

Echogenic foci mimicking adenomyosis presumably due to air intravasation into the myometrium during sonohysterography

Fatih Örs, Anna S. Lev-Toaff, Diane Bergin

PURPOSE

To report the radiological findings of a pseudolesion in the myometrium mimicking adenomyosis presumably due to air intravasation during sonohysterography (SHG).

MATERIALS AND METHODS

We searched magnetic resonance imaging (MRI) and transvaginal ultrasound (TVUS) examination results before and after SHGs, in which echogenic foci were found suggesting adenomyosis in the myometrium, and found 7 female cases. MRI and TVUS findings were compared to the SHG findings to assess the persistence of echogenic foci seen with SHG and other imaging modalities, and to exclude the possibility of pseudolesions secondary to saline-air intravasation into the myometrium during SHG.

RESULTS

Ages of the 7 patients ranged from 27 to 60 years; 2 of them were postmenopausal. SHG examinations showed solitary or multiple echogenic foci measuring 4-15 mm, with acoustic shadowing, which were adjacent to the endometrium and consistent with adenomyosis. Only 1 of the patients underwent both MRI and TVUS, 2 of them had TVUS after SHG, and 1 had TVUS before SHG; the 3 remaining patients had TVUS as a baseline examination prior to SHG. None of these TVUS or MRI examinations confirmed the echogenic foci found with SHG.

CONCLUSION

In order to differentiate echogenic myometrial pseudolesions from true adenomyosis lesions, a detailed preliminary TVUS is essential before any SHG procedure. If such lesions are encountered despite meticulous care to avoid the inadvertent introduction of air into the endometrial cavity, TVUS findings should be reviewed and a pelvic MRI is recommended in cases with heterogeneous myometrium.

Key words: • adenomyosis • uterus • ultrasonography

Sonohysterography (SHG) is an easy-to-perform, well-tolerated, cost-effective means of directing the work-up for patients with pre- and postmenopausal bleeding (1). The technique involves placement of a 5 F catheter into the endometrial canal with subsequent introduction of sterile saline solution under ultrasonographic guidance (2). In premenopausal patients, SHG is preferred during the early proliferative phase (days 4-6) of the patient's menstrual cycle, when the endometrium is its thinnest. In postmenopausal patients, the normal atrophic endometrium should measure less than 2.5 mm in single-layer thickness at the time of SHG (3).

SHG is a valuable tool for examining the endometrial cavity in patients with dysfunctional uterine bleeding, recurrent pregnancy loss, retained products of conception, and infertility. It also enables triage of postmenopausal patients with bleeding. SHG is used mostly for the detection of endometrial and subendometrial lesions; however, other lesions in the myometrium, such as adenomyosis and leiomyoma, can be seen during SHG.

Adenomyosis is a common gynecologic condition that affects menstruating women. It is diagnosed when ectopic endometrial glands and stroma are found deep within the myometrium and is associated with surrounding myometrial hypertrophy. On ultrasonography (US), adenomyosis most commonly appears as areas of decreased echogenicity or heterogeneity of the myometrium (4). However, in a rare form of adenomyosis, i.e., cystic adenomyosis, the extent and degree of hemorrhage within the ectopic endometrial glands are more extensive. When large or confluent, the areas of heterotopic endometrial tissue result in discrete echogenic nodules within the myometrium (5).

The aim of this retrospective study was to report the radiological findings of pseudolesions in the myometrium mimicking adenomyosis due to air intravasation during SHG.

Materials and methods

SHG reports between December 2000 and September 2004 were evaluated retrospectively. The study included 7 patients who were diagnosed with echogenic foci in the myometrium during SHG and were subsequently reexamined. The possible etiology of these foci was reported as adenomyosis or myometrial intravasation of saline with air bubbles associated with SHG.

