

**American College of Radiology
ACR Appropriateness Criteria®
Endometriosis**

Variant: 1 Adult. Clinically suspected pelvic endometriosis. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US pelvis transabdominal and US pelvis transvaginal	Usually Appropriate	O
US pelvis transvaginal	Usually Appropriate	O
MRI pelvis without and with IV contrast	Usually Appropriate	O
MRI pelvis without IV contrast	Usually Appropriate	O
US pelvis transabdominal	Usually Not Appropriate	O
CT pelvis with IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without and with IV contrast	Usually Not Appropriate	⊕⊕⊕⊕

Variant: 2 Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

Procedure	Appropriateness Category	Relative Radiation Level
MRI pelvis without and with IV contrast	Usually Appropriate	O
MRI pelvis without IV contrast	Usually Appropriate	O
CT pelvis with IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without and with IV contrast	Usually Not Appropriate	⊕⊕⊕⊕

Variant: 3 Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US pelvis transabdominal and US pelvis transvaginal	Usually Appropriate	O
US pelvis transrectal	Usually Appropriate	O
US pelvis transvaginal	Usually Appropriate	O
MRI pelvis without and with IV contrast	Usually Appropriate	O
MRI pelvis without IV contrast	Usually Appropriate	O
Fluoroscopy contrast enema	May Be Appropriate (Disagreement)	⊕⊕⊕
US pelvis transabdominal	Usually Not Appropriate	O
CT pelvis with IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without and with IV contrast	Usually Not Appropriate	⊕⊕⊕⊕

Variant: 4 Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

Procedure	Appropriateness Category	Relative Radiation Level
MRI pelvis without and with IV contrast	Usually Appropriate	O
US pelvis transabdominal	May Be Appropriate	O
US pelvis transabdominal and US pelvis transvaginal	May Be Appropriate	O

US pelvis transvaginal	May Be Appropriate	O
MRI pelvis without IV contrast	May Be Appropriate (Disagreement)	O
CT pelvis with IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without IV contrast	Usually Not Appropriate	⊕⊕⊕
CT pelvis without and with IV contrast	Usually Not Appropriate	⊕⊕⊕⊕⊕

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Summary of Literature Review

Introduction/Background

Endometriosis is a common condition impacting approximately 10% of individuals assigned female at birth [1]. The disorder is caused by endometrial-like tissue located outside of the endometrial cavity, associated with inflammation and fibrosis, on or extending below the peritoneal surface [2]. Endometriosis that extends below the peritoneum is often referred to as deep endometriosis (DE). Endometriosis is usually multifocal and typically occurs in predictable locations in the pelvis.

The clinical presentation of endometriosis is variable, ranging from asymptomatic to severe symptoms that interfere with daily activity. Pelvic pain is the most common symptom, which can manifest as dysmenorrhea, dyspareunia, dyschezia, dysuria, or menorrhagia. Approximately one-half of patients with endometriosis experience infertility [3]. Treatment of endometriosis is variable and largely determined by the patient's individualized goals. Medical therapies can help temporize symptoms, but surgical excision by a specialist is considered the definitive treatment. Health care spending on endometriosis is similar to other chronic diseases with an estimated annual economic burden of \$69.4 billion [4].

The diagnosis of endometriosis is challenging due to variable presenting symptoms and nonspecific physical examination findings [5]. Historically, the diagnosis of endometriosis was made by diagnostic laparoscopy with histologic inspection. Studies have shown that preoperative imaging is associated with decreased morbidity and mortality and reduces the need for repeat surgeries by reducing the number of incomplete surgeries. The literature now supports the use of imaging before surgery, because information gained from imaging studies helps inform patient decision making, is important for surgical planning, and impacts management [1,6,7].

Special Imaging Considerations

Expanded protocol transvaginal ultrasound (TVUS) studies have been developed to identify and "map" DE. Although specific details vary, these studies are typically performed by a physician or expert in endometriosis imaging and are characterized by a more detailed imaging protocol that includes anatomy and scanning maneuvers that are not part of the female pelvic US as defined by the [ACR-ACOG-AIUM-SPR-SRU Practice Parameter for the Performance of Ultrasound of the](#)

[Female Pelvis](#) [8]. For example, the uterosacral ligaments, anterior rectosigmoid wall, appendix, and diaphragm are evaluated, and dynamic sliding maneuvers to evaluate organ mobility are performed [9-14]. Imaging is typically performed after bowel preparation or enema for detection and characterization of bowel lesions [15-18]. Others have reported including 3-D US imaging and saline contrast sonovaginography [19-22]. Studies have shown that special training is required to perform these expanded TVUS examinations and that these examinations are associated with a learning curve of at least 40 examinations [20,23-27]. Studies comparing the expanded protocol to routine pelvic US have shown a significantly higher sensitivity of the expanded studies [28]. Although there has been no formal assessment, expanded protocol TVUS studies are currently not widely available in the United States, and at the time of this document preparation, the expanded protocol studies are not recognized as a specific examination type by the ACR.

Expert consensus groups advise using an MRI protocol tailored for detection of DE. Moderate bladder distention and vaginal contrast are recommended to help improve lesion conspicuity involving these structures [29]. There is less agreement surrounding maneuvers to help improve detection of bowel lesions, including bowel preparation, rectal contrast, fasting, and administration of anti-peristaltic agents [30-34].

Though fluorine-18-2-fluoro-2-deoxy-D-glucose (FDG)-PET/CT has not been studied for the clinical variants described in this paper, a retrospective study showed that endometriosis can be detected on FDG-PET/CT [35]. The radiopharmaceutical fluoroestradiol, an estrogen analog PET agent currently approved for use in patients with metastatic breast cancer, has shown promise as an agent that can be used to detect endometriosis in early clinical trials [36].

Initial Imaging Definition

Initial imaging is defined as imaging at the beginning of the care episode for the medical condition defined by the variant. More than one procedure can be considered usually appropriate in the initial imaging evaluation when:

- There are procedures that are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care)

OR

- There are complementary procedures (ie, more than one procedure is ordered as a set or simultaneously wherein each procedure provides unique clinical information to effectively manage the patient's care).

Discussion of Procedures by Variant

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

A. CT Pelvis With IV Contrast

There is no relevant literature to support the use of pelvic CT with intravenous (IV) contrast as the initial imaging modality for clinically suspected endometriosis.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

B. CT Pelvis Without and With IV Contrast

There is no relevant literature to support the use of pelvic CT without and with IV contrast as the initial imaging modality for clinically suspected endometriosis.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

C. CT Pelvis Without IV Contrast

There is no relevant literature to support the use of pelvic CT without IV contrast as the initial imaging modality for clinically suspected endometriosis.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

D. MRI Pelvis Without and With IV Contrast

MRI pelvis is an excellent imaging modality for the preoperative diagnosis of endometriosis [37-39] and has been shown to correspond well with surgical staging systems and histopathologic findings [40-43]. Variability in the literature surrounding accuracy of MRI compared to other modalities for detection of endometriosis may be attributed to differences in imaging techniques used [40]. The performance of MRI for detection of endometriosis varies by lesion location. MRI is excellent for identification of DE but has shown poorer diagnostic accuracy for detection of superficial peritoneal disease [44-46].

