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RadioGraphics

Migration of Intrauterine Devices: Radiologic Findings and Implications for Patient Care[1]

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ONLINE-ONLY CME

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LEARNING OBJECTIVES

After completing this journal-based CME activity, participants will be able to:

- Identify normally and abnormally positioned IUDs as shown with various imaging modalities.
- Discuss the management and urgency of treatment of IUD expulsion, IUD displacement, and perforation by IUDs.
- Describe the risks and complications associated with IUDs in pregnant patients.

TEACHING POINTS

See last page

Intrauterine devices (IUDs) are a commonly used form of contraception worldwide. However, migration of the IUD from its normal position in the uterine fundus is a frequently encountered complication, varying from uterine expulsion to displacement into the endometrial canal to uterine perforation. Different sites of IUD translocation vary in terms of their clinical significance and subsequent management, and the urgency of communicating IUD migration to the clinician is likewise variable. Expulsion or intrauterine displacement of the IUD leads to decreased contraceptive efficacy and should be clearly communicated, since it warrants IUD replacement to prevent unplanned pregnancy. Embedment of the IUD into the myometrium can usually be managed in the outpatient clinical setting but occasionally requires hysteroscopic removal. Complete uterine perforation, in which the IUD is partially or completely within the peritoneal cavity, requires surgical management, and timely and direct communication with the clinician is essential in such cases. Careful evaluation for intraabdominal complications is also important, since they may warrant urgent or emergent surgical intervention. The radiologist plays an important role in the diagnosis of IUD migration and should be familiar with its appearance at multiple imaging modalities.

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Abbreviations: IUD = intrauterine device, 3D = three-dimensional

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Introduction

Intrauterine devices (IUDs) are a commonly used, highly effective, and rapidly reversible form of contraception. Two types of IUDs are available in the United States: a copper-containing IUD (TCu 380A [Paraguard]; Barr Pharmaceuticals, Pomona, NY) and a levonorgestrel-releasing IUD (LNG 20 [Mirena]; Bayer Healthcare Pharmaceuticals, Wayne, NJ). In general, an IUD consists of a T-shaped polyethylene frame with a copper wire or a levonorgestrel-containing collar around the stem. A polyethylene monofilament string is attached to the base of the stem (1). The copper wire is radiopaque and hyperechoic at ultrasonography (US). The frame of the levonorgestrel-releasing IUD contains barium sulfate, which aids in visualization at radiography but not at US (2).

The contraceptive effects of IUDs are multifactorial. IUDs produce chronic inflammatory changes of the endometrium and fallopian tubes that have spermicidal effects, inhibit fertilization, and create an inhospitable environment for implantation. The levonorgestrel-releasing IUD also alters and partially inhibits ovulation (3,4). Overall, IUDs are 98%–99% effective in preventing pregnancy (5,6). The IUD can easily be removed when the individual desires to attempt pregnancy. The copper IUD works for up to 10 years, whereas the levonorgestrel-releasing IUD works for up to 5 years (7–9).

As with any medication or medical device, there are side effects and risks associated with intrauterine contraception. Most commonly, patients will experience pain and abnormal bleeding, most severely during the first few months after IUD insertion (10,11). In a patient with a long-standing IUD who presents with pain, evaluation for other causes (eg, pelvic inflammatory disease, ectopic pregnancy, IUD displacement) must be performed.

In this article, we discuss clinical and radiologic considerations in the evaluation of IUDs; commonly encountered complications, including expulsion, displacement, and uterine perforation; and IUDs and pregnancy.

Clinical and Radiologic Considerations

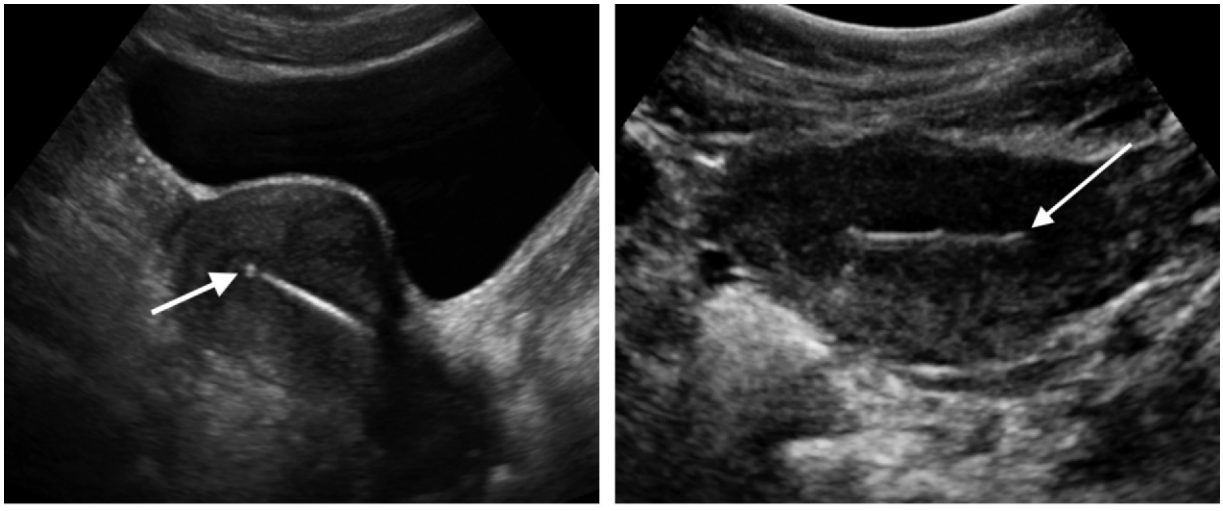
Various imaging modalities are used in the evaluation of IUDs. US is appropriate for initial evaluation; it is widely available and inexpensive and does not involve radiation. Furthermore, US can often provide answers to clinical questions related to the IUD. It easily helps determine whether an IUD is correctly positioned and can often help identify IUD-related complications. IUD displacement and myometrial perforation can be fully evaluated by performing US alone. Three-dimensional (3D) US is often helpful for further characterizing these findings, and its use is becoming standard practice in the routine evaluation of IUDs.

Abdominal radiography—more specifically, anteroposterior and lateral radiography—can be helpful in demonstrating an extrauterine IUD and is required for the diagnosis of IUD expulsion. Conventional radiography exposes the patient to only minimal radiation, and the radiopaque IUD is easily identified if it has not been expelled (Fig 1). Occasionally, computed tomography (CT) is used for the assessment of IUD positioning; more often, however, IUDs are incidentally visualized at CT studies that were ordered for different indications (12). CT is the best modality for the evaluation of complications associated with intraabdominal IUDs, such as visceral perforation, abscess formation, and bowel obstruction. However, CT does expose the patient to significantly more radiation. Magnetic resonance (MR) imaging is not typically used specifically for the evaluation of intrauterine contraception, but modern IUDs are safely imaged with both 1.5-T and 3.0-T magnets and appear as signal voids (13).

IUD insertion generally requires no imaging guidance. The IUD is inserted through the cervix using a sheath and is placed at the uterine fundus. Some circumstances may require US guidance; for example, if submucosal fibroids are present, US guidance ensures proper positioning within the endometrial cavity. In addition, if there is high resistance to insertion, US guidance helps prevent uterine perforation.

At gynecologic examination following insertion, the retrieval string should protrude ap-

Figure 1. Pelvic radiograph shows normal positioning of an IUD. The IUD is upright in the midline pelvis inferior to the pelvic brim, in the expected location of the uterus. Intrauterine displacement and embedment may have similar appearances at radiography. Multiple sclerotic metastases are incidentally noted in the left femur and pelvis.



a. b.

