Endometrial Ablation: More Choices, More Options

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With the development of multiple new endometrial ablation techniques, there is a skills-appropriate procedure for almost every gynecologist, bringing this outpatient alternative to more patients than ever.

More than 600,000 hysterectomies are performed annually in the United States, 25% to 30% of which have a primary indication of menorrhagia.[1] Consequently, a broad spectrum of endometrial ablation techniques have been developed to avoid the morbidity of hysterectomy with a simpler outpatient alternative. These techniques all have unique strengths, weaknesses, and potential complications that can be matched with individual physician and patient needs.

Numerous endometrial ablation techniques have been described since 1981, beginning with the Nd:YAG laser and the rollerball/resectoscope.[2] The complication rates have been low for the laser and rollerball, at 2.7% and 2.1% respectively.[3] By contrast, the complication rate for resection is about 11-fold higher.[4] Nonetheless, these techniques still produce less morbidity and a quicker return to work than hysterectomy. They all require operative hysteroscopy, though, in which relatively few gynecologists are proficient. As a result, nonhysteroscopic techniques have been developed to allow more gynecologists to add endometrial ablations to their armamentarium.

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REVIEW OF TECHNIQUES

Current endometrial ablation procedures can be divided into hysteroscopic and nonhysteroscopic (Table 1). While concomitant ultrasonography or preprocedure/postprocedure hysteroscopy is recommended for most of these modalities, the majority are performed without direct visualization (ie, "blind"). In addition to the Nd:YAG laser and electrosurgery (eg, rollerball, resection), direct-visualization hysteroscopic techniques now include the use of controlled, freely circulating heated saline solution (hydrothermal ablation [HTA]).[5]

The first of the nonhysteroscopic techniques, the thermal balloon, uses a 5-mm probe with an attached balloon (originally latex, now silicone) (Figure 1). This balloon is inserted into the endometrial cavity, and then expanded to fit. First designed for passive heat transfer from fluid inside the balloon, the device now employs intraballoon fluid circulation. Preoperative suction curettage is recommended,[6] and some experts are using preprocedure

TABLE 1. Endometrial Ablation Techniques

Hysteroscopic
- Nd:YAG laser
- Electrosurgery (rollerball, resection)
- Heated saline (hydrothermal ablation)

Nonhysteroscopic
- Balloon
- Cryotherapy
- Bipolar radiofrequency probe
- Microwave

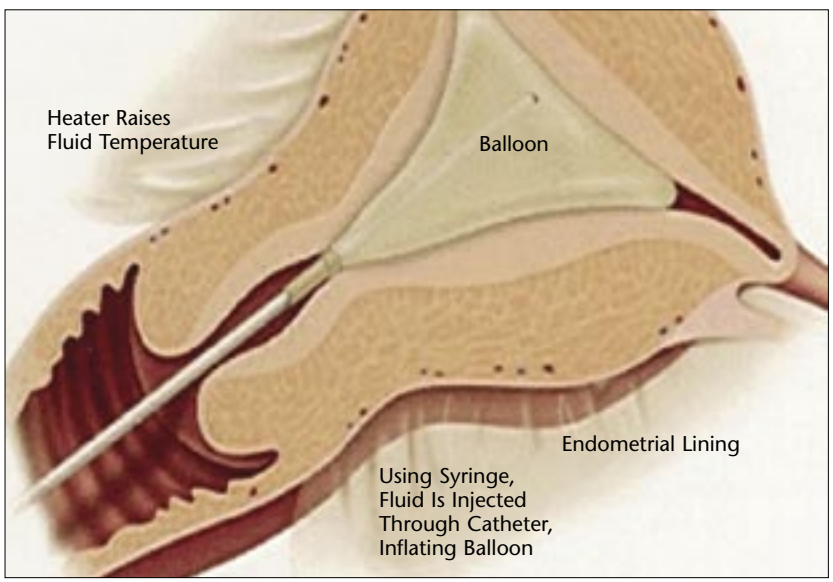
hormone therapy with antiestrogens. Success is defined as a score of ≤ 75 on a pictorial bleeding assessment chart (PBAC) (Figure 2). The only significant potential complication is endometritis (2.4%), and the 5-year success rate is 68% versus 69% for the rollerball.

