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AAGL Practice Report: Practice Guidelines for the Diagnosis and Management of Endometrial Polyps

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ABSTRACT Endometrial polyps are a common gynecologic disease that may be symptomatic, with abnormal vaginal bleeding being the most common presentation. They may be found incidentally in symptom-free women investigated for other indications. Increasing age is the most important risk factor, with medications such as tamixifen also implicated. Specific populations at risk include women with infertility. Malignancy arising in polyps is uncommon, and specific risks for malignancy include increasing age and postmenopausal bleeding. Management may be conservative, with up to 25% of polyps regressing, particularly if less than 10 mm in size. Hysteroscopic polypectomy remains the mainstay of management, and there are no differences for outcomes in the modality of hysteroscopic removal. Symptomatic postmenopausal polyps should be excised for histologic assessment, and removal of polyps in infertile women improves fertility outcomes. Blind removal is not indicated where instrumentation for guided removal is available. Surgical risks associated with hysteroscopic polypectomy are low. Journal of Minimally Invasive Gynecology (2012) 19, 3–10 © 2012 AAGL. All rights reserved.

Keywords: Endometrial polyp; Hysteroscopic management; Diagnosis of endometrial polyp; Malignancy in endometrial polyp; Diagnosis of endometrial polyp

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Endometrial polyps are a localized endometrial intrauterine overgrowth that may be single or multiple, may measure from a few millimeters to centimeters, and may be sessile or pedunculated [1]. Endometrial polyps consist of endometrial glands, stroma, and blood vessels [2]. Risk factors for the development of endometrial polyps include age, hypertension, obesity, and tamoxifen use [3,4]. Endometrial polyps may be asymptomatic [5], and when symptoms occur they most commonly include abnormal (including postmenopausal) uterine bleeding [5,6] and less commonly infertility [7]. Malignancy is uncommon and occurs in 0% to 12.9% of endometrial polyps, depending on the population studied [6].

Identification and Assessment of Evidence

This AAGL practice guideline was produced with the following search methodology; electronic resources including Medline, PubMed, CINAHL, the Cochrane Library (including the Cochrane Database of Systematic Reviews), Current Contents and EMBASE were searched for all publications in relation to Endometrial polyps (1951 to week 30 2010). The MeSH terms included all subheadings and keywords included "endometrial polyps," "intrauterine pathology," "endometrial polyp and malignancy," "diagnosis of endometrial polyps," "management of endometrial polyps," "intrauterine surgery," "intrauterine pathology and infertility."

The search was not restricted to English language, with committee members fluent in languages other than English reviewing relevant publications and providing related information to the committee, translated into English. The full text of all publications was retrieved, abstracted, and tabulated. Relevant publications were then reviewed and

The purpose of this guideline is to provide clinicians with evidence-based information about the management of endometrial polyps to guide the clinical management of this condition.

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Table 1

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force

I	Evidence obtained from at least one properly designed randomized controlled trial.
II-1	Evidence obtained from well-designed controlled trials without randomization.
II-2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
II-3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
III	Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

On the basis of the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.

additional references hand searched and added to the Table 1. All studies were assessed for methodologic rigor and graded according to the classification system outlined at the end of this document.

Clinical Presentation

Endometrial polyps are a common gynecologic disorder whose incidence is unknown because many polyps are asymptomatic [8–11]. The prevalence is reported to be between 7.8% to 34.9%, depending on the population studied [5,12–14].

Risk factors for the development of endometrial polyps include age, hypertension, obesity, and tamoxifen use [3,4]. Increasing age appears to be the best-documented risk indicator for endometrial polyps. The prevalence of endometrial polyps appears to increase by age during the reproductive years, but it is not clear whether it continues to rise or decreases after menopause [5,14–18]. It is accepted that the evidence to reliably arrive at this information is difficult to obtain. There appears to be an association between the finding of endometrial polyps and other benign diseases including myomas, cervical polyps, and endometriosis [11,18–20].

Women using tamoxifen are at specific risk for development of polyps, with Class II studies reporting up to 30% to 60% prevalence [17,21–23]. Data regarding an eventual relationship between hormone therapy and endometrial polyps are contradictory, as some studies report higher prevalence of endometrial polyps in women using hormone therapy [24,25], whereas others do not [26–30]. A progestogen with high antiestrogenic activity, as well as use of oral contraceptive pills may have a protective effect on the development of endometrial polyps [24,31]. The use of the levonorgesterel-releasing intrauterine devices as a treatment for endometrial polyps or to prevent their development in a low-risk population has not yet been evaluated.

Most women with symptomatic endometrial polyps present with abnormal uterine bleeding, and this has been recently classified AUB-P for premenopausal women endorsed by FIGO [32]. Polyps are found in 10% to 40% of women suffering from premenopausal bleeding [14,16,20], and symptoms do not correlate with polyp number, diameter or location [33].

The prevalence of endometrial polyps appears to be increased in infertile women. In a large prospective trial including 1000 infertile women scheduled for in vitro fertilization, the prevalence of endometrial polyps was found to be 32% [7]. The high prevalence of endometrial polyps in infertile women suggests a causative relationship between the presence of endometrial polyps and infertility. However, a causal relationship between endometrial polyps and infertility appears to have been confirmed in only one randomized trial [34].

