

[CASE REPORT]

Deciduosis of the Appendix During Pregnancy

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Abstract:

Acute appendicitis is an important differential diagnosis in patients with right lower quadrant pain during pregnancy. Endometriosis, a hormone-related pathology, is another possibility. Patients with endometriosis are typically symptomatic before pregnancy. Stromal endometriosis is a variant of endometriosis that presents no symptoms before pregnancy but which occasionally presents with the new onset of symptoms during pregnancy. We report the case of a 35-year-old woman in her 8th month of pregnancy who presented with impending appendiceal rupture due to deciduosis of the appendix, a progesterone-related condition, during pregnancy. This case suggests that deciduosis/stromal endometriosis should be considered as a differential diagnosis of acute abdomen during pregnancy, even if the patient is asymptomatic before pregnancy.

Key words: stromal endometriosis, decidualization, endometriosis, appendicitis, deciduosis, ectopic decidua

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Introduction

Appendiceal endometriosis can be a cause of acute abdomen during pregnancy (1). Patients with endometriosis in the appendix typically have endometriosis-related symptoms in the right lower quadrant when they are not pregnant (2). Decidualization, a process resulting in morphological and functional changes to the endometrial stromal cells due to hormonal changes during pregnancy, can occur in the ectopic endometrial tissue of the appendix. It sometimes leads to menstruation-like change at the affected appendix, which can cause appendiceal bleeding or perforation (3).

Our patient was in the third trimester of pregnancy and had no endometriosis-related symptoms before pregnancy. However, she had developed an impending appendiceal rupture, and the pathological findings suggested pre-existing endometriosis in the appendix. The mechanism of her asymptomatic status before pregnancy was not explained by typical endometriosis. We therefore suggest that stromal endometriosis, a variant of endometriosis that only involves the implantation of endometrial stromal cells, was already present in the appendiceal tissue before pregnancy.

Case Report

A 35-year-old Japanese primigravida woman in her 8th month of pregnancy presented to our hospital with acute abdominal pain. Her medical history included partial placenta previa and uterine myoma. Intermittent pain in the right-lower abdomen began on waking on the day of admission. The pain was mild but persistent and was accompanied by nausea and abdominal bloating with no alleviation or exacerbation by food intake or defecation. There was no genital bleeding or abnormal discharge. The fetus (33 weeks, 6 days) had normal development. The pain gradually worsened; thus, the patient presented to the emergency room. She was alert on arrival, but in acute distress. Her body temperature was 36.6°C, her blood pressure was 93/55 mmHg, her heart rate was 90/min and her respiration rate was 20/min with 98% oxygen saturation in room air. Her bowel sounds were normal, but she had slight tenderness in the right-lower abdomen with no rebound tenderness or guarding. There was no costovertebral angle tenderness, Murphy's sign, or psoas sign. Blood tests revealed the following: WBC count, 15,000/ μ L with 86.6% neutrophils; Hb, 9.2 g/dL; and platelet count, 244,000/ μ L. The results of a comprehensive metabolic panel were within the normal limits. Abdominopelvic ultrasound revealed no clear evidence of

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Figure 1. The resected specimen macroscopically shows swelling of the entire appendix and surrounding adipose tissue.

cholecystitis, appendicitis, ileus or ovarian torsion; however, the patient was admitted to the hospital for close monitoring due to the possibility of acute abdomen. Over the next three hours, her abdominal pain worsened. A further examination revealed an elevated body temperature of 37.6°C and localized rebound tenderness in the right-lower quadrant. An abdominal CT scan performed after her clinical condition sharply deteriorated did not show the appendix. Despite the negative results of both ultrasound and CT, we could still not rule out acute appendicitis based on the findings of the physical examination. Antibiotic treatment was started and emergency exploratory laparotomy was performed, revealing a swollen appendix with signs of impending rupture. The resected specimen was 42×20 mm in size (Fig. 1). The fetus was immediately delivered, followed by appendectomy. The Apgar score was 3 at one minute and 6 at five minutes. Antibiotic treatment was continued for seven days and both the mother and child were eventually discharged without complications.

