Long-term Outcome of Hysteroscopic Endometrial Ablation in the Treatment of Dysfunctional Uterine Bleeding

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Objectives:
To evaluate the long-term outcomes of hysteroscopic endometrial ablation in the treatment of dysfunctional uterine bleeding in a regional hospital in Hong Kong.

Design:
This was a retrospective cohort review and telephone survey of 134 patients who had heavy dysfunctional uterine bleeding unresponsive to medical treatment. They underwent hysteroscopic endometrial ablation between 1998 and 2005. Primary outcomes included: treatment success in terms of reduction in menstrual flow, need of second operation, and patient satisfaction. Secondary outcomes included: short- and long-term complications and factors associated with successful outcomes.

Results:
A total of 134 hysteroscopic endometrial ablations were performed during the study period. Concurrent hysteroscopic myomectomy and polypectomy were performed for 46 (34%) and 15 (11%) of the patients, respectively. The median operating time was 30 minutes, and median blood loss was 10 ml; 93% of the patients were discharged within 24 hours. Majority (96%) of the operations were deemed successful, as the patients developed either amenorrhoea or hypomenorrhoea. Five patients failed endometrial ablation, three of whom had a subsequent hysterectomy. Preoperative endometrial preparation and uterine size correlated with treatment success. Short-term complications included over-absorption of the distending medium and endometritis (in 5% and 4% of the patients, respectively). Cyclical pelvic pain (10%) with or without haematometra or haematosalpinx were observed as long-term complications. Overall 92% of patients were satisfied with their operative results.

Conclusion:
Hysteroscopic endometrial ablation is a safe and effective surgical option for dysfunctional uterine bleeding. It allows concurrent surgical resection of submucosal fibroids and endometrial polyps, which are commonly associated with heavy menstrual flow. Its advantages are short hospital stays and early recovery, and most women find it a satisfactory solution for their menstrual problems.
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Keywords: Catheter ablation; Endometrium; Hysteroscopy; Menorrhagia; Treatment outcome

Introduction

Heavy menstrual bleeding is one of the most common presenting symptoms in gynaecological practice. Hysterectomy has been the gold standard and a popular treatment in the past. In the UK, it was reported that one in five women had undergone a hysterectomy for heavy menstrual flow