

ENDOMETRIAL RESECTION FOR THE TREATMENT OF MENORRHAGIA

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ABSTRACT

Background Endometrial resection is an alternative to hysterectomy in the treatment of women with menorrhagia, but it may not control the condition. We sought to evaluate the effectiveness of such resection.

Methods We followed 525 consecutive women (mean age at initial surgery, 42 years) for up to five years after endometrial resection. The women were examined 6 to 12 weeks after the operation and were then sent yearly questionnaires seeking information about their condition. The mean duration of follow-up was 31 months. Thirty-seven women (86 percent of the 43 women available for five years of follow-up) were followed for the entire period.

Results Endometrial resection was completed successfully in 95 percent of the women, with operative complications in 6 percent. Forty-eight women underwent subsequent resection. The yearly questionnaires indicated that 85 to 100 percent of the women (depending on the year of follow-up) had adequately controlled menorrhagia, 26 to 40 percent had amenorrhea, 71 to 80 percent reported either a lessening of menstrual pain or no pain, and 79 to 87 percent were satisfied with the results of their surgery. No further surgery was needed by 80 percent of the women, and only 9 percent underwent hysterectomy during the five years of follow-up, with 98 percent of those operations being performed in the first three postoperative years.

Conclusions Endometrial resection is an effective alternative to hysterectomy in women with menorrhagia. (N Engl J Med 1996;335:151-6.)

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HYSTEROSCOPIC ablation of the endometrium has become an accepted alternative to hysterectomy in the treatment of menorrhagia.¹ More than 10,200 of these procedures were performed in England and Wales from April 1993 through October 1994,² for instance, only four years after the use of the technique was first reported in the United Kingdom.³ The rapid acceptance of endometrial ablation, whether performed by laser photovaporization,^{4,5} coagulation with a rollerball electrode,^{6,7} or electroresection,^{8,9} follows the numerous reports that the operation reduces menstrual blood loss.¹⁰ In addition, endometrial ablation is less traumatic than hysterectomy, causes less postoperative morbidity, is associated with a shorter recovery period, and can potentially be performed as day surgery.^{2,5,9,11-15}

Unlike hysterectomy, however, endometrial abla-

tion is not always effective. Most women who have undergone the procedure menstruate, and some have recurrent menorrhagia. In one series of 234 women undergoing endometrial resection, 10 percent required further gynecologic surgery during a 30-month follow-up period.⁹ The follow-up in most reports is short, often averaging less than one year, and the important issue of whether endometrial ablation would be less attractive if the probability of further intervention was found to increase with time has not been carefully studied. We report the results of a study in which a large number of women with menorrhagia who underwent transcervical resection of the endometrium were followed for up to five years, with particular attention to the need for further surgery.

METHODS**Study Patients**

We offered endometrial resection to women with symptomatic menorrhagia sufficiently severe to warrant hysterectomy who had not had a response to progestogens, nonsteroidal antiinflammatory drugs, antifibrinolytic drugs, danazol, or a combination of contraceptives or who had not complied with such therapy. The women were required to be 30 to 50 years old (except in unusual circumstances), to desire no further children, and to have had normal cervical smears and endometrial biopsies in the past 12 months. Some were also at high risk for operative or postoperative complications of hysterectomy.¹⁶ Women with adnexal tenderness suggestive of pelvic inflammatory disease or endometriosis, major uterovaginal prolapse, or submucosal fibroid tumors larger than 5 cm in diameter were not offered the operation. The women were told that they might need laparotomy or hysterectomy at the time of the operation and that surgery would considerably reduce their fertility and make pregnancy hazardous. Barrier methods of contraception were recommended to women who had not been sterilized.

We studied the outcome of endometrial resection in 525 consecutive women who underwent a total of 575 procedures from August 1988 through July 1993, including 46 women who had second resections and 2 who had three resections. Initially, 449 of the women had chosen endometrial resection in preference to hysterectomy, 62 were randomly assigned to undergo the procedure as part of a trial comparing it with hysterectomy, and 14 were advised to have endometrial resection for medical reasons — because, for example, they had severe rubella syndrome or cardiac valvular disease or had received a liver transplant.