Figure 2. Normal positioning of an IUD. **(a)** Transabdominal longitudinal US image of the uterus demonstrates an IUD with its stem entirely within the endometrial cavity and its proximal end (arrow) at the top of the uterine cavity. **(b)** On a transabdominal transverse US image, the arms of the IUD (arrow) extend laterally at the uterine fundus.

proximately 2–3 cm through the external cervical os, with the entire IUD within the endometrial cavity. No portion of the device should be visible within the endocervical canal. The patient should be followed up within 6 weeks to ensure that the string is seen at pelvic examination, since a missing string is a common indication of displacement, uterine perforation, or expulsion (8,9).

Teaching Point

At US, the stem of a properly placed IUD is straight and is entirely within the endometrial cavity, with the arms of the IUD extending laterally at the uterine fundus (Fig 2). At evaluation of fundal placement of the IUD, the distance from

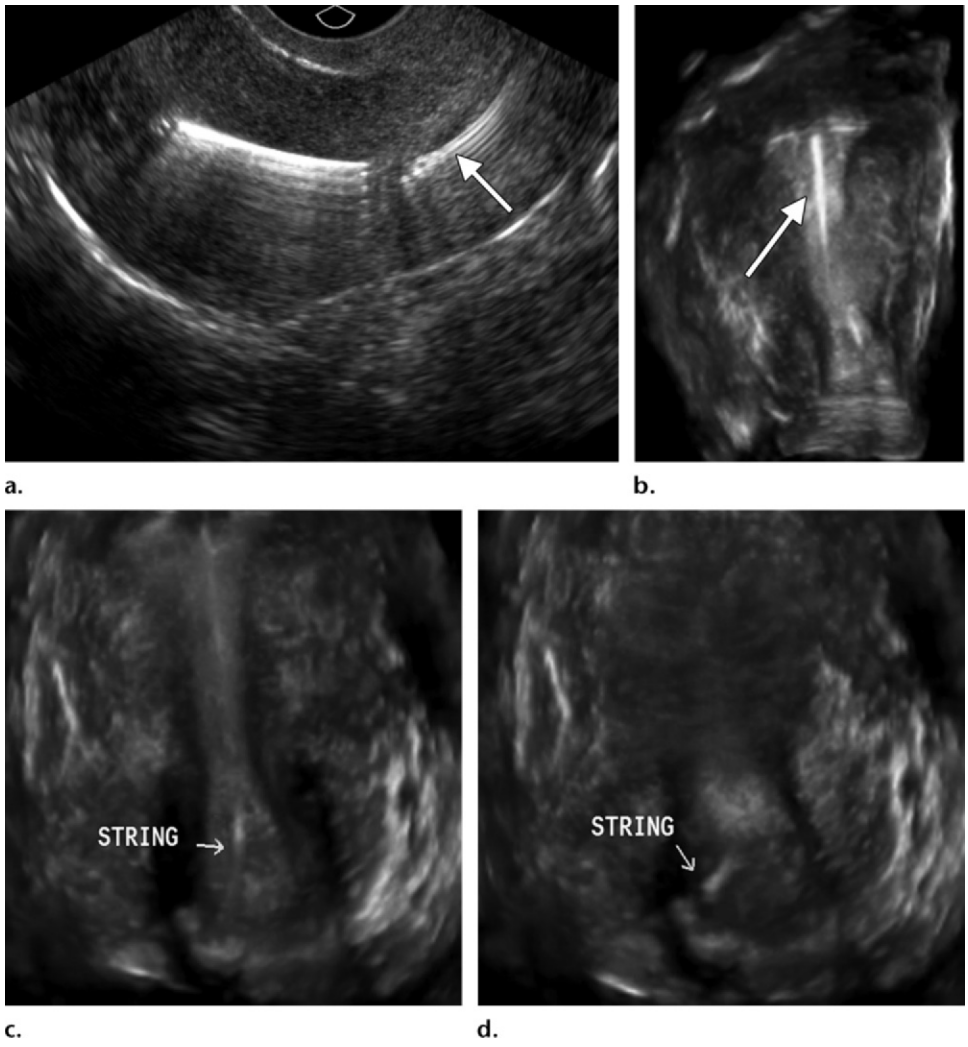


Figure 3. Normal appearance of an IUD and retrieval string. **(a)** Transvaginal longitudinal US image of the uterus demonstrates an appropriately placed IUD, with the string (arrow) exiting through the endocervical canal. **(b)** Coronal 3D US image through the uterus demonstrates the hyperechoic IUD (arrow) appropriately positioned in the echogenic endometrial canal. **(c, d)** Coronal 3D US images of the lower uterine segment and cervix obtained at slightly different obliquities demonstrate the string (arrow) exiting through the cervix.

the top of the uterine cavity to the IUD should be 3 mm or less (14). A distance greater than 4 mm is more often associated with symptoms such as bleeding and pain, as well as with a higher risk of expulsion or displacement (14,15).

The IUD string is not generally visible radiographically but can often be seen at US, particularly on 3D images (12). Three-dimensional US is also beneficial for determining if the IUD is entirely within the endometrial cavity (Fig 3) (16). Two-dimensional US is adequate for identifying the stem, but 3D US is often crucial for

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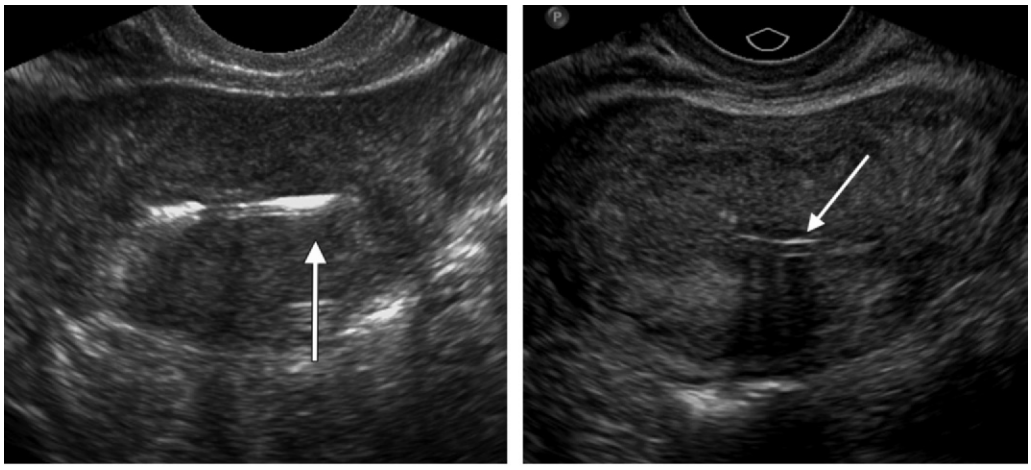

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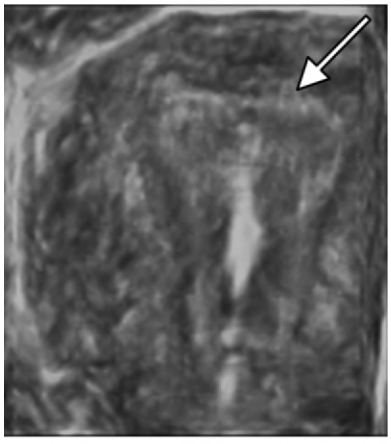