All SHGs were performed by the same radiologist at the Thomas Jefferson University Hospital's Department of Radiology. With the patient in the lithotomy position, a single-hinged speculum was inserted into the vagina, and the cervix was cleaned with antiseptic solution. A 5 F balloon-bearing catheter (Ackrad Laboratories, Cranford, NJ, USA) was flushed free of air with sterile saline and then placed into the lower uter-

From the Department of Radiology (F.Ö. ✉ drfors@yahoo.com), Gülhane Military Medical Academy, Ankara, Turkey; and Department of Radiology (A.S.L., D.B.) Thomas Jefferson University Hospital, Philadelphia, Pennsylvania, USA.

Received 14 November 2006; revision requested 4 January 2007; revision received 11 January 2007; accepted 14 January 2007.

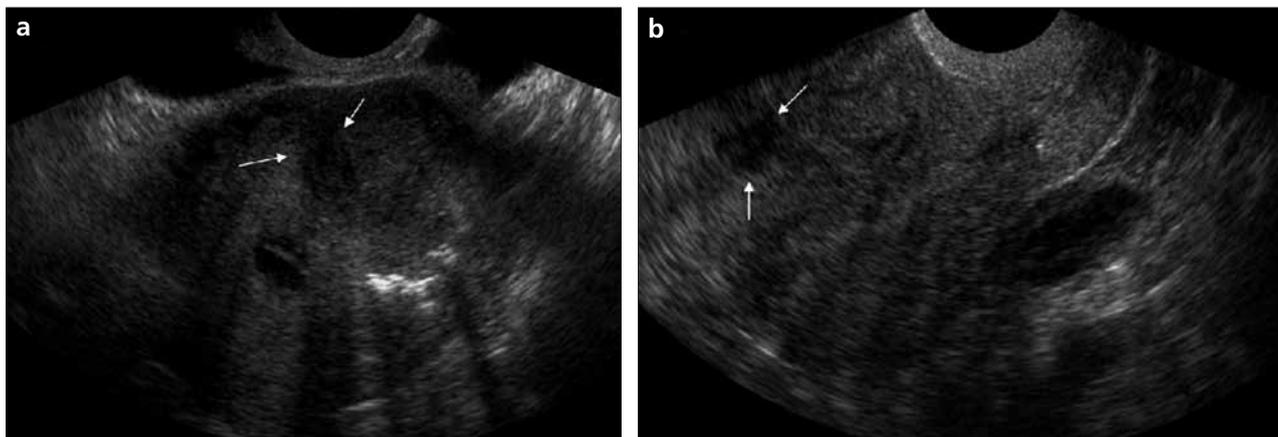


Figure 1. a, b. Posterior myometrial echogenic foci (a) were present during the SHG procedure in a 45-year-old patient with the complaint of dysmenorrhea, whereas they were not seen in the TVUS performed 2 months earlier (b). Anterior myometrial hypoechoic fibroid (arrows) was noted in both images.