Surgery

Among the 575 procedures, 394 (69 percent) were carried out after treatment with danazol or an analogue of gonadotropin-

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releasing hormone to thin the endometrium and facilitate surgery.¹⁷ The women were usually admitted to the hospital on the day of surgery. All received a combination of amoxicillin and clavulanate (Augmentin, SmithKline Beecham, Worthing, United Kingdom; 1.2 g intravenously) as antibiotic prophylaxis. Local anesthesia was used in 174 procedures (30 percent)¹² and general anesthesia in the remaining 401 (70 percent). Focal lesions, such as submucosal fibroid tumors, were resected as described by Neuwirth,¹⁸ and then the endometrium was systematically excised³ with a 26-gauge continuous-flow resectoscope fitted with a passive handle mechanism and a 4-mm, 30-degree fore-oblique optic, an electro-surgical generator (Valleylab Force 2 or 40, Boulder, Colo.) set to produce 100 to 120 W of blended cutting-coagulation power, a 24-gauge cutting loop (or 2-mm rollerball, for electrocoagulation of the fundus and tubal ostia), and a sterile solution containing 1.5 percent glycine to distend and irrigate the uterus. All the endoscopic equipment was obtained from Karl Storz (Tuttlingen, Germany). The absorption of fluid was monitored carefully.¹⁹ Video monitoring was used during all procedures. The resected tissue was sent for histopathological study.

Follow-up

Most of the women were discharged the day after the operation and examined as outpatients 6 to 12 weeks after surgery. They then were mailed a yearly questionnaire asking about changes in their patterns of menstruation and about their overall level of satisfaction with the operation. They were also asked about current gynecologic problems, medications, and any recent surgery. If a woman did not respond within six weeks, we telephoned her or her general practitioner. Women who were not satisfied with the results of the endometrial resection were offered further treatment, usually either a second endometrial resection or a hysterectomy.

Statistical Analysis

The data were analyzed with the C-Stat (Cherwell Scientific, Oxford, United Kingdom) and Confidence Interval Analysis (BMJ, London) statistical packages. Life-table analysis with log-rank testing was used to determine the risk of treatment failure after surgery, the end point being the time when further surgery was performed.²⁰ All the statistical tests were two-tailed.

RESULTS

The average age of the women at entry into the study was 42 years; 12 were less than 30 years old, 5 had major medical problems, and 7 had been sterilized. Menstrual symptoms had been present for a mean of six years, and 441 of the women (84 percent) had received some medical therapy (Table 1). Menorrhagia was the most common symptom, but 229 women (44 percent) also reported dysmenorrhea.

First Operation

The endometrial-resection procedure was terminated prematurely in 25 women (5 percent) for various reasons: large fibroid tumors in 10 women, fluid overload in 6, uterine perforation in 4, uterine abnormalities in 2, a poor view of the uterine cavity in 2, and a thin cesarean-section scar in 1 (Table 2). It was necessary to switch from local to general anesthesia during the operation in three women. Forty women underwent laparoscopic sterilization at the time of endometrial resection.

Ten women (2 percent) had uterine perforation during the initial endometrial resection, six of them because of the operator's inexperience. Nine perfora-

TABLE 1. CHARACTERISTICS OF THE 525 WOMEN IN THE STUDY BEFORE THEY UNDERWENT ENDOMETRIAL RESECTION.

CHARACTERISTIC	VALUE
Age — yr*	
Mean	42
Range	16–58
Parous — no. (%)	447 (85)
Sterilized — no. (%)	166 (32)
Prior medical treatment — no. (%)	441 (84)
Duration of menses — days	
Mean	8
Range	3–42
Duration of cycle — days	
Mean	26
Range	0–72
Duration of symptoms — yr	
Mean	6
Range	0.5–35
Menstrual symptoms — no. (%)†	
Heavy periods	487 (93)
Painful periods‡	229 (44)
Irregular periods	59 (11)
Prolonged periods	38 (7)
Intermenstrual bleeding	19 (4)
Frequent periods	13 (2)
Other	9 (2)

*The data on age include four postmenopausal women with menorrhagia who were receiving replacement therapy with estrogen and progestogen.

†Some women had more than one symptom.