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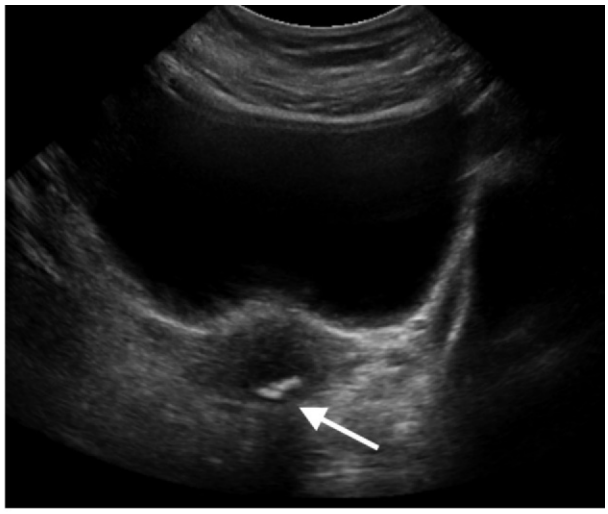
Figure 4. Copper-containing versus levonorgestrel-releasing IUDs at US. **(a)** Transvaginal transverse US image of the uterine fundus shows the echogenic arms of a copper-containing IUD (arrow) in their entirety. **(b)** On a transvaginal transverse US image of the uterine fundus obtained in a different patient, the arms of a levonorgestrel-releasing IUD (arrow) are incompletely visualized, with central posterior acoustic shadowing. **(c)** Coronal 3D US image through the uterus obtained in the same patient as in **b** shows the arms of the IUD (arrow) in their entirety.

determining the location of the arms of the IUD with respect to the uterine cavity (17). There are also differences in conspicuity between the copper-containing IUD and the levonorgestrel-releasing IUD. The echogenic stem and arms of the copper-containing IUD are seen in their entirety on sagittal and transverse views, respectively. In contrast, the levonorgestrel-releasing IUD usually manifests with acoustic shadowing between its echogenic proximal and distal ends, so that precise localization is hindered. Both types of IUDs are more conspicuous at 3D US than at two-dimensional US (Fig 4) (2).

Complications

Expulsion

Uterine expulsion of the IUD is a relatively common complication, occurring in up to 10% of patients (5). Insertion early in the menstrual cycle may increase the likelihood of expulsion (18). Other risk factors include nulliparity, menorrhagia, and immediate postpartum insertion (19–21). Patients with severe anatomic distortion of the uterine cavity (eg, a bicornate uterus or large submucosal fibroids) may be at higher risk for IUD expulsion or difficulty with placement (22,23). The position of the uterus (anteverted versus retroverted) does not affect expulsion rates (24). After IUD expulsion, patients



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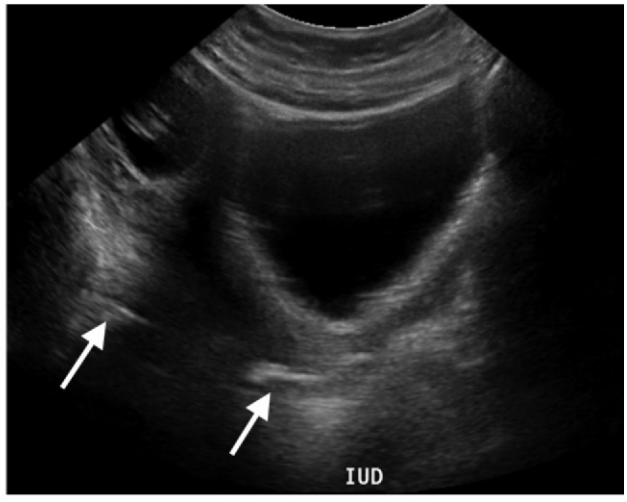

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Figure 5. Intrauterine pregnancy in a 36-year-old woman who presented to the emergency department with lower abdominal pain. **(a)** Transabdominal transverse US image through the vagina shows a malpositioned IUD (arrow) in the vaginal fornix. **(b)** Transabdominal longitudinal US image through the uterus reveals a gestational sac and yolk sac (arrowhead), findings that are consistent with an intrauterine pregnancy. **(c)** Transabdominal longitudinal US image through the cervix depicts expulsion of the IUD (arrows) through the cervix into the vaginal fornix. The intrauterine pregnancy is also visible.

may present with pain, spotting, or palpation of the IUD within the vagina. However, some expulsions are asymptomatic.

Teaching Point

The contraceptive efficacy of IUDs is associated with appropriate intrauterine location (Fig 5). In particular, an IUD in a cervical location is associated with increased accidental pregnancy compared with a properly positioned IUD (25).

Detection of uterine expulsion should be clearly communicated in the radiology report. In a patient with partial expulsion of the IUD into the cervix, management generally consists of removal with alligator forceps or an IUD hook (25). The IUD should not be reinserted. When the IUD is not seen at US and expulsion is suspected, the fact that the IUD is not within the peritoneal cavity must be confirmed with abdominopelvic radiography (26).

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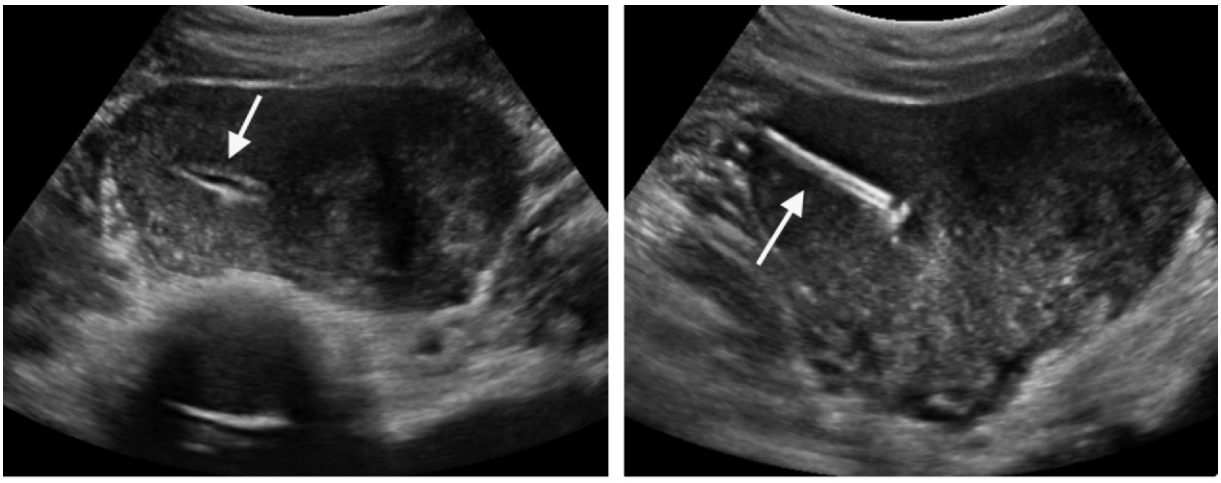

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Figure 6. Displaced IUD. **(a)** Transabdominal transverse US image through the uterus obtained in an asymptomatic 30-year-old woman with a missing IUD string at routine pelvic examination demonstrates the stem of a malpositioned IUD (arrow) in the right uterine fundus. A large left fundal transmural leiomyoma is incidentally noted. **(b)** Transabdominal oblique US image of the uterine fundus shows the stem of the IUD (arrow) lying obliquely in the endometrial cavity with its proximal end at the right uterine ostium. There is no myometrial perforation.

Displacement

Another commonly encountered problem with intrauterine contraception is displacement of the IUD within the uterine cavity. Such displacement occurs in up to 25% of females with an IUD (2,27). A displaced IUD is usually asymptomatic, although some affected patients present with cramping or bleeding (Fig 6).