Although uncommon, both atypical hyperplasia and endometrial cancer may originate from endometrial polyps. The results of previous case series indicate that malignancy occurs within 0% to 12.9% of endometrial polyps [14, 35–41]. Most authors agree that the risk of malignancy in endometrial polyps increases with age and that the risk of malignancy in premenopausal women appears to be low. The presence of symptoms (abnormal uterine bleeding) has been identified as a possible risk indicator of malignancy within endometrial polyps [37,39,42–44]. Polyp size also appears to be a risk indicator for malignant endometrial polyps [36,37]. Although the reports are not consistent, other known risk factors for endometrial carcinoma, such as obesity, diabetes mellitus, and hypertension have also been reported to increase the risk of malignancy within endometrial polyps [14,40,45]. The use of tamoxifen appears to increase the risk of atypical hyperplasia and malignancy in endometrial polyps [3,45,46].

The knowledge regarding the natural history and clinical consequences of endometrial polyps without treatment is limited. In one class II study, 27% of the endometrial polyps regressed spontaneously during a 1-year follow-up [11]. Polyps that regress tend to be smaller compared with polyps that persist [11,47].

Guidelines for Recognizing the Presence of Endometrial Polyps

1. Increasing age is the most common risk factor for the presentation of an endometrial polyp (Level B).

2. For women with symptoms with a polyp, abnormal uterine bleeding is the most common presenting symptom (Level B).
3. Infertile women are more likely to be diagnosed with an endometrial polyp (Level B).
4. Polyps may naturally regress in up to 25% of patients, with small polyps more likely to resolve spontaneously (Level A).
5. Medications such as tamoxifen may predispose to the formation of endometrial polyps (Level B).

Malignancy arising in polyps is uncommon with increasing age; symptoms of abnormal bleeding and tamoxifen use increase this possibility (Level B).

Diagnosis

Imaging

On transvaginal ultrasonography (TVUS) an endometrial polyp typically appears as a hyperechoic lesion with regular contours within the uterine lumen, surrounded by a thin hyperechoic halo [10]. Cystic spaces may be seen within the polyp [48], or the polyp may appear as a nonspecific endometrial thickening or focal mass within the endometrial cavity [49]. These sonographic findings are not specific and may be found with other diseases such as myomas [50]. Performance of TVUS in the proliferative phase of the menstrual cycle is likely to provide the most reliable results [51]. Repetition of ultrasonography in the postmenstrual phase may help to differentiate "polypoidal endometrium" from a true polyp, the ultimate diagnosis being histologic.

TVUS has a reported sensitivity of 19% to 96%, specificity of 53% to 100%, positive predictive value (PPV) of 75% to 100%, and negative predictive value (NPV) of 87% to 97% to diagnose endometrial polyps compared with hysteroscopy with guided biopsy [13,52–58]. A paucity of level I evidence may explain this wide range of data, as well as studies describing a small number of patients. In a single, large, level II-2 study the reported sensitivity, specificity, PPV, and NPV of TVUS was 86%, 94%, 91% and 90%, respectively [55].

The addition of color-flow or power Doppler respectively may improve the diagnostic capability of TVUS. Color-flow Doppler may demonstrate the single feeding vessel typical of endometrial polyps [49]. Power Doppler is reported to increase sensitivity to 91% and 97% in patients with and without symptoms patients, respectively [59]. Specificity and NPV may be increased to 95% and 94%, respectively, when color-flow Doppler is added to grayscale TVUS to identify the feeding vessel [60]. There are limited data to support color-flow or power Doppler aiding in the differentiation of hyperplasia and malignancy in polyps [61–63], with no difference in the histologic grading of polyps on the basis of their resistive index, pulsatility index, or size [64]. Consequently, Doppler examination is not a substitute for surgical removal of polyps followed by pathologic evaluation when malignancy is suspected.

The addition of intrauterine contrast by saline infusion sonography (SIS) or gel installation sonography [65] may outline small endometrial polyps missed on grayscale TVUS and is likely to improve diagnostic accuracy [14,54,66–69]. When compared with hysteroscopy with guided biopsy, SIS has a sensitivity of 58% to 100%, specificity of 35% to 100%, PPV of 70% to 100%, and NPV of 83% to 100% [50,53,54,56,70]. A number of level II studies report no significant difference between SIS and diagnostic hysteroscopy in diagnosing endometrial polyps [54,71]. Advantages of SIS include assessment of both the uterine cavity and other uterine and pelvic structures [71] and the potential to assess tubal patency in patients with infertility [10]. Disadvantages of SIS include an inability to determine final endometrial disease [50], a slower learning curve compared with noncontrast TVUS [67] and patient discomfort caused by fluid leakage or pain during examination [65].