‡Most women had some pain during menstruation, but pain was considered a symptom only if it was rated as severe or very severe on a scale that included the following categories: absent, mild, moderate, severe, and very severe.

tions were recognized immediately and treated with laparotomy or laparoscopy in which the uterine defect was sutured.²¹ One perforation was missed at first; at laparotomy the next day, a rectal tear was found and sutured. Nineteen women each absorbed more than 2 liters of irrigating solution during the operation, without serious sequelae. Three women (0.6 percent) required the insertion of an intrauterine balloon because of bleeding after surgery, but none needed transfusions. Two women had cervical trauma during cervical dilatation at the start of surgery. There were more complications when the first endometrial resection was combined with hysteroscopic myomectomy than when resection was performed alone (15 percent vs. 5 percent, $P < 0.001$). Preoperative thinning of the endometrium with danazol or an analogue of gonadotropin-releasing hormone had a minimal effect on the incidence of complications, but the women so treated had smaller mean deficits of fluid than the untreated women (536 vs. 729 ml), shorter operating times (33 vs. 36 minutes), and less estimated loss of blood (86 vs. 103 ml) ($P < 0.001$ for all comparisons). No woman required emergency hysterectomy. The postoperative complications included endometritis in

TABLE 2. OPERATIVE FINDINGS AND RESULTS OF 575 ENDOMETRIAL RESECTIONS IN 525 WOMEN WITH MENORRHAGIA.

VARIABLE	FIRST RESECTIONS (N=525)	SUBSEQUENT RESECTIONS (N=50)*
Uterine size — wk†		
Mean	6.9	7
Range	4–17	4–10
Length of uterine cavity — cm		
Mean	7.9	7.3
Range	4–14	4–11
Focal lesions of uterus — no. (%)‡	181 (34)	23 (52)
Simultaneous myomectomy — no. (%)	112 (21)	—
Fluid balance — ml		
Mean	585§	496
Range	0–4350	0–2000
Surgery not completed — no. (%)	25 (5)	3 (7)
Operative complications — no. (%)	34 (6)	5 (11)
Uterine perforation	10 (2)	4 (9)
Fluid overload (>2 liters)	19 (4)	1 (2)
Hemorrhage	3 (0.6)	—
Cervical tear	2 (0.4)	—
Operating time — min		
Mean	33	26
Range	10–100	12–45
Estimated blood loss — ml		
Mean	91	89
Range	0–500	0–250
Hospital stay — days		
Mean	0.94	1.24
Range	0–13	0–4
Vaginal bleeding — days		
Mean	14.4	9.1
Range	0–70	0–21
Vaginal discharge — days		
Mean	11.5	6.4
Range	0–120	0–17
Late postoperative complications — no. (%)	14 (3)	2 (5)
Endometritis	9 (2)	2 (5)
Secondary hemorrhage	3 (0.6)	—
Urinary tract infection	2 (0.4)	—
Return to normal domestic activities — wk		
Mean	1.4	1.3
Range	0–8	0–4
Return to work — wk		
Mean	2.1	1.4
Range	0–14	0.5–4

*Of the 50 endometrial resections performed subsequent to a first resection, 44 were performed at our institution, and 41 were completed. The remaining 3 resections were terminated prematurely because of equipment failure, fluid overload, and uterine perforation (1 each). Percentages in this column are based on the 44 resections performed at our institution.

†Uterine size was determined by comparison with uterine size during the 38 weeks of a normal pregnancy, and values are expressed in weeks of gestation.

‡Such lesions as fibroids, polyps, and uterus bicornis are included.

§The mean fluid balance was 614 ml in women who had not undergone tubal sterilization and 524 ml in women who had done so (P<0.001).

nine women, urinary tract infection in three, and secondary hemorrhage in two.

Normal histologic features were reported in 42 percent of endometrial specimens obtained during the initial resections, and a further 51 percent con-

tained atrophic endometrium. The abnormal findings included polyps (in 4 percent of specimens), endometritis (in 1 percent), and cystic hyperplasia without atypia (in 0.8 percent). Despite earlier biopsy, two women were found to have atypical endometrial hyperplasia (0.4 percent); there was no evidence of hyperplasia at subsequent hysterectomy. Adenomyosis was detected in 48 specimens (9 percent).

