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Primary retroperitoneal cyst in pregnancy: A case report based on immunohistochemical analysis and literature review

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ABSTRACT

Primary retroperitoneal cystic lesions (PRCLs) are extremely rare, and their histogenesis and clinical evolution remain unclear. Here, we report the case of a 38-years-old primigravida who was referred to our hospital for the delivery. Routine ultrasonographic examination at 36 weeks of gestation revealed the presence of a cystic mass close to the right side of the uterus. One month after the childbirth, we performed the surgery. The cystic mass was present on the right side of the retroperitoneal cavity. We successfully extracted the cyst without rupture. The cyst was 12 × 6 × 3 cm, unilocular, exhibited a thin wall, and contained mucinous liquid. Histological examination revealed that the lining of the cyst comprised two types of adjacent cells. The flat low cuboidal cells were positive for calretinin, cytokeratin (CK) 5/6, CK7, cancer antigen 125 (CA125), and D2-40, all of which are mesothelial markers. The tall columnar cells were also positive for the mesothelial marker CK7. However, the flat low cuboidal cells were negative for mucinous cell makers, while tall columnar cells were positive for these markers. The tall columnar cells contained mucin but were not positive for gastrointestinal epithelial-specific secreted mucin makers. This finding directly supports our hypothesis that the retroperitoneal cysts emerged from the mesothelium.

Key words: *retroperitoneal cyst*, *histogenesis*, *immunohistochemical analysis*, *mucinous metaplasia*

INTRODUCTION

Primary retroperitoneal cysts that arise within the retroperitoneal space but are located away from the retroperitoneal organs, have been rarely reported. However, up to 80% of cases are associated with malignancies, as confirmed on the basis of histological findings[11]. Primary retroperitoneal cystic lesions (PRCLs) are extremely rare, and their histogenesis and clinical evolution remain unclear. PRCLs are difficult to diagnose before the surgery, and are classified as either neoplastic or non-neoplastic[20].

Here, we report a case of PRCL during pregnancy, which was diagnosed using the immunohistochemical analysis and discuss the histogenesis of the cyst that was extracted during surgery.

CASE PRESENTATION

The patient was a 38-years-old primigravida who was referred to our hospital for the delivery. Her family and medical histories did not reveal any previous reports associated with the emergence of cysts. A routine ultrasonographic examination at 36 weeks of gestation revealed the presence of a cystic lesion for the first time. The cyst was 12 × 6 × 3 cm in size, unilocular without mural nodules, and present close to the right side of the uterus (Figure 1). We suspected that it was a benign tumor. Therefore, we planned to conduct further examinations after performing the delivery. The patient underwent spontaneous vaginal delivery at 40 weeks of gestation. One month after the childbirth, pelvic magnetic resonance imaging (MRI) revealed the presence of a 12.5 cm × 5.5-cm unilocular cyst without mural nodules in the right abdomen. The cyst exhibited high signal intensity in the T2-weighted images. Contrast-enhanced computed tomography (CT) revealed that the cyst was in the retroperitoneal space because the ascending colon was displaced medially due to presence of the cyst (Figure 2). The preoperative serum levels of CA125, CA19-9, and carcinoembryonic antigen (CEA)

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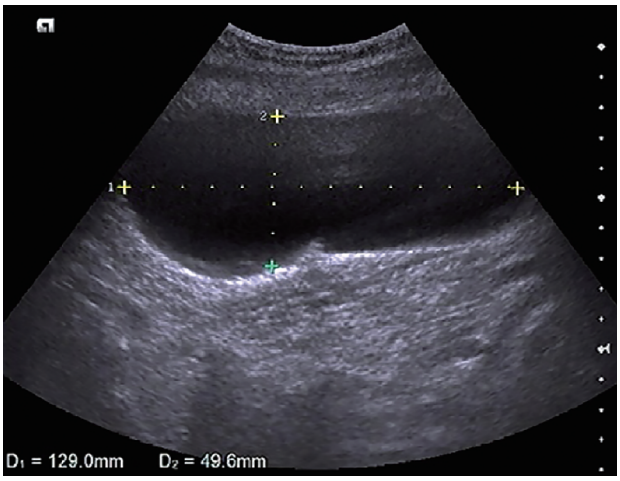

Figure 1 Ultrasonographic examination at 36 weeks of gestation revealed a cystic lesion, measuring 13 cm × 5 cm × 3 cm in size.

were within their normal range. Abdominal surgery revealed that the uterus, ovaries, and fallopian tubes were normal. The cystic lesion was present on the right side of the retroperitoneal cavity, inside the psoas muscle, and outside the common iliac near to the external iliac artery and vein (Figure 3). We incised the retroperitoneum from the abdominal cavity along the major axis of the cyst and extracted the cyst without any rupture. The cyst was 12 × 6 × 3 cm in size, 200 g in weight, unilocular, exhibited a thin wall, and contained mucinous liquid (Figure 4). On the basis of the histopathological analysis, it was diagnosed as primary retroperitoneal mucinous cystadenoma (PRMC) at that time. In this study, we further performed the histopathological analysis using immunohistochemical staining. The cyst wall was lined with a single layer of mesothelial cells and few mucinous metaplasia cells. Finally, we diagnosed the cyst as a PRCL without neoplasm. No signs of recurrence were observed even seven years post operation.