Image acquisition is more automated for MRI than US [47]. The large field-of-view afforded by MRI can decrease the need for multiple additional imaging studies that are sometimes required to supplement US pelvis studies, which do not include the entire urinary or gastrointestinal tracts [48].

The impact of IV contrast for identification and characterization of DE remains a topic of debate. The Society of Abdominal Radiology's Disease Focused Panel on Endometriosis highly recommends the use of IV contrast agents in dedicated endometriosis MRI protocols to aid in the differentiation of benign ovarian endometriomas from ovarian malignancies, an important distinction among patients with endometriosis who are at risk for endometriosis-associated malignancies [33,49]. IV contrast is also helpful in establishing the diagnosis of other pelvic conditions that may present with similar symptoms such as uterine fibroids or other infectious or inflammatory disorders.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

E. MRI Pelvis Without IV Contrast

MRI pelvis without IV contrast is helpful for the diagnosis of DE as described in the preceding paragraph. Although much of the literature surrounding MRI of the pelvis for detection of DE describes using IV contrast agents, a study that specifically compared MRI without IV contrast to MRI with IV contrast found no benefit of IV contrast media [50].

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

F. US Pelvis Transabdominal

Although it is possible that larger ovarian endometriomas could be detected by transabdominal pelvic US, many of the structures involved by superficial and DE are not well seen by transabdominal technique alone.

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

G. US Pelvis Transabdominal and US Pelvis Transvaginal

Transabdominal pelvic US imaging is described in some endometriosis protocols as an adjunct to TVUS imaging to evaluate the urinary tract or gastrointestinal tract [51]. Transabdominal US can

serve as an important adjunct to TVUS studies because it widens the field-of-view beyond what is possible by TVUS imaging. Transabdominal US imaging is useful for detection of urinary tract endometriosis. Urinary obstruction caused by involvement of the ureters or bladder can be silent and associated with loss of renal function [51]. Transabdominal US imaging can also help identify sites of bowel involvement beyond the pelvis, including the appendix, terminal ileum, cecum, and sigmoid [14]. DE TVUS supplemented by transabdominal US imaging was found to accurately predict intraoperative endometriosis staging at a multi-institutional study performed at centers of endometriosis excellence [52].

Variant 1: Adult. Clinically suspected pelvic endometriosis. Initial imaging.

H. US Pelvis Transvaginal

TVUS is known to be an accurate study for the evaluation of ovarian endometriomas [7]. It is difficult to know the true accuracy of routine TVUS for detection of DE because the bulk of the literature has focused on TVUS with expanded protocols performed by highly skilled or trained operators that include evaluation of additional anatomic landmarks and additional scanning maneuvers described under special imaging considerations [40]. One study found "community US" less beneficial for detection of endometriosis [53]. The expanded TVUS studies have excellent performance for detection of DE [54-61] and have shown similar diagnostic performance to pelvic MRI [62,63]. Expanded TVUS studies can be used to preoperatively map lesions for surgical planning and to predict surgical difficulty [52,64-67]. The uterine sliding sign has good diagnostic performance for detection of endometriosis involving the bowel and pouch of Douglas obliteration, and some authors advocate including this with a routine pelvic US to help diagnose endometriosis [68-72]. Although the routine transvaginal pelvic US Practice Parameters established by the ACR do not include extra maneuvers aimed at detection of DE, such as the sliding sign, a protocol for inclusion of these maneuvers in a US practice in the United States have been proposed by Young et al [14].

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

A. CT Pelvis With IV Contrast

There is no relevant literature to support the use of routine pelvic CT with IV contrast as a next imaging study for characterization or treatment planning of suspected pelvic endometriosis.

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

B. CT Pelvis Without and With IV Contrast

There is no relevant literature to support the use of routine pelvic CT without and with IV contrast as a next imaging study for characterization or treatment planning of suspected pelvic endometriosis.

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

C. CT Pelvis Without IV Contrast

There is no relevant literature to support the use of routine pelvic CT without IV contrast as a next imaging study for characterization or treatment planning of suspected pelvic endometriosis.

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative

ultrasound. Next imaging study for characterization or treatment planning.

D. MRI Pelvis Without and With IV Contrast

A study that evaluated patients who underwent routine pelvic US and pelvic MRI with IV contrast and later went on to surgery for endometriosis found 51% of patients with a negative US went on to have disease identified on MRI. The same study showed that 78% of patients with endometriosis identified by US were found to have additional sites of disease by MRI [73].

MRI is known to correspond well with surgical staging systems and histopathologic findings [40-43]. Some pelvic MRI classification systems can predict surgical time, length of hospital stay, and postoperative complications [74]. Structured reporting of pelvic MRI studies can improve sensitivity compared to routine read studies and are preferred by referring physicians [75,76].

MRI pelvis allows imaging with a large field-of-view to include anatomy that is generally beyond the field-of-view for TVUS. Structures that are not well seen by US, such as pelvic nerves, can be depicted by MRI [77,78]. MRI pelvis can be used for surgical planning for bladder endometriosis because it can accurately predict lesion size and involvement of the ureter orifices [46,79]. These studies are also helpful for surgical planning when bowel disease is present as described under Variant 3.

The usefulness of IV contrast for endometriosis lesion identification and localization is unknown. Contrast-enhanced imaging is known to be useful in differentiating benign from malignant ovarian lesions. Given the risk of malignant transformation of endometriosis and the increased risk of ovarian cancer among patients with endometriosis, the Society of Abdominal Radiology's Endometriosis Disease Focused Panel recommends using MRI without and with IV contrast for endometriosis evaluation [33].

Variant 2: Adult. Clinically suspected pelvic endometriosis. Indeterminate or negative ultrasound. Next imaging study for characterization or treatment planning.

E. MRI Pelvis Without IV Contrast

MRI pelvis without IV contrast is helpful for the diagnosis of DE, for further characterization of indeterminate findings on US, and for treatment planning as described in the preceding paragraph. Assessment of ovarian lesions is limited without IV contrast.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

The intestinal tract is the most common site of nongynecologic endometriosis. Endometriosis can infiltrate the muscular bowel wall leading to gastrointestinal symptoms. The anterior wall of the rectosigmoid colon is the most common location for bowel endometriosis, followed by the sigmoid colon, cecum and ileocecal valve, appendix, and small bowel [80]. Rectosigmoid bowel lesions can be removed by surgical shaving, discoid resection, or segmental resection. Information from imaging studies is used to predict which of these surgical approaches will be needed.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

A. CT Pelvis With IV Contrast

There is no relevant literature to support the use of standard pelvic CT without a water enema as an initial imaging modality for clinically suspected rectosigmoid endometriosis. Studies looking into specialized CT techniques that are not widely available, such as CT with colonic distention by water enema or CT colonography have found these methods to be accurate for identifying and characterizing gastrointestinal tract endometriotic lesions for surgical planning. Both of these

techniques allow for detection of multifocal lesions and lesions proximal to the rectosigmoid beyond the field-of-view of TVUS [81-89].

