

## Nonovarian Gynecologic Cysts: MR Imaging Findings

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MR imaging has improved the detection and characterization of cysts arising in the ovaries. Although they are less common, cysts also can develop in the endocervical glands (nabothian cysts), labia (Bartholin's cysts), vaginal wall (Gartner's cysts), and broad ligament (paratubal cysts). Findings on pelvic MR imaging were reviewed to determine the prevalence and MR features of gynecologic cysts arising outside the ovary.

### Materials and Methods

From January 1990 to June 1991, 458 women had MR imaging of the pelvis at Yale-New Haven Hospital. MR imaging reports were

reviewed to determine cases in which nabothian cysts, Bartholin's cysts, or Gartner's cysts were diagnosed on the basis of MR detection of a cystic structure in the appropriate anatomic site [1, 2]. Because imaging studies may not allow distinction of cysts in the broad ligament from cysts in the adjacent ovary [3], surgical pathology reports were reviewed to identify cases in which cysts seen on MR images were determined pathologically to be paratubal cysts.

All patients were studied on a 1.5-T system (Signa, General Electric, Milwaukee, WI). All patients were studied with both T1-weighted (400–600/13–20) images in either the axial or coronal plane and T2-weighted (spin echo 1700–2117/20, 80 or fast spin echo 2900–4500/126) images in both the sagittal and axial planes. Images were acquired with a 128 × 256 matrix, two excitations, 5-mm slice thickness, 2.5-mm interslice gap, 28-cm field of view, spatial presat-

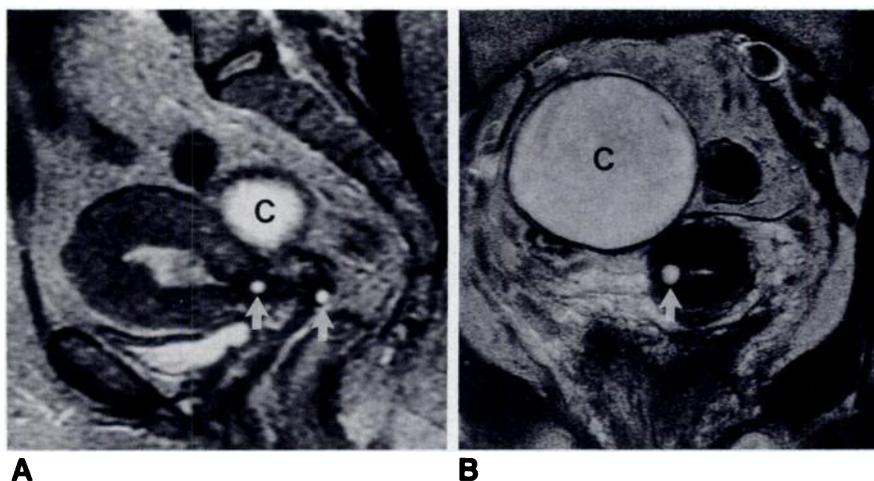


Fig. 1.—Nabothian cysts in a 55-year-old woman.

A, Sagittal T2-weighted (2000/80) MR image shows two small nabothian cysts (arrows) appearing as small well-circumscribed high-signal structures adjacent to cervical canal. C = ovarian cyst.

B, Coronal T2-weighted (3000/100) fast spin-echo MR image shows a 6-mm nabothian cyst (arrow) within cervical fibrous stroma.

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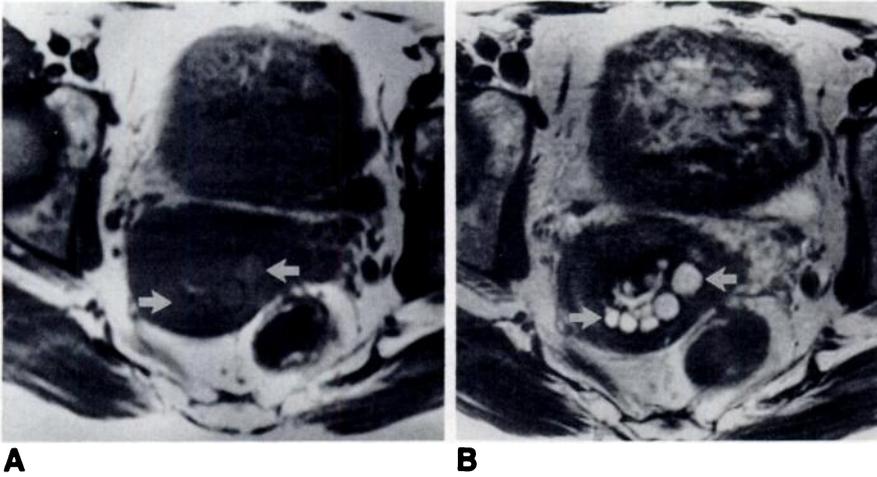


Fig. 2.—Nabothian cysts in a 47-year-old woman.

