



Ultrasound-guided Reoperative Hysteroscopy: Managing Endometrial Ablation Failures

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ABSTRACT

Endometrial ablation and hysteroscopic myomectomy and polypectomy are having an increasing impact on the care of women with abnormal uterine bleeding (AUB). The complications of these procedures include the late onset of recurrent vaginal bleeding, cyclic lower abdominal pain, hematometra and the inability to adequately sample the endometrium in women with postmenopausal bleeding. According to the 2007 ACOG Practice Bulletin, approximately 24% of women treated with endometrial ablation will undergo hysterectomy within 4 years.¹

By employing careful cervical dilation, a wide variety of gynecologic resectoscopes, and continuous sonographic guidance it is possible to explore the entire uterine cavity in order to locate areas of sequestered endometrium, adenomyosis, and occult hematometra.

Sonographically guided reoperative hysteroscopy offers a minimally invasive technique to avoid hysterectomy in over 60% to 88% of women who experience endometrial ablation failures.^{2,3} The procedure is adaptable to an office-based setting and offers a very low incidence of operative complications and morbidity. In addition, the technique provides a histologic specimen, which is essential in adequately evaluating the endometrium in postmenopausal women or women at high risk for the development of adenocarcinoma of the endometrium.

INTRODUCTION

Endometrial ablation [EA] has been an important addition to the gynecologic armamentarium for the treatment of abnormal uterine bleeding. The first techniques utilized an operative hysteroscope in combination with either a neodymium:YAG laser⁴ or a surgical electrode.^{5,6} Since 1995, five non-resectoscopic endometrial ablation (NREA) devices have been introduced and extensively employed to manage AUB in women who have completed their childbearing.⁷ Oftentimes, EA is combined with hysteroscopic polypectomy or myomectomy to optimize the management of AUB.⁸

It is well known that of women who undergo EA a significant number will eventually require a hysterectomy. Longinotti et al. analyzed the long-term results of 3,681 women undergoing endometrial ablation at 30 Kaiser Permanente Northern California facilities and noted 26% required hysterectomy during the 8-year follow-up period.⁹ The ACOG Practice Bulletin, May 2007 edition, states that hysterectomy rates within 4 years following both resectoscopic and NREA are at least 24%.¹

The late complications of EA are three-fold: persistent or recurrent vaginal bleeding,⁸ cyclic pelvic pain,⁹ and the inability to adequately assess the endometrium in women who later require sampling.¹⁰

Troublesome vaginal bleeding, may occur months or years following EA and has been attributed to inadequate endometrial destruction,^{11,12} unsuspected deep adenomyosis,¹³ or the occurrence of new pathology — myomata, endometrial hyperplasia, or cancer.

Pelvic pain is generally cyclic and has been attributed to cornual and central hematometra¹⁰ as well as the post-ablation tubal sterilization syndrome (PATSS).¹⁴ McCausland et al. note that the etiology of cyclic pelvic pain “following both resectoscopic and nonresectoscopic endometrial ablations is due to the intrauterine scarring and contracture that can occur following the procedure.”¹⁰ Hopkins et al. performed hysterosalpingograms on 21 women at 3-, 6-, and 9-month intervals following radiofrequency global endometrial ablation and observed that intrauterine synechiae actually increased throughout the observation period suggesting that the uterus continues to undergo remodeling long after the original procedure.¹⁵

The inability to adequately assess the uterine cavity is an important and under-reported delayed complication following EA. Ahonkallio et al. demonstrated that endometrial biopsies failed in 23% of women with previous EA and were likely unreliable in many of the remaining patients given that endometrium is often trapped in the cornual region, which is frequently inaccessible. Any of these delayed complications are sufficient reasons for performing hysterectomies.¹⁶

Several authors, however, have reported “repeat” or “reoperative” endometrial ablation procedures. In 1992 Gimpelson reported a series of 16 women who underwent repeat EA utilizing either a hysteroscopic Nd:YAG or an electro-surgical technique; all were able to successfully avoid hysterectomy during the study period.¹⁷ In a series of 118 women who were offered reoperative hysteroscopic surgery (RHS), Istre et al.¹⁸ were successful in avoiding hysterectomy in 72% of the subjects during a mean follow-up period of 22 months. In 2001, the author reported a series of 26 women who had undergone sonographically guided RHS following EA failures and noted that hysterectomy was avoided in 88.5% during a mean follow-up period of 23.2 ± 22.7 months.³