Studies with noncontrast 3-dimensional (3-D) TVUS show limited improvement to diagnosis when compared with 2D TVUS with sensitivity of 100%, specificity of 71% to 99%, PPV 89% to 99%, and NPV of 100% [58]. Adding saline solution contrast to 3-D sonography results in slightly higher specificity (88%–99%) and PPV (97%–100%) for endometrial polyps than those of 3-D ultrasonography, with reasonably high sensitivity of 92–95% and NPV of 97% [58,72]. It appears that the addition of intrauterine contrast allows greater diagnostic accuracy than the addition of 3-D without contrast.

Blind Biopsy

Blind dilation and curettage or endometrial biopsy is inaccurate in diagnosing endometrial polyps [73] even with specificity and PPV of 100%. The low sensitivity of 8% to 46% and NPV of 7% to 58% when compared with hysteroscopy and guided biopsy [56,74,75] indicate that this technique should not be used for diagnosis. This technique may also cause polyp fragmentation and make histologic diagnosis difficult [76].

Hysteroscopic-guided Biopsy

Hysteroscopy with guided biopsy is the most common comparator for other techniques to diagnose polyps as it offers the highest sensitivity and specificity for conservative measures [77]. Diagnostic hysteroscopy alone only allows subjective assessment of the size and characteristic of the lesion with reported sensitivity of 58% to 99%, specificity of 87% to 100%, PPV of 21% to 100%, and NPV of 66% to 99% when compared with hysteroscopy with guided biopsy [13,54,56,72,78,79]. The choice of inpatient or outpatient diagnostic (and therapeutic) procedures is dependent on instrument availability, patient choice and physician skill, with good success reported in both settings [50,79–81].

Other Diagnostic Tests

Hysterosalpingography has a high sensitivity (98%) but low specificity (34.6%) compared with hysteroscopy for endometrial polyps [70]. The use of ionizing radiation, iodinated contrast materials and patient discomfort, limit the usefulness of this investigation for this indication. Endometrial polyps can be identified on magnetic resonance imaging as low signal intensity intracavitary masses surrounded by high signal intensity fluid and endometrium by T_2-weighted magnetic resonance imaging. Very high cost and limited availability with limited advantages over sonography preclude this technique from routine use. Computed tomography scanning has limited role because of its low sensitivity of 53% when compared with TVUS, even with contrast enhancement [82].

Guidelines for the Diagnosis of Endometrial Polyps

1. TVUS provides reliable information for the detection of endometrial polyps and should be the investigation of choice where available (Level B).
2. The addition of color or power Doppler increases the capacity of TVUS to diagnose endometrial polyps (Level B).
3. Adding intrauterine contrast to sonography (with or without 3-D imaging) improves the diagnostic capacity for endometrial polyps (Level B).
4. Blind dilation and curettage or biopsy should not be used for diagnosis of endometrial polyps (Level B).

Management

Conservative Management

Given that most polyps are not malignant, there is an option for expectant management with no intervention. There is Class II evidence that polyps may spontaneously regress in approximately 25% of cases, with smaller polyps more likely to regress compared with polyps >10 mm in length [11,47,83]. Asymptomatic postmenopausal polyps are unlikely to be malignant [37] and observation is an option after discussion with the patient.

Medical Management

Medical management has a limited role for endometrial polyps. Although GnRHa could be used as an adjunctive treatment before hysteroscopic resection [84], this must be balanced against medication costs and side effects and excisional surgery alone. There are no data to support use of GnRHa in this setting.

The use of some types of hormonal therapies may have a preventative role for polyp formation [31]. The use of levonorgestrel releasing intrauterine system in women taking tamoxifen is reported to reduce the incidence of endometrial polyps. However, its use for the treatment of polyps should be currently limited to research protocols [85].

Conservative Surgical Management

Blind dilation and curettage has been reported in a class II study to remove endometrial polyps in 4/51 patients (8%), whereas the addition of polyp forceps increases complete extraction to 21/51 patients (41%). Class II-2 and II-3 studies indicate that removal of endometrial disease by blind curettage is successful less than 50% of the time, and in many cases removal is incomplete [74,75,86–88]. When hysteroscopic treatment is available, blind curettage should not be used as a diagnostic or therapeutic intervention. When an endometrial polyp is diagnosed or suspected and hysteroscopy is not available, the patient should be referred for appropriate treatment.

Hysteroscopic Resection

Hysteroscopic polypectomy is effective and safe as both a diagnostic and therapeutic intervention. There are a variety of methods practiced to remove polyps at hysteroscopy; however, there are no comparative studies for these methods with regard to efficacy or costs, and the method of choice is the one with which the clinician is trained in and most familiar.

Hysteroscopy and electrosurgical removal of polyps is both commonly available and of relatively low cost. Visualization and direct removal is reported to be effective and reduces recurrence rate compared with the use of vision and removal by polypectomy forceps [89]. Other instruments include bipolar systems [90,91] and the hysteroscopic morcellator [92,93], although these techniques may be limited by availability and the cost of disposable and specialized equipment.

There are few studies prospectively evaluating the effect of polypectomy on symptoms. In the only class I study on this subject, 150 women with an endometrial polyp were allocated to hysteroscopic removal or observation for 6 months. There was no difference in the volume of menstrual loss between the groups, although symptomatic improvement, such as intermenstrual bleeding, was significantly improved by polyp removal [83].