No guidelines exist for management in asymptomatic patients with a displaced IUD. However, the greater the displacement of the IUD from its proper position in the uterine fundus, the less effective it is for contraception and the more likely it is to be expelled. It is important (although not urgent) to communicate the detection of a displaced IUD in the radiology report. The management of this situation varies among practitioners and often depends on the patient's preferences. Removal of a displaced IUD without myometrial perforation is generally uncomplicated, being performed in the clinical setting with alligator forceps or an IUD hook. Rarely, hysteroscopic removal is necessary (28). Occasionally, the patient desires to leave the displaced IUD in place.

Perforation

Uterine perforation is an uncommon but serious complication in females with an IUD, occurring in up to one of every 1,000 cases (29). Although there are not many documented risk factors, perforation occurs more frequently in patients who are lactating or who gave birth within the past 6 months. Perforation is thought to be related to low estrogen levels leading to uterine shrinkage. Uterine abnormalities and clinician inexperience also contribute to an increased likelihood of perforation (30,31).

IUD perforation is variable in extent and symptomatology, ranging from embedment in the myometrium to complete transuterine perforation with migration of the IUD into the peritoneal cavity (32). Some patients may be asymptomatic but

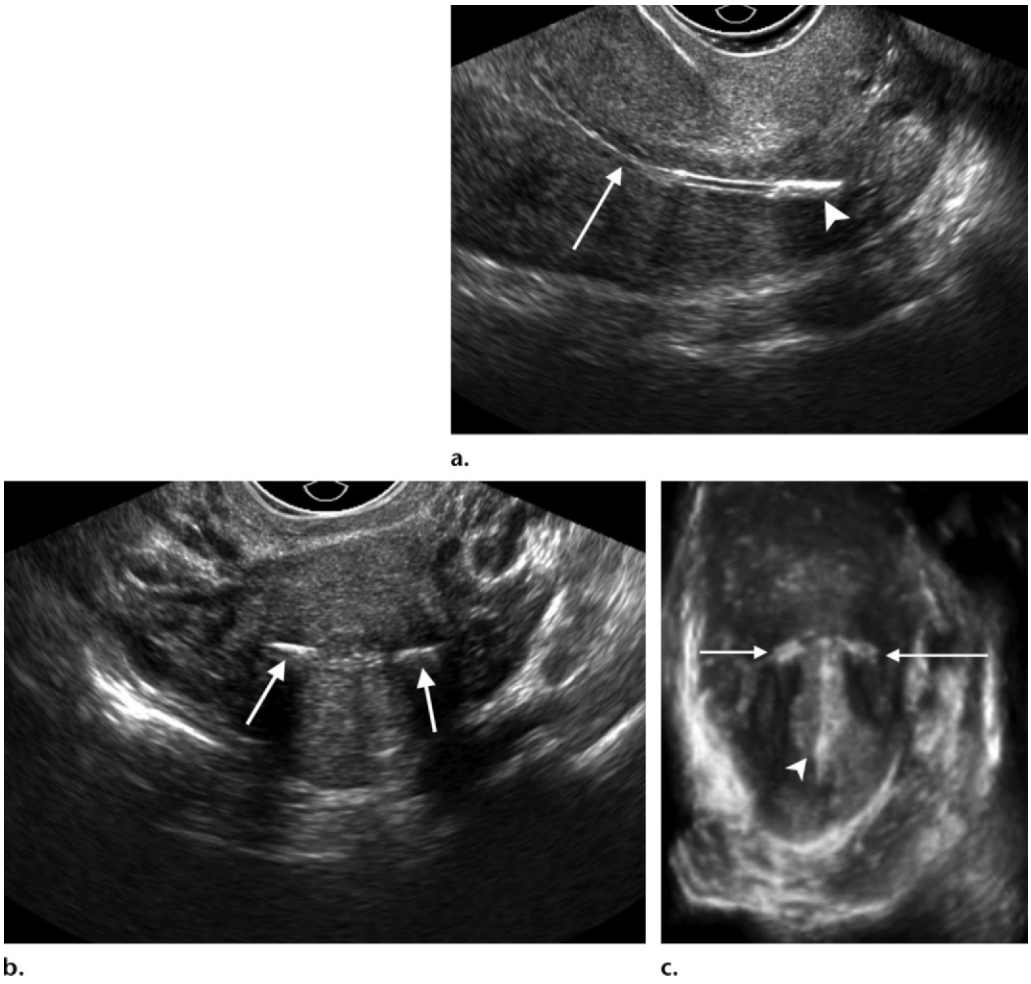

Figure 7. IUD embedment. **(a)** Transvaginal longitudinal US image through the cervix obtained in an asymptomatic 44-year-old woman with a missing IUD string at routine pelvic examination shows the stem of the IUD (arrow) positioned partially in the endocervical canal. The base of the stem (arrowhead) is embedded in the posterior cervix. **(b)** Transvaginal transverse US image through the cervix shows the arms of the IUD (arrows) protruding laterally into the myometrium of the midbody of the uterus. **(c)** Coronal 3D US image shows the arms of the IUD (arrows) extending laterally into the myometrium, with the base of the IUD stem (arrowhead) perforating the cervix.

present with a missing IUD string at pelvic examination, whereas others may present with severe abdominal pain or vaginal bleeding (30).

Embedment.—Embedment refers to IUD penetration into the endometrium or myometrium without extension through the serosa (Fig 7). It may occur to some degree in up to 18% of females with an IUD. Embedment is more common in females with smaller fundal endometrial diameters (17).

US is the modality of choice for initial imaging in patients with suspected perforation. Three-dimensional US in particular has been shown to be helpful in identifying malpositioned and embedded IUDs in symptomatic patients (16). In the emergent setting, CT is commonly performed to

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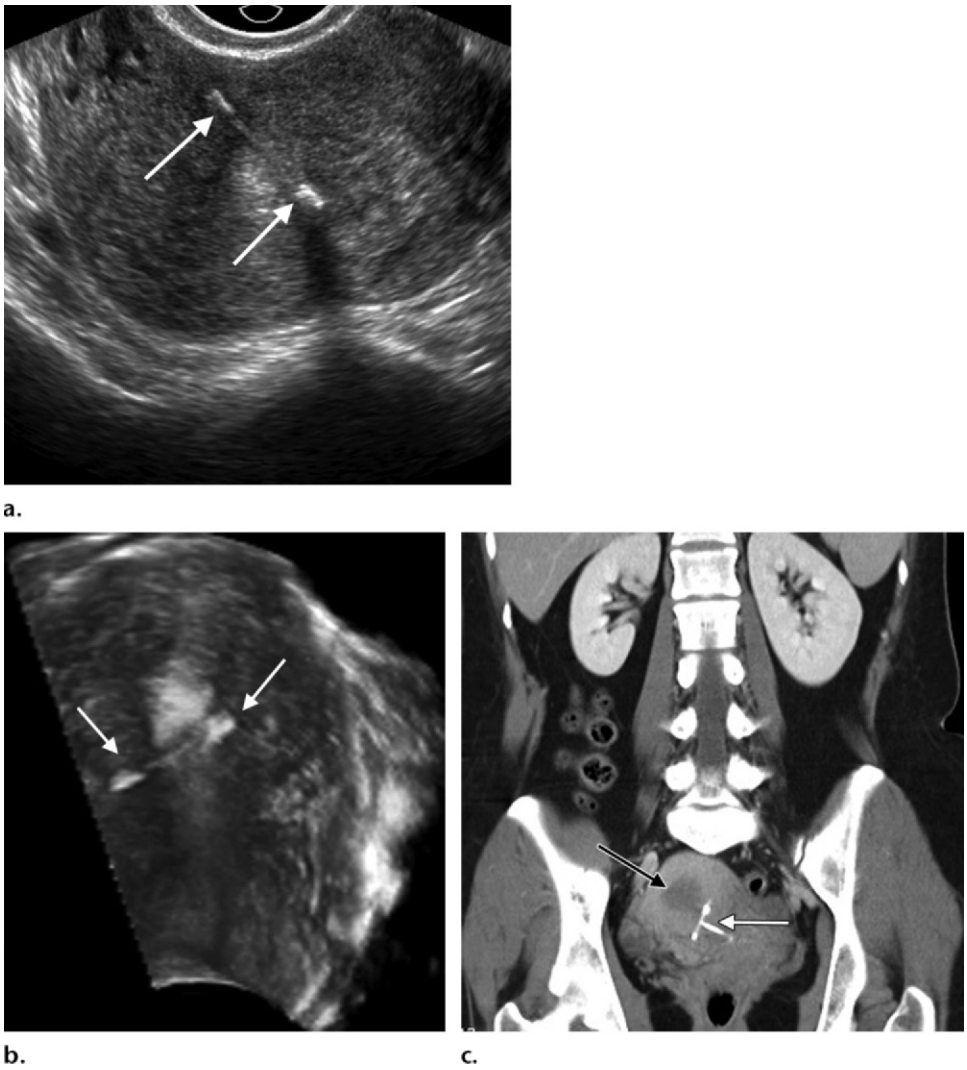