The author believes that the use of a sonographically guided hysteroscopic resection technique provides two distinct

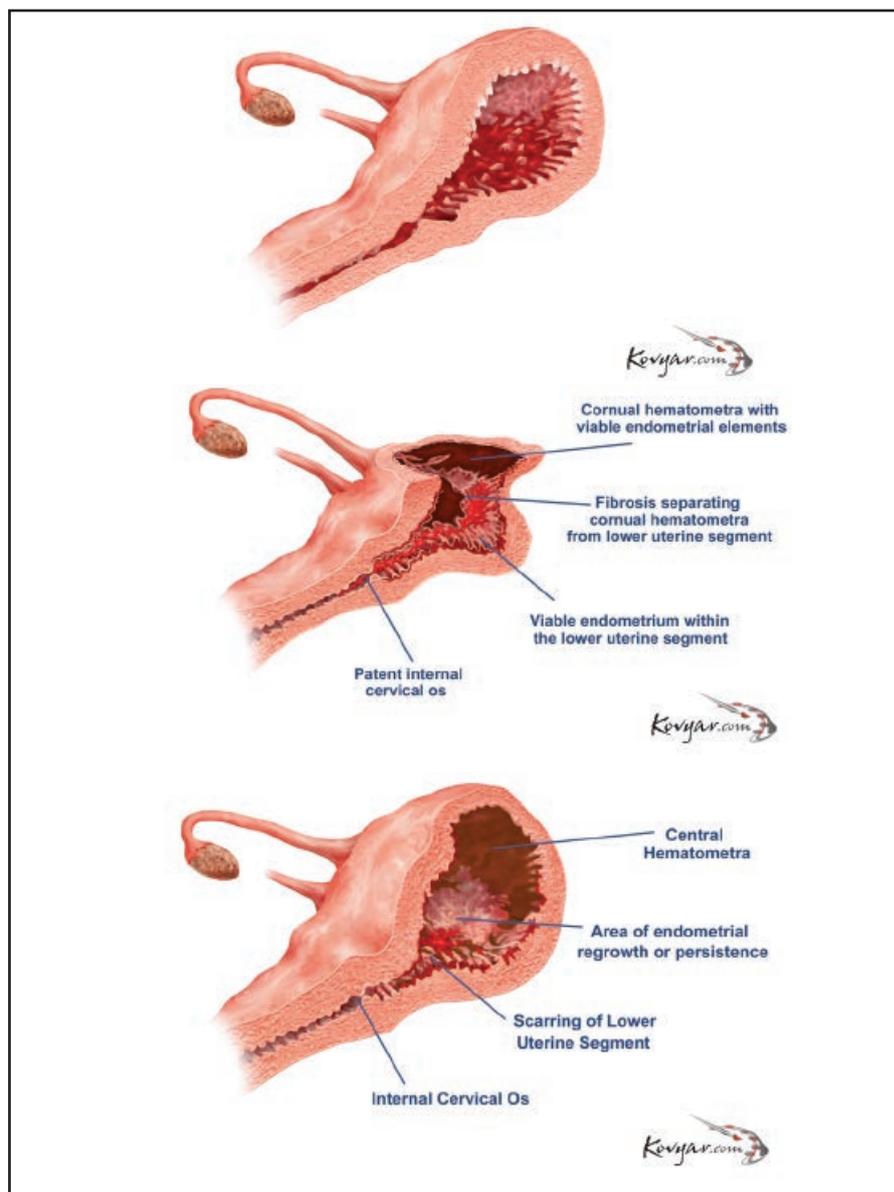


Figure 1. Three groups of women requiring reoperative hysteroscopic surgery (RHS).



Figure 2. Transvaginal ultrasound demonstrating hematometra.