Intrauterine adhesion risk is low after polypectomy, because the myometrium is not incised [94]. A class 1 study reports no adhesions after hysteroscopic polypectomy [95].

Radical Surgical Options

Hysterectomy guarantees no polyp recurrence and no potential for malignancy; however, it is a major surgical procedure, with significantly greater costs and potential for morbidity. It should be used judiciously and only after discussion with the patient about its implication. There are no comparative data for conservative and radical treatments.

Clinical Outcomes

Symptomatic polyps should be removed in the premenopausal or postmenopausal woman because evidence reports improvement in symptoms, with abnormal uterine bleeding

after hysteroscopic polypectomy resolving in 75% to 100% of cases [83,96,97]. Because postmenopausal bleeding in women is associated with the highest risk of premalignant and malignant tissue changes, it is especially important to exclude this histologically [39,42–44].

In class II-3 studies, recurrence of histologically confirmed polyps after up to 9 years follow-up after hysteroscopic polypectomy is between 2.5% to 3.7% [89,98]. Further long-term, high-quality studies are required to establish recurrence rates.

Polypectomy in the subfertile woman is effective in improving fertility, with reported pregnancy rates varying between 43% to 80% [89,99,100]. Spontaneous pregnancy rates are reported to be increased, as well as those associated with assisted reproductive technology. A class I study of polypectomy before intrauterine insemination showed significantly increased subsequent pregnancy success (RR of 2.1, 95% CI 1.5–2.9, $p < .001$), with 65% of women in the polypectomy group conceiving spontaneously before assisted reproductive technology [34].

Guidelines for the Management of Endometrial Polyps

1. Conservative management is reasonable, particularly for small polyps and if asymptomatic (Level A).
2. Medical management of polyps cannot be recommended at this time (Level B).
3. Hysteroscopic polypectomy remains the gold standard for treatment (Level B).
4. There does not appear to be differences in clinical outcomes with different hysteroscopic polypectomy techniques (Level C).
5. Removal for histologic assessment is appropriate in postmenopausal women with symptoms (Level B).
6. Hysteroscopic removal is to be preferred to hysterectomy because of its less-invasive nature, lower cost, and reduced risk to the patient (Level C).

For the infertile patient with a polyp, surgical removal is recommended to allow natural conception or assisted reproductive technology a greater opportunity to be successful (Level A).

Recommendations for Future Research

There is a paucity of high-quality data in the subject area of endometrial polyps given the common occurrence of this pathology. The following considerations are proposed for future research:

1. Randomized trials of women with abnormal uterine bleeding to evaluate the clinical outcome of polypectomy.
2. Cost comparisons of different methods for hysteroscopic removal of polyps, including office and outpatient locations.
3. Randomized studies of medical treatments (including the LNG-IUS) for the treatment of women with polyps.
4. Prospective multicenter study including postmenopausal women both with and without symptoms and with endometrial polyps to evaluate the risk of malignancy.

Prospective long-time follow-up studies after hysteroscopic polypectomy to evaluate the recurrence rate of endometrial polyps.

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References

1. Kim KR, Peng R, Ro JY, Robboy SJ. A diagnostically useful histopathologic feature of endometrial polyp: the long axis of endometrial glands arranged parallel to surface epithelium. *Am J Surg Pathol*. 2004;28:1057–1062.
2. Peterson WF, Novak ER. Endometrial polyps. *Obstet Gynecol*. 1956; 8:40–49.
3. Cohen I. Endometrial pathologies associated with postmenopausal tamoxifen treatment. *Gynecol Oncol*. 2004;94:256–266.
4. Onalan R, Onalan G, Tonguc E, Ozdener T, Dogan M, Mollamahmutoglu L. Body mass index is an independent risk factor for the development of endometrial polyps in patients undergoing in vitro fertilization. *Fertil Steril*. 2009;91:1056–1060.
5. Dreisler E, Stampe Sorensen S, Ibsen PH, Lose G. Prevalence of endometrial polyps and abnormal uterine bleeding in a Danish population aged 20-74 years. *Ultrasound Obstet Gynecol*. 2009;33: 102–108.
6. Lieng M, Istre O, Qvigstad E. Treatment of endometrial polyps: a systematic review. *Acta Obstet Gynecol Scand*. 2010;89: 992–1002.
7. Hinckley MD, Milki AA. 1000 office-based hysteroscopies prior to in vitro fertilization: feasibility and findings. *JSLS*. 2004;8:103–107.
8. Fay TN, Khanem N, Hosking D. Out-patient hysteroscopy in asymptomatic postmenopausal women. *Climacteric*. 1999;2:263–267.