Further Treatment

Seventeen women (3 percent) required medical therapy for recurrent menstrual symptoms and were treated with a progestogen or a nonsteroidal anti-inflammatory drug. Eighty-four women (16 percent) underwent further surgery after the initial endometrial resection. Second endometrial resections were carried out because of persistent or recurrent menorrhagia in 20 women, cyclic pelvic pain in 13, pelvic pain and abnormal bleeding in 11, and a desire for amenorrhea in 4. Concurrent laparoscopic procedures included the ablation of endometriotic tissue, ovarian cystectomy, and the division of the uterosacral ligaments (in two women each) and oophorectomy and salpingectomy (one woman each).

There were 4 uterine perforations (8 percent) during the 50 subsequent endometrial resections, significantly more than occurred during the first resections (P=0.01); all four of these women were treated with observation or laparoscopy. One woman absorbed more than 2 liters of irrigating solution. No woman in this group required emergency hysterectomy. There were two cases of postoperative endometritis.

Forty-one percent of the women had normal histologic features at the time of their second endometrial resections. Among the abnormal findings were endometrial atrophy (in 48 percent), the lack of endometrium (7 percent), adenomyosis (7 percent), reaction to a foreign body (5 percent), and endometritis (2 percent).

The most common reasons for hysterectomy in the 46 women who ultimately underwent that procedure were heavy and painful menstrual periods (18 women) and pelvic pain (14 women). Eight women underwent hysterectomy for incidental reasons, such as enlarging fibroid tumors, abnormal endometrial histology, uterovaginal prolapse, and an ovarian cyst. The other surgical procedures performed in this group were dilatation and curettage, drainage of hematomata, and laparoscopic ablation of a uterine nerve (two women each).

The results of histologic testing were available for 42 of the 46 hysterectomy specimens (91 percent). Twenty-nine specimens (69 percent) contained endometrium, and 10 (24 percent) did not; there was no comment by the pathologist about the remaining 3. The myometrium was described as normal in 18 specimens (43 percent). Ten specimens (24 percent)

contained fibroid tumors, six (14 percent) had adenomyosis, and three (7 percent) had giant-cell reactions to a foreign body. There was endometriosis in four specimens and hematometra in one.

Effect on Menstruation

The proportion of women in the study for whom follow-up data were available varied with each year of the five-year follow-up period, ranging from 100 percent for the first year to 86 percent for the fifth year (Table 3). The majority of women reported improvement in their menstrual periods after endometrial resection, including those who had amenorrhea at some time during follow-up (a proportion ranging from 26 percent to 40 percent) (Fig. 1). From 71 to 80 percent of women (depending on the year of follow-up) reported that they had no menstrual pain or that their pain had lessened. Seventy-nine to 87 percent of women expressed satisfaction with the results of the first resection during each of the five years of follow-up. Among the 25 women in whom the operation could not be completed, 14 were satisfied with their surgery and only 2 later underwent hysterectomy.

Life-Table Analysis

Five years after the first endometrial resection, 80 percent of women (95 percent confidence interval, 76 to 84 percent) had had no further surgery, and 91 percent (95 percent confidence interval, 88 to 94 percent) had not had a hysterectomy (Fig. 2 and Table 3). The first endometrial resections were significantly more successful than the subsequent resections in averting either hysterectomy (relative risk, 1.2; 95 percent confidence interval, 1.0 to 1.4; $P < 0.001$) or surgery of any type (relative risk, 1.2; 95 percent confidence interval, 0.9 to 1.4; $P = 0.03$). Women with dysfunctional uterine bleeding were significantly less likely to require further surgery than those with submucous fibroid tumors (relative

risk, 1.1; 95 percent confidence interval, 1.0 to 1.2; $P = 0.02$). The outcome in women under 45 years of age at the time of their first endometrial resections was slightly less favorable than the outcome in those 45 years old or older (relative risk of further surgery, 1.2; 95 percent confidence interval, 0.8 to 1.9). Uterine size and the type of endometrial preparation used were not related to the incidence of treatment failure.

