underwent excisional biopsy, and endometriosis was pathologically confirmed. Medical records and radiological results including X-ray imaging, CT, and MRI were thoroughly reviewed. Serum cancer antigen 125 (CA125) was also measured in five patients.

Results

Clinical Features

Patients' demographic data are shown in Table 1. Five lesions involved the right groin, and one patient had two lesions in the bilateral groin. One lesion involved the subcutaneous fat, which was related with previous cesarean section scar, and one lesion involved the abdominal muscle. All patients had history or coexisting obstetric or gynecologic disorder, such as an ovarian cyst, uterine myoma, or cesarean section. Five patients displayed some degree of pain during menstruation, and one patient complained of inguinal pain at rest. In some cases, preoperative blood CA125 was not tested because endometriosis was not a preoperative differential diagnosis. Preoperative serum CA125 level was measured in 5 of 8 patients, and slightly higher levels of serum CA125 were observed in two patients.

Imaging Findings

Details of the imaging protocols and radiological findings are shown in Table 2. CT and MR images revealed involvement of subcutaneous soft tissues in all lesions. Five lesions developed to the right suprapubic area, and one patient had lesion that (Case 8) developed on bilateral suprapubic area. One patient (Case 3) had lesion that developed near the midline of the inferior abdominal wall and one patient (Case 4) over the rectus abdominis muscle. Two patients underwent pelvic X-ray imaging, but the findings were not remarkable (figure not shown). Four patients underwent CT for diagnosis. In these patients, all lesions were identified over the right pubic tubercle with no bulging of the skin. These lesions were nodular, but the borders were spiculated and had infiltrative pattern to the surrounding fat tissue. One lesion was a well-defined nodular mass with clear margin. All patients underwent MRI for diagnosis. On MRI, 6 of 8 cases showed isointense lesions compared with the muscle on both T1- and T2-weighted images, but the lesions contained small foci, showing hyperintensity on T1- and T2-weighted images. One patient (Case 2) had cystic isointense lesion on T1-weighted images and hyperintense lesion on T2-weighted image with fluid-fluid level feature. One patient (Case 4) had hyperintense lesion on T1- and T2-weighted images. Intravenous contrast-enhanced MRI was performed in five patients. In these cases, homogeneous enhancement was observed.

Intraoperative Findings

Six lesions developed on the suprapubic area (cases 1, 2 and 5–8) were located over the superficial inguinal ring and were connected with the inguinal canal. One lesion that developed to the caudal abdominal wall (Case 3) was close to the surgical scar of a previous cesarean section. One lesion that developed over the rectus abdominis muscle (Case 4)

Table 1 Summary of Patient Characteristics

Case No.	Age, Year	Gynecological History or Coexistent	Menstruation	Site Involved	Preoperative Symptom	Size, cm	Hardness	Mobility	Margin	Serum CA125 Level (IU/mL)
1	51	Uterine myoma, endometriotic cyst of ovary	Irregular	Right groin	Painful mass during menstruation	1	Elastic hard	Adhesive	Slightly unclear	35
2	44	Mass lesion of the uterine body, Cesarean section	Regular	Right groin	Painful mass during menstruation	3	Soft	NA	Unclear	NA
3	31	Cesarean section	Regular	Right subcutaneous tissue (Scar of the cesarean section)	Painful mass at rest	3	Hard	Adhesive	Unclear	NA
4	32	Ovarian cyst	NA	Right rectus abdominis muscle	Tightness during menstruation	1	NA	Mobile	Clear	NA
5	44	Left endometriotic cyst of ovary, Cesarean section	Regular	Right groin	Painful mass during menstruation	1	Hard	Mobile	Unclear	24
6	39	Uterine myoma	Regular	Right groin	Painful mass during menstruation	1	Elastic hard	NA	NA	34
7	40	Bilateral endometriotic cyst of ovary	Regular	Right groin	Inguinal pain during menstruation	Not palpable	Not palpable	Not palpable	Not palpable	39
8	40	Uterine myoma	Regular	Bilateral groin (right < left)	Painful mass during menstruation	1	Elastic hard	Adhesive	Unclear	12

Abbreviations: NA, not applicable; CA125, Serum cancer antigen 125.