9. de Ziegler D. Contrast ultrasound: a simple-to-use phase-shifting medium offers saline infusion sonography-like images. *Fertil Steril*. 2009;92:369–373.
10. Martinez-Perez O, Perez-Medina T, Bajo-Arenas J. Ultrasonography of endometrial polyps. *Ultrasound Rev Obstet Gynecol*. 2003;3:43.
11. Lieng M, Istre O, Sandvik L, Qvigstad E. Prevalence, 1-year regression rate, and clinical significance of asymptomatic endometrial polyps: cross-sectional study. *J Minim Invasive Gynecol*. 2009;16: 465–471.
12. Haimov-Kochman R, Deri-Hasid R, Hamani Y, Voss E. The natural course of endometrial polyps: Could they vanish when left untreated? *Fertil Steril*. 2009;92:828.e11–828.e12.
13. Fabres C, am V, Balmaceda J, Zegers-Hochschild F, Mackenna A, Fernandez E. Comparison of ultrasonography and hysteroscopy in the diagnosis of intrauterine lesions in infertile women. *J Am Assoc Gynecol Laparosc*. 1998;5:375–378.
14. Anastasiadis PG, Koutlaki NG, Skaphida PG, Galazios GC, Tsikouras PN, Liberis VA. Endometrial polyps: prevalence, detection, and malignant potential in women with abnormal uterine bleeding. *Eur J Gynaecol Oncol*. 2000;21:180–183.
15. Nappi L, Indraccolo U, Di Spiezio Sardo A, et al. Are diabetes, hypertension, and obesity independent risk factors for endometrial polyps? *J Minim Invasive Gynecol*. 2009;16:157–162.
16. Nagele F, O'Connor H, Davies A, Badawy A, Mohamed H, Magos A. 2500 Outpatient diagnostic hysteroscopies. *Obstet Gynecol*. 1996;88: 87–92.
17. Reslová T, Tosner J, Resl M, Kugler R, Vávrová I. Endometrial polyps: a clinical study of 245 cases. *Arch Gynecol Obstet*. 1999; 262:133–139.
18. Vilodre LC, Bertat R, Petters R, Reis FM. Cervical polyp as risk factor for hysteroscopically diagnosed endometrial polyps. *Gynecol Obstet Invest*. 1997;44:191–195.
19. McBean JH, Gibson M, Brumsted JR. The association of intrauterine filling defects on hysterosalpingogram with endometriosis. *Fertil Steril*. 1996;66:522–526.
20. Clevenger-Hoeft M, Syrop CH, Stovall DW, Van Voorhis BJ. Sonohysterography in premenopausal women with and without abnormal bleeding. *Obstet Gynecol*. 1999;94:516–520.
21. Hann LE, tz EM, Bach AM, Francis SM. Sonohysterography for evaluation of the endometrium in women treated with tamoxifen. *AJR Am J Roentgenol*. 2001;177:337–342.
22. Cain J, Elmasri W, Gregory T, Kohn E. Chapter 41: gynecology. In: Brunicardi FC, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE, editors. *Schwartz's principles of surgery.* 9th ed. Columbus, OH: McGraw-Hill Professional.
23. Exacoustos C, Zupi E, Cangi B, Chiaretti M, Arduini D, Romanini C. Endometrial evaluation in postmenopausal breast cancer patients receiving tamoxifen: an ultrasound, color flow Doppler, hysteroscopic and histological study. *Ultrasound Obstet Gynecol*. 1995;6:435–442.
24. Dreisler E, Sorensen S, Lose G. Endometrial polyps and associated factors in Danish women aged 36–74 years. *Am J Obstet Gynecol*. 2009;200:e1–e6.
25. Maia H Jr, Barbosa IC, Marques D, Calmon LC, Ladipo OA, Coutinho EM. Hysteroscopy and transvaginal sonography in menopausal women receiving hormone replacement therapy. *J Am Assoc Gynecol Laparosc*. 1996;4:13–18.
26. Akkad AA, Habiba MA, Ismail N, Abrams K, al-Azzawi F. Abnormal uterine bleeding on hormone replacement: the importance of intrauterine structural abnormalities. *Obstet Gynecol*. 1995;86: 330–334.
27. Bakour S, Gupta J, Khan K. Risk factors associated with endometrial polyps in abnormal uterine bleeding. *Int J Gynaecol Obstet*. 2002;76: 165–168.
28. Perrone G, DeAngelis C, Critelli C, et al. Hysteroscopic findings in postmenopausal abnormal uterine bleeding: a comparison between HRT users and non-users. *Maturitas*. 2002;43:251–255.