DISCUSSION

In our study, over 90 percent of women undergoing endometrial resection did not have hysterectomy, and 80 percent had no gynecologic surgery during the first five years after the resection. These results are consistent with those of some earlier studies,^{6-9,22} but other investigators have reported rates of reoperation within the year after surgery that are higher than our five-year rate.^{2,13-15} The outcome after laser ablation of the endometrium is equally variable.^{2,4,5,23} The most variable rates are those associated with the nonhysteroscopic techniques, which have cumulative rates of failure as high as 56 percent during the 12 months after surgery.^{2,24,25}

One may speculate that techniques not performed under direct vision are more likely than other techniques to leave areas of endometrium untreated, but the variable results of hysteroscopic ablation must be explained in other ways. The surgeon's level of experience is one factor.²³ In studies with high rates of success, the surgeons are usually more experienced. Because the depth of endometrial excision or destruction is known to be a predictor of outcome,²⁶ it is likely that inexperienced surgeons, fearful of causing hemorrhage or uterine perforation, treat patients more superficially.

The duration of follow-up is another important determinant of outcome. We found that the rate of treatment failure reaches a plateau only after three years. Thus, outcomes appear better if women are fol-

TABLE 3. FOLLOW-UP DATA AFTER ENDOMETRIAL RESECTION IN 525 WOMEN.

YEAR OF FOLLOW-UP	FOLLOW-UP		CHANCE OF AVERTING FURTHER MEDICAL TREATMENT	CHANCE OF AVERTING FURTHER SURGERY	CHANCE OF AVERTING HYSTERECTOMY
	MAXIMAL NO. OF WOMEN STUDIED	NO. ACTUALLY FOLLOWED (%)			
	percent (95 percent confidence interval)				
1	525	524 (100)	98 (98-100)	94 (90-97)	98 (96-99)
2	421	408 (97)	98 (97-100)	92 (90-95)	96 (95-98)
3	264	253 (96)	98 (97-100)	94 (92-97)	98 (96-100)
4	160	146 (91)	99 (98-100)	99 (97-100)	99 (98-100)
5	43	37 (86)	100	100	100

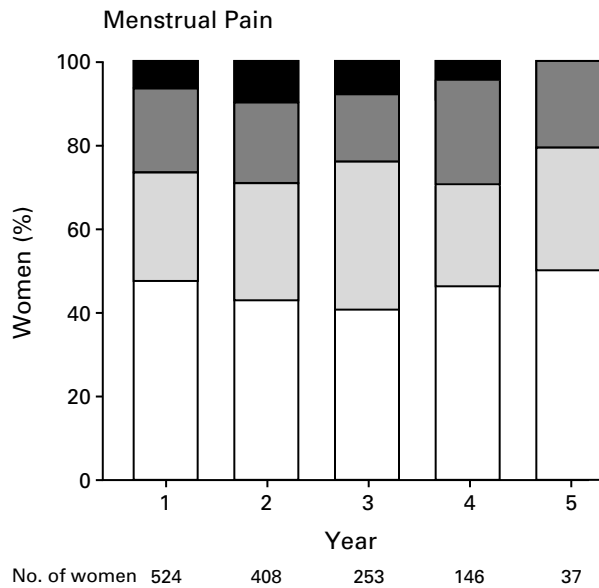
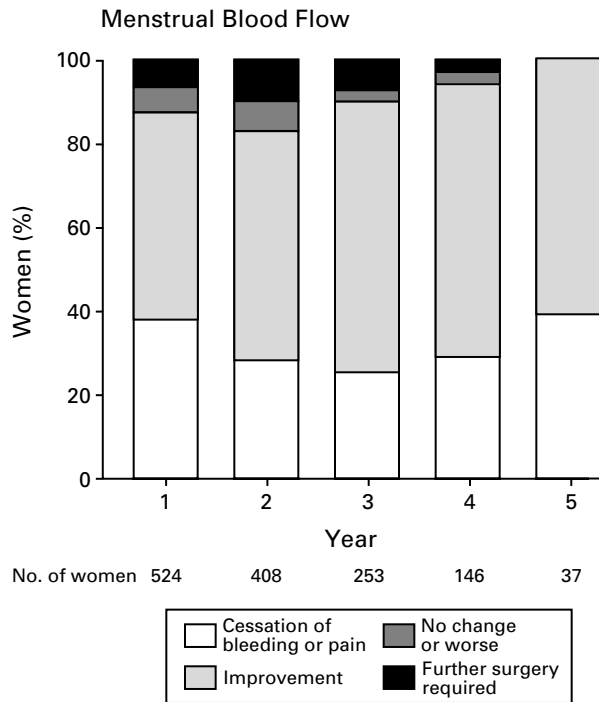