Figure 8. Malpositioned IUD in a 32-year-old woman who presented to the emergency department with lower abdominal pain. **(a)** Transvaginal transverse US image of the uterus shows the arms of the IUD (arrows) turned obliquely and perforating the myometrium in the uterine midbody. **(b)** Coronal 3D US image of the uterus more clearly depicts the arms of the IUD (arrows) extending into the myometrium. **(c)** Coronal reformatted CT image demonstrates the malpositioned IUD (white arrow) in the endometrial cavity (black arrow) with its arms perforating the myometrium.

exclude other causes for the patient's symptoms and to verify US findings (Fig 8). Generally, however, CT should not be the initial imaging study in patients with suspected IUD embedment.

Embedment of the IUD warrants direct communication of this finding to the clinician, as well as clear documentation in the radiology report. Management of this entity is variable but at the least consists of treatment with empirical antibiotics. Clinical removal of the IUD with alligator forceps or an IUD hook may be attempted. If there is resistance to removal or

9a.

9b.

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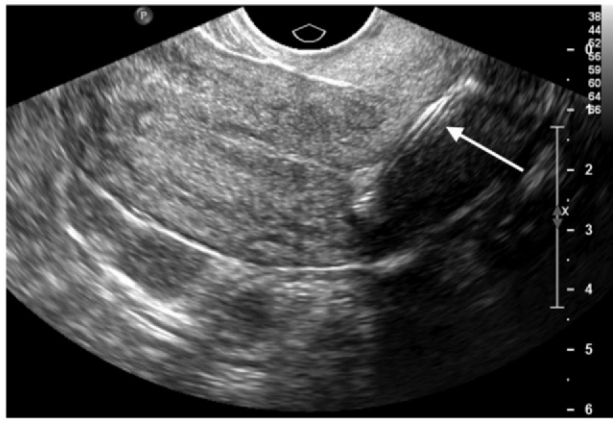

10a.

10b.

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Figures 9, 10. **(9)** Complete uterine perforation in a 36-year-old woman with subacute abdominal pain and a missing IUD string. At clinical US, the IUD was visible within the endometrial cavity, but an attempt to remove it was unsuccessful. **(a)** Abdominopelvic radiograph demonstrates the IUD in the midpelvis. **(b)** CT scan through the pelvis demonstrates the stem of the IUD (arrow) within the uterus. **(c)** Coronal reformatted CT image through the pelvis demonstrates an arm of the IUD (arrow) perforating the serosa of the uterine fundus. No intraabdominal complications are appreciated. **(10)** Complete uterine perforation in a 31-year-old woman who presented to the emergency department with lower abdominal pain. **(a)** Transvaginal longitudinal US image demonstrates a malpositioned IUD (arrow) in the lower uterine segment and the cervix. **(b, c)** CT scans through the pelvis (**c** obtained at a slightly lower level than **b**) demonstrate an arm of the IUD (arrow) perforating through the posterior serosa of the uterus into the pouch of Douglas adjacent to the rectum. There is no bowel perforation.