A, Axial T1-weighted (500/20) MR image shows multiple cysts (arrows) near external cervical os with a signal intensity similar to that of muscle.

B, Axial T2-weighted (4500/126) fast spin-echo MR image shows multiple cysts (arrows) that are hyperintense relative to fat.

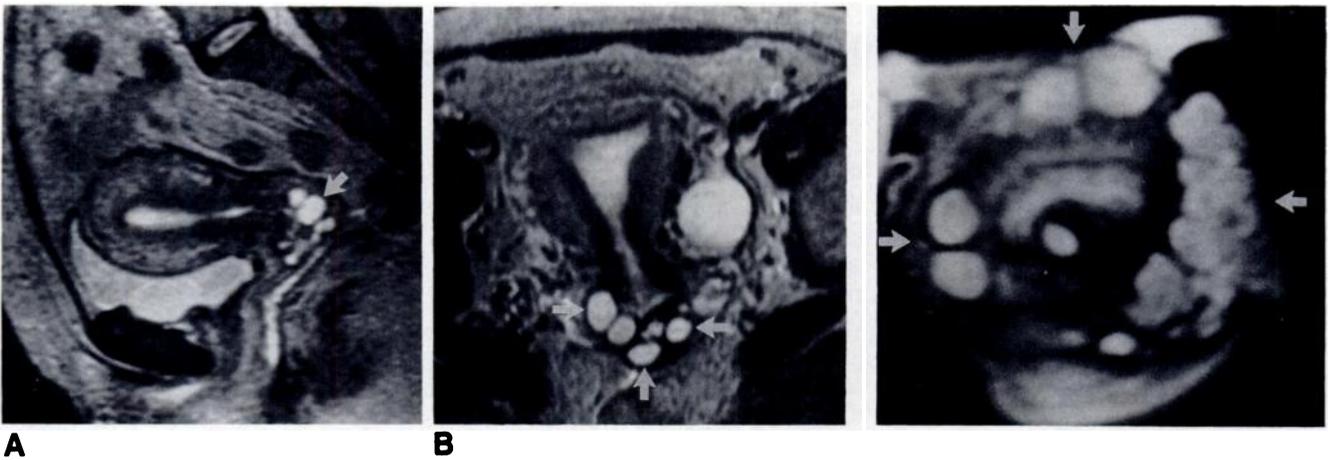


Fig. 3.—A and B, Unusually large nabothian cysts in a 44-year-old woman. Sagittal (A) and axial (B) T2-weighted (2000/80) MR images show multiple discrete nabothian cysts (arrows) in cervix, most prominently near external os.

Fig. 4.—Unusually large nabothian cysts in a 44-year-old woman. T2-weighted (2000/80) transverse MR image of a surgical uterine specimen shows multiple cysts (arrows) near external cervical os. Histologic examination showed marked acute and chronic cervicitis.