Cryotherapeutic ablation uses a 5.5-mm probe with liquid nitrogen coolant. It requires at least two freeze-thaw cycles, causing a 3.5-cm x 5-cm ice ball to form; the size of the uterine cavity dictates the number of ice balls needed. Ultrasonography is required during the procedure. No hormonal pretreatment is recommended. The most prevalent problem is device malfunction (25.9%). Although the PBAC score was similar to rollerball at 12 months (67.4% versus 73.3%), the amenorrhea rate was only 22.2% for the cryoprobe versus 46.5% for the rollerball.[7,8]

The bipolar radiofrequency device uses suction with a 7.5-mm probe. The technique draws the endometrium to the device, evacuating steam and by-products of ablation. This impedance-based treatment requires preoperative assessment of the length and width of the uterine cavity, with hysteroscopy recommended preprocedure and postprocedure. The device theoretically should ablate the cornual areas better than other techniques, and it offers greater speed.[9,10] The 12-month studies show amenorrhea rates equal to the rollerball, but the device malfunction rate is 11.6%. The complication rate is low, but bowel injuries have been reported.[11,12]

The microwave modality employs a graduated, 8.8-mm probe. Pretreatment ultrasonography is recommended, with preprocedure and postprocedure hysteroscopy. The operator maintains continuous motion, taking 3 to 4 minutes in total. Pretreatment uterine preparation with a gonadotropin-releasing hormone (GnRH) agonist (eg, leuprolide) is recommended.[13] Key safety issues include the inability of preprocedure hysteroscopy to identify landmarks such as the right and left cornua, and differences in cavity length verification between sounding and the microwave probe; if this discrepancy exceeds 5 mm, the procedure should be aborted. In addition, the temperature indicator on the monitor may fluctuate, with an abnormal rise possibly indicating incorrect probe placement or uterine perforation (Figure 3). The 12-month success rate is comparable to the rollerball, at 96% and 93%, respectively, and amenorrhea rates are 61% versus 51%.[14] There is some potential for perforation and bowel injury with less experienced operators.

FIGURE 1. Thermal balloon technique for endometrial ablation.



Hydrothermal ablation is performed under direct visualization, and is essentially a diagnostic hysteroscopy with additional capabilities.[15,16] Depending on the results of preoperative hysteroscopy, the surgeon may abort treatment or proceed. As the heated saline solution is introduced, the operator can literally watch the endometrial cavity change from red to white. Fluid leakage into the fallopian tubes is rare, requiring pressure ≥ 70 mm Hg. The procedure is halted immediately with a fluid loss > 10 mL. A tight seal on the cervix is mandatory, and can usually be achieved with one or two single-tooth tenacula. Some experts use endoloops or cerclage to ensure a good seal if the cervix is very patulous. A 4-cm x 8-cm gauze pad can be placed in the posterior fornix to catch any fluid. Reports of complications include minor damage to the external genitalia and bowel injuries.[17] Parameters for the various ablation techniques are listed in Table 2.

Amenorrhea and overall success rates for the various procedures are cited in Table 3. With regard to amenorrhea, 3-year rates are lowest for the balloon, cryotherapy, and bipolar radiofrequency techniques (Figures 4 and 5). "Success" refers to the amenorrhea rate plus the percentage of patients who are satisfied with the postprocedure reduction in bleeding.