29. Orvieto R, Bar-Hava I, Dicker D, Bar J, Ben-Rafael Z, Neri A. Endometrial polyps during menopause: characterization and significance. *Acta Obstet Gynecol Scand*. 1999;78:883–886.
30. Elliott J, Connor M, Lashen H. The value of outpatient hysteroscopy in diagnosing endometrial pathology in postmenopausal women with and without hormone replacement therapy. *Acta Obstet Gynecol Scand*. 2003;82:1112–1119.
31. Oguz S, Sargin A, Kelekci S, Aytan H, Tapisiz OL, Mollamahmutoglu L. The role of hormone replacement therapy in endometrial polyp formation. *Maturitas*. 2005;50:231–236.
32. Munro M, Critchley HO, Broder MS, Fraser IS. FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. *Int J Gynecol Obstet*. 2011;113:3–11.
33. Hassa H, Tekin B, Senses T, Kaya M, Karatas A. Are the site, diameter, and number of endometrial polyps related with symptomatology? *Am J Obstet Gynecol*. 2006;194:718–721.
34. Perez-Medina T, Bajo-Arenas J, Salazar F, et al. Endometrial polyps and their implication in the pregnancy rates of patients undergoing intrauterine insemination: a prospective, randomized study. *Hum Reprod*. 2005;20:1632–1635.
35. Bakour SH, Khan KS, Gupta JK. The risk of premalignant and malignant pathology in endometrial polyps. *Acta Obstet Gynecol Scand*. 2000;79:317–320.
36. Ben-Arie A, Goldchmit C, Laviv Y, et al. The malignant potential of endometrial polyps. *Eur J Obstet Gynecol Reprod Biol*. 2004;115: 206–210.
37. Ferrazzi E, Zupi E, Leone FP, et al. How often are endometrial polyps malignant in asymptomatic postmenopausal women? A multicenter study. *Am J Obstet Gynecol*. 2009;200:235.e1–235.e6.
38. Lieng M, Qvigstad E, Sandvik L, Jørgensen H, Langebrekke A, Istre O. Hysteroscopic resection of symptomatic and asymptomatic endometrial polyps. *J Minim Invasive Gynecol*. 2007;14:189–194.
39. Papadia A, Gerbaldo D, Fulcheri E, et al. The risk of premalignant and malignant pathology in endometrial polyps: should every polyp be resected? *Minerva Ginecol*. 2007;59:117–124.
40. Savelli L, De Iaco P, Santini D, et al. Histopathologic features and risk factors for benignity, hyperplasia, and cancer in endometrial polyps. *Am J Obstet Gynecol*. 2003;188:927–931.
41. Hileeto D, Fadare O, Martel M, Zheng W. Age dependent association of endometrial polyps with increased risk of cancer involvement. *World J Surg Oncol*. 2005;3:8.
42. Antunes A Jr, Costa-Paiva L, Arthuso M, Costa JV, Pinto-Neto AM. Endometrial polyps in pre- and postmenopausal women: factors associated with malignancy. *Maturitas*. 2007;57:415–421.
43. Machtinger R, Korach J, Padoa A, et al. Transvaginal ultrasound and diagnostic hysteroscopy as a predictor of endometrial polyps: risk factors for premalignancy and malignancy. *Int J Gynecol Cancer.* 2005; 15:325–328.
44. Shushan A, Revel A, Rojansky N. How often are endometrial polyps malignant? *Gynaecol Obstet Invest*. 2004;58:212–215.
45. Bernstein L, Deapen D, Cerhan JR, et al. Tamoxifen therapy for breast cancer and endometrial cancer risk. *J Natl Cancer Inst*. 1999;91: 1654–1662.
46. Kedar RP, Bourne TH, Powles TJ, et al. Effects of tamoxifen on uterus and ovaries of postmenopausal women in a randomised breast cancer prevention trial. *Lancet*. 1994;343:1318–1321.
47. DeWaay DJ, Syrop CH, Nygaard IE, Davis WA, Van Voorhis BJ. Natural history of uterine polyps and leiomyomata. *Obstet Gynecol*. 2002;100:3–7.
48. Hulka CA, Hall DA, McCarthy K, Simeone JF. Endometrial polyps, hyperplasia, and carcinoma in postmenopausal women: differentiation with endovaginal sonography. *Radiology.* 1994;191:755–758.
49. Schorge J, Schaffer JI, Halvorson LM, et al. Chapter 8. Abnormal uterine bleeding. In: Schorge JO, Halvorson LM, Hoffman BL, Bradshaw KD, Cunningham FG, editors. *Williams Gynecology.* Columbus: McGraw-Hill Professional. 2008.