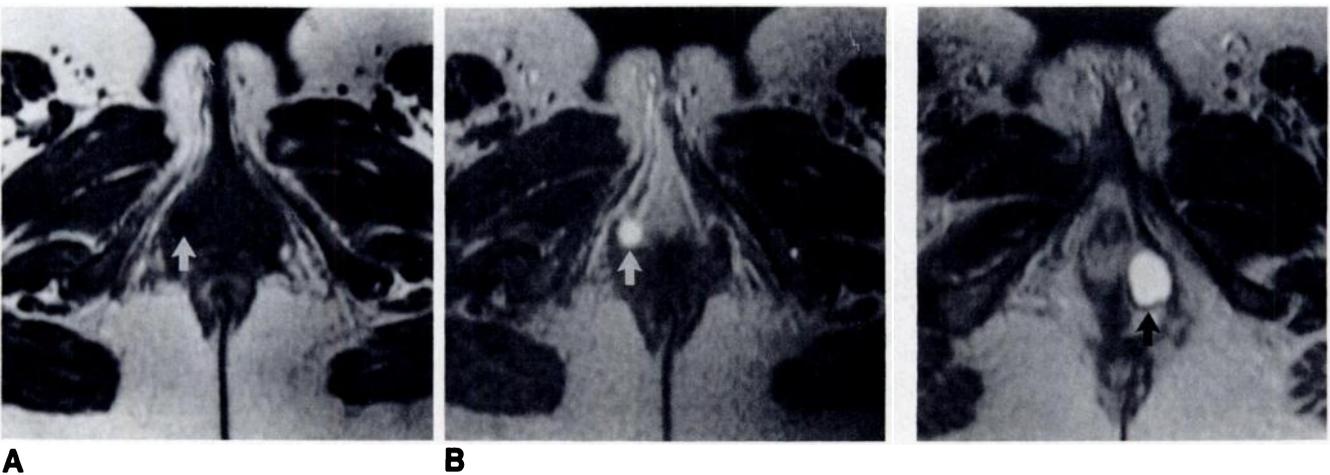


Fig. 5.—A and B, Bartholin's cyst in a 37-year-old woman. Cyst (arrow) in right labium has low signal intensity on T1-weighted (400/13) axial MR image (A) and high signal intensity on T2-weighted (2000/80) axial MR image (B).

Fig. 6.—Bartholin's cyst in a 35-year-old woman. T2-weighted (2117/80) axial MR image shows 2-cm cyst (arrow) in left labium that is hyperintense relative to fat.

uration superior and inferior to the imaging volume, and respiratory compensation.

**Results and Discussion**

*Nabothian Cysts*

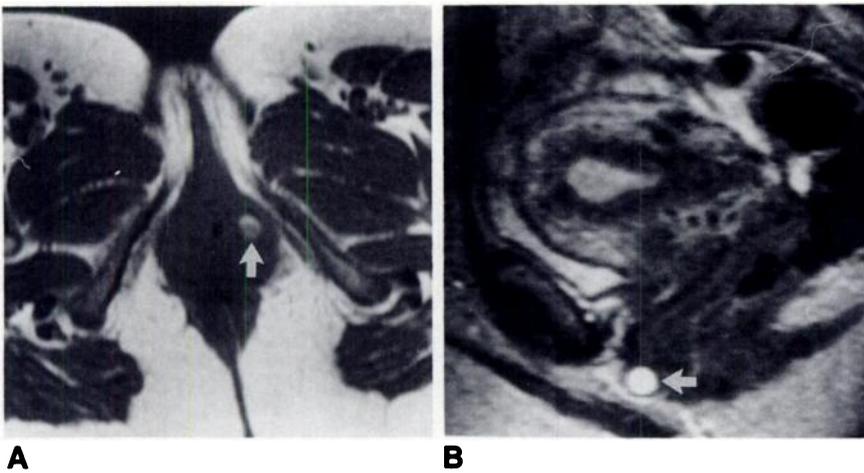
Nabothian cysts were detected in 57 patients, for a prevalence of 12%. This may differ from the frequency with which nabothian cysts are seen on physical examination because (1) MR imaging can be used to detect cysts above the external os that are not detectable on physical examination and (2) small cysts may be below the resolution of routine MR imaging with the body coil. On MR images, nabothian cysts appeared as single or multiple well-circumscribed cystic lesions in the

cervical fibrous stroma (Figs. 1 and 2) that were up to 1.7 cm in diameter (Figs. 3 and 4). All were hyperintense relative to fat on T2-weighted images. On T1-weighted images, most were isointense with urine or muscle. None of these patients were referred specifically for evaluation of nabothian cysts.

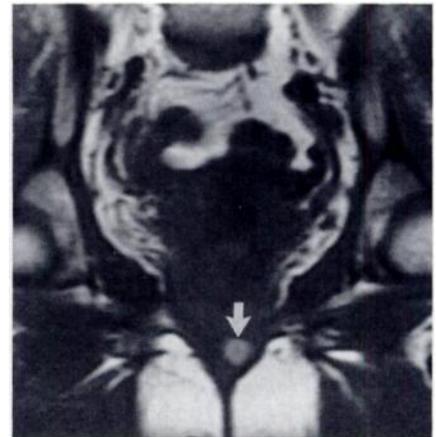
Nabothian cysts are retention cysts of the cervical glands. They are caused by chronic inflammation with scarring of the cervix, which leads to occlusion of the lumen of the cervical glands. Cystic accumulation of mucus within the dilated glands accounts for the MR appearance [1].

