

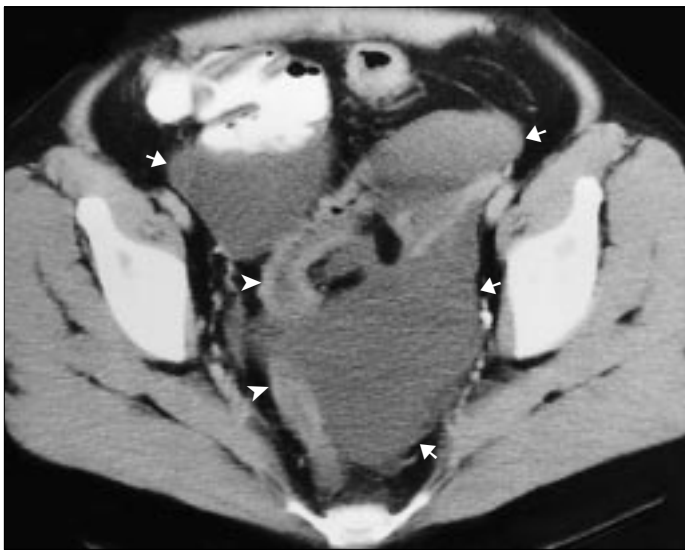
## Pelvic pain and history of previous pelvic surgery

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**A** 39-year-old woman consulted her physician because of pelvic pain. A hysterectomy had been performed several years previously because of symptomatic uterine fibroids. Com-

puted tomography (CT) and ultrasound images are shown below (Figures 1–4).

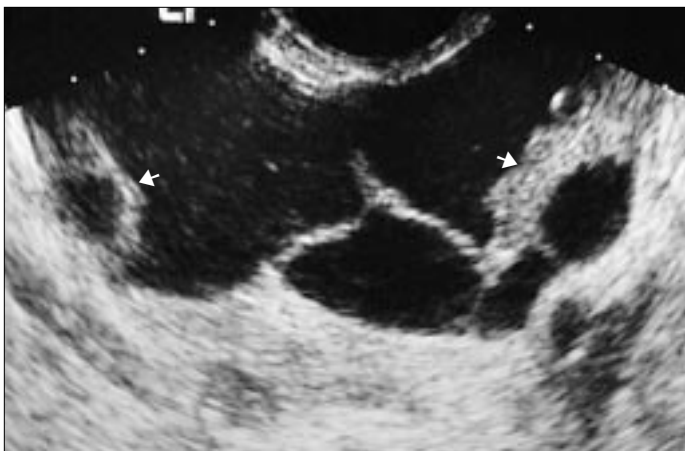
*For diagnosis and discussion, see the following page.*



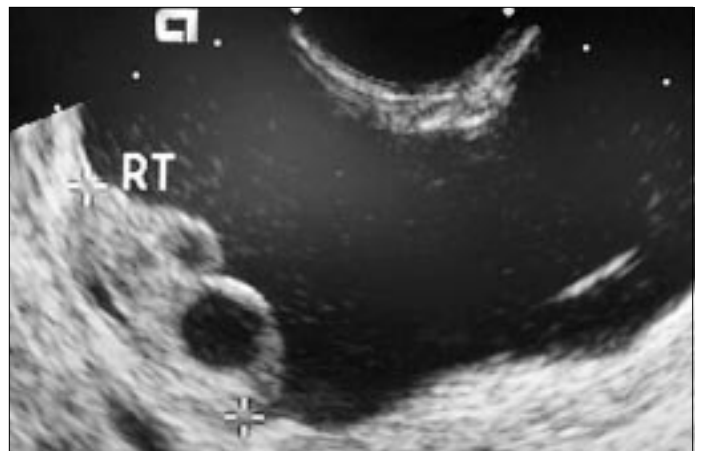
**Figure 1.** CT image demonstrates multiple cystic pelvic masses (arrows) adjacent to the sigmoid colon (arrowheads).



**Figure 2.** CT image shows both ovaries (arrows) adjacent to cystic pelvic masses.



**Figure 3.** Axial ultrasound image demonstrates both ovaries (arrows) to be within or in the wall of a septate cyst.



**Figure 4.** Sagittal ultrasound image demonstrates the right ovary (electronic calipers) to be in the wall of or within a large anechoic cyst.

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**DIAGNOSIS:** Peritoneal inclusion cysts.

## DISCUSSION

Peritoneal inclusion cysts are complex cystic adnexal masses consisting of a normal ovary entrapped in multiple fluid-filled adhesions. The cysts usually develop in women of reproductive age who have a history of previous pelvic surgery or pelvic infection. This unusual but benign mass, which has a distinct sonographic appearance, has also been referred to as *benign encysted fluid*, *inflammatory cyst of the peritoneum*, *peritoneal pseudocyst*, *entrapped ovarian cyst*, *multilocular peritoneal cyst*, and *postoperative peritoneal cyst* (1).