50. Bernard JP, Rizk E, Camatte S, Robin F, Taurelle R, Lecuru F. Saline contrast sonohysterography in the preoperative assessment of benign intrauterine disorders. *Ultrasound Obstet Gynecol*. 2001;17: 145–149.
51. Nalaboff KM, Pellerito JS, Ben-Levi E. Imaging the endometrium: disease and normal variants. *Radiographics*. 2001;21:1409–1424.
52. Ragni G, Diaferia D, Vegetti W, Colombo M, Arnoldi M, Crosignani PG. Effectiveness of sonohysterography in infertile patient work-up: a comparison with transvaginal ultrasonography and hysteroscopy. *Gynecol Obstet Invest*. 2005;59:184–188.
53. Valenzano MM, Lijoi D, Mistrangelo E, Fortunato T, Costantini S, Ragni N. The value of sonohysterography in detecting intracavitary benign abnormalities. *Arch Gynecol Obstet*. 2005;272: 265–268.
54. Schwärzler P, Concin H, Bösch H, Berlinger A, Wohlgenannt K, Collins WP, Bourne TH. An evaluation of sonohysterography and diagnostic hysteroscopy for the assessment of intrauterine pathology. *Ultrasound Obstet Gynecol*. 1998;11:337–342.
55. Vercellini P, Cortesi I, Oldani S, Moschetta M, De Giorgi O, Crosignani PG. The role of transvaginal ultrasonography and outpatient diagnostic hysteroscopy in the evaluation of patients with menorrhagia. *Hum Reprod*. 1997;12:1768–1771.
56. Pasqualotto EB, Margossian H, Price LL, Bradley LD. Accuracy of preoperative diagnostic tools and outcome of hysteroscopic management of menstrual dysfunction. *J Am Assoc Gynecol Laparosc*. 2000;7:201–209.
57. Indman PD. Abnormal uterine bleeding. Accuracy of vaginal probe ultrasound in predicting abnormal hysteroscopic findings. *J Reprod Med*. 1995;40:545–548.
58. La Torre R, De Felice C, De Angelis C, Coacci F, Mastrone M, Cosmi EV. Transvaginal sonographic evaluation of endometrial polyps: a comparison with two dimensional and three dimensional contrast sonography. *Clin Exp Obstet Gynecol*. 1999;26:171–173.
59. Jakab A, Ovári L, Juhász B, Birinyi L, Bacskó G, Tóth Z. Detection of feeding artery improves the ultrasound diagnosis of endometrial polyps in asymptomatic patients. *Eur J Obstet Gynecol Reprod Biol*. 2005;119:103–107.
60. Timmerman D, Verguts J, Konstantinovic ML, et al. The pedicle artery sign based on sonography with color Doppler imaging can replace second-stage tests in women with abnormal vaginal bleeding. *Ultrasound Obstet Gynecol*. 2003;22:166–171.
61. Alcazar JL, Castillo G, Mínguez JA, Galán MJ. Endometrial blood flow mapping using transvaginal power Doppler sonography in women with postmenopausal bleeding and thickened endometrium. *Ultrasound Obstet Gynecol*. 2003;21:583–588.
62. Vuento MH, Pirhonen JP, Mäkinen JI, et al. Screening for endometrial cancer in asymptomatic postmenopausal women with conventional and colour Doppler sonography. *Br J Obstet Gynaecol*. 1999;106:14–20.
63. de Kroon C, Hiemstra E, Trimbos JB, Jansen FW. Power Doppler area in the diagnosis of endometrial cancer. *Int J Gynecol Cancer*. 2010;20: 1160–1165.
64. Goldstein SR, Monteagudo A, Popiolek D, Mayberry P, Timor-Tritsch I. Evaluation of endometrial polyps. *Am J Obstet Gynecol*. 2002;186:669–674.
65. Exalto N, Stappers C, van Raamsdonk LA, Emanuel MH. Gel instillation sonohysterography: first experience with a new technique. *Fertil Steril*. 2007;87:152–155.
66. Jansen FW, de Kroon CD, van Dongen H, Grooters C, Louwé L, Trimbos-Kemper T. Diagnostic hysteroscopy and saline infusion sonography: prediction of intrauterine polyps and myomas. *J Minim Invasive Gynecol*. 2006;13:320–324.
67. Syrop CH, Sahakian V. Transvaginal sonographic detection of endometrial polyps with fluid contrast augmentation. *Obstet Gynecol*. 1992;79:1041–1043.
68. Guven M, Bese T, Demirkiran F. Comparison of hydrosonography and transvaginal ultrasonography in the detection of intracavitary pathologies in women with abnormal uterine bleeding. *Int J Gynecol Cancer*. 2004;14:57–63.
69. Dijkhuizen F, De Vries LD, Mol BW, et al. Comparison of transvaginal ultrasonography and saline infusion sonography for the detection of intracavitary abnormalities in premenopausal women. *Ultrasound Obstet Gynecol*. 2000;15:372–376.
70. Preutthipan S, Linasmita V. A prospective comparative study between hysterosalpingography and hysteroscopy in the detection of intrauterine pathology in patients with infertility. *J Obstet Gynaecol Res*. 2003; 29:33–37.
71. Widrich T, Bradley LD, Mitchinson AR, Collins RL. Comparison of saline infusion sonography with office hysteroscopy for the evaluation of the endometrium. *Am J Obstet Gynecol*. 1996;174:1327–1334.
72. Makris N, Skartados N, Kalmantis K, Mantzaris G, Papadimitriou A, Antsaklis A. Evaluation of abnormal uterine bleeding by transvaginal 3-D hysterosonography and diagnostic hysteroscopy. *Eur J Gynaecol Oncol*. 2007;28:39–42.
73. Gimpelson RJ, Rappold HO. A comparative study between panoramic hysteroscopy with directed biopsies and dilatation and curettage. A review of 276 cases. *Am J Obstet Gynecol*. 1988;158(Pt 1):489–492.
74. Bettocchi S, Ceci O, Vicino M, Marello F, Impedovo L, Selvaggi L. Diagnostic inadequacy of dilatation and curettage. *Fertil Steril*. 2001;75:803–805.
75. Svirsky R, Smorgick N, Rozowski U, et al. Can we rely on blind endometrial biopsy for detection of focal intrauterine pathology? *Am J Obstet Gynecol*. 2008;199:115.e1–115.e3.
76. Hamou J. *Hysteroscopy and micro-colopo-hysteroscopy: text and atlas*. Norwalk: Appleton & Lange; 1991.
77. Makris N, Kalmantis K, Skartados N, Papadimitriou A, Mantzaris G, Antsaklis A. Three-dimensional hysterosonography versus hysteroscopy for the detection of intracavitary uterine abnormalities. *Int J Gynecol Obstet*. 2007;97:6–9.
78. Birinyi L, Daragó P, Török P, et al. Predictive value of hysteroscopic examination in intrauterine abnormalities. *Eur J Obstet Gynecol Reprod Biol*. 2004;115:75–79.
79. Lo KW, Yuen PM. The role of outpatient diagnostic hysteroscopy in identifying anatomic pathology and histopathology in the endometrial cavity. *J Am Assoc Gynecol Laparosc*. 2000;7:381–385.
80. Bettocchi S, Ceci O, Nappi L, et al. Operative office hysteroscopy without anesthesia: analysis of 4863 cases performed with mechanical instruments. *J Am Assoc Gynecol Laparosc*. 2004;11:59–61.
81. Clark TJ, Khan KS, Gupta JK. Current practice for the treatment of benign intrauterine polyps: a national questionnaire survey of consultant gynaecologists in UK. *Eur J Obstet Gynecol Reprod Biol*. 2002;103: 65–67.
82. Grossman J, Ricci ZJ, Rozenblit A, Freeman K, Mazzariol F, Stein MW. Efficacy of contrast-enhanced CT in assessing the endometrium. *AJR Am J Roentgenol*. 2008;191:664–669.
83. Lieng M, Istre O, Sandvik L, Engh V, Qvigstad E. Clinical effectiveness of transcervical polyp resection in women with endometrial polyps: randomized controlled trial. *J Minim Invasive Gynecol*. 2010;17:351–357.
84. Vercellini P, Trespidi L, Bramante T, Panazza S, Mauro F, Crosignani PG. Gonadotropin releasing hormone agonist treatment before hysteroscopic endometrial resection. *Int J Gynecol Obstet*. 1994;45:235–239.
85. Gardner FJ, Konje JC, Bell SC, et al. Prevention of tamoxifen induced endometrial polyps using a levonorgestrel releasing intrauterine system long-term follow-up of a randomised control trial. *Gynecol Oncol*. 2009;114:452–456.
86. Moghal N. Diagnostic value of endometrial curettage in abnormal uterine bleeding—a histopathological study. *J Pak Med Assoc*. 1997; 47:295–299.
87. Gebauer G, Hafner A, Siebzehnrübl E, Lang N. Role of hysteroscopy in detection and extraction of endometrial polyps: Results of a prospective study. *Am J Obstet Gynecol*. 2001;184:59–63.