*Bartholin's Cysts*

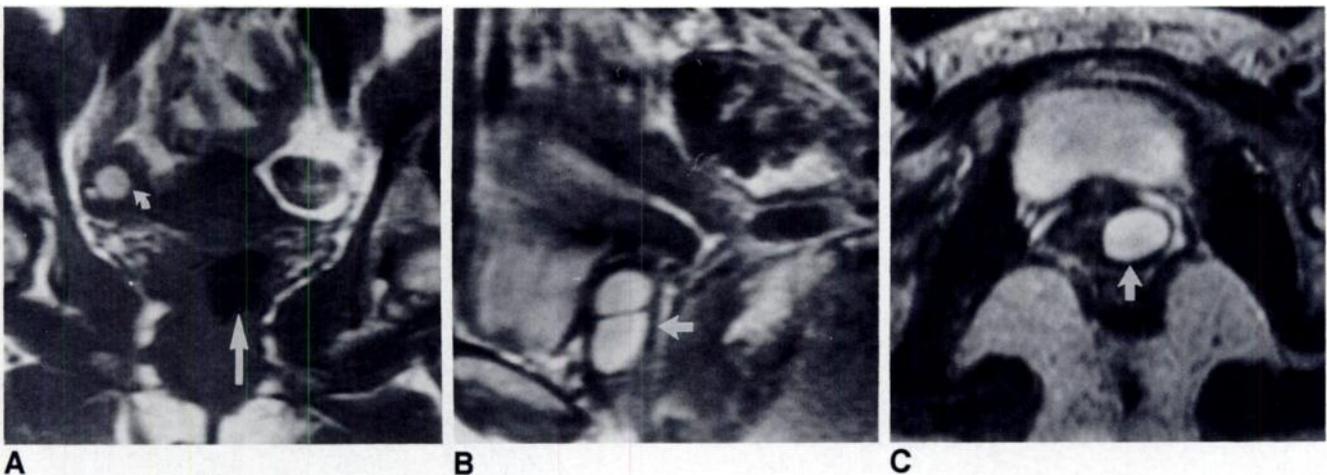
Bartholin's cysts were detected in six cases, for a prevalence of 1.3%. This corresponds closely to the prevalence of



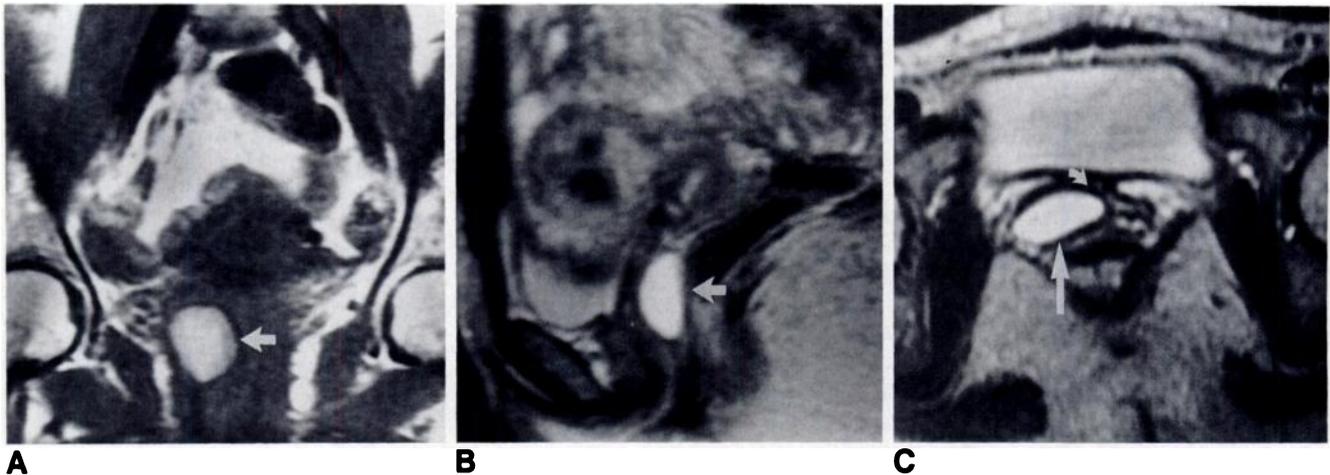
**Fig. 7.**—Bartholin's cyst in a 38-year-old woman.  
**A,** Axial T1-weighted (433/17) MR image shows cyst (arrow) in left labium. Hyperintensity of cyst may reflect hemorrhagic, proteinaceous, or mucinous content.  
**B,** Sagittal T2-weighted (2117/80) MR image shows cyst (arrow) hyperintense relative to fat.