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

B. CT Pelvis Without and With IV Contrast

There is no relevant literature to support the use of standard CT pelvis without and with IV contrast in the evaluation of clinically suspected rectosigmoid endometriosis.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

C. CT Pelvis Without IV Contrast

There is no relevant literature to support the use of CT pelvis without IV contrast for clinically suspected rectosigmoid endometriosis.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

D. Fluoroscopy Contrast Enema

Fluoroscopic enema studies allow for evaluation of the entire colon, allowing for diagnosis of cecal lesions. These studies are less specific than other imaging modalities because the cause of the mass effect on the bowel wall is not directly visualized and cannot be characterized. A study comparing double-contrast barium enema to TVUS performed with rectal water contrast shows similar accuracy for both studies with slightly better tolerance of TVUS with bowel preparation compared to barium enema [90].

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

E. MRI Pelvis Without and With IV Contrast

MR pelvis is an excellent modality to detect and classify rectosigmoid bowel endometriosis for surgical planning [42,91,92]. Surgical approach can be predicted based on morphologic characteristics of lesions and quantitative assessment of lesion length, thickness, and circumferential involvement of the bowel lumen [93,94]. This information can be used to predict the type of resection that will be needed, aiding in informed decision making and treatment planning [42,91,92,94-96].

The field-of-view for pelvic MRI includes the entire rectum and sigmoid colon. The cecum and terminal ileum are often included within the field-of-view. A small percentage of small bowel loops are also included within the field-of-view.

Added MR cine sequences have been suggested to evaluate immobility from pelvic adhesions like the US sliding sign [97]. MR colonography has also been described as an accurate tool for evaluation of bowel lesions before surgery [98].

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

F. MRI Pelvis Without IV Contrast

MRI pelvis without IV contrast is excellent for diagnosis of rectosigmoid endometriosis and for treatment planning as described in the preceding paragraph. Assessment of ovarian lesions, or other pelvic pathology, is a finding that is often seen in association with rectosigmoid endometriosis and is limited without IV contrast.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

G. US Pelvis Transabdominal

Transabdominal US imaging cannot be used to evaluate rectosigmoid lesions but can be used as

an adjunct to identify sites of bowel involvement beyond the pelvis including the appendix, terminal ileum, cecum, and sigmoid [14].

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

H. US Pelvis Transabdominal and US Pelvis Transvaginal

A study evaluating a combined transabdominal US and TVUS protocol found excellent sensitivity and specificity for rectosigmoid lesions and slightly decreased sensitivity for sigmoid lesions. The study did not report data on more proximal lesions [80]. As described in the previous paragraph, other studies have shown that transabdominal pelvis US can be used to evaluate the appendix, terminal ileum, cecum, and sigmoid colon, and therefore the addition of transabdominal imaging is likely to be of benefit in evaluating lesions proximal to the rectosigmoid.

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

I. US Pelvis Transrectal

Transrectal pelvic US allows for evaluation of the bowel wall layers involved by an endometriotic lesion, which can help with surgical planning, as rectosigmoid endometriotic lesions involving the muscular layer may require discoid or segmental resection, whereas more superficial lesions can be treated with rectal shaving. Transrectal pelvic US also allows for accurate measurements from the caudal margin of an endometriotic lesion to the anal verge, which is important for surgical planning in the setting of low-lying lesions that may require a diverting ostomy. These studies are limited by a narrow field-of-view that allows for evaluation of the rectosigmoid colon but cannot evaluate more proximal structures [40,99,100].

Variant 3: Adult. Clinically suspected rectosigmoid endometriosis. Initial imaging.

J. US Pelvis Transvaginal

TVUS can be used to evaluate rectosigmoid endometriosis but cannot be used to evaluate for lesions proximal to the rectosigmoid junction, which is beyond the field-of-view for a transvaginal probe. Literature surrounding the use of TVUS for the evaluation of rectosigmoid endometriosis has exclusively evaluated protocols that include scanning maneuvers beyond what is included in a routine TVUS as defined by the ACR Practice Parameters. TVUS performed with added maneuvers including scanning with probe in the posterior vaginal fornix and the sliding sign has been shown to be a reliable predictor of bowel endometriosis [101-104]. These protocols can also be used for surgical planning when the lesion length, circumferential extent, distance to the anal verge, and muscular involvement are reported [105-107]. When specialist-performed DE TVUS is used, the accuracy of surgical planning measurements is similar to MRI [108]. A study comparing DE TVUS performed by a trained versus untrained operator showed the modality predicted bowel endometriosis when performed by the trained operator but not by the untrained operator [109].

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

A. CT Pelvis With IV Contrast

There is no relevant literature to support the use of pelvic CT for patients with an endometriosis diagnosis established by surgery with new or ongoing symptoms. CT with IV contrast could help identify and characterize other etiologies of pelvic pain.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

B. CT Pelvis Without and With IV Contrast

There is no relevant literature to support the use of pelvic CT without and with IV contrast for patients with endometriosis diagnosis established by surgery and new or ongoing symptoms.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

C. CT Pelvis Without IV Contrast

There is no relevant literature to support the use of pelvic CT without IV contrast for patients with endometriosis diagnosis established by surgery and new or ongoing symptoms.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

D. MRI Pelvis Without and With IV Contrast

MRI pelvis is known to be an excellent modality for detecting endometriosis. An imaging review paper describes findings that may be seen postoperatively, including susceptibility artifacts related to surgical material and fibrotic adhesions that appear as linear hypointense bands on T2-weighted images with signal intensity lower than that is seen with endometriosis [110]. Semicircular suture may be seen along the anterior rectosigmoid wall in patients who have undergone discoid resection. Bladder volumes may be decreased, and the bladder contour may be irregular following partial cystectomy for endometriosis lesion resection [110].

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

E. MRI Pelvis Without IV Contrast

MRI pelvis without IV contrast is known to be an excellent modality for detecting and mapping endometriosis as summarized in the preceding paragraph; however, there are little data on the use of MRI without IV contrast to evaluate patients with ongoing or new symptoms following laparoscopy. IV contrast can be helpful in diagnosing other causes for recurrent symptoms in the postoperative time period.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

F. US Pelvis Transabdominal

There are no data describing the use of transabdominal pelvic US to evaluate for endometriosis in patients with ongoing or new symptoms following surgery. As in the preoperative setting, it is possible that larger ovarian endometriomas could be detected by transabdominal US, but many of the structures involved by superficial and DE are not well seen by transabdominal US technique alone.

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

G. US Pelvis Transabdominal and US Pelvis Transvaginal

Although there is no relevant literature to support the use of US pelvis transabdominal and US pelvis transvaginal as a follow-up imaging modality for patients with known deep infiltrative endometriosis with ongoing or new symptoms, transabdominal and transvaginal pelvic US studies that follow an expanded protocol to include additional anatomic landmarks and additional scanning maneuvers (described under special imaging considerations) are known to be excellent for detection of endometriosis.