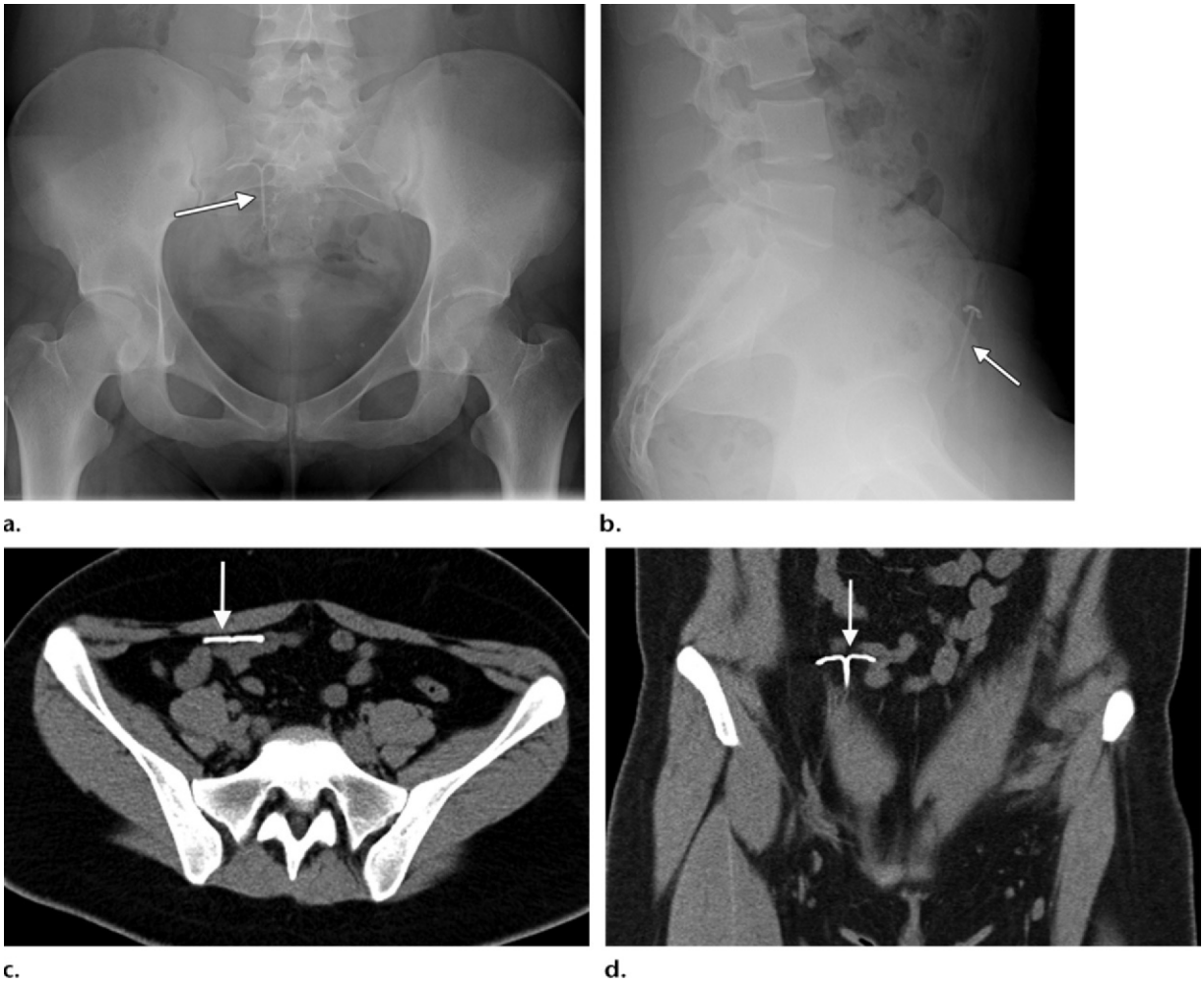


Figure 11. Intraabdominal IUD migration in an asymptomatic 21-year-old woman with a missing IUD string at routine examination. Clinical US demonstrated an empty endometrial cavity. **(a, b)** Anteroposterior **(a)** and lateral **(b)** radiographs of the abdomen show the IUD (arrow) in the right anterior pelvis. **(c, d)** Axial **(c)** and coronal reformatted **(d)** CT images help confirm the location of the extrauterine IUD (arrow) in the right anterior pelvic cavity, adjacent to small bowel loops. There is no bowel perforation or obstruction.

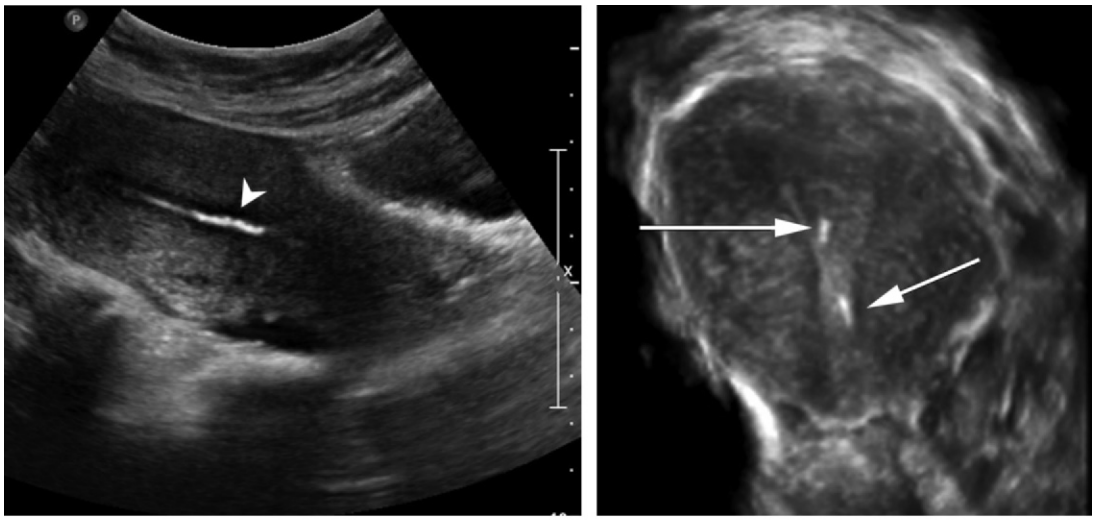
the IUD breaks, surgical hysteroscopy may be performed (8,26,33). This situation should be addressed in a timely manner to minimize symptoms and additional complications, as well as unplanned pregnancy.

Complete Perforation.—Complete uterine perforation is a more serious complication because the IUD has perforated through all three layers of the uterus and is either partially or completely within the peritoneal cavity.

Teaching Point

If the IUD extends through the uterine serosa but is still partially contained in the uterus (Figs 9, 10), the most common complication is omental adhesion formation (32).

Intraabdominal migration of the IUD may lead to more serious complications. Most frequently, the IUD is freely floating in the abdomen or pelvis, encased in adhesions, or adherent to bowel or omentum (Figs 11, 12). Adhesion formation



a. b.

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Figure 12. Intraabdominal IUD migration in a 33-year-old woman with abdominal cramping, vaginal spotting, and a missing IUD string. **(a)** Transabdominal longitudinal US image through the uterus demonstrates a hyperechoic linear structure (arrowhead) in the endometrial canal. The arms of the IUD are not visible. **(b)** Coronal 3D US image of the uterus more clearly demonstrates that the linear hyperechoic structure within the endometrial canal is discontinuous (arrows), a finding that is more compatible with endometrial calcifications. **(c)** Abdominopelvic radiograph shows the IUD in the left upper quadrant of the abdomen.

can lead to infertility, chronic pain, and intestinal obstruction. Rarely, an intraperitoneal IUD can perforate adjacent structures, leading to peritonitis, fistulas, or hemorrhage (34–36). Intraabdominal infection or abscess formation occurs in up to 16% of patients (37). As with partial perforation, symptomatology is variable, ranging from no symptoms to severe pain and bleeding.

Pelvic US should be the initial imaging study. In some patients, US is followed with abdominopelvic radiography. Conventional radiography is required for the diagnosis of expulsion but can also be helpful for determining whether there is complete uterine perforation. A definite diagnosis of complete perforation can be made at conventional radiography if the IUD is located above the pelvic brim, far lateral (on an anteroposterior view), or far anterior or posterior (on

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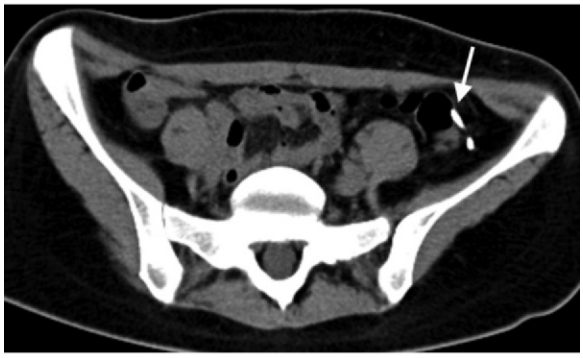

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Figure 13. Uterine perforation in a 36-year-old woman in whom IUD placement led to acute abdominal pain and disappearance of the IUD string. **(a)** Abdominopelvic radiograph demonstrates the IUD (arrow) in the left side of the pelvis and rotated 180° from its presumed normal orientation, findings that caused concern for complete uterine perforation. **(b)** CT scan through the pelvis shows the extrauterine IUD (arrow) in the left anterior pelvic cavity, adjacent to but not perforating the sigmoid colon.