**Fig. 8.**—Bartholin's cyst in a 41-year-old woman. Coronal T1-weighted (500/20) MR image shows cyst (arrow) in left labium that is hyperintense relative to muscle.



**Fig. 9.**—Gartner's cyst in a 39-year-old woman.  
**A,** Coronal T1-weighted (400/13) MR image shows septated low-signal structure (large arrow) in left wall of vagina. Note also small hemorrhagic cyst (small arrow) in right ovary.  
**B,** Sagittal T2-weighted (1700/80) MR image shows septated high-signal structure (arrow) in vicinity of vagina.  
**C,** Axial T2-weighted (2000/80) MR image shows high-signal cystic structure (arrow) in left lateral wall of vagina, findings consistent with Gartner's cyst.



**Fig. 10.**—Gartner's cyst in a 42-year-old woman.  
**A,** Coronal T1-weighted (500/20) MR image shows high-signal structure (arrow) in right wall of vagina, suggesting either hemorrhagic, proteinaceous, or mucinous content.  
**B,** Sagittal T2-weighted (1700/80) MR image shows high-signal structure (arrow) in vicinity of vagina.  
**C,** Axial T2-weighted (2000/80) MR image shows close relationship of cyst (large arrow) to right wall of vagina (small arrow), consistent with Gartner's cyst.

2% that has been reported for detection by physical examination [2]. These cysts appeared as discrete cystic structures in the labia. All were hyperintense relative to fat on T2-weighted images. On T1-weighted images, signal intensity was similar to that of urine (one case), muscle (three cases), or fat (two cases), presumably reflecting differences in protein or mucin content (Figs. 5–8). Clinically, none of the cysts were symptomatic at the time of MR imaging.

Bartholin's cysts arise from the duct system of Bartholin's glands. Most cysts involve the main duct only and thus are unilocular. Bartholin's cysts are unilateral, nontender, tense, palpable masses 1–4 cm in diameter. Most contain sterile fluid and are located in the posterior part of the labia majora. The cysts are often asymptomatic unless they become enlarged or infected [2].

#### Gartner's Cysts

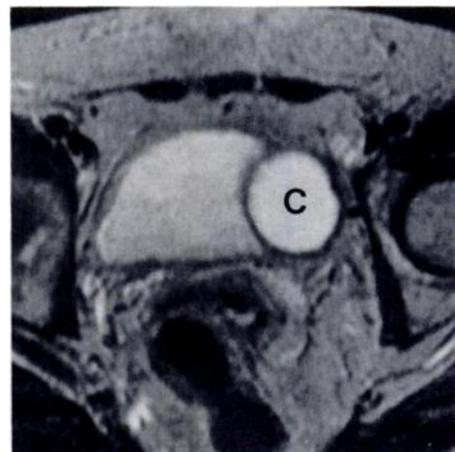
Gartner's cysts were detected in six patients, for a prevalence of 1.3%. This is similar to the prevalence of approximately 1% for their detection on physical examination. They appeared as ovoid (five cases) or septated (one case) cystic lesions located within the wall of the vagina (Figs. 9 and 10). All were hyperintense relative to fat on T2-weighted images. On T1-weighted images, four were hypointense or isointense with muscle, and two were isointense with fat. Clinically, no patients had symptoms attributable to Gartner's cysts before MR imaging. On physical examination, the Gartner's cyst was detected before MR imaging in three cases. In another case, the cyst was drained after MR imaging, and 20 ml of clear fluid was aspirated (Fig. 9).

True Gartner's cysts develop from remnants of the vaginal portion of the mesonephric (wolffian) ducts. If parts of these ducts fail to regress, secretory activity gives rise to cystic tumors within the wall of the vagina. Clinically indistinguishable

from "true" Gartner's cysts, paramesonephric cysts can arise in the vaginal wall from vestiges of the paramesonephric (müllerian) ducts. Both types of vaginal cysts are usually asymptomatic, and their gross appearances are similar, so their precise origin is not of major clinical significance. Most are solitary, smaller than 2 cm in diameter, and located in the anterolateral wall of the vagina [2].