Transabdominal US imaging is helpful for evaluation of the urinary tract or gastrointestinal tract and can serve as an important adjunct to TVUS studies because it widens the field-of-view beyond what is possible by TVUS imaging. TVUS supplemented by transabdominal US imaging was found to accurately predict intraoperative endometriosis staging at a multi-institutional study performed at centers of endometriosis excellence [52].

Variant 4: Adult. Established postoperative endometriosis diagnosis. New or ongoing symptoms of endometriosis. Follow-up imaging.

H. US Pelvis Transvaginal

Although TVUS is known to be an excellent modality for detecting endometriosis, little is known about the use of US following surgery for endometriosis. A study of 50 women who underwent TVUS within 1 year of rectosigmoid bowel resection for DE found evidence of DE, pelvic adhesions, and adenomyosis in women with continued symptoms [111].

Summary of Recommendations

- **Variant 1:** US pelvis transabdominal and US pelvis transvaginal or US pelvis transvaginal or MRI pelvis without and with IV contrast or MRI pelvis without IV contrast is usually appropriate as the initial imaging of clinically suspected pelvic endometriosis in an adult patient. These procedures are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care).
- **Variant 2:** MRI pelvis without and with IV contrast or MRI pelvis without IV contrast is usually appropriate as the next imaging study for characterization or treatment planning after an indeterminate or negative US in an adult patient with clinically suspected pelvis endometriosis. These procedures are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care).
- **Variant 3:** US pelvis transabdominal and US pelvis transvaginal or US pelvis transrectal or US pelvis transvaginal or MRI pelvis without and with IV contrast or MRI pelvis without IV contrast is usually appropriate as the initial imaging of an adult patient with clinically suspected rectosigmoid endometriosis. These procedures are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care). The panel did not agree on recommending fluoroscopy contrast enema for patients in this clinical scenario. There is insufficient medical literature to conclude whether or not these patients would benefit from this procedure. Imaging with this procedure is controversial but may be appropriate.
- **Variant 4:** MRI pelvis without and with IV contrast is usually appropriate as the follow-up imaging of an adult patient with an established postoperative endometriosis diagnosis with new or ongoing symptoms of endometriosis. The panel did not agree on recommending MRI pelvis without IV contrast for patients in this clinical scenario. There is insufficient medical literature to conclude whether or not these patients would benefit from this procedure. Imaging with this procedure is controversial but may be appropriate.

Supporting Documents

The evidence table, literature search, and appendix for this topic are available at <https://acsearch.acr.org/list>. The appendix includes the strength of evidence assessment and the final rating round tabulations for each recommendation.

For additional information on the Appropriateness Criteria methodology and other supporting documents, please go to the ACR website at <https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria>.

Appropriateness Category Names and Definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, because of both organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared with those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® [Radiation Dose Assessment Introduction](#) document.

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
0	0 mSv	0 mSv
○ ●	<0.1 mSv	<0.03 mSv
○ ● ●	0.1-1 mSv	0.03-0.3 mSv
○ ● ● ●	1-10 mSv	0.3-3 mSv
○ ● ● ● ●	10-30 mSv	3-10 mSv



30-100 mSv

10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."

References

1. Pascoal E, Wessels JM, Aas-Eng MK, et al. Strengths and limitations of diagnostic tools for endometriosis and relevance in diagnostic test accuracy research. [Review]. *Ultrasound Obstet Gynecol.* 60(3):309-327, 2022 Sep.
2. Tomassetti C, Johnson NP, Petrozza J, et al. An International Terminology for Endometriosis, 2021. *Facts Views Vis Obgyn* 2021;13:295-304.
3. Peterson CM, Johnstone EB, Hammoud AO, et al. Risk factors associated with endometriosis: importance of study population for characterizing disease in the ENDO Study. *Am J Obstet Gynecol.* 208(6):451.e1-11, 2013 Jun.
4. Della Corte L, Di Filippo C, Gabrielli O, et al. The Burden of Endometriosis on Women's Lifespan: A Narrative Overview on Quality of Life and Psychosocial Wellbeing. [Review]. *International Journal of Environmental Research & Public Health [Electronic Resource].* 17(13), 2020 06 29. *Int J Environ Res Public Health.* 17(13), 2020 06 29.
5. Carneiro MM, Filogonio ID, Costa LM, de Avila I, Ferreira MC. Clinical prediction of deeply infiltrating endometriosis before surgery: is it feasible? A review of the literature. [Review]. *Biomed Res Int.* 2013:564153, 2013.
6. Burkett BJ, Cope A, Bartlett DJ, et al. MRI impacts endometriosis management in the setting of image-based multidisciplinary conference: a retrospective analysis. *Abdom Radiol.* 45(6):1829-1839, 2020 06.
7. Nisenblat V, Bossuyt PM, Farquhar C, Johnson N, Hull ML. Imaging modalities for the non-invasive diagnosis of endometriosis. [Review]. *Cochrane Database Syst Rev.* 2:CD009591, 2016 Feb 26.
8. American College of Radiology. ACR-ACOG-AIUM-SPR-SRU Practice Parameter for the Performance of Ultrasound of the Female Pelvis. Available at: <https://gravitas.acr.org/PPTS/GetDocumentView?docId=63+&releaseId=2>
9. Gerges B, Lu C, Reid S, Chou D, Chang T, Condous G. Sonographic evaluation of immobility of normal and endometriotic ovary in detection of deep endometriosis. *Ultrasound Obstet Gynecol.* 49(6):793-798, 2017 Jun.
10. Guerriero S, Condous G, van den Bosch T, et al. Systematic approach to sonographic evaluation of the pelvis in women with suspected endometriosis, including terms, definitions and measurements: a consensus opinion from the International Deep Endometriosis Analysis (IDEA) group. *Ultrasound Obstet Gynecol.* 48(3):318-32, 2016 Sep.
11. Hudelist G, Fritzer N, Staettner S, et al. Uterine sliding sign: a simple sonographic predictor for presence of deep infiltrating endometriosis of the rectum. *Ultrasound Obstet Gynecol.* 41(6):692-5, 2013 Jun.
12. Rao T, Condous G, Reid S. Ovarian Immobility at Transvaginal Ultrasound: An Important Sonographic Marker for Prediction of Need for Pelvic Sidewall Surgery in Women With Suspected Endometriosis. *J Ultrasound Med.* 41(5):1109-1113, 2022 May.