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Table 2 Radiographic Findings

Case No.	CT Features	MRI Acquisition					MRI Features	Signal Intensity*				
		Field Strength (T)	Contrast Agent	Pre-Contrast Sequences	Imaging Planes	Contrast Enhancement		T1-WI	T2-WI	Contrast Enhancement	Small Foci	Fluid-Fluid Level
1	Spiculated border and infiltrative pattern	1.5	Magnevist (10 mL)	T1WI, T2WI, T1FS	Axial, Sagittal	T1FS	Spiculated border and infiltrative pattern	Isointense	Isointense	Homogeneous	Yes	No
2	Well-defined nodule	1.5	Not used	T1WI, T2WI, T1FS, T2FS	Axial, Sagittal	Not performed	Well-defined nodule	Isointense	Hyperintense	NA	No	Yes
3	NA	1.5	Magnevist (11 mL)	T1WI, T2WI, T1FS, T2FS	Axial, Sagittal	T1FS	Spiculated border and infiltrative pattern	Isointense	Isointense	Homogeneous	Yes	No
4	NA	1.5	Not used	T1WI, T2WI, T1FS, T2FS	Axial, Sagittal	Not performed	Well-defined nodule	Hyperintense	Hyperintense	NA	No	No
5	NA	1.5	Omniscan (10 mL)	T1WI, T2WI, T1FS	Axial, Coronal	T1FS	Spiculated border and infiltrative pattern	Isointense	Isointense	Homogeneous	Yes	No
6	NA	1.5	Not used	T1WI, T2WI, T2FS	Axial, Sagittal, Coronal	Not performed	Spiculated border and infiltrative pattern	Isointense	Isointense	NA	Yes	No
7	Spiculated border and infiltrative pattern	1.5	Omniscan (12mL)	T1WI, T2WI, T1FS	Axial, Sagittal	T1FS	Spiculated border and infiltrative pattern	Isointense	Isointense	Homogeneous	Yes	No
8	Spiculated border and infiltrative pattern	3.0	Gadovist (4 mL)	T1WI, T1FS, T2FS	Axial, Sagittal	T1FS	Spiculated border and infiltrative pattern	Isointense	Isointense	Homogeneous	Yes	No

Note: *Signal intensity compared to normal muscle.
Abbreviations: NA, not applicable; CT, computed tomography; MRI, magnetic resonance imaging; FS, fat-suppressed; WI, weighted imaging.

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adhered to the surrounding muscle tissue and separated from the ipsilateral inguinal canal. All lesions were excised for pathological diagnosis.

Pathological Findings

All resected specimens were evaluated histologically. The histological findings of case 7 are shown in Figure 1. The paraffin-embedded thin tissue sections revealed numerous glands with large lumina lined by a layer of cubic or columnar cells with heterogeneous stromal cells and fibroblast-like spindle cells (Figure 1A). These stromal cells were positive for CD10 (Figure 1B). Numerous micro-hemorrhages were identified in the stromal tissue (Figure 1C). The histological appearance of all specimens confirmed the endometriosis of the endometrial gland and stroma. All cases had no findings suggestive of desmoid tumor or fibromatosis.

Representative Case Presentations

Case 1

A 51-year-old woman with a palpable mass on the right groin was treated with excisional biopsy. Preoperative MRI showed a 1-cm ill-defined mass over the right pubis (Figure 2). On T1- and T2-weighted images, the tumor was isointense compared with the muscle. On contrast-enhanced T1-weighted imaging, the tumor was enhanced homogeneously. The lesions contained small foci showing hyperintensity on T1- and T2-weighted images. Similar findings were observed in cases 5–8.

Case 2

A 44-year-old woman with a palpable mass on the right groin was treated with excisional biopsy. Preoperative CT showed a 3-cm well-defined mass over the caudal end of the right rectus abdominis muscle (Figure 3). MRI showed isointense mass lesion compared with muscle on T1-weighted images. On T2-weighted images, the tumor was hyperintense with a single fluid-fluid level feature.

Case 3

A 31-year-old woman with a hard adhesive mass of the right abdominal subcutaneous tissue was treated with excisional biopsy. The tumor was close to the surgical scar of a previous cesarean section. Preoperative MRI showed a 3-cm ill-defined mass in the subcutaneous fat (Figure 4). On T1- and T2-weighted images, the tumor was isointense compared with muscle. On contrast-enhanced T1-weighted imaging, the tumor was enhanced homogeneously. The lesion contained small foci, showing hyperintensity on T1- and T2-weighted images.