#### Paratubal Cysts

Three patients with surgically proved paratubal cysts had MR imaging preoperatively (Figs. 11–13). The prevalence of these cysts on MR imaging studies is difficult to calculate because paratubal cysts seen on MR images may be misdi-



**Fig. 11.**—Paratubal cyst in a 59-year-old woman. T2-weighted (2000/80) axial MR image shows 4-cm left adnexal cyst (C). Because left ovary could not be detected as a separate structure, lesion was misdiagnosed as an ovarian cyst.

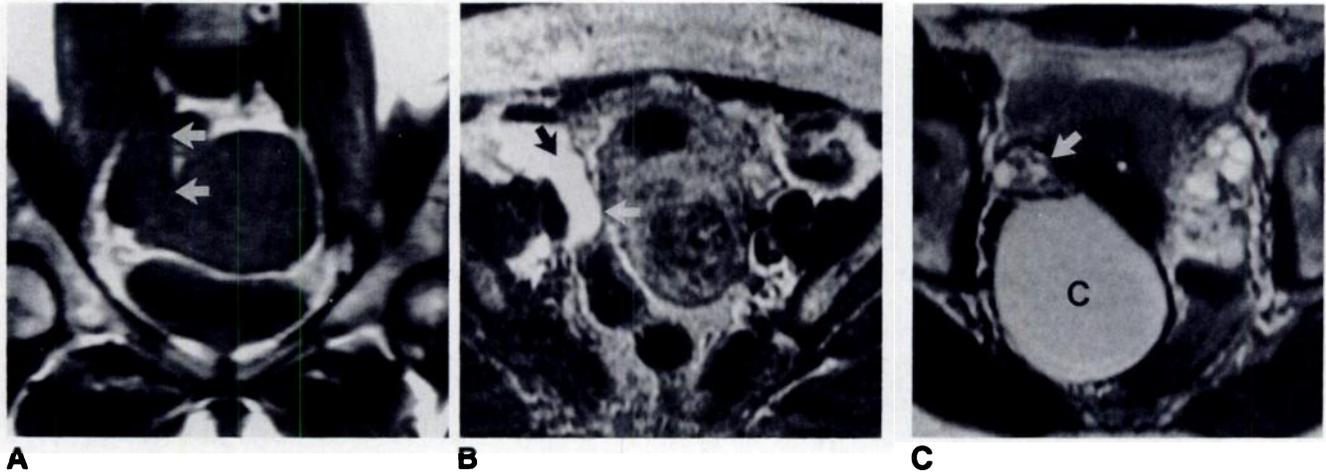


Fig. 12.—Paratubal cyst in a 48-year-old woman.

A, Coronal T1-weighted (500/20) MR image shows elongated structure (arrows) adjacent to right side of uterus.

B, Axial T2-weighted (2000/80) MR image shows elongated oval structure (arrows) with high signal intensity, suggesting fluid contents. Elongated shape prospectively suggested nonovarian origin.

Fig. 13.—Paratubal cyst in a 25-year-old woman. T2-weighted (3000/126) fast spin-echo MR image shows large cyst (C) posterior to right ovary (arrow). Because cyst was separate from ovary, a paratubal cyst was diagnosed prospectively.

agnosed as ovarian cysts (Fig. 11), and not all patients with a diagnosis of ovarian cysts based on MR findings have surgery. Surgical data suggest that paratubal cysts account for 10–20% of adnexal masses. On MR images, two of the lesions could be differentiated prospectively from ovarian lesions because of an elongated configuration of the cyst (Fig. 12) or an anatomically normal ipsilateral ovary (Fig. 13).

Paratubal (paraovarian or parovarian) cysts develop within the broad ligament. They arise most commonly from either the mesothelial epithelium of peritoneal inclusions or vestiges of the paramesonephric ducts and rarely from remnants of the mesonephric ducts [4]. Complications of these cysts can develop, including hemorrhage, torsion, and rupture, similar to those associated with ovarian cystic lesions. On sono-

grams, uncomplicated paratubal cysts may be indistinguishable from simple ovarian cysts [3]. In some cases, either transvaginal sonography or MR imaging may show that the paratubal cyst is separate from a normal ipsilateral ovary.

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