A histological examination of the proximal portion of the resected appendix showed multiple nests of cells with foamy or eosinophilic cytoplasm (Fig. 2A) rather than prominent suppurative inflammation of the appendiceal wall, as expected. The lesion occupied the entire swollen appendiceal wall, including the mucosal layer (Fig. 2B). The accumulated cells forming the nests morphologically resembled decidualized endometrial stromal cells. There were no endometrial glands or spiral arteries. Based on these findings, we suggested decidualization associated with stromal endometriosis as a potential diagnosis. This was further confirmed by immunoreactivity of the cells against anti-progesterone receptor and CD10 antibodies (Fig. 2C, D). The cut surface was intact, but scattered decidualization/stromal endometriosis was observed throughout the appendix and the surrounding adipose tissue. The patient provided her informed consent for the publication of this report.

Discussion

Endometriosis is defined as pathological endometrial change outside of the uterus (4). It is typically located in the pelvis, such as in the ovaries or peritoneum, but can occur in other sites, including the bowel, the diaphragm, and pleural cavity (5). Endometriotic tissue shows similar changes to eutopic endometrium in response to hormones. The eutopic endometrium grows under the influence of estrogen in the proliferative phase. In the secretory phase, the endometrium continues to thicken due to high estrogen and progesterone levels. Serum progesterone and estrogen concentrations drop during the late-secretory phase if pregnancy does not occur, which increases the contractility of spiral arteries (6). This causes ischemia of the uterine stroma and glands, which leads to abruption of the uterine lining. Unlike the eutopic endometrium, exfoliated tissue and blood in the endometriosis cannot be drained. The internal accumulation of tissue and blood results in inflammation and adhesion. Clinically, there are multiple symptoms, especially in the pelvis, including dyspareunia, chronic pelvic pain, dysmenorrhea and infertility. It can also cause ileus, bowel obstruction, and pneumothorax, depending on the affected sites (6-9). Endometriosis is pathologically proven by CD10-immunoreactivity, which is a sensitive immunohistochemical marker of endometrial stromal cells at ectopic sites (7).

Endometriosis during pregnancy shows varied clinical presentations. During early pregnancy, progesterone levels remain high, so exfoliation does not occur, but decidualization takes place. Decidualization results in morphological and functional changes to endometrial stromal cells (10). It includes stromal hyperplasia and the infiltration of lymphocytes, which thicken endometrial tissue. The role of decidualization has not been clarified, but it is considered to be necessary in preparation for pregnancy (10). Clinically, endometriosis-related symptoms usually lessen or even disappear during pregnancy because of the lack of endometrial tissue exfoliation (1). There are, however, cases of endometriosis-related symptoms worsening during pregnancy. Several mechanisms are hypothesized: the pre-pregnancy fragility of tissue and vessels due to chronic inflammation (11), adhesions that may cause increasing traction of structures surrounding the enlarging uterus (12), and invasion of decidualized endometriotic tissue into structures and vessel walls, leading to tissue rupture due to the increase of mechanical compression by thickened tissue (1, 13). In most cases, endometriosis-related symptoms are already noticed before pregnancy; thus, endometriosis is rarely unnoticed by the time of pregnancy.

Our patient had no endometriosis-related symptoms before pregnancy. Histologically, only stromal cells were found, with little or no components of uterine glands or spiral arteries. The pathological findings suggested that so-called ‘stromal endometriosis’, a variant of endometriosis, which may explain the rare presentation in our case.