13. Reid S, Leonardi M, Lu C, Condous G. The association between ultrasound-based 'soft markers' and endometriosis type/location: A prospective observational study. *European Journal of Obstetrics, Gynecology, & Reproductive Biology*. 234:171-178, 2019 Mar. *Eur J Obstet Gynecol Reprod Biol*. 234:171-178, 2019 Mar.
14. Young SW, Saphier NB, Dahiya N, et al. Sonographic evaluation of deep endometriosis: protocol for a US radiology practice. *Abdom Radiol*. 41(12):2364-2379, 2016 12.
15. Leon M, Vaccaro H, Alcazar JL, et al. Extended transvaginal sonography in deep infiltrating endometriosis: use of bowel preparation and an acoustic window with intravaginal gel: preliminary results. *J Ultrasound Med*. 33(2):315-21, 2014 Feb.
16. Ros C, Martinez-Serrano MJ, Rius M, et al. Bowel Preparation Improves the Accuracy of Transvaginal Ultrasound in the Diagnosis of Rectosigmoid Deep Infiltrating Endometriosis: A Prospective Study. *J Minim Invasive Gynecol*. 24(7):1145-1151, 2017 Nov - Dec.
17. Ros C, Rius M, Abrao MS, et al. Bowel preparation prior to transvaginal ultrasound improves detection of rectosigmoid deep infiltrating endometriosis and is well tolerated: prospective study of women with suspected endometriosis without surgical criteria. *Ultrasound Obstet Gynecol*. 57(2):335-341, 2021 02.
18. Ferrero S, Barra F, Stabilini C, Vellone VG, Leone Roberti Maggiore U, Scala C. Does Bowel Preparation Improve the Performance of Rectal Water Contrast Transvaginal Ultrasonography in Diagnosing Rectosigmoid Endometriosis?. *J Ultrasound Med*. 38(4):1017-1025, 2019 Apr.
19. Bratila E, Comandasu DE, Coroleuca C, et al. Diagnosis of endometriotic lesions by sonovaginography with ultrasound gel. *Med. ultrasonography*. 18(4):469-474, 2016 Dec 05.
20. Ferrero S, Scala C, Stabilini C, Vellone VG, Barra F, Leone Roberti Maggiore U. Transvaginal sonography with vs without bowel preparation in diagnosis of rectosigmoid endometriosis: prospective study. *Ultrasound Obstet Gynecol*. 53(3):402-409, 2019 Mar.
21. Saccardi C, Cosmi E, Borghero A, Tregnaghi A, Dessoile S, Litta P. Comparison between transvaginal sonography, saline contrast sonovaginography and magnetic resonance imaging in the diagnosis of posterior deep infiltrating endometriosis. *Ultrasound Obstet Gynecol*. 40(4):464-9, 2012 Oct.
22. Thonnon C, Philip CA, Fassi-Fehri H, et al. Three-dimensional ultrasound in the management of bladder endometriosis. *J Minim Invasive Gynecol*. 22(3):403-9, 2015 Mar-Apr.
23. Indrielle-Kelly T, Fischerova D, Hanus P, et al. Early Learning Curve in the Assessment of Deep Pelvic Endometriosis for Ultrasound and Magnetic Resonance Imaging. *Biomed Res Int*. 2020:8757281, 2020.
24. Menakaya U, Infante F, Lu C, et al. Interpreting the real-time dynamic 'sliding sign' and predicting pouch of Douglas obliteration: an interobserver, intraobserver, diagnostic-accuracy and learning-curve study. *Ultrasound Obstet Gynecol*. 48(1):113-20, 2016 Jul.
25. Piessens S, Healey M, Maher P, Tsaltas J, Rombauts L. Can anyone screen for deep infiltrating endometriosis with transvaginal ultrasound?. *Aust N Z J Obstet Gynaecol*. 54(5):462-8, 2014 Oct.
26. Tammaa A, Fritzer N, Strunk G, Krell A, Salzer H, Hudelist G. Learning curve for the

detection of pouch of Douglas obliteration and deep infiltrating endometriosis of the rectum. *Hum Reprod.* 29(6):1199-204, 2014 Jun.

27. Young SW, Dahiya N, Patel MD, et al. Initial Accuracy of and Learning Curve for Transvaginal Ultrasound with Bowel Preparation for Deep Endometriosis in a US Tertiary Care Center. *J Minim Invasive Gynecol.* 24(7):1170-1176, 2017 Nov - Dec.

28. Fraser MA, Agarwal S, Chen I, Singh SS. Routine vs. expert-guided transvaginal ultrasound in the diagnosis of endometriosis: a retrospective review. *Abdom Imaging.* 40(3):587-94, 2015 Mar.

29. Unlu E, Virarkar M, Rao S, Sun J, Bhosale P. Assessment of the Effectiveness of the Vaginal Contrast Media in Magnetic Resonance Imaging for Detection of Pelvic Pathologies: A Meta-analysis. *J Comput Assist Tomogr.* 44(3):436-442, 2020 May/Jun.

30. Bazot M, Bharwani N, Huchon C, et al. European society of urogenital radiology (ESUR) guidelines: MR imaging of pelvic endometriosis. *Eur Radiol.* 27(7):2765-2775, 2017 Jul.

31. Ciggaar IA, Henneman ODF, Oei SA, Vanhooymissen IJSM, Blikkendaal MD, Bipat S. Bowel preparation in MRI for detection of endometriosis: Comparison of the effect of an enema, no additional medication and intravenous butylscopolamine on image quality. *Eur J Radiol.* 149:110222, 2022 Apr.

32. Pereira AMG, Brizion VSC, Carvas Junior N, et al. Can Enhanced Techniques Improve the Diagnostic Accuracy of Transvaginal Sonography and Magnetic Resonance Imaging for Rectosigmoid Endometriosis? A Systematic Review and Meta-analysis. *J Obstet Gynaecol Can.* 42(4):488-499.e4, 2020 Apr.

33. Tong A, VanBuren WM, Chamie L, et al. Recommendations for MRI technique in the evaluation of pelvic endometriosis: consensus statement from the Society of Abdominal Radiology endometriosis disease-focused panel. [Review]. *Abdom Radiol.* 45(6):1569-1586, 2020 06.

34. Yap SZL, Leathersich S, Lu J, Fender L, Lo G. Pelvic MRI staging of endometriosis at 3T without patient preparation or anti-peristaltic: Diagnostic performance outcomes. *Eur J Radiol.* 105:72-80, 2018 Aug.

35. Balogova S, Darai E, Noskovicova L, Lukac L, Talbot JN, Montravers F. Interference of Known or Suspected Endometriosis in Reporting FDG PET/CT Performed in Another Indication. *Clin Nucl Med.* 47(4):305-313, 2022 Apr 01.

36. Cosma S, Salgarello M, Ceccaroni M, et al. Accuracy of a new diagnostic tool in deep infiltrating endometriosis: Positron emission tomography-computed tomography with 16alpha-[18F]fluoro-17beta-estradiol. *J Obstet Gynaecol Res.* 42(12):1724-1733, 2016 Dec.

37. Bermot C, Labauge P, Limot O, Louboutin A, Fauconnier A, Huchon C. Performance of MRI for the detection of anterior pelvic endometriotic lesions. *J Gynecol Obstet Hum Reprod.* 47(10):499-503, 2018 Dec.

38. Medeiros LR, Rosa MI, Silva BR, et al. Accuracy of magnetic resonance in deeply infiltrating endometriosis: a systematic review and meta-analysis. [Review]. *Arch Gynecol Obstet.* 291(3):611-21, 2015 Mar.

39. Thomeer MG, Steensma AB, van Santbrink EJ, et al. Can magnetic resonance imaging at 3.0-Tesla reliably detect patients with endometriosis? Initial results. *J Obstet Gynaecol Res.*

40(4):1051-8, 2014 Apr.