PATHOLOGY FINDINGS

Histological examination revealed that the lining of the cyst comprised two types of cells, including flat low cuboidal and tall columnar cells, with a clear cytoplasm, and without any boundary between them (Figure 4). The tall columnar cells contained mucin, which was indicated through the positive results of the diastase periodic acid-Schiff (d-PAS) and alcian blue stainings. However, the flat low cuboidal cells were negative for both the stainings (Figure 5).

The immunohistochemical findings were as follows: the flat low cuboidal cells were positive for calretinin, cytokeratin (CK) 5/6, CK7, CA125, and D2-40, the markers of mesothelial cells. These cells were negative for CK20, which suggests that they have not emerged from intestinal epithelial cells. Conversely, the tall columnar cells were negative for calretinin, CK 5/6, CA125, and D2-40 but positive for CK7 (Figure 5). This suggested that these cells were not of mesothelial origin but only exhibited the properties of mesothelial cells. The tall columnar cells contained mucin, but were negative for MUC-2, MUC-5, and MUC-6, which are the markers of esophagus-, stomach-, intestine-, and colon-specific secreted mucin. Therefore, the cyst was not diagnosed as mucinous cystadenoma. Lastly, it was diagnosed as a cyst containing epithelial cells with mucinous metaplasia.

DISCUSSION

PRCL is rare and can be classified as either neoplastic or non-neoplastic[20]. Here, we pathologically diagnosed the cyst as a case of PRCL with mucinous metaplasia rather than PRMC, which is characterized as neoplastic. However, clinically, the cyst could be treated as a PRMC. PRMC is extremely rare, as only 20 cases of PRMC have been published in the literature from 2009 till 2019[1–10,12–19]. The age of the patients ranged between 21–71 years (mean, 40.7 years). Most patients were female, with only 1 male patient. In 16 cases, the patients

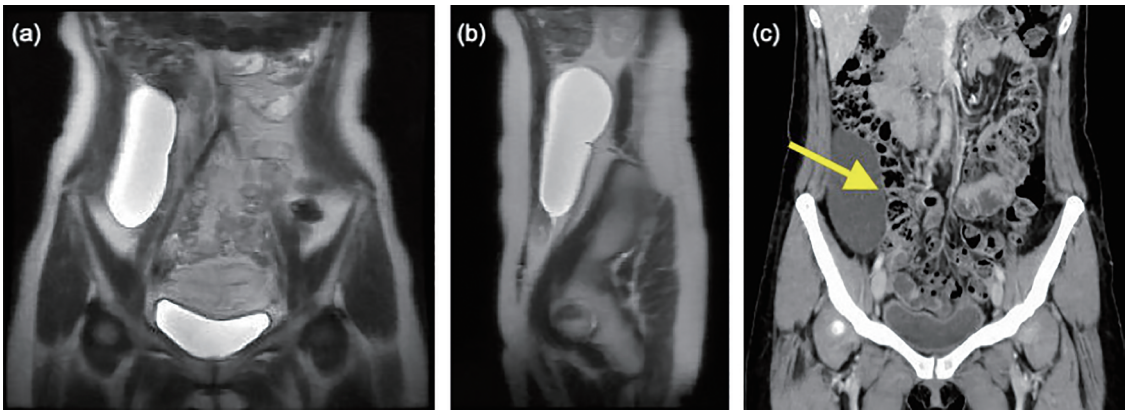

Figure 2 Pelvic magnetic resonance images, (a) frontal image and (b) sagittal image showing a 12.5 cm × 5.5-cm unilocular cyst without mural nodules in the right abdomen. The cyst shows a high-signal intensity in the T2-weighted images. (c) Contrast-enhanced computed tomography image showing that the cyst is in the retroperitoneal space based on the medial displacement of the ascending colon by the cyst.