88. Loffer FD. Hysteroscopy with selective endometrial sampling compared with D&C for abnormal uterine bleeding: the value of a negative hysteroscopic view. *Obstet Gynecol*. 1989;73:16–20.
89. Preutthipan S, Herabutya Y. Hysteroscopic polypectomy in 240 premenopausal and postmenopausal women. *Fertil Steril*. 2005;83: 705–709.
90. Golan A, Sagiv R, Berar M, Ginath S, Glezerman M. Bipolar electrical energy in physiologic solution—a revolution in operative hysteroscopy. *J Am Assoc Gynecol Laparosc*. 2001;8:252–258.
91. Vilos GA. Intrauterine surgery using a new coaxial bipolar electrode in normal saline solution (Versapoint): a pilot study. *Fertil Steril*. 1999; 72:740–743.
92. Emanuel MH, Wamsteker K. The Intra Uterine Morcellator: a new hysteroscopic operating technique to remove intrauterine polyps and myomas. *J Minim Invasive Gynecol*. 2005;12:62–66.
93. van Dongen H, Emanuel MH, Wolterbeek R, Trimbos JB, Jansen FW. Hysteroscopic morcellator for removal of intrauterine polyps and myomas: a randomized controlled pilot study among residents in training. *J Minim Invasive Gynecol*. 2008;15: 466–471.
94. Deans R, Abbott J. Review of intrauterine adhesions. *J Minim Invasive Gynecol*. 2010;17:555–569.
95. Taskin O, Sadik S, Onoglu A, et al. Role of endometrial suppression on the frequency of intrauterine adhesions after resectoscopic surgery. *J Am Assoc Gynecol Laparosc*. 2000;7:351–354.
96. Brooks PG, Loffer FD, Serden SP. Resectoscopic removal of symptomatic intrauterine lesions. *J Reprod Med*. 1989;34:435–437.
97. Nathani F, Clark TJ. Uterine polypectomy in the management of abnormal uterine bleeding: a systematic review. *J Minim Invasive Gynecol*. 2006;13:260–268.
98. Henriquez DD, van Dongen H, Wolterbeek R, Jansen FW. Polypectomy in premenopausal women with abnormal uterine bleeding: effectiveness of hysteroscopic removal. *J Minim Invasive Gynecol*. 2007; 14:59–63.
99. Spiewankiewicz B, Stelmachów J, Sawicki W, Cendrowski K, Wypych P, Swiderska K. The effectiveness of hysteroscopic polypectomy in cases of female infertility. *Clin Exp Obstet Gynecol*. 2003;30: 23–25.
100. Valle RF. Therapeutic hysteroscopy in infertility. *Int J Fertil*. 1984;29: 143–148.