40. Alborzi S, Rasekhi A, Shomali Z, et al. Diagnostic accuracy of magnetic resonance imaging, transvaginal, and transrectal ultrasonography in deep infiltrating endometriosis. *Medicine (Baltimore)*. 97(8):e9536, 2018 Feb.
41. Burla L, Scheiner D, Hotker AM, et al. Structured manual for MRI assessment of deep infiltrating endometriosis using the ENZIAN classification. *Archives of Gynecology & Obstetrics*. 303(3):751-757, 2021 03. *Arch Gynecol Obstet*. 303(3):751-757, 2021 03.
42. Di Paola V, Manfredi R, Castelli F, Negrelli R, Mehrabi S, Pozzi Mucelli R. Detection and localization of deep endometriosis by means of MRI and correlation with the ENZIAN score. *Eur J Radiol*. 84(4):568-74, 2015 Apr.
43. Manganaro L, Celli V, Dolciami M, et al. Can New ENZIAN Score 2020 Represent a Staging System Improving MRI Structured Report?. *Int J Environ Res Public Health*. 18(19), 2021 09 22.
44. Kruger K, Behrendt K, Niedobitek-Kreuter G, Koltermann K, Ebert AD. Location-dependent value of pelvic MRI in the preoperative diagnosis of endometriosis. *Eur J Obstet Gynecol Reprod Biol*. 169(1):93-8, 2013 Jul.
45. Manganaro L, Fierro F, Tomei A, et al. Feasibility of 3.0T pelvic MR imaging in the evaluation of endometriosis. *Eur J Radiol*. 81(6):1381-7, 2012 Jun.
46. Tian Z, Zhang YC, Sun XH, et al. Accuracy of transvaginal ultrasound and magnetic resonance imaging for diagnosis of deep endometriosis in bladder and ureter: a meta-analysis. *Journal of Obstetrics & Gynaecology*. 42(6):2272-2281, 2022 Aug. *J Obstet Gynaecol*. 42(6):2272-2281, 2022 Aug.
47. Botterill EM, Esler SJ, McIlwaine KT, et al. Endometriosis: Does the menstrual cycle affect magnetic resonance (MR) imaging evaluation?. *Eur J Radiol*. 84(11):2071-9, 2015 Nov.
48. Bielen D, Tomassetti C, Van Schoubroeck D, et al. IDEAL study: magnetic resonance imaging for suspected deep endometriosis assessment prior to laparoscopy is as reliable as radiological imaging as a complement to transvaginal ultrasonography. *Ultrasound in Obstetrics & Gynecology*. 56(2):255-266, 2020 08. *Ultrasound Obstet Gynecol*. 56(2):255-266, 2020 08.
49. McDermott S, Oei TN, Iyer VR, Lee SI. MR imaging of malignancies arising in endometriomas and extraovarian endometriosis. *Radiographics*. 32(3):845-63, 2012 May-Jun.
50. Bazot M, Gasner A, Lafont C, Ballester M, Darai E. Deep pelvic endometriosis: limited additional diagnostic value of postcontrast in comparison with conventional MR images. *Eur J Radiol* 2011;80:e331-9.
51. Pateman K, Holland TK, Knez J, et al. Should a detailed ultrasound examination of the complete urinary tract be routinely performed in women with suspected pelvic endometriosis?. *Hum Reprod*. 30(12):2802-7, 2015 Dec.
52. Montanari E, Bokor A, Szabo G, et al. Accuracy of sonography for non-invasive detection of ovarian and deep endometriosis using #Enzian classification: prospective multicenter diagnostic accuracy study. *Ultrasound Obstet Gynecol*. 59(3):385-391, 2022 03.
53. Pattanasri M, Ades A, Nanayakkara P. Correlation between ultrasound findings and

laparoscopy in prediction of deep infiltrating endometriosis (DIE). *Aust N Z J Obstet Gynaecol.* 60(6):946-951, 2020 12.

54. Deslandes A, Parange N, Childs JT, Osborne B, Bezak E. Current Status of Transvaginal Ultrasound Accuracy in the Diagnosis of Deep Infiltrating Endometriosis Before Surgery: A Systematic Review of the Literature. [Review]. *J Ultrasound Med.* 39(8):1477-1490, 2020 Aug.
55. Goncalves MO, Siufi Neto J, Andres MP, Siufi D, de Mattos LA, Abrao MS. Systematic evaluation of endometriosis by transvaginal ultrasound can accurately replace diagnostic laparoscopy, mainly for deep and ovarian endometriosis. *Human Reproduction.* 36(6):1492-1500, 2021 05 17.
56. Guerriero S, Ajossa S, Minguez JA, et al. Accuracy of transvaginal ultrasound for diagnosis of deep endometriosis in uterosacral ligaments, rectovaginal septum, vagina and bladder: systematic review and meta-analysis. [Review]. *Ultrasound Obstet Gynecol.* 46(5):534-45, 2015 Nov.
57. Holland TK, Cutner A, Saridogan E, Mavrelos D, Pateman K, Jurkovic D. Ultrasound mapping of pelvic endometriosis: does the location and number of lesions affect the diagnostic accuracy? A multicentre diagnostic accuracy study. *BMC Womens Health.* 13:43, 2013 Oct 29.
58. Leonardi M, Uzuner C, Mestdagh W, et al. Diagnostic accuracy of transvaginal ultrasound for detection of endometriosis using International Deep Endometriosis Analysis (IDEA) approach: prospective international pilot study. *Ultrasound Obstet Gynecol.* 60(3):404-413, 2022 Sep.
59. Ros C, de Guirior C, Mension E, et al. Transvaginal ultrasound for diagnosis of deep endometriosis involving uterosacral ligaments, torus uterinus and posterior vaginal fornix: prospective study. *Ultrasound Obstet Gynecol.* 58(6):926-932, 2021 Dec.
60. Xiang Y, Wang G, Zhou L, Wang Q, Yang Q. A systematic review and meta-analysis on transvaginal ultrasonography in the diagnosis of deep invasive endometriosis. *Ann. palliat. med..* 11(1):281-290, 2022 Jan.
61. Zhou Y, Su Y, Liu H, Wu H, Xu J, Dong F. Accuracy of transvaginal ultrasound for diagnosis of deep infiltrating endometriosis in the uterosacral ligaments: Systematic review and meta-analysis. *J Gynecol Obstet Hum Reprod.* 50(3):101953, 2021 Mar.
62. Guerriero S, Saba L, Pascual MA, et al. Transvaginal ultrasound vs magnetic resonance imaging for diagnosing deep infiltrating endometriosis: systematic review and meta-analysis. [Review]. *Ultrasound Obstet Gynecol.* 51(5):586-595, 2018 May.
63. Indrielle-Kelly T, Fruhauf F, Fanta M, et al. Diagnostic Accuracy of Ultrasound and MRI in the Mapping of Deep Pelvic Endometriosis Using the International Deep Endometriosis Analysis (IDEA) Consensus. *Biomed Res Int.* 2020:3583989, 2020.
64. Exacoustos C, Malzoni M, Di Giovanni A, et al. Ultrasound mapping system for the surgical management of deep infiltrating endometriosis. *Fertil Steril.* 102(1):143-150.e2, 2014 Jul.
65. Rotter I, Ryl A, Grzesiak K, et al. Cross-Sectional Inverse Associations of Obesity and Fat Accumulation Indicators with Testosterone in Non-Diabetic Aging Men. *Int J Environ Res Public Health* 2018;15.