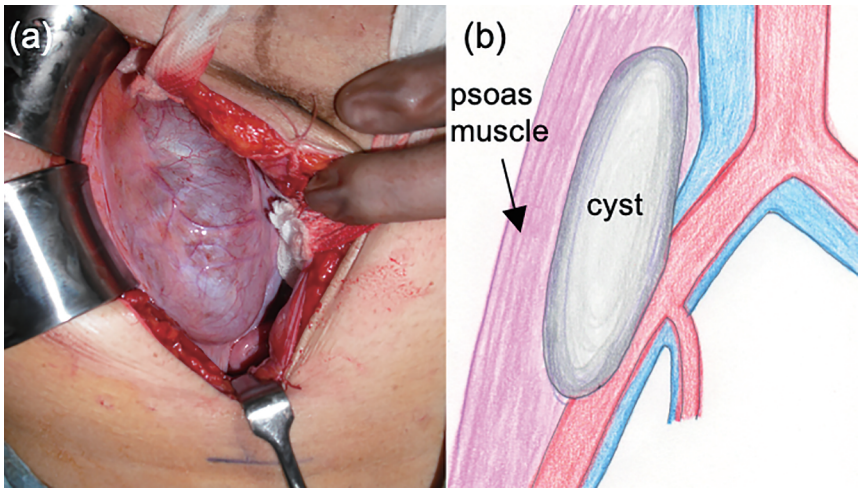

Figure 3 Laparotomy findings. (a) We made the midline incision on abdominal wall. The cyst was in the right side of retroperitoneal cavity. (b) The schema of the cyst position. The cyst was inside the psoas muscle and outside the common iliac to external iliac artery and vein.

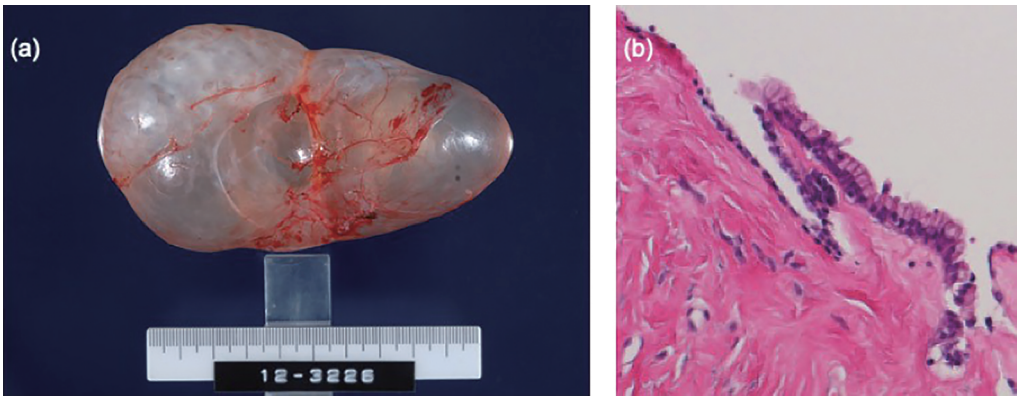

Figure 4 (a) Macroscopic examination of the operative part. The cyst was 12 cm × 6 cm × 3 cm in size, 200 g in weight, and unilocular; it had a thin wall and contained mucinous liquid. (b) Microscopic examination of the cyst. The lining of the cyst consisted of two types of cells, flat low cuboidal cells (arrowheads) and tall columnar cells with a clear cytoplasm (arrows), without a boundary between them (hematoxylin-eosin staining).

exhibited symptoms, such as abdominal pain and distention. In the remaining 4 cases, the patients were asymptomatic and were diagnosed incidentally. In all cases, the tumors were unilateral (on the right side in 11, left side in 7, and unknown in 2 cases). The size of the tumors ranged between 5 to 32 cm. The tumors were unilocular in 15 cases (75%), and only 13 cases were diagnosed preoperatively; however, in 3 of the 10 cases, PRMC was diagnosed as a renal cyst.

In our case, the cyst was detected incidentally during a routine ultrasonographic examination at our hospital at 36 weeks of gestation. The reason why it was first detected at 36 weeks of gestation is thought to be that the uterus was enlarged, and the cyst was close to the uterus. After delivery, the cyst was diagnosed as a retroperitoneal cyst based on the CT and MRI findings.

In all cases, surgical excision was performed for the diagnosis and treatment. No recurrence occurred in 12 cases that were followed up (duration: 6 months to 5 years) post operation.

