

**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		None
US pelvis transabdominal	8		None
US hysterosonogram	6		None
US pelvis with Doppler	4		None
CT pelvis with contrast	2		Med
MRI pelvis with contrast	2		None
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Radiologic Procedure	Rating	Comments	RRL*
US pelvis transabdominal	4		None
US hysterosonogram	2		None
US pelvis with Doppler	2		None
CT pelvis with contrast	2		Med
MRI pelvis with contrast	2		None
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	8		None
US pelvis transabdominal	4		None
US pelvis with Doppler	4		None
CT pelvis with contrast	2		Med
MRI pelvis with contrast	2		None
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Radiologic Procedure	Rating	Comments	RRL*
US pelvis transvaginal	9		None
US pelvis transabdominal	8		None
US hysterosonogram	4		None
US pelvis with Doppler	2		None
CT pelvis with contrast	2		Med
MRI pelvis with contrast	2		None
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			<b>*Relative Radiation Level</b>

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

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	6		None
US pelvis with Doppler	5		None
US pelvis transabdominal	4		None
CT pelvis with contrast	2		Med
MRI pelvis with contrast	2		None
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			<b>*Relative Radiation Level</b>

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

Radiologic Procedure	Rating	Comments	RRL*
US hysterosonogram	7		None
US pelvis with Doppler	5		None
MRI pelvis with contrast	4	See comments regarding contrast in text under "Anticipated Exceptions."	None
CT pelvis with contrast	2		Med
<b>Rating Scale:</b> 1=Least appropriate, 9=Most appropriate			<b>*Relative Radiation Level</b>

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## ABNORMAL VAGINAL BLEEDING

Expert Panel on Women's Imaging: Arthur C. Fleischer, MD<sup>1</sup>; Rochelle F. Andreotti, MD<sup>2</sup>; Sandra O. DeJesus Allison, MD<sup>3</sup>; Teresita L. Angtuaco, MD<sup>4</sup>; Mindy M. Horrow, MD<sup>5</sup>; Susanna I. Lee MD, PhD<sup>6</sup>; Marcia C. Javitt, MD<sup>7</sup>; Anna S. Lev-Toaff, MD<sup>8</sup>; Leslie M. Scoutt, MD<sup>9</sup>; Carolyn Zelop, MD.<sup>10</sup>

### **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  $\leq 5$  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 cavitory 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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## 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), also known as nephrogenic fibrosing dermopathy) was first identified in 1997 and has recently generated substantial concern among radiologists, referring doctors and lay people. Until the last few years, gadolinium-based MR contrast agents were widely believed to be almost universally well tolerated, extremely safe and non-nephrotoxic, even when used in patients with impaired renal function. All available experience suggests that these agents remain generally very safe, but recently some patients with renal failure who have been exposed to gadolinium contrast agents (the percentage is unclear) have developed NSF [23-25], a syndrome that can be fatal. Further studies are necessary to determine what

the exact relationships are between gadolinium-containing contrast agents, their specific components and stoichiometry, patient renal function and NSF. Current theory links the development of NSF to the administration of relatively high doses (eg, >0.2mM/kg) and to agents in which the gadolinium is least strongly chelated. The FDA has recently issued a “black box” warning concerning these contrast agents ([http://www.fda.gov/cder/drug/InfoSheets/HCP/gcca\\_200705HCP.pdf](http://www.fda.gov/cder/drug/InfoSheets/HCP/gcca_200705HCP.pdf)).

This warning recommends that, until further information is available, gadolinium contrast agents should not be administered to patients with either acute or significant chronic kidney disease (estimated GFR <30 mL/min/1.73m<sup>2</sup>), recent liver or kidney transplant or hepato-renal syndrome, unless a risk-benefit assessment suggests that the benefit of administration in the particular patient clearly outweighs the potential risk(s) [24].

## 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. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria<sup>®</sup> [Radiation Dose Assessment Introduction](#) document.

Relative Radiation Level Designations	
Relative Radiation Level	Effective Dose Estimate Range
None	0
Minimal	< 0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv

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