

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

Clinical Condition: Abnormal Vaginal Bleeding

Variant 1: Postmenopausal vaginal bleeding, First study.

Radiologic Procedure	Rating	Comments	RRL*
US pelvis transvaginal	9		O
US pelvis transabdominal	8		O
US hysterosonogram	6		O
US pelvis with Doppler	4		O
CT pelvis with contrast	2		☒☒☒
MRI pelvis with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 2: Postmenopausal vaginal bleeding, endometrium <5 mm by transvaginal ultrasound.

Radiologic Procedure	Rating	Comments	RRL*
US pelvis transabdominal	4		O
US hysterosonogram	2		O
US pelvis with Doppler	2		O
CT pelvis with contrast	2		☒☒☒
MRI pelvis with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 3: Postmenopausal vaginal bleeding, endometrium ≥5 mm by transvaginal ultrasound.

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	8		O
US pelvis transabdominal	4		O
US pelvis with Doppler	4		O
CT pelvis with contrast	2		☒☒☒
MRI pelvis with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Clinical Condition:**Abnormal Vaginal Bleeding****Variant 4:****Premenopausal vaginal bleeding. First study.**

Radiologic Procedure	Rating	Comments	RRL*
US pelvis transvaginal	9		O
US pelvis transabdominal	8		O
US hysterosonogram	4		O
US pelvis with Doppler	2		O
CT pelvis with contrast	2		⊕ ⊕ ⊕
MRI pelvis with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 5:**Premenopausal vaginal bleeding, endometrium <16 mm by transvaginal ultrasound.**

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	6		O
US pelvis with Doppler	5		O
US pelvis transabdominal	4		O
CT pelvis with contrast	2		⊕ ⊕ ⊕
MRI pelvis with contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 6:**Premenopausal vaginal bleeding, endometrium ≥16 mm by transvaginal ultrasound.**

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	7		O
US pelvis with Doppler	5		O
MRI pelvis with contrast	4	See statement regarding contrast in text under "Anticipated Exceptions."	O
CT pelvis with contrast	2		⊕ ⊕ ⊕
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

ABNORMAL VAGINAL BLEEDING

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Summary of Literature Review

Virtually every woman will at some point in her lifetime experience episodes of vaginal bleeding that will be perceived as abnormal. Menses begin at puberty and extend to menopause. The average menstrual cycle is 29 days long with a range of 23-39 days [1]. Overall, the length of the menstrual cycle remains relatively constant throughout the reproductive years, but as a woman approaches menopause the cycle gradually shortens. Although blood loss is difficult to quantify, most blood loss occurs in the first few days of menses, and bleeding generally lasts from 2 to 7 days. The cycle length and the volume and duration of bleeding remain fairly constant for a woman throughout her reproductive years. After menopause, bleeding ceases completely. Any variation from this pattern is potentially abnormal.

Abnormal vaginal bleeding is most often caused by hormone imbalance. Vaginal bleeding is also caused by pregnancy, polyps, myomas, endometrial hyperplasia, adenomyosis, and cancers of the cervix or endometrium. In a premenopausal or perimenopausal woman who is not pregnant, the most likely cause of abnormal bleeding is anovulatory cycles [1]. It may also be associated with adenomyosis in parous women. In a postmenopausal woman, the most likely cause of abnormal bleeding is atrophic endometrium [2]. In the menstruating female, a trial of medical hormonal therapy can be instituted [1]. In the postmenopausal female or if bleeding persists in the premenopausal female despite medical management, imaging studies are warranted. In younger women, the goal is to diagnose polyps, myomas, or other focal structural causes for bleeding. In older women the goal is the

same and includes diagnosis of endometrial cancer, which is the underlying cause in 10% of postmenopausal women with abnormal bleeding [3]. Meta-analysis has shown that an endometrial thickness ≤ 5 mm is associated with less than 1% probability of endometrial cancer [4].