66. Leonardi M, Espada M, Choi S, et al. Transvaginal Ultrasound Can Accurately Predict the American Society of Reproductive Medicine Stage of Endometriosis Assigned at Laparoscopy. *Journal of Minimally Invasive Gynecology*. 27(7):1581-1587.e1, 2020 Nov - Dec. *J Minim Invasive Gynecol*. 27(7):1581-1587.e1, 2020 Nov - Dec.

67. Hudelist G, Montanari E, Salama M, Dauser B, Nemeth Z, Keckstein J. Comparison between Sonography-based and Surgical Extent of Deep Endometriosis Using the Enzian Classification - A Prospective Diagnostic Accuracy Study. *J Minim Invasive Gynecol*. 28(9):1643-1649.e1, 2021 09.

68. Alcazar JL, Eguez PM, Forcada P, et al. Diagnostic accuracy of sliding sign for detecting pouch of Douglas obliteration and bowel involvement in women with suspected endometriosis: systematic review and meta-analysis. [Review]. *Ultrasound Obstet Gynecol*. 60(4):477-486, 2022 Oct.

69. Leonardi M, Martins WP, Espada M, Georgousopoulou E, Condous G. Prevalence of negative sliding sign representing pouch of Douglas obliteration during pelvic transvaginal ultrasound for any indication. *Ultrasound Obstet Gynecol*. 56(6):928-933, 2020 12.

70. Piessens S, Edwards A. Sonographic Evaluation for Endometriosis in Routine Pelvic Ultrasound. *Journal of Minimally Invasive Gynecology*. 27(2):265-266, 2020 02. *J Minim Invasive Gynecol*. 27(2):265-266, 2020 02.

71. Reid S, Lu C, Casikar I, et al. Prediction of pouch of Douglas obliteration in women with suspected endometriosis using a new real-time dynamic transvaginal ultrasound technique: the sliding sign. *Ultrasound Obstet Gynecol*. 41(6):685-91, 2013 Jun.

72. Young SW, Dahiya N, Yi J, Wasson M, Davitt J, Patel MD. Impact of Uterine Sliding Sign in Routine United States Ultrasound Practice. *J Ultrasound Med*. 40(6):1091-1096, 2021 Jun.

73. Bartlett DJ, Burkett BJ, Burnett TL, Sheedy SP, Fletcher JG, VanBuren WM. Comparison of routine pelvic US and MR imaging in patients with pathologically confirmed endometriosis. *Abdom Radiol*. 45(6):1670-1679, 2020 06.

74. Thomassin-Naggara I, Lamrabet S, Crestani A, et al. Magnetic resonance imaging classification of deep pelvic endometriosis: description and impact on surgical management. *Hum Reprod*. 35(7):1589-1600, 2020 07 01.

75. Barbisan CC, Andres MP, Torres LR, et al. Structured MRI reporting increases completeness of radiological reports and requesting physicians' satisfaction in the diagnostic workup for pelvic endometriosis. *Abdominal Radiology*. 46(7):3342-3353, 2021 07. *Abdom Radiol*. 46(7):3342-3353, 2021 07.

76. Jaramillo-Cardoso A, Shenoy-Bhangle A, Garces-Descovich A, Glickman J, King L, Morteles KJ. Pelvic MRI in the diagnosis and staging of pelvic endometriosis: added value of structured reporting and expertise. *Abdom Radiol*. 45(6):1623-1636, 2020 06.

77. Manganaro L, Porpora MG, Vinci V, et al. Diffusion tensor imaging and tractography to evaluate sacral nerve root abnormalities in endometriosis-related pain: a pilot study. *Eur Radiol*. 24(1):95-101, 2014 Jan.

78. Zhang X, Li M, Guan J, et al. Evaluation of the sacral nerve plexus in pelvic endometriosis by three-dimensional MR neurography. *J Magn Reson Imaging*. 45(4):1225-1231, 2017 04.

79. Rousset P, Bischoff E, Charlot M, et al. Bladder endometriosis: Preoperative MRI analysis

with assessment of extension to ureteral orifices. Diagnostic and Interventional Imaging. 102(4):255-263, 2021 Apr. Diagn Interv Imaging. 102(4):255-263, 2021 Apr.

80. Di Giovanni A, Casarella L, Coppola M, Iuzzolino D, Rasile M, Malzoni M. Combined Transvaginal/Transabdominal Pelvic Ultrasonography Accurately Predicts the 3 Dimensions of Deep Infiltrating Bowel Endometriosis Measured after Surgery: A Prospective Study in a Specialized Center. *J Minim Invasive Gynecol.* 25(7):1231-1240, 2018 Nov - Dec.
81. Baggio S, Zecchin A, Pomini P, et al. The Role of Computed Tomography Colonography in Detecting Bowel Involvement in Women With Deep Infiltrating Endometriosis: Comparison With Clinical History, Serum Ca125, and Transvaginal Sonography. *J Comput Assist Tomogr.* 40(6):886-891, 2016 Nov/Dec.
82. Belghiti J, Thomassin-Naggara I, Zacharopoulou C, et al. Contribution of Computed Tomography Enema and Magnetic Resonance Imaging to Diagnose Multifocal and Multicentric Bowel Lesions in Patients With Colorectal Endometriosis. *J Minim Invasive Gynecol.* 22(5):776-84, 2015 Jul-Aug.
83. Biscaldi E, Barra F, Scala C, Stabilini C, Vellone VG, Ferrero S. Magnetic Resonance Rectal Enema Versus Computed Tomographic Colonography in the Diagnosis of Rectosigmoid Endometriosis. *J Comput Assist Tomogr.* 44(4):501-510, 2020 Jul/Aug.
84. Biscaldi E, Ferrero S, Leone Roberti Maggiore U, Remorgida V, Venturini PL, Rollandi GA. Multidetector computerized tomography enema versus magnetic resonance enema in the diagnosis of rectosigmoid endometriosis. *Eur J Radiol.* 83(2):261-7, 2014 Feb.
85. Ferrero S, Barra F, Scala C, Condous G. Ultrasonography for bowel endometriosis. [Review]. *Best Pract Res Clin Obstet Gynaecol.* 71:38-50, 2021 Mar.
86. Iosca S, Lumia D, Bracchi E, et al. Multislice computed tomography with colon water distension (MSCT-c) in the study of intestinal and ureteral endometriosis. *Clin Imaging.* 37(6):1061-8, 2013 Nov-Dec.
87. Jeong SY, Chung DJ, Myung Yeo D, Lim YT, Hahn ST, Lee JM. The usefulness of computed tomographic colonography for evaluation of deep infiltrating endometriosis: comparison with magnetic resonance imaging. *J Comput Assist Tomogr.* 37(5):809-14, 2013 Sep-Oct.
88. Roman H, Carilho J, Da Costa C, et al. Computed tomography-based virtual colonoscopy in the assessment of bowel endometriosis: The surgeon's point of view. *Gynecol Obstet Fertil.* 44(1):3-10, 2016 Jan.
89. Woo S, Suh CH, Kim H. Diagnostic performance of computed tomography for bowel endometriosis: A systematic review and meta-analysis. *Eur J Radiol.* 119:108638, 2019 Oct.
90. Jiang J, Liu Y, Wang K, Wu X, Tang Y. Rectal water contrast transvaginal ultrasound versus double-contrast barium enema in the diagnosis of bowel endometriosis. *BMJ Open.* 7(9):e017216, 2017 Sep 07.
91. Busard MP, van der Houwen LE, Bleeker MC, et al. Deep infiltrating endometriosis of the bowel: MR imaging as a method to predict muscular invasion. *Abdom Imaging.* 37(4):549-57, 2012 Aug.
92. Kim A, Fernandez P, Martin B, et al. Magnetic Resonance Imaging Compared with Rectal Endoscopic Sonography for the Prediction of Infiltration Depth in Colorectal Endometriosis. *J Minim Invasive Gynecol.* 24(7):1218-1226, 2017 Nov - Dec.