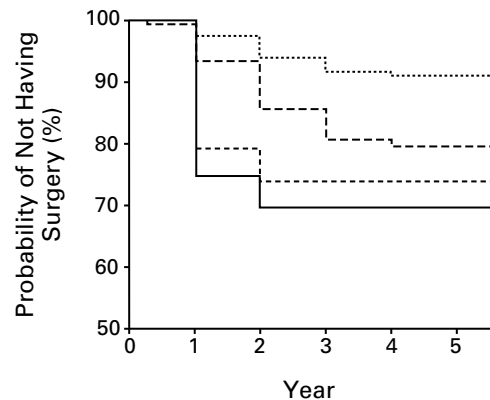
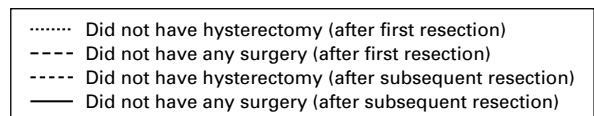
Figure 1. Changes in Menstrual Blood Flow and Menstrual Pain in Women Followed for up to Five Years after a First Endometrial Resection.

lowed for only one or two years. Life-table analysis provides a statistical model of the effect of time and also gives women a realistic indication of the likelihood that their surgery will succeed.

Two other factors play a major part in determining outcome. The results are better with the initial procedure and when the uterine cavity is normal. However, even among women who undergo more than

one resection or require hysteroscopic myomectomy, over 70 percent do not have hysterectomy during the five years after surgery. Others have reported equally encouraging results in these situations.^{5,7,27,28}

In our patients, recurrences of menorrhagia and dysmenorrhea or pelvic pain were the principal reasons for further surgery. The patients with menorrhagia and dysmenorrhea had good responses to such surgery, but those with cyclic pelvic pain associated with oligomenorrhea or amenorrhea were more difficult to treat. When a hematometra is present, it can be treated by cervical dilatation and drainage, possibly combined with a second endometrial ablation. Pelvic pain that develops after endometrial resection in the absence of a hematometra is difficult to explain or treat. Such pain could be due to fibroid degeneration, endometriosis, or adenomyosis, but adenomyosis is an uncommon histologic diagnosis at the time of resection^{8,9} or hysterectomy.²⁸ Altered pelvic hemodynamics akin to those of the pelvic congestion syndrome may cause pain in some women. In these patients further endometrial resection is generally unhelpful. Laparoscopic surgery may be useful in women with endometriosis, but hysterectomy is often the only effective treatment. An approach combining hysteroscopy and laparoscopy has been suggested as the primary treatment when menorrhagia is associated with severe dysmenorrhea,²⁹ but because dysmenorrhea generally lessens after endometrial resection alone,^{26,27} the use of an additional procedure is difficult to justify.



NO. OF WOMEN	525	524	408	253	146	37
First resection	525	524	408	253	146	37
Subsequent resection	48	45	27	18	9	2

Figure 2. Life-Table Analysis of the Need for Further Surgery after First and Subsequent Endometrial Resections in the 525 Women in the Study.

What is the role of endometrial resection in treating women with menorrhagia? The surgical nature of the treatment, coupled with its small but definite rate of complications, means that medical therapy must remain the first choice. The new intrauterine device containing levonorgestrel is another nonsurgical option.³⁰ When medical treatment is contraindicated, poorly tolerated, unsuccessful, or resisted, endometrial resection is an effective mode of therapy, giving 9 in 10 women a chance of averting hysterectomy. Although there is debate about the effect of endometrial ablation on the overall rates of hysterectomy,³¹ it does offer women who are reluctant to undergo hysterectomy the dual advantages of relatively conservative surgery and freedom from prolonged medical therapy.

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