PRCL is rare, and its histogenesis and clinical evolution remain unclear. In previous reports, it has been suggested that these cysts arise from either ectopic ovarian tissue, a teratoma in which the mucinous lining of the epithelium has displaced all the other components, or an intestinal duplication, also known as enterogenous genesis. Another reasonable theory is that these cysts arise from the invagination of the retroperitoneal mesothelial layer, which undergoes mucinous metaplasia and is associated with cyst formation. In our case, both the ovaries appeared normal, and no ovarian tissue, or the components of teratoma or intestinal mucosa were found to be present around the cyst. Histological examination revealed that the lining of the cyst comprised two types of cells, without any boundary between them. Immunohistochemical analysis revealed that the flat low cuboidal cells were positive for calretinin, cytokeratin (CK) 5/6, CK7, CA125, and D2-40, which are the mesothelial markers. The tall columnar cells were also positive for the mesothelial marker CK7. The flat low cuboidal cells were negative for mucinous cell makers, while the tall columnar cells were positive for these markers. The tall columnar cells contained mucin but they were not positive for gastrointestinal epithelial-specific secreted mucin makers. These findings directly support our hypothesis that in this case of PRCL, retroperitoneal cysts emerged

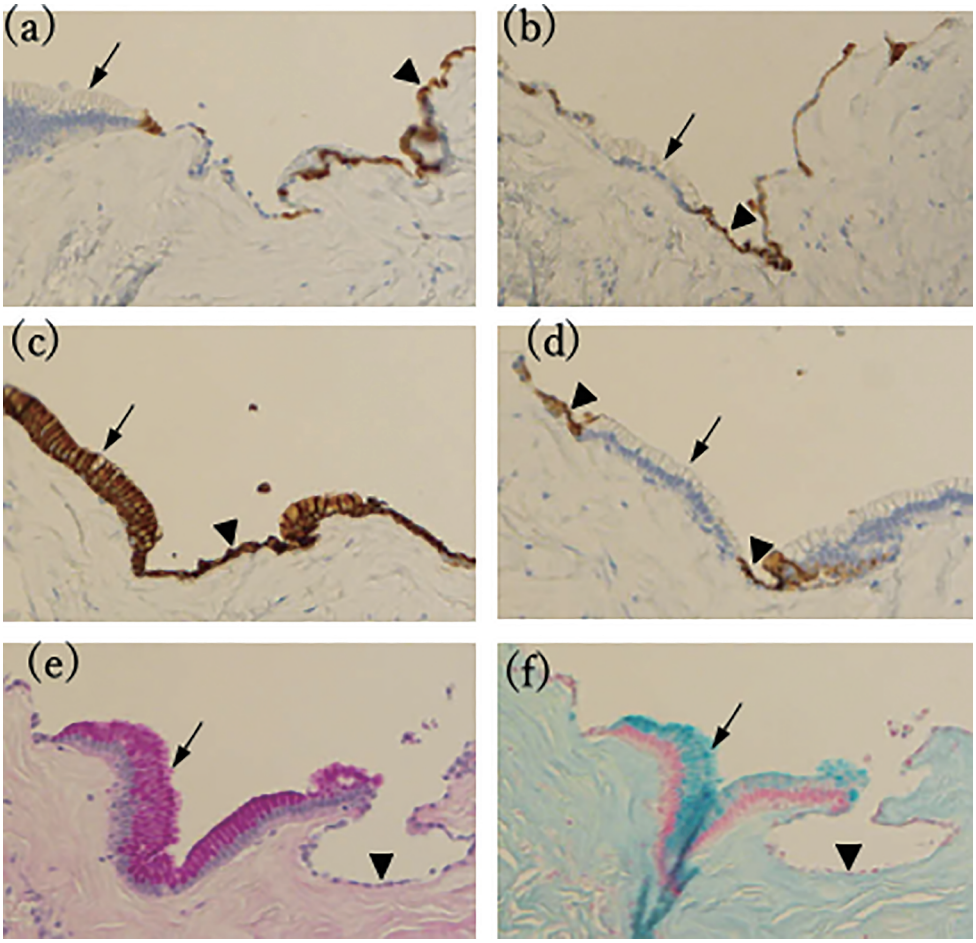

Figure 5 The flat low cuboidal cells (arrowheads) were positive for calretinin (a), cytokeratin (CK) 5/6 (b), CK7 (c), CA125 (d), which are markers of mesothelial cells. The tall columnar cells (arrows) contained mucin as indicated by the positive results of the diastase periodic acid-Schiff (d-PAS) (e) and alcian blue stainings (f). These cells were negative for calretinin (a), cytokeratin (CK) 5/6 (b), CA125 (d) but positive for CK7 (c).

Table 1 Immunohistochemical and histochemical findings

Antibody	Flat low cuboidal cells	Tall columnar cells
Calretinin	+	–
CK5/6	+	–
CK7	+	+
CA125	+	–
D2-40	+	–
CK20	–	–
CEA	–	–
d-PAS[a]	–	+
Alcian blue	–	+
MUC-2, MUC-5, and MUC-6	–	–

[a] diastase periodic acid-Schiff

from the mesothelium and its metaplastic mucinous-like cells. PRCL is rare and has not been reported extensively in the literature. Therefore, further studies to establish the methods for the diagnosis and treatment of PRCL are warranted.

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Disclosure

The authors have no conflict of interest to disclose.

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