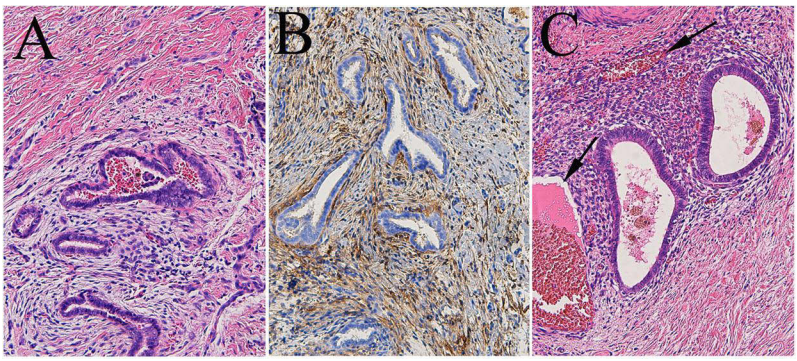

Figure 1 Histological findings of the inguinal endometriosis. The histological section stained with hematoxylin and eosin revealed numerous glands with large lumina lined by a layer of cubic or columnar cells with heterogeneous stromal cells and fibroblast-like spindle cells surrounded by fibrosis (**A**). These stromal cells were positive for CD10 (**B**). Numerous microhemorrhages were identified in the stromal tissue ((**C**); arrows). The histological appearance was consistent with endometriosis in the endometrial gland and stroma.

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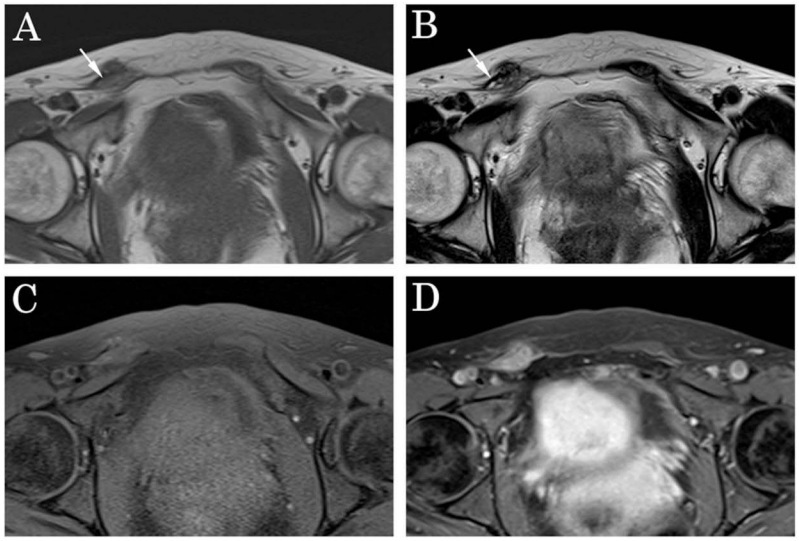

Figure 2 A 51-year-old woman with right inguinal endometriosis (Case 1). The preoperative magnetic resonance imaging showed a 1-cm ill-defined mass over the right pubis. On T1- and T2-weighted images, the tumor was isointense compared with muscle (**A** and **B**). On contrast-enhanced T1-weighted imaging, the tumor was enhanced homogeneously (**C** and **D**). The lesions contained small foci, showing hyperintensity on T1- and T2-weighted images (arrows). Similar findings were observed in cases 5–8.

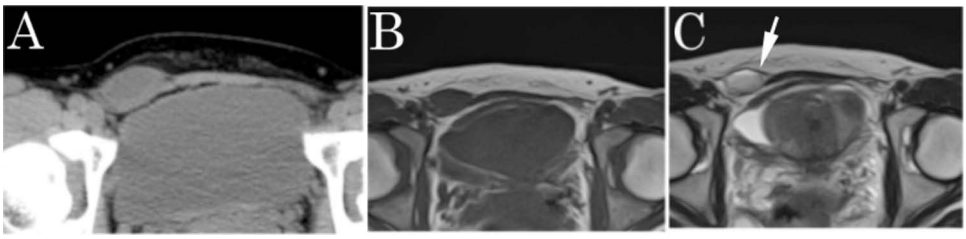

Figure 3 A 44-year-old woman with right inguinal endometriosis with fluid-fluid level feature (Case 2). The preoperative computed tomography showed a 3-cm well-defined mass over the caudal end of the right rectus abdominis muscle (**A**). Magnetic resonance imaging showed isointense mass lesion compared with muscle on T1-weighted images (**B**). On T2-weighted images, the tumor was hyperintense with a single fluid-fluid level feature ((**C**); arrow).