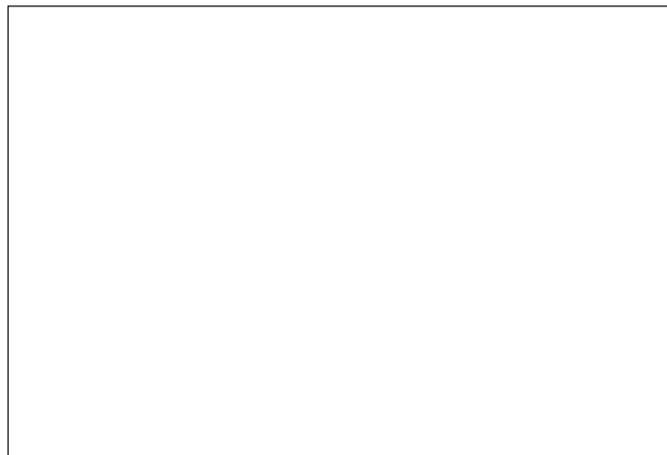


Figure 3. Transvaginal ultrasound demonstrating endometrial regrowth.

advantages over other methods of RHS. First, sonographic guidance is an excellent tool for locating areas of hematometra, endometrial regrowth, and leiomyomas in a setting where standard intrauterine landmarks are often absent. Second, hysteroscopic resection techniques provide ample tissue for histologic analysis, an important requirement in the management of women with a history of abnormal peri-menopausal or postmenopausal bleeding and a prior EA. This paper will summarize the author's technique, which has evolved over the past two decades and is now performed in an office-based setting.

Indications for Reoperative Hysteroscopic Surgery (RHS)

The indications for RHS fall into the three groups (Fig. 1) already mentioned: those who experience recurrent vaginal bleeding, cyclic pelvic pain, or require endometrial sampling because of abnormal perimenopausal or postmenopausal bleeding. In addition, there is a fourth group of women who develop asympto-

matic hematometra as an incidental finding on ultrasound or MRI generally performed for another reason. This latter group is usually amenorrheic but may require endometrial sampling depending on their age and risk factors for developing endometrial cancer.

Preoperative Evaluation

The most important preoperative tool is a good history. Often the history is straightforward; a woman with a previous EA presents with gradually increasing vaginal bleeding accompanied by few if any cramps. In other instances, the patient may present with severe lower abdominal pain accompanied by little or no vaginal bleeding. The pain may be suprapubic or localized to one of the lower quadrants; it is often described as suprapubic "sharp," "stabbing," "cramping," or even "labor-like" in quality. On occasion, the pain may be localized to the lower back or in one of the lower quadrants. When the pain is unaccompanied by vaginal bleeding the diagnosis is often delayed. In general, the

pain will resolve spontaneously within a few days only to recur the next cycle.

A pelvic examination and transvaginal ultrasound (TVUS) are best performed when the patient is symptomatic. The former often reveals uterine tenderness without cervical motion or adnexal tenderness. The latter often reveals the presence of one or more hematometrae (Fig. 2). In some instances well-circumscribed areas of endometrium may be found in the cornua (Fig. 3) or scattered along the central uterine axis. Additionally, ultrasound may be useful in the diagnosis of PATSS. Advanced studies such as sonohysterography or hysterosalpingography are often painful and add little to the evaluation.

In determining whether or not pelvic pain is related to a previous EA the use of endometrial suppressive agents — oral contraceptives, leuprolide acetate, danazol, and medroxyprogesterone — may be helpful in establishing the diagnosis. The improvement of pelvic pain with endometrial suppression, however, is not specific to the diagnosis of hematometra or endometrial regrowth. However, the failure of symptoms to resolve with endometrial suppression strongly suggests another etiology.

Who are good candidates for RHS?

Once the diagnosis has been established several factors must be weighed in determining whether or not the patient is an appropriate candidate for RHS. Although there is little evidence-based data at this time the author believes that appropriate candidates for RHS include women who meet the criteria listed in Table I.

Table I Candidacy for Reoperative Hysteroscopy: Factors to Consider
A symptom-free interval following the initial EA of at least 1 year Women who are 45 years of age or older Uterine dimensions <12 cms long, < 6 cms AP, and < 7 cms transverse Absence of multiple intramural leiomyomas Absence of severe adenomyosis Highly motivated women Subjects are well informed of risks, consequences, and alternatives



Figure 4. Laminaria japonica placed under ultrasound guidance.



Figure 5. Operating room setup.

Patient Preparation

Once the decision has been made to perform RHS, it is best to schedule surgery in the presence of symptoms or clear ultrasound findings. One should refrain from using endometrial suppressive agents during the cycle prior to RHS.