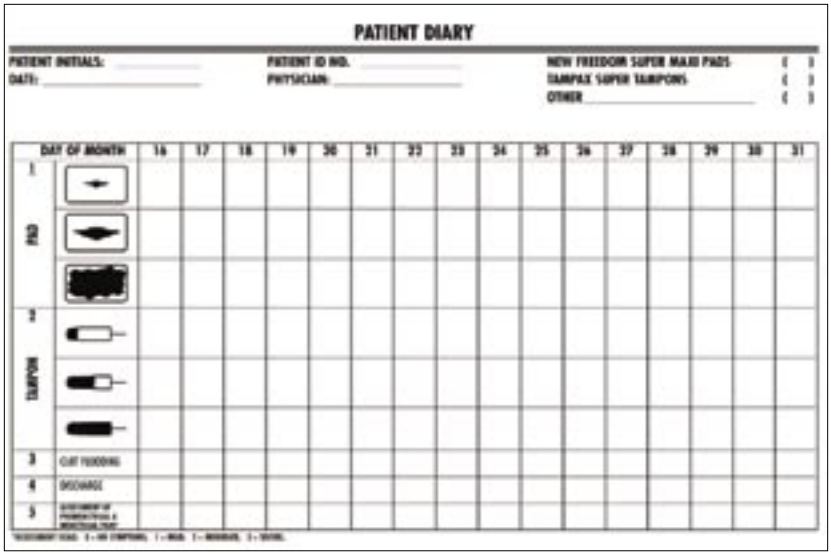


FIGURE 2. Pictorial bleeding assessment chart.

OTHER CONSIDERATIONS

A patient who has painless menorrhagia and whose uterus is not too enlarged may be a candidate for endometrial ablation. However, if she is experiencing pain due to uterine enlargement, hysterectomy may be preferable. Candidates should generally also have documented benign pathology, progestin resistance/intolerance, and no desire for future pregnancy. If the patient undergoes ablation and does not have a satisfactory reduction in bleeding, she can either undergo a repeat procedure or opt for hysterectomy. Patients who undergo repeat procedures may benefit from 6 months of preprocedure hormone treatment. Such pretreatment yields higher postprocedure amenorrhea and success rates, with similar results for progesterone, oral contraceptives, or GnRH agonists.[18-21] With-

FIGURE 3. Placement of microwave probe for endometrial ablation. Inset shows temperature monitor.

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TABLE 2. Comparison of Endometrial Ablation Technologies

	Balloon	Cryotherapy	Bipolar Radiofrequency	Microwave	Hydrothermal
Vision	Introduced blindly Possible activation in false passage	Introduced blindly Possible activation in false passage Requires concurrent ultrasonography	Introduced blindly Possible activation in false passage	Introduced blindly Possible activation in false passage	Direct visualization Requires visual confirmation of proper position before activation
Anatomy	Cavity ≤ 10 cm Includes intramural fibroids ≤ 2 cm	Cavity ≤ 10 cm Includes intramural fibroids ≤ 2 cm	Cavity ≤ 10 cm Includes intramural fibroids ≤ 2 cm	Cavity ≤ 14 cm Includes fibroids ≤ 3 cm	Cavity ≤ 10.5 cm Includes irregular shapes and bicornuate/ septate uteri
Fibroid Size	No stipulations	≤ 2 cm	≤ 2 cm	≤ 3 cm	≤ 4 cm
Energy	Heat	Liquid nitrogen	Impedance (radio frequency)	Microwave (9.2 GHz)	Heated saline solution
Temperature	87°C	90°C (per 3.5-5 cm ball)			80-90°C
Time	8 min	10-20 min	90 sec	3-4 min	10 min
Pressure/ Manipulation	160-180 mm Hg High pressure may cause discomfort	Probe movement may cause discomfort	Probe movement may cause discomfort Electrostimulation may induce muscle spasm	Probe movement may cause discomfort	Gravity pressure Low pressure and lack of probe movement minimizes discomfort

out pretreatment, ablation performed on a thickened endometrial lining will remove approximately 4 to 5 mm of surface depth. Pretreatment reduces the endometrial depth, resulting in more complete ablation. Thus, omitting pretreatment may produce a higher failure rate for initial procedures.

A multistudy review has shown that all endometrial ablation techniques are essentially comparable, regardless of hormonal pretreat-

TABLE 3. Comparative Amenorrhea/Success Rates for Endometrial Ablation

	Balloon	Cryotherapy	Bipolar Radiofrequency	Microwave	Hydrothermal Ablation	Rollerball
Postprocedure Interval	3 y	1 y	3 y	1 y	3 y	3 y
Amenorrhea	15%	22%	44%	61%	53%	51%
Satisfactory Reduction in Bleeding	53%	45%	43%	35%	41%	42%
Success	68%	67%	87%	96%	94%	93%

ment.[22] The HTA system does offer direct visualization and somewhat greater flexibility by accommodating a larger uterine size, larger fibroids, and partially septate/bicornuate uteri. Endometrial ablation can effectively replace 30% of hysterectomies. It is an outpatient procedure and can often be performed using local anesthesia. Recovery time is minimal, with a low complication rate.