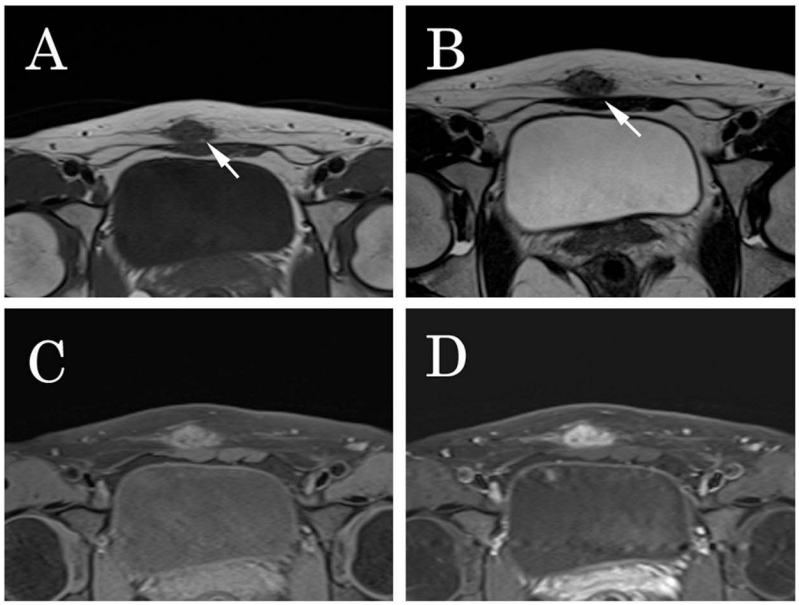

Figure 4 A 31-year-old woman with abdominal wall endometriosis which arose from the cesarean section scar (Case 3). The preoperative magnetic resonance imaging showed a 3-cm ill-defined mass in the subcutaneous fat. On T1- and T2-weighted images, the tumor was isointense compared with the muscle (**A** and **B**). On contrast-enhanced T1-weighted imaging, the tumor was enhanced homogeneously (**C** and **D**). The lesions contained small foci, showing hyperintensity on T1- and T2-weighted images (arrows).