We insist that patients undergoing RHS undergo cervical dilation and laminaria placement the day prior to surgery. This is done under minimal to moderate sedation. Patients are forewarned that the evening prior to RHS can be quite uncomfortable as the laminaria often expands against a fibrotic lower uterine segment.

Laminaria placement is preceded by careful dilation under sonographic guidance with Hegar dilators. Generally, a 3- or 4-mm laminaria is sufficient for this purpose and should be passed well beyond the internal cervical os (Fig. 4). Patients are given prescriptions for NSAIDs or opiates and asked to not eat or drink anything prior their procedure.

Equipment, Setup, and Personnel for RHS

The equipment and personnel utilized for RHS are identical to what the author has reported for sonographically guided hysteroscopic endomyometrial resection.¹⁹ Low-viscosity fluids are delivered through one of several fluid-management systems at initial pump settings varying from 100 to 180 mm Hg. Fluids are allowed to egress by gravity alone during the resection phase of the procedure. Active suction may be supplied during the coagulation phase in order to remove as many water vapor bubbles as possible.

Our operating room (Fig. 5) is equipped with an Autocon II 400 (Karl Storz Endoscopy, Culver City, CA) enabling us to utilize both unipolar and bipolar electrosurgery. Unipolar electrosurgery is generally performed at 140 watts of C-Cut, effect 4, during the resection phase and 120 watts of forced coagulation current, effect 4, for the ablation portion of the procedure.

Whenever bipolar electrosurgery is used, a saline-C-cut, effect 5, setting is employed. During unipolar electrosurgery, glycine 1.5% is used for distention; normal saline is used during bipolar electrosurgery.

Most cases are performed with either a 22 Fr or a 26 Fr continuous flow resectoscope (CFR), the former being preferred during earlier portions of the case. A variety of ultrasound machines have been used over the past decades. We presently use a Siemens Acuson X150 (Siemens Corp., New York, NY) equipped with a variable frequency abdominal transducer in order to provide continuous sonographic monitoring. Our operating room is outfitted with two side-by-side monitors that facilitate real-time observation (Fig. 6). All procedures are digitally recorded using a MediCapture USB 200 (MediCapture, Inc., Philadelphia, PA).

Most cases are presently performed in an office setting and require a minimum of 4 assistants. The first assistant



Figure 6. Operating room with monitors side by side.

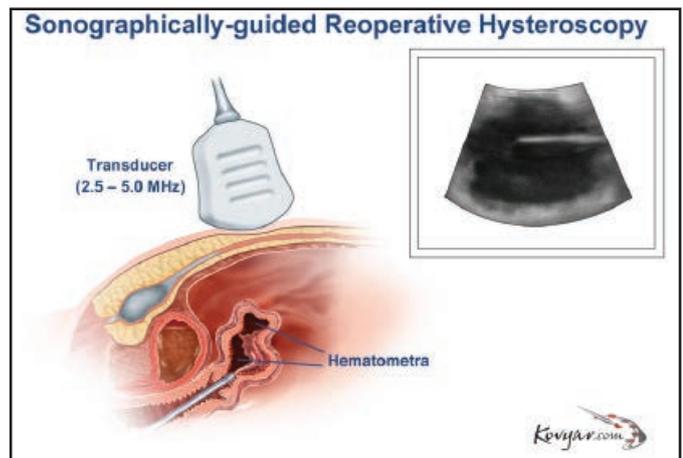


Figure 7. New Igor drawing of ultrasound-guided reoperative hysteroscopic surgery.



stands to the operator's left while the sonographer stands to the right. A fluid management technician is responsible for all functions related to the hysteroscopy pump and reports the rate of fluid absorption as well as the net fluid deficit. The fourth member of the team is an appropriately trained and credentialed registered nurse who administers midazolam and fentanyl while monitoring the patient for her level of consciousness.