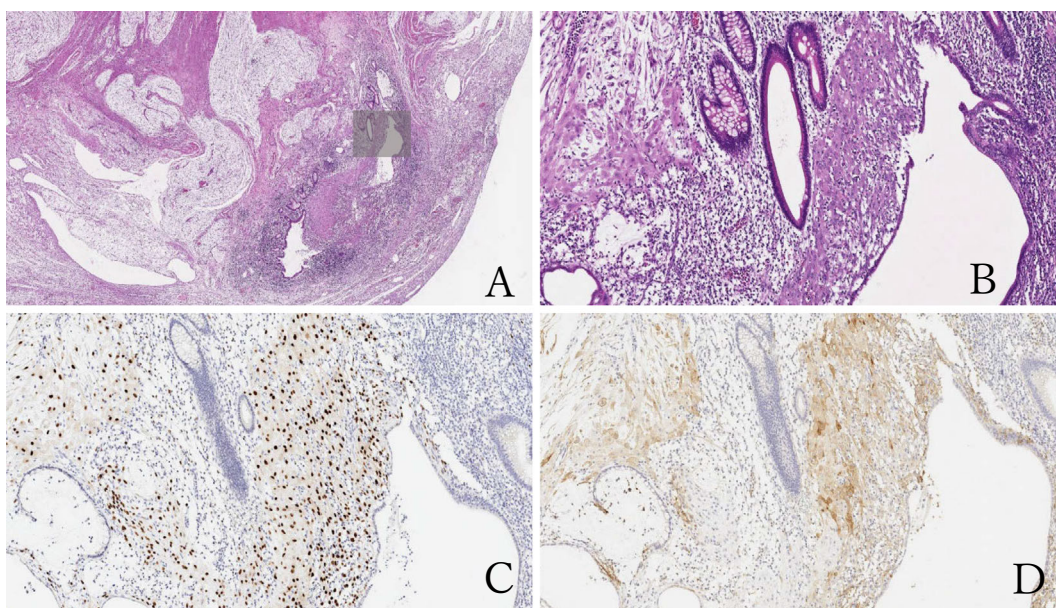


Figure 2. A: The appendiceal wall is completely occupied by multiple nests of cells with foamy or eosinophilic cytoplasm. [Hematoxylin and Eosin (H&E) staining, original magnification $\times 15$]. B: A high-power view of the nest located in the mucosal layer. Morphologically, cells forming the nest appear to be decidualized endometrial stromal cells (H&E staining, original magnification $\times 100$). C, D: On immunohistochemistry, nuclear staining for anti-progesterone receptor antibodies (C) and cytoplasmic staining for CD10 antibodies (D) are positive, indicating that the cells have features of endometrial stromal cells (Immunoperoxidase method, original magnification $\times 100$).

Stromal endometriosis is characterized by endometriosis-like tissue, with the absence or rarity of glands or spiral arteries (14, 15). It is most commonly seen in the ovaries (16). Lack of endometrial components other than stromal cells does not cause the exfoliation of tissue, although stromal tissue changes throughout the menstrual cycle. Clinically, it is usually asymptomatic when the patient is in a non-pregnant state; thus, it has only been reported when found incidentally.

During pregnancy, however, exposure to progesterone leads to decidualization of the stromal endometriotic tissue, as with typical endometriosis. Continuous exposure to progesterone may cause the endometriotic tissue to become thicker in comparison to that in non-pregnant females. Stromal endometriosis of intraperitoneal organs, such as the appendix, may therefore become symptomatic because of the continuous mechanical compression that only occurs during pregnancy, in combination with the enlarged uterus. This would explain the cause of impending appendiceal rupture in our case.

Both stromal endometriosis and typical endometriosis can cause appendiceal damage during pregnancy; however, the clinical course before pregnancy may be different. As discussed above, it is hypothesized that stromal cells without glands or spiral arteries do not cause exfoliation in response to menstrual hormonal change, suggesting that most patients with stromal endometriosis remain asymptomatic before pregnancy. During pregnancy, however, the continuous swelling of stromal cells may cause mechanical compression of

the adjacent tissue, resulting in rupture. Stromal endometriosis should be considered as a possible differential diagnosis of acute abdomen during pregnancy, even if there are no endometriosis-related symptoms before pregnancy.

In our case, the appendix was not clearly identified by either ultrasound or CT, likely due to the enlarged gravid uterus, which may cause lower sensitivity in the diagnosis of acute appendicitis in pregnant patients (17).

Surgical treatment corresponding with the clinical course may be indicated in patients with stromal endometriosis, similarly to patients with typical endometriosis. Deciduo- or stromal endometriosis-related appendiceal damage is indistinguishable from typical acute appendicitis without a pathological examination due to the similar lack of symptoms before pregnancy. It may be necessary to manage the condition similarly to common acute appendicitis.

Conclusion

Stromal endometriosis is typically asymptomatic; however, during pregnancy it may become symptomatic due to mechanical compression caused by the thickening of tissue, which is induced by progesterone-related decidualization. It should be considered as a differential diagnosis of acute abdomen during pregnancy, even if the patient is asymptomatic before pregnancy. Pathological findings may distinguish deciduo- or stromal endometriosis in the appendix from acute appendicitis.

The authors state that they have no Conflict of Interest (COI).

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