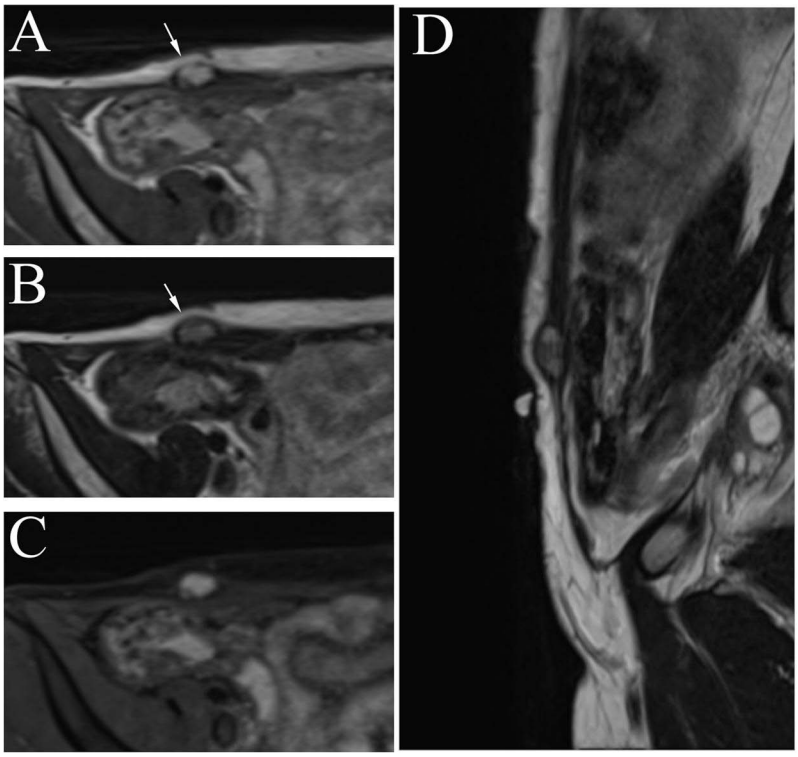

Figure 5 A 32-year-old woman with a mobile mass of the right abdomen (Case 4). The patient did not undergo cesarean section. Preoperative magnetic resonance imaging showed a 1-cm well-defined mass over the right rectus abdominis muscle. On T1- and T2-weighted images, the tumor was hyperintense compared with the muscle ((**A** and **B**); arrow). The signal was not reduced on fat-suppressed images (**C**). Sagittal section of the abdomen showed no continuity between the tumor and right inguinal canal (**D**).

Case 4

A 32-year-old woman with a mobile mass on the right abdomen was treated with excisional biopsy. The patient did not undergo cesarean section. Preoperative MRI showed a 1-cm well-defined mass over the right rectus abdominis muscle (Figure 5). On T1- and T2-weighted images, the tumor was hyperintense compared with the muscle. The signal was not reduced on fat-suppressed images. Sagittal section of the abdomen showed no continuity between the tumor and the right inguinal canal.

Discussion

Extragenital endometriosis has an estimated prevalence of 8.9% of all anatomical sites, according to a review from a Glasgow hospital.[8] Moreover, superficial development is extremely rare. Therefore, the disease is occasionally difficult to diagnose clinically. The purpose of this study was to evaluate the radiological imaging findings and clinical features of this rare lesion and to clarify the distinction between superficial endometriosis and soft tissue tumor.

First, clinical features were distinctive features that aid the diagnosis of this rare lesion. Almost all patients had obstetric or gynecologic disorder and complained of painful menstruation. Most benign soft tissue tumors are asymptomatic and present as painless nodule or mass. Schwannomas, neurofibromas, and glomus tumors may be tender and painful.[9] Furthermore, unlike other soft tissue sarcomas, synovial sarcomas are often painful.[10] However, the quality and timing of pain caused by endometriosis are totally different from those experienced in these soft tissue tumors. The pain in endometriosis has been classically described as cyclical.[11] In this study, 6 of 8 patients presented with cyclic pain related to menstruation. Thus, cyclic pain may serve as an important clinical clue in differentiating superficial endometriosis from soft tissue tumors.

The serum CA125 is reported to be a useful marker in the diagnosis of endometriosis.[12,13] In this study, slightly higher levels of serum CA125 were observed in 2 of 5 patients. However, these two patients had coexisting endometriotic cysts, which can elevate serum CA125 levels. Moreover, almost all patients in this study had coexisting ovarian cyst or

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uterine myoma. These findings suggest that serum CA125 may have limited utility in distinguishing superficial endometriosis from soft tissue tumors.

Radiologically, almost lesions were not well-circumscribed and had an infiltrative pattern to the surrounding tissue. Additionally, on MRI, almost all lesions demonstrated isointensity on both T1- and T2-weighted images. These radiological features are considered to correspond to the pathological findings of stromal cells and fibroblast-like spindle cells surrounded by fibrosis. In soft tissue tumors, desmoid tumors or fibromatoses can have similar signal intensity in both T1- and T2-weighted images.[14,15] Therefore, we require more supportive radiological findings to distinguish endometriosis from these soft tissue tumors. In this study, almost all lesions contained small hyperintense foci, showing hyperintensity on T1- and T2-weighted images. These MRI features may offer supportive information when considering the diagnosis of abdominal wall endometriosis. Only one case showed fluid-fluid level feature, suggesting intralesional hemorrhage. In a past report, identification of endometriomas by MRI relies on the detection of pigmented hemorrhagic lesions and multiple hyperintense lesions on T1-weighted images, regardless of the intensity on T2-weighted images, are distinctive of pelvic endometriosis with high sensitivities and specificities.[16] It was suggested that the findings of small hyperintense foci or fluid-fluid level can reflect similar hemorrhagic conditions, which is useful in differentiating endometriosis from desmoid tumor or fibromatosis. Although histologic examination remains the standard for the definitive diagnosis of endometriosis, MRI can help confirm the suspicion of abdominal wall endometriosis to avoid misdiagnosis.