PROCEDURE

The procedure is begun by removing the previously placed laminaria and prepping the cervix and vagina with a bactericidal solution. The cervix is grasped at 12 o'clock with a tenaculum. Next, a vasopressin solution containing 2.5 units in 20 mL saline is injected deep into the cervical stroma at 3 and 9 o'clock using a 21-gauge x 1½-inch needle. The cervix is carefully dilated under sonographic guidance to either 8 mm (for a 22 Fr CFR) or 10 mm (for a 26 Fr CFR). Glycine 1.5% is delivered at a pump infusion pressure of 120 to 180 mm Hg. We carefully monitor fluid absorption and adjust the infusion pressure accordingly. In the presence of a small or tubular cavity the initial resection is carried out on the thickest uterine wall, which is often the posterior or anterior wall. Even in the presence of poor hysteroscopic visualization this first critical strip is removed by extending the loop approximately 7 mm and removing a continuous ribbon of tissue from the upper reaches of the cavity to the internal os, a maneuver performed

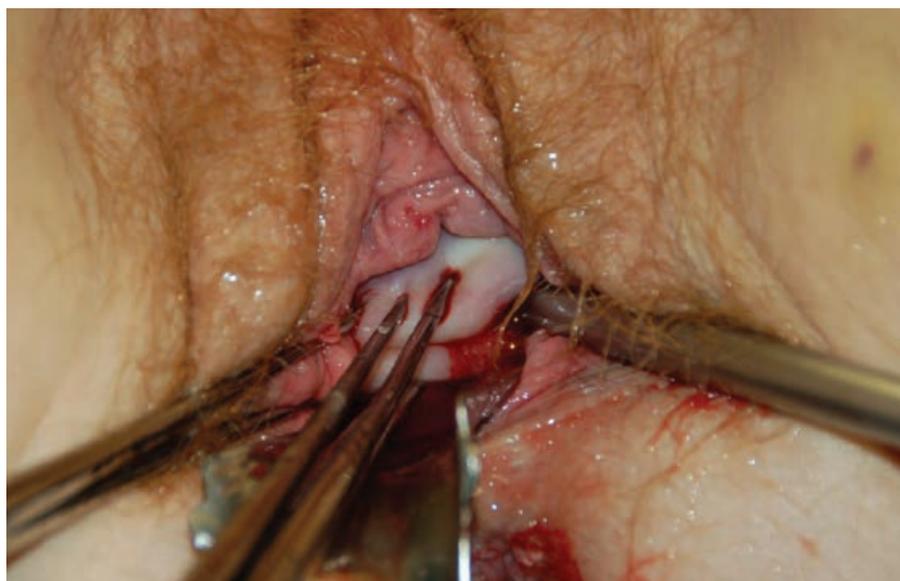


Figure 8. Two-tenaculae technique.

almost entirely with ultrasound guidance (Fig. 7). In most cases, the removal of this tissue strip provides sufficient room within the uterine cavity so that continuous flow and visualization are facilitated. Once this central cavity is established the resection margin is widened in all quadrants with care to leave at least 5 mm to 10 mm of tissue from the central cavity to the uterine serosa at any given point. It is important to keep the uterine cavity well distended allowing an adequate "sonohysterogram" during the procedure. This is done by maintaining sufficient pump pressure and minimizing extravasation of fluid from the cervix; the latter can be accomplished by placing additional tenaculae at the 3 or 9 o'clock positions (Fig. 8). Unlike endomyometrial resection (EMR),²⁰ there is no predetermined order of resection. Each case is

highly variable, and the particular path of dissection is determined by both the intrauterine and sonographic findings, the two complementing each other.

Initial inspection of the cavity may reveal active endometrial elements. In some cases, islands of endometrium are hemosiderin-stained, especially if the area has been contained within a sequestered hematometra. The extent of intrauterine adhesions (IUA) can be quite variable. In some instances there are few, if any, IUA — this is especially true when RHS is offered to women who have received little relief of their menstrual symptoms and in whom new-onset cyclic pelvic pain is not a major presenting problem. In other clinical scenarios, initial inspection reveals virtually no endometrial elements; this is especially true if there is a sequestered area of endometrium or a hematome-

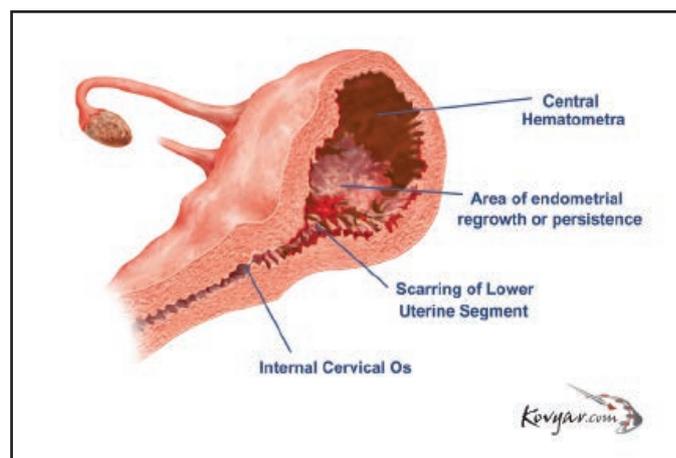


Figure 9. Igor drawing of centrally located hematometra.