93. Rousset P, Buisson G, Lega JC, et al. Rectal endometriosis: predictive MRI signs for segmental bowel resection. *European Radiology*. 31(2):884-894, 2021 Feb. *Eur Radiol*. 31(2):884-894, 2021 Feb.

94. Valentini AL, Gui B, Micco M, et al. How to improve MRI accuracy in detecting deep infiltrating colorectal endometriosis: MRI findings vs. laparoscopy and histopathology. *Radiol Med (Torino)*. 119(5):291-7, 2014 May.

95. Brusic A, Esler S, Churilov L, et al. Deep infiltrating endometriosis: Can magnetic resonance imaging anticipate the need for colorectal surgeon intervention?. *Eur J Radiol*. 121:108717, 2019 Dec.

96. Youn P, Copson S, Jacques A, Haliczenko K, McDonnell R, Lo G. Spiders and mushrooms: Reporting bowel endometriosis shape on preoperative MRI to flag surgical complexity. *J Med Imaging Radiat Oncol*. 66(7):905-912, 2022 Oct.

97. Fan J, McDonnell R, Jacques A, Fender L, Lo G. MRI sliding sign: Using MRI to assess rectouterine mobility in pelvic endometriosis. *J Med Imaging Radiat Oncol*. 66(1):54-59, 2022 Feb.

98. Scardapane A, Lorusso F, Bettocchi S, et al. Deep pelvic endometriosis: accuracy of pelvic MRI completed by MR colonography. *Radiol Med (Torino)*. 118(2):323-38, 2013 Mar.

99. Noventa M, Saccardi C, Litta P, et al. Ultrasound techniques in the diagnosis of deep pelvic endometriosis: algorithm based on a systematic review and meta-analysis. [Review]. *Fertil Steril*. 104(2):366-83.e2, 2015 Aug.

100. Biscaldi E, Barra F, Leone Roberti Maggiore U, Ferrero S. Other imaging techniques: Double-contrast barium enema, endoscopic ultrasonography, multidetector CT enema, and computed tomography colonoscopy. [Review]. *Best Pract Res Clin Obstet Gynaecol*. 71:64-77, 2021 Mar.

101. Gerges B, Li W, Leonardi M, Mol BW, Condous G. Optimal imaging modality for detection of rectosigmoid deep endometriosis: systematic review and meta-analysis. *Ultrasound Obstet Gynecol*. 58(2):190-200, 2021 08.

102. Guerriero S, Ajossa S, Orozco R, et al. Accuracy of transvaginal ultrasound for diagnosis of deep endometriosis in the rectosigmoid: systematic review and meta-analysis. [Review]. *Ultrasound Obstet Gynecol*. 47(3):281-9, 2016 Mar.

103. Reid S, Espada M, Lu C, Condous G. To determine the optimal ultrasonographic screening method for rectal/rectosigmoid deep endometriosis: Ultrasound "sliding sign," transvaginal ultrasound direct visualization or both?. *Acta Obstet Gynecol Scand*. 97(11):1287-1292, 2018 Nov.

104. Vimercati A, Achilarre MT, Scardapane A, et al. Accuracy of transvaginal sonography and contrast-enhanced magnetic resonance-colonography for the presurgical staging of deep infiltrating endometriosis. *Ultrasound Obstet Gynecol*. 40(5):592-603, 2012 Nov.

105. Aas-Eng MK, Lieng M, Dauser B, et al. Transvaginal sonography determines accurately extent of infiltration of rectosigmoid deep endometriosis. *Ultrasound Obstet Gynecol*. 58(6):933-939, 2021 Dec.

106. Abdalla-Ribeiro H, Maekawa MM, Lima RF, de Nicola ALA, Rodrigues FCM, Ribeiro PA. Intestinal endometriotic nodules with a length greater than 2.25 cm and affecting more

than 27% of the circumference are more likely to undergo segmental resection, rather than linear nodeectomy. *PLoS ONE*. 16(4):e0247654, 2021.

- 107.** Malzoni M, Casarella L, Coppola M, et al. Preoperative Ultrasound Indications Determine Excision Technique for Bowel Surgery for Deep Infiltrating Endometriosis: A Single, High-Volume Center. *J Minim Invasive Gynecol*. 27(5):1141-1147, 2020 Jul - Aug.
- 108.** Sloss S, Mooney S, Ellett L, et al. Preoperative Imaging in Patients with Deep Infiltrating Endometriosis: An Important Aid in Predicting Depth of Infiltration in Rectosigmoid Disease. *J Minim Invasive Gynecol*. 29(5):633-640, 2022 05.
- 109.** Rosefort A, Huchon C, Estrade S, Paternostre A, Bernard JP, Fauconnier A. Is training sufficient for ultrasound operators to diagnose deep infiltrating endometriosis and bowel involvement by transvaginal ultrasound?. *J Gynecol Obstet Hum Reprod*. 48(2):109-114, 2019 Feb.
- 110.** Guerra A, Darai E, Osorio F, et al. Imaging of postoperative endometriosis. [Review]. *Diagn Interv Imaging*. 100(10):607-618, 2019 Oct.
- 111.** Martire FG, Zupi E, Lazzeri L, et al. Transvaginal Ultrasound Findings After Laparoscopic Rectosigmoid Segmental Resection for Deep Infiltrating Endometriosis. *J Ultrasound Med*. 40(6):1219-1228, 2021 Jun.
- 112.** American College of Radiology. ACR Appropriateness Criteria® Radiation Dose Assessment Introduction. Available at: <https://edge.sitecorecloud.io/americanoldf5f-acrorgf92a-productioncb02-3650/media/ACR/Files/Clinical/Appropriateness-Criteria/ACR-Appropriateness-Criteria-Radiation-Dose-Assessment-Introduction.pdf>.

Disclaimer

The ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

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