The pathogenesis of superficial endometriosis is still unknown, but case 3 showed a distinct occurrence compared with other cases. The subcutaneous lesion was suggested to arise from the cesarean section scar in this case. Extragenital endometriosis from the scar has been shown to be the most common.[17,18] A previous surgical procedure is suggested to be associated to this occurrence. In this case, the etiology is considered to be the implantation of occult endometrial tissues into the subcutaneous tissue by cesarean section. On the contrary, desmoid tumors are frequently associated with surgical trauma. Lesion arising from a cesarean section scar was previously reported.[19] Therefore, clinicians should take note of these two pathological conditions for the differential diagnosis of the palpable mass near the cesarean section scar. In cases 1, 2 and 5–8, the subcutaneous lesions were connected with the inguinal canal. Several etiological theories have been proposed. These include coelomic metaplasia, congenital presence of developmentally displaced endometrial tissue, direct extension through the round ligament or patent omphalomesenteric duct, or mechanical seeding of endometrial tissues via the lymphatic or venous system transfer via lymphatics or blood vessels.[20] The current patients had history or coexisting obstetric or gynecologic disorder such as ovarian cyst and uterine myoma, which suggests endometriosis of the gynecologic organ. Therefore, the etiology of these cases may be related to the direct extension of the endometrial tissue through the round ligament from a gynecologic organ. In case 4, the lesion did not involve the inguinal canal. This patient had no history of cesarean section. The etiology was unknown, but coelomic metaplasia or mechanical seeding of endometrial tissues, lymphatics, or blood vessels may explain the occurrence of endometriosis in this case. As discussed above, multiple pathophysiological mechanisms may act simultaneously in the development of superficial endometriosis.

All cases in the current study had been examined by a nearby gynecologist and/or orthopedic surgeon prior to their visits to our institution, but the diagnosis was unclear, or a soft tissue tumor, lymphadenitis, or other disease was suspected. Because superficial endometriosis of the abdominal wall or groin is extremely rare, both gynecologists and orthopedic surgeons may encounter considerable difficulty in reaching the correct diagnosis. Misdiagnosis or prolonged delay in diagnosis may lead to unnecessary investigations, inappropriate treatments, and significant disadvantage for the patient. It is therefore essential for clinicians to recognize that superficial endometriosis can occur in the soft tissues. Awareness of its characteristic features—particularly cyclic pain related to menstruation and distinctive MRI findings such as small hyperintense foci or fluid–fluid levels—can provide important diagnostic clues. Prompt recognition of these features may help reduce of misdiagnosis and to ensure timely and appropriate management. Therefore, in a woman with a groin or abdominal wall mass, the triad of (1) cyclical pain, (2) a history of gynecological surgery/disorder, and (3) an MRI showing an isointense lesion with internal T1/T2 hyperintense foci, should be considered diagnostic of superficial endometriosis until proven otherwise.

This study had several limitations. This was a retrospective study, and the number of patients was limited. We do not have a comparative case of other tumors for the differential diagnosis. Additional work is required for understanding the biology and diagnosis of superficial endometriosis underlining the current findings. While our findings in this limited

case series require further validation, they highlight a distinct clinical-radiological profile that can significantly aid in the diagnostic evaluation of soft tissue masses in women of reproductive age.

Conclusion

We showed clinical and radiographic findings of superficial endometriosis. In conclusion, the diagnosis of superficial endometriosis mimicking a soft tissue tumor should be strongly considered in women presenting with a palpable mass and cyclical pain. MRI findings of small T1/T2 hyperintense foci or a fluid-fluid level within the lesion provide critical radiological support for this diagnosis and can help prevent misdiagnosis.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this paper, the authors used ChatGPT5 for English translation. After using this tool, the authors reviewed and edited the content as required and accept full responsibility for the content of the publication.

Abbreviations

MRI, Magnetic resonance imaging; CT, Computed tomography; CA125, Serum cancer antigen 125.

Ethics Approval Statement

This study was approved by the research ethics committee of Niigata University Graduate School of Medical and Dental Sciences and Niigata Cancer Center Hospital (Approval no. 2018-0005).

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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