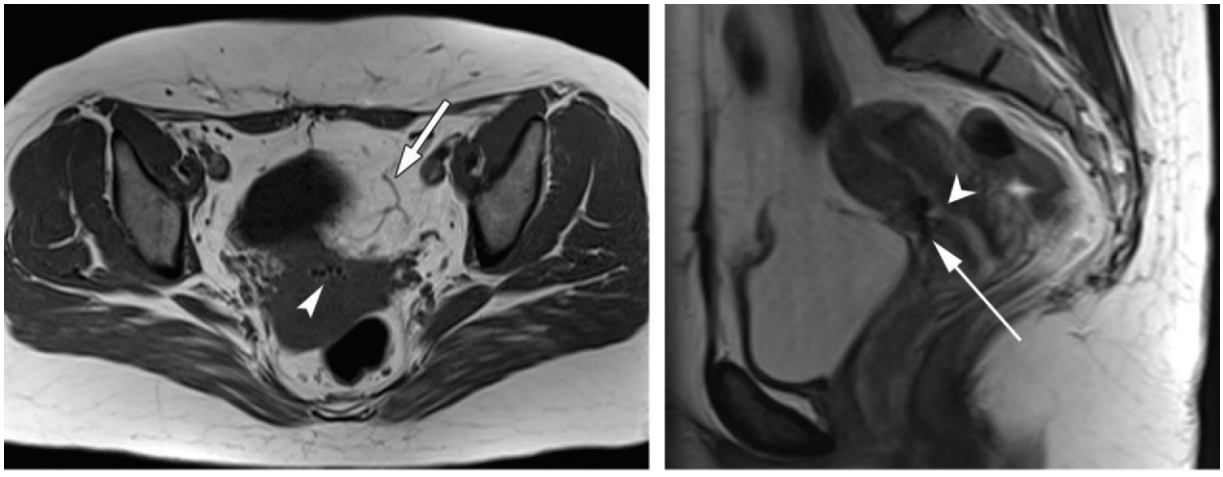
a lateral view). Rotation of the IUD of 90° or 180° at conventional radiography is a less specific indication of complete perforation. Embedment is difficult to detect at conventional radiography, since there will not be dramatic movement of the IUD within the pelvis in such cases (26). CT helps gauge the severity of perforation and is also useful for evaluating for further complications in patients with complete perforation. Although adhesions cannot be seen at CT, sequelae of adhesions, bowel obstruction, IUD perforation into adjacent structures, and intraabdominal abscesses are visible. However, CT is not essential for making the diagnosis, and direct advancement to surgery is appropriate in some circumstances. MR imaging is not routinely used to evaluate an IUD but can be helpful in localizing the IUD and evaluating its relationship to the uterus.

Uterine perforation is thought to occur frequently at the time of insertion (12,30,38), and it should be suspected in patients with acute pain and a missing IUD string (Fig 13). However, the perforation may not be recognized immediately, and close follow-up of newly inserted IUDs is essential. Factors leading to periprocedural perforation are patient related (size, configuration, and undetected anomalies of the uterus) or due to practitioner inexperience (38). At the time of insertion, the IUD itself or the insertion tube may be pushed through the myometrium (30).

Prior cesarean section does not increase the risk of uterine perforation by an IUD. In fact, IUD insertion through the incision site immediately following cesarean delivery has been shown to have significantly fewer complications than postpartum vaginal insertion (39). Uterine perforation following cesarean section is rare, although some cases have been reported (Fig 14) (40).

Management of uterine perforation by an IUD is controversial. Although it is agreed that all patients with perforation should receive empirical antibiotics, some data suggest that surgical treatment should be reserved for symptomatic patients (38). However, surgical removal of an intraabdominal IUD is recommended by the World Health Organization and is generally accepted as

Figure 14. Uterine perforation after cesarean section in a 29-year-old woman who presented with a missing IUD string. Following initial US, hysteroscopic removal was attempted. The string was visualized in the left anterolateral quadrant but could not be extracted. **(a)** Axial T1-weighted MR image through the pelvis demonstrates the IUD (arrow) as a signal void anterior to the lower uterine segment–cervix. Arrowhead = artifact created by the coiled string within the uterus. **(b)** Sagittal T2-weighted MR image through the pelvis demonstrates an ill-defined hypointense focus anterior to the cesarean section scar (arrowhead) representing the coiled string (arrow). **(c)** Intraoperative photograph shows the IUD (arrow) entangled in the omentum, with the IUD string (arrowhead) exiting through a 5-mm perforation at the cesarean incision site. There is no bowel or bladder injury.



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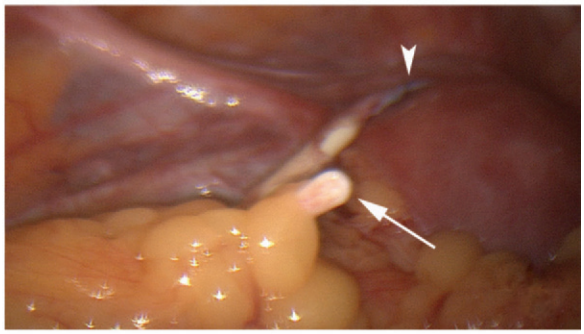


c.

appropriate treatment (41). Laparoscopic surgery is preferred, but laparotomy is indicated when a bowel perforation or severe sepsis is present (42). Laparoscopy may be converted to laparotomy in the presence of adhesions that preclude safe laparoscopic removal (34).

In our experience, adhesion formation secondary to uterine perforation appears to be related to the timing of treatment. Cases that were treated months after presentation demonstrated a higher likelihood and greater severity of abdominal adhesions, whereas in cases that were diagnosed and treated early, few adhesions were seen at the time of laparoscopy. The World Health Organization recommends that, regardless of its type and location, a perforated IUD be removed as soon as possible after the diagnosis has been established, due to the potential for adhesion formation (41). In symptomatic patients or patients with related complications, urgent surgical intervention may be appropriate. It is important that the radiologist directly and expediently relay critical findings of perforation to the clinician.

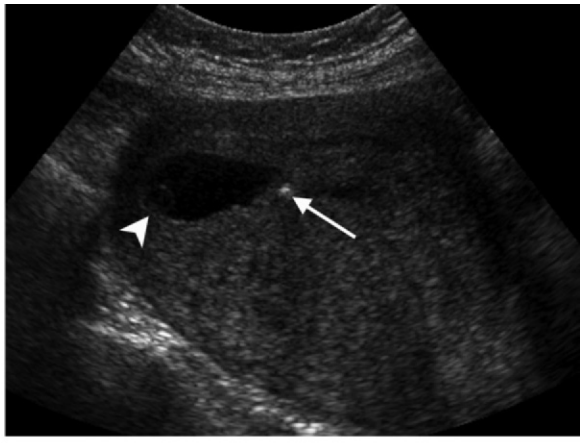
IUDs and Pregnancy

IUDs provide highly effective contraception. However, pregnancy does occur in approximately two of every 100 females per year of IUD utilization. Pregnancy most commonly occurs in the first year of IUD use (43). An IUD in situ is associated with multiple adverse outcomes during pregnancy, including neonatal complications (eg, low birth weight) and late gestational risks (eg, premature labor, chorioamnionitis, and spontaneous abortion). There is a 40%–50% spontaneous abortion rate in females with an IUD, which is twice the rate in the general female population (Fig 15). These risks are reduced with removal of the IUD early in pregnancy (44,45).

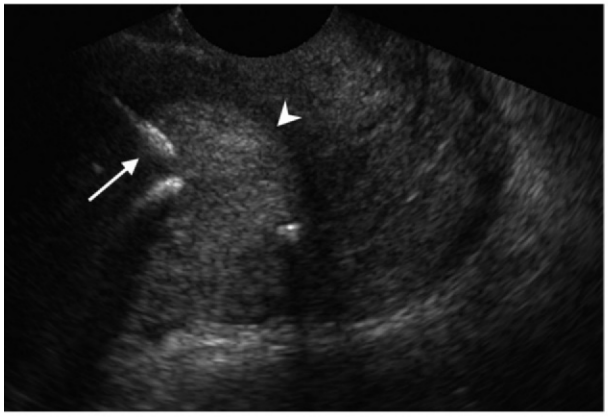
Teaching Point

Figure 15. Spontaneous abortion in a 39-year-old woman with a known 10-week intrauterine pregnancy and an IUD. **(a)** Transvaginal longitudinal routine obstetric US image through the uterus demonstrates the IUD (arrow) in the endometrial cavity. **(b)** Transabdominal longitudinal routine obstetric US image through the uterus demonstrates the IUD (arrow) adjacent to an intrauterine gestational sac and fetal pole (arrowhead). **(c)** On a transvaginal longitudinal US image obtained 2 weeks later when the patient presented to the emergency department with vaginal bleeding, the IUD (arrow) is incorporated into new endometrial echogenic debris (arrowhead). The intrauterine pregnancy is no longer visible. These findings are consistent with a spontaneous abortion.

a.



b.



c.