CONCLUSION

With a number of endometrial ablation techniques available, gynecologists ranging from novice to master hysteroscopist can evaluate their individual skills and adopt the procedure with the best "fit." Today, most menorrhagic patients can be offered an outpatient alternative to hysterectomy, achieving less or no bleeding with a greatly reduced risk of morbidity.

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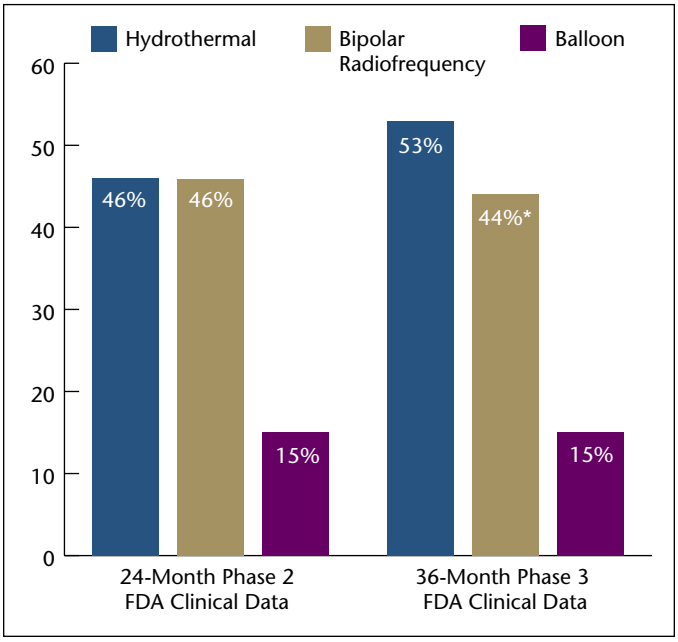

FIGURE 4. Comparative clinical data for endometrial ablation technologies.†

FDA = US Food and Drug Administration.

*This data has not been published, however, it has been presented during a podium presentation during the 2005 AAGL Annual Meeting.

†No direct comparison can be made due to differences in manufacturer's clinical study protocol.

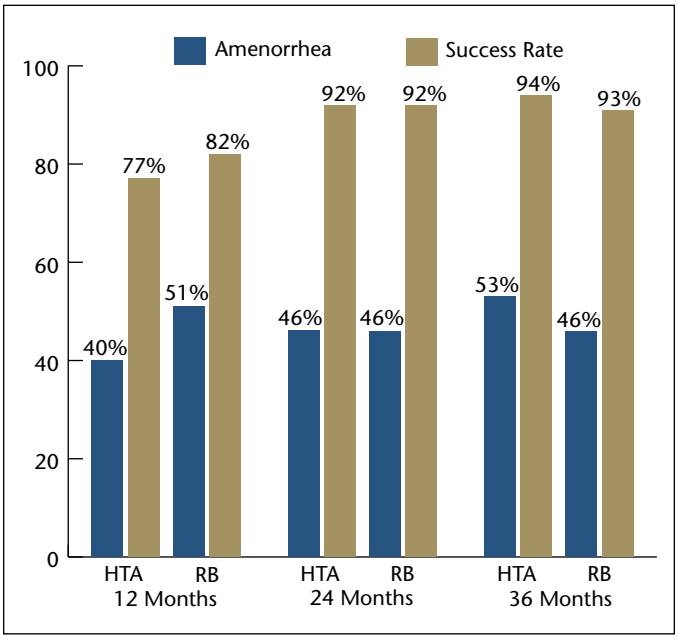

FIGURE 5. Clinical data for hydrothermal ablation results.*

HTA = hydrothermal ablation; RB = rollerball.

*This table presents the per protocol results of the Phase 3 study data.

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This reprint is an edited version of the original CME article that appeared in The Female Patient. *2005;30(12):35-40.*

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