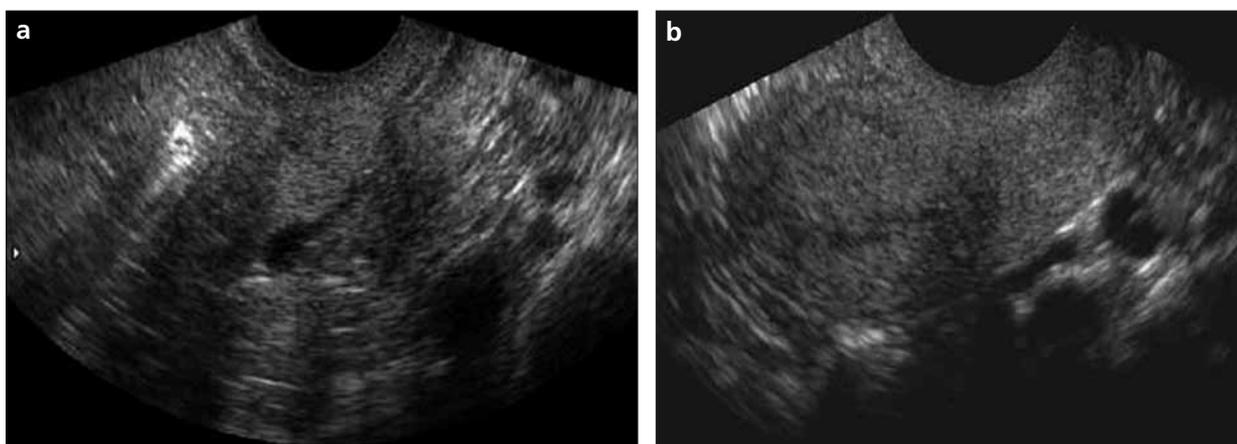


Figure 2. a, b. SHG (a) of a 55-year-old postmenopausal woman with endometrial irregularity shows echogenic foci in fundal myometrium during the SHG procedure. Follow-up TVUS (b) of the patient 2 months after the SHG showed no echogenic lesion.

ine segment. The balloon was inflated with sterile saline. The speculum was then removed, and the vaginal probe was inserted. Sterile saline (20–40 ml) was introduced into the uterine cavity. The myometrium, endometrium, and uterine cavity were evaluated for any abnormalities.

The 7 patients ranged in age from 27 to 60 years and 2 of the patients were postmenopausal. Indications of SHG were endometrial irregularity (n = 1, age, 55 years) and tamoxifen use for breast cancer (n = 1; age, 60 years) in the postmenopausal patients. SHG was performed for infertility in 3 patients (aged 40, 41, and 44 years) and for irregularly heavy menses in 2 patients (aged 27 and 45 years).

After reviewing the SHG reports of these 7 patients, transvaginal ultrasonography (TVUS) and/or pelvic magnetic resonance imaging (MRI) prior to or after SHG was searched in

an effort to make comparisons and determine the etiology of the echogenic foci observed in the myometrium during SHG.

Results

Minimally echogenic, well-defined foci with occasional acoustic shadowing and irregular contours were observed with SHG in all 7 patients. Lesions were solitary in 3 patients, whereas several neighboring foci were present in the others. The size of these myometrial lesions varied from 4 to 15 mm, all of which were subjacent to the endometrium. Therefore, the lesions were reported as either foci of adenomyosis or myometrial intravasation of saline with air bubbles.

The other radiological tests of these patients, such as TVUS and/or pelvic MRI, obtained before or after SHG, were investigated for the presence of adenomyosis. The results of pelvic MRI per-

formed after SHG and TVUS 2 months before the SHG were obtained in one patient. Although this patient with heavy menses had 2 mural fibroids confirmed with all radiological tests, neither follow-up TVUS nor pelvic MRI revealed evidence of adenomyosis, and the foci observed as echogenic in SHG were not verified (Fig. 1).

Follow-up TVUS was performed after SHG on the 2 postmenopausal patients due to endometrial irregularity and tamoxifen use. Although myometrial heterogeneity, in general, was evident, more prominent echogenic foci observed during SHG were not reidentified in the same particular locations (Fig. 2).

Although one patient had neither TVUS nor pelvic MRI after SHG, TVUS, which was performed the day before SHG as part of her infertility work-up, was negative for any myometrial abnormality.