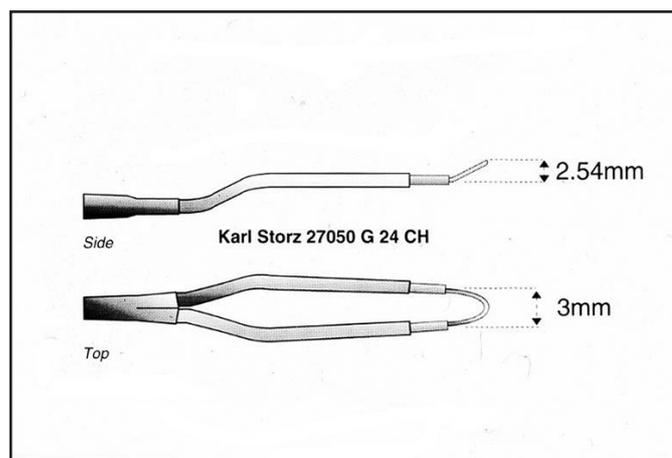
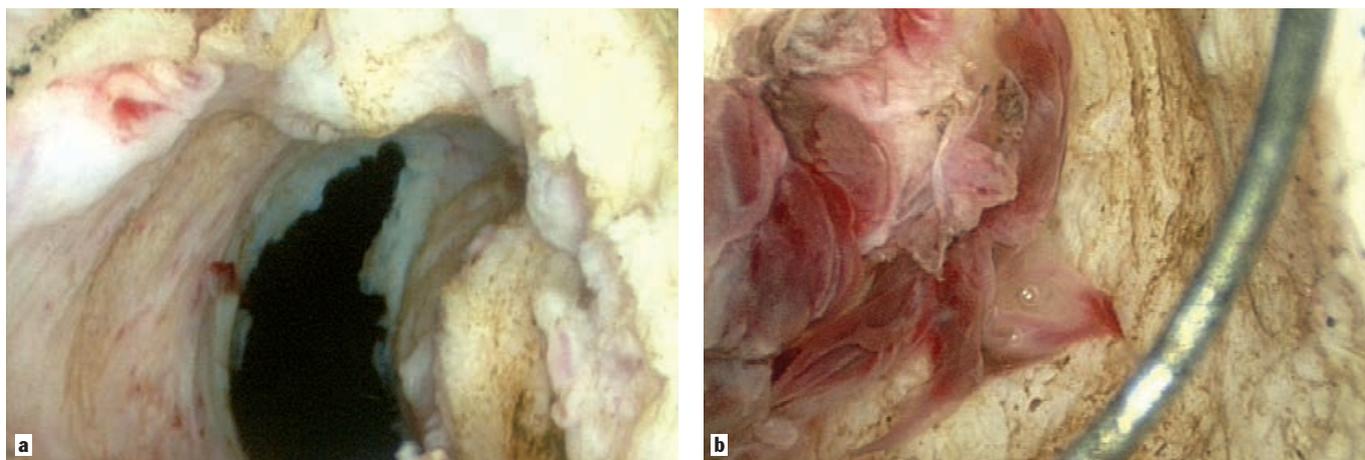


Figure 10. Reconfigured loop electrode.



Figures 11a and 11b. Dissection of cornual hematometra.

tra. Oftentimes, ultrasound guidance is able to determine the relationship between the resectoscope loop and the hematometra. In this scenario it is important that only thin strips of tissue be removed (1 to 3 mm in thickness). The management of centrally located hematometra (Fig 9) is fairly straightforward, and RHS can be managed much like a primary EMR.²⁰ In most cases of RHS the tubal ostia are not clearly identified. Should one fail to identify the tubal ostia it is important to carefully explore the cornua. This can be done with a reconfigured loop electrode (Fig. 10) with care to perform both blunt and electrosurgical dissection under careful sonographic guidance. Careful dissection often allows the operator entry into a cornual hematometra — often signaled by the egress of chocolatey material — beyond which active endometrial elements are clearly seen (Figs. 11a & 11b). Once the surgeon is confident that all remaining areas of endometrium have been

identified and excised, the freshly exposed myometrium is then deeply coagulated with a ball-electrode, usually at 120 watts of coagulation current. The final result generally reveals a cavity, which is quite larger than originally noted (Fig. 12); a transabdominal scan confirms the extent of dissection and the disappearance of any preoperative evidence of a hematometra.