Management in patients with an IUD and a synchronous intrauterine pregnancy depends on gestational age and IUD location. During the first trimester, removal of the IUD under US guidance using an IUD hook or alligator forceps is recommended. However, if the location makes removal difficult or will disrupt the pregnancy, the risks of IUD removal outweigh the benefits (46). Removal during the second trimester is riskier, potentially leading to rupture of membranes, bleeding, or fetal loss. US localization is critical, and removal is again based on location and lack of incorporation into the placenta or gestational sac. Beyond the late second trimester, the risks of removal outweigh the benefits.

Another risk in females with an IUD is ectopic pregnancy, although the risk in females not using contraception is 10 times higher than in those using contraception (21,47). However, ectopic pregnancy is more common in females with an IUD than in those using other forms of contraception (48). When pregnancy occurs with an IUD in place, implantation is unlikely to occur in the endometrial cavity. Therefore, patients with an IUD and positive pregnancy test results should be assumed to have an ectopic pregnancy until proved otherwise (12).

Teaching Point

From a radiologic perspective, it is important to understand the risks and complications of pregnancy in females with an IUD. The difficulty and risk of removal increase as the pregnancy progresses, so that early identification and acknowledgment of an intrauterine pregnancy and IUD by the radiologist result in a better prognosis. Patients with an IUD and worrisome symptoms of ectopic pregnancy should be more carefully evaluated for this entity. Obviously, a diagnosis of ectopic pregnancy, which can lead to life-threatening complications, warrants direct communication of the diagnosis to the clinician.

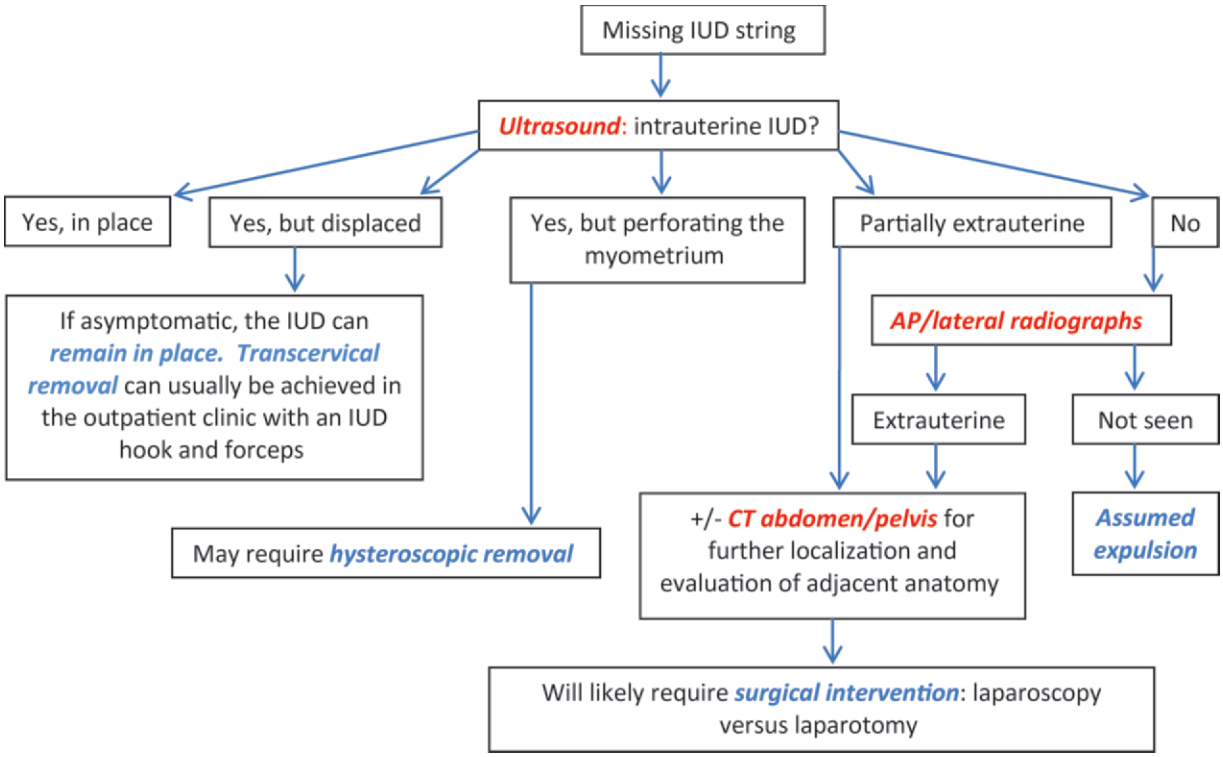


Figure 16. Flow chart illustrates an overview of imaging-based management of translocated IUDs.

Conclusions

IUDs are a widely used method of contraception with inherent risks that the radiologist should understand both radiologically and clinically. Multiple imaging modalities can be used to evaluate an IUD, but US is appropriate for initial evaluation. Conventional radiography of the abdomen is used to assess the location of an IUD when it is not clearly visualized at US. CT is the most useful modality for identifying complications of an intraabdominal IUD (Fig 16).

The radiologist should make sure to communicate any findings of IUD malpositioning to the clinician. Detection of expulsion or displacement should be immediately communicated to the patient and her healthcare provider, since they can lead to decreased contraceptive efficacy and may require further management. Embedment of an IUD in the myometrium may necessitate intervention in the outpatient clinical setting and warrants communication of this finding to the referring clinician, as well as clear documentation in the radiology report. Timely and direct communication with the clinician is most urgent for those patients with complete uterine perforation and partial or complete protrusion of the IUD into the peritoneal cavity. Patients with an uncomplicated perforation will likely undergo laparoscopic removal of the IUD. Early surgical intervention appears to decrease the likelihood of adhesion formation, thereby making laparoscopic removal easier. Emergent surgical intervention should be guided by the patient's clinical presentation, supplemented by findings at cross-sectional imaging performed to detect serious intraabdominal complications.

It is also important to understand the complications associated with pregnancy in females with an IUD. Such pregnancies are associated with multiple adverse outcomes for the mother and fetus. Understanding these complications will allow a more thorough assessment of the study and may provide impetus for expedited clinical communication of pertinent findings.

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RadioGraphics

Migration of Intrauterine Devices: Radiologic Findings and Implications for Patient Care

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Page 337 (Figure on page 337)
At US, the stem of a properly placed IUD is straight and is entirely within the endometrial cavity, with the arms of the IUD extending laterally at the uterine fundus (Fig 2).

Page 340 (Figure on page 340)
The contraceptive efficacy of IUDs is associated with appropriate intrauterine location (Fig 5).

Page 345
If the IUD extends through the uterine serosa but is still partially contained in the uterus (Figs 9, 10), the most common complication is omental adhesion formation (32).

Page 348
An IUD in situ is associated with multiple adverse outcomes during pregnancy.

Page 349
However, ectopic pregnancy is more common in females with an IUD than in those using other forms of contraception (48).