Transvaginal Ultrasound

Transvaginal ultrasound (TVUS) depicts endometrial pathology [2,5,6]. The upper limit of normal for endometrial thickness has been debated. For premenopausal women with bleeding, a thickness of >16 mm has a sensitivity of 67%, specificity of 75%, and positive predictive value of 14% for demonstrating relevant pathology [7]. For postmenopausal women with bleeding, a thickness of >5 mm has a sensitivity of at least 82% for detecting endometrial abnormalities [3,7], and for detecting endometrial cancer has a sensitivity of 80%-100% and a specificity of about 60% [3,8-10]. Few clinicians advocate mandatory uterine sampling for abnormal postmenopausal bleeding regardless of the ultrasound (US) findings [9]. Most, however, suggest that endometrial sampling is not necessary if thickness is <5 mm [3,7,10-13]. When the endometrium is thickened, the vaginal sonogram helps localize focal lesions, thereby reducing the risk of missing lesions at sampling [3,9].

Myometrial abnormalities causing menorrhagia can be diagnosed by both TVUS and magnetic resonance imaging (MRI). Although both modalities can be used effectively to diagnose adenomyosis and differentiate it from leiomyomas, TVUS is usually the first imaging study obtained in patients with abnormal bleeding. Using specific criteria to diagnose adenomyosis, sonography demonstrates a sensitivity of 80%-86% and specificity of 50%-96% [14].

Hysterosonography

Hysterosonography consists of introduction of sterile saline into the uterine cavity via a small catheter using transvaginal sonographic guidance [15]. In 48 postmenopausal women with bleeding and endometrial thickness between 5 and 10 mm, the distension of the cavity with saline revealed focal cavitary masses in 19 (40%). Seven of the patients with endometrial masses had biopsy prior to hysterosonography, and the biopsy was false negative in four (57%) [15]. In both premenopausal and postmenopausal women with abnormal bleeding and endometrial thickening, the exclusion of a focal mass may help direct management to hormone treatment or blind biopsy, whereas the identification of a focal mass may direct management to hysteroscopically guided biopsy. There is also strong evidence that hysterosonography is as accurate as office hysteroscopy in detecting intracavitary lesions and is better tolerated by the patient [16].

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The American College of Radiology seeks and encourages collaboration with other organizations on the development of the ACR Appropriateness Criteria through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply society endorsement of the final document.

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Transabdominal Ultrasound

Although transabdominal US gives an overall view of the pelvis, the depiction of the endometrium is better with TVUS [17].

Doppler Ultrasound

In postmenopausal women with vaginal bleeding, there is evidence to suggest that the uterine artery resistive index and the pulsatility index are lower for endometrial cancer than for benign lesions [8]. There is, however, variability from institution to institution and overlap between benign and malignant findings. In general, duplex Doppler US does not add significant additional information to grayscale imaging of the endometrium [18]. However, color Doppler sonography can identify the feeding vessel of a polyp, significantly aiding their detection [19].

Three-Dimensional Sonography

Three-dimensional sonography and hysterosonography have been found to add information that is not available on the 2-dimensional transvaginal image, due to its multiplanar capabilities [20]. With the ability to capture a volume of US data and image in the coronal plane, there is enhanced visualization of intracavitary abnormalities associated with vaginal bleeding [20,21].

Magnetic Resonance Imaging

MRI of the pelvis is not warranted unless bleeding is attributed to leiomyomas and myomectomy is contemplated, or unless sonography is indeterminate in differentiating adenomyosis from leiomyomas. MRI accurately depicts the size, number, and location of leiomyomas. Using specific criteria, MRI differentiates adenomyosis from leiomyomas with a sensitivity and specificity of 86-100% and an overall accuracy of 85-90.5%. [14,22].

Computed Tomography

Computed tomography (CT) scan of the pelvis is not warranted for diagnosis of abnormal vaginal bleeding.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (ie, $<30 \text{ mL/min/1.73m}^2$), and almost never in other patients. There is growing literature regarding NSF. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates $<30 \text{ mL/min/1.73m}^2$. For more information, please see the [ACR Manual on Contrast Media](#) [23].

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, both because of 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 to 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
O	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 (eg, region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as NS (not specified).

Supporting Document(s)

- [ACR Appropriateness Criteria® Overview](#)
- [Procedure Contrast Information](#)
- [Evidence Table](#)

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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.