The development of peritoneal inclusion cysts depends on the presence of peritoneal adhesions and active ovaries (2). During the reproductive years, ovaries are the main source of peritoneal fluid. Fluid normally produced by the ovaries during ovulation is absorbed by the peritoneum. However, if the peritoneum has been disrupted by previous surgery, inflammation, or infection, its absorptive properties diminish, thus trapping this physiologic fluid. Also, inflammation of the peritoneum can contribute to production of a more exudative fluid, which is less adequately absorbed by the peritoneum. Previous surgery, infection, or inflammation often leads to the development of adhesions within the abdomen and pelvis. With extensive peritoneal adhesions, the fluid produced by normal ovaries is trapped by the scarred peritoneum. As the normal ovary continues to produce fluid and the fluid becomes entrapped by surrounding adhesions, a complex cystic pelvic mass develops (3). Other causes of peritoneal inclusion cysts include trauma, pelvic inflammatory disease, and endometriosis.

The time interval between the most recent surgery, infection, or inflammatory process and the detection of peritoneal inclusion cysts has ranged from 6 months to 20 years. Peritoneal inclusion cysts as large as 20 cm in diameter have been reported (4). The contents of the cysts usually resemble those of a unilocular cyst but may contain serosanguineous or proteinaceous material. The cyst walls are mesothelial in origin, lack smooth muscle, and have usually been altered by inflammation, fibrosis, and cellular proliferation (3). Patients with peritoneal inclusion cysts frequently present with lower abdominal pain, pelvic fullness, and/or a palpable mass (2).

The most important sonographic finding is a normal ovary surrounded by fluid and multiple septations. The ovary may be located centrally or laterally and is surrounded by fluid. The fluid is usually anechoic but can be echogenic secondary to hemorrhagic or proteinaceous material. The septations represent the cyst walls, which are composed of mesothelial and fibrous strands and should be <5 mm thick. Septal vascularity may be demonstrated by Doppler examination of the cyst walls. The expected finding is a low resistive flow or decreased resistive index (0.50 to 0.60) in the septal walls, indicating a low-pressure vascular state (1). The septations and the characteristic resistive indices are best demonstrated by endovaginal sonography. An appropri-

ate description of the sonographic appearance of peritoneal inclusion cysts is that of "a spider in a web." The ovary, or "spider," is located centrally or laterally within the network of weblike septations.

Pathologic studies have shown that peritoneal inclusion cysts are adherent to the surface of the ovaries but do not involve the normal ovarian parenchyma (2). Peritoneal inclusion cysts should be differentiated from paraovarian cysts, hydrosalpinx, and low-grade cystic mesothelioma (2). A paraovarian cyst is derived from the embryologic remnants of wolffian or müllerian ducts within the broad ligament and is a benign congenital variation. Anatomically, the ovary is located outside the paraovarian cyst and inside or within the wall of the peritoneal inclusion cysts. Paraovarian cysts are usually round or ovoid in shape and are not associated with a history of pelvic surgery, pelvic inflammatory disease, or trauma. On ultrasound evaluation, hydrosalpinx appears as a tubular or ovoid cyst. Folds are often visible, septations are incomplete, and the ovary can be demonstrated outside of the cystic lesion. A cystic mesothelioma, a common low-grade mesenchymal tumor, may sonographically resemble peritoneal inclusion cysts. However, peritoneal inclusion cysts do not have a smooth muscle component within the septal walls, which pathologically differentiates them from a mesothelioma.

Treatment of peritoneal inclusion cysts remains controversial, and both medical and surgical treatments are used. Because peritoneal inclusion cysts do not have malignant potential, a conservative approach is usually recommended. However, because of continued pain and distention, many patients choose definitive treatment. Peritoneal inclusion cysts can cause infertility, and surgery is often used in this group of patients. Surgical options include open resection, laparoscopic drainage, and percutaneous drainage. With reported recurrence rates of 30% to 50% after surgical treatment (1), more conservative therapy consisting of cyst drainage and oral contraceptive administration may be the most effective treatment. Preoperative diagnosis of peritoneal inclusion cysts, demonstrating the ovary within the cyst on sonography, permits more conservative treatment (2). The use of intermittent pain medication in combination with oral contraceptive therapy is a common initial approach to treatment. If further treatment is required, cyst aspiration (either percutaneously or transvaginally under sonographic guidance) and laparoscopic adhesiotomy may be performed. These treatments are usually without risk of major complications.

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