CONCLUSIONS

Although the precise number of all types of endometrial ablation and resection performed in the United States is difficult to uncover, one estimate suggests that in 2008 alone, approximately 312,000 global endometrial ablations were performed in this country.²¹ Longinotti et al. noted that in a cohort of 3,681 women with a history of EA the probability of subsequent hysterectomy at 8 years was 26%, the majority

of which were done within 3 years of the original procedure.⁹ The failure rate appears to be unrelated to the type of procedure or the existence of leiomyomas. Age at the time of the original procedure does appear to play an important role in predicting hysterectomy risk. Women under the age of 40 have a 40% probability of hysterectomy during the 8-year follow-up period, while the risk drops to 20% for women in the 45 to 50 year age cohort. The results were similar for all types of EA procedures and independent of leiomyomata.

Longinotti et al. also note that the most common indications were vaginal bleeding (51.6%), pain (22%), and vaginal bleeding with pain (20.3%).⁹ Although there are relatively few series of RHS for EA failures the available data suggest that between 60% to 88.5% of hysterectomies can be avoided in women followed up to 84 months.^{2,3,18}

The author's experience suggests that the incorporation of careful patient

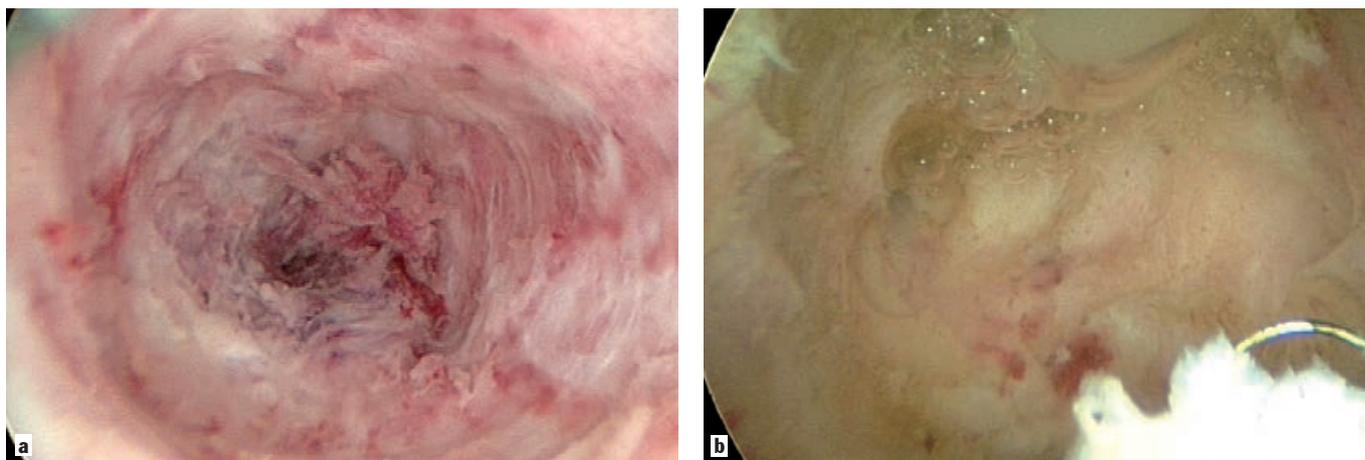


Figure 12. Before and after.

selection, meticulous cervical preparation, and sonographic guidance are the keys to performing safe reoperative hysteroscopy with a high degree of patient satisfaction and success. The assembly of a dedicated and stable operating room team is a key component for this procedure's success. Future work is needed to better delineate those women who are the best candidates for reoperative hysteroscopic surgery. **STI**

AUTHOR'S DISCLOSURES

The author is a consultant for Hologic, Inc. However, they will not be funding any of this work. There are no pertinent conflicts of interest.

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