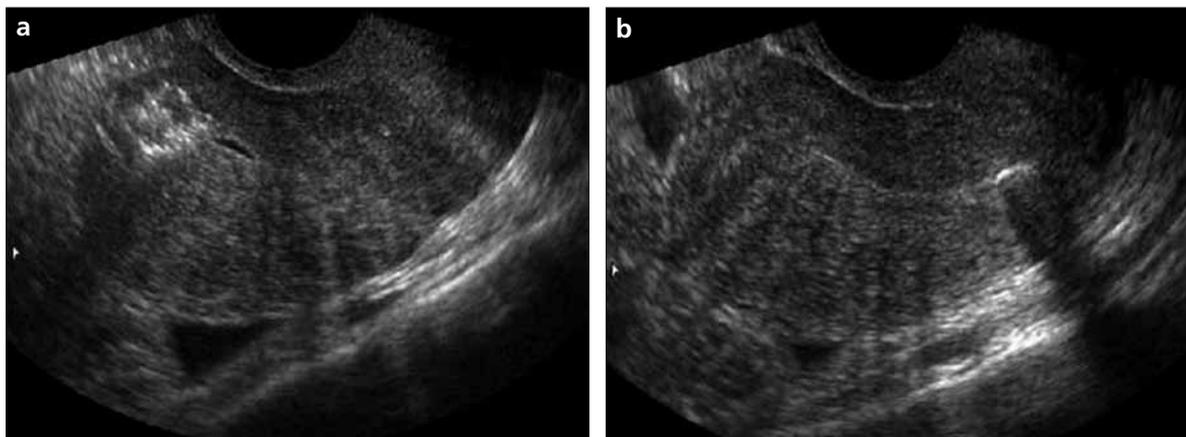


Figure 3. a, b. Echogenic foci are seen in the myometrium during the SHG (a), but not in the preliminary scanning (b) of a 44-year-old patient with secondary infertility.

The remaining 3 patients (2 with infertility and 1 with irregular menses) did not undergo any other radiological test before or after SHG; however, preliminary transvaginal scans performed immediately prior to SHG did not show any echogenic lesions, which were seen during the SHG procedure (Fig. 3).

In addition to the echogenic foci in the myometrium observed during SHG, endometrial abnormalities were observed. Endometrial cavitory adhesions were identified in 2 patients, endometrial thickening in 1, and small amounts of menstrual debris in another patient. No endometrial or subendometrial lesions were noted in 3 patients.

Apart from consistently present echogenic foci suggesting adenomyosis, myometrial evaluation by SHG revealed mural fibroid in 2 patients and myometrial heterogeneity in 3 patients, whereas no myometrial lesions were seen in 2 patients.

Discussion

Uterine adenomyosis is a common gynecologic condition that is characterized by the presence of heterotopic endometrial glands and stroma in the myometrium, with adjacent smooth muscle hyperplasia. The typical symptoms include pelvic pain, dysmenorrhea, and menorrhagia. With the advent of high-resolution imaging techniques, adenomyosis can be diagnosed with a high degree of accuracy. The imaging signs demonstrated with TVUS and MRI correspond closely to the varied appearances of this disease with histopathological analysis. The accompanying smooth muscle hyperplasia

produces the typical gross appearance of adenomyosis and corresponds to areas of decreased echogenicity seen with TVUS (5). TVUS also shows heterogeneity of the myometrial echotexture, which corresponds to small echogenic islands of heterotopic endometrial tissue surrounded by hypoechoic smooth muscle. Common TVUS features of adenomyosis are rounded enlargement of the uterus without a discrete mass, asymmetrical myometrial thickening, myometrial cysts (correlated with fluid-filled, dilated endometrial glands), diffuse thickening of the junctional zone (>12 mm), poor definition of the endometrial-myometrial junction, and subendometrial echogenic nodules and/or linear striations. In addition, there are some uncommon TVUS features of adenomyosis that include focal adenomyosis (localized mass within the myometrium with poorly defined margins), polypoid adenomyoma (polypoid mass protruding into the endometrial cavity), and adenomyotic cyst (due to extensive bleeding into the ectopic endometrium) (6).

SHG has been shown to be a safe, simple, and effective outpatient method for evaluating the potentially abnormal endometrium using TVUS in an outpatient setting. The differential diagnosis of an abnormally thick, irregular, or indistinct endometrium includes diffuse processes (e.g., endometrial hyperplasia, the secretory phase of the menstrual cycle) and focal diseases (e.g., endometrial polyps, carcinoma). Subendometrial pathologic conditions, such as submucosal leiomyomas and adenomyosis may also manifest as apparent endometrial thickening. These

entities can be distinguished from each other with SHG (7).

The risk associated with SHG is very limited. The likelihood of pain or discomfort may be minimized by the small quantities of fluid used. No serious complications have been reported in the literature (8). In our cases, no complications were seen.

In our 7 SHG examinations, we saw some echogenic islands in the myometrium, which can be seen in adenomyosis. These echogenic foci, which were observed during SHG, but were unidentifiable with repeat scans on other days or by other radiological means, could be considered pseudolesions mimicking adenomyosis. TVUS examination reports (for all patients) and a pelvic MRI report (for one patient) lacked the evidence to explain the echogenic lesions observed during SHG. Hence, we referred to them as pseudolesions secondary to technical glitches, such as the failure to replace the air in the SHG catheter with saline at the beginning of the procedure. Additionally, these pseudolesions may be focal myometrial intravasation of saline with air bubbles during SHG, which can be seen following cervical dilatation and slightly difficult cannulation of the uterine cavity.

To the best of our knowledge, there are no reports of pseudolesions secondary to saline and air bubble intravasation, but air trapping in the endometrial cavity and subsequent shadowing air echoes with compromised image quality have been reported secondary to the failure to flush the catheter system before SHG (9).

The present study has some limitation. First, the number of patients was small. Additionally, follow-up imaging modalities were not standardized because of the retrospective nature of the study.

In conclusion, in order to differentiate echogenic myometrial pseudolesions from true adenomyosis lesions, a detailed preliminary TVUS is essential prior to any SHG procedure. If such lesions are encountered despite meticulous care to avoid the inadvertent introduction of air into the endometrial cavity, TVUS findings should be reviewed and pelvic MRI (with its high sensitivity to detect adenomyosis) should be performed in cases with a heterogeneous myometrium.

References

1. Lev-Toaff AS, Toaff ME, Liu JB, Merton, DA, Goldberg BB. Value of sonohysterography in the diagnosis and management of abnormal uterine bleeding. *Radiology* 1996; 201:179–184.
2. Jorizzo JR, Riccio GJ, Chen MY, Carr JJ. Sonohysterography: the next step in the evaluation of the abnormal endometrium. *Radiographics* 1999; 19:117–130.
3. Davis PC, O'Neill MJ, Yoder IJ, Lee SI, Mueller MR. Sonohysterographic findings of endometrial and subendometrial conditions. *Radiographics* 2002; 22:803–816.
4. Fedele L, Bianchi S, Dorta M, Arcaini L, Zanotti F, Carinelli S. Transvaginal ultrasonography in the diagnosis of diffuse adenomyosis. *Fertil Steril* 1992; 58:94–97.
5. Reinhold C, Tafazoli F, Mehio A, et al. Uterine adenomyosis: endovaginal US and MR imaging features with histopathologic correlation. *Radiographics* 1999; 19:147–160.
6. Chopra S, Lev-Toaff AS, Ors F, Bergin D. Adenomyosis: common and uncommon manifestations on sonography and magnetic resonance imaging. *J Ultrasound Med* 2006; 25:617–627.
7. Cullinan JA, Fleisher JA, Kepple DM, Arnold AL. Sonohysterography: a technique for endometrial evaluation. *Radiographics* 1995; 15:501–514.
8. Gaucherand P, Piacenza JM, Salle B, Rudigoz RC. Sonohysterography of the uterine cavity: preliminary investigations. *J Clin Ultrasound* 1995; 23:339–348.
9. Lindheim SR, Morales AJ. Comparison of sonohysterography and hysteroscopy: lessons learned and avoiding pitfalls. *J Am Assoc Gynecol Laparosc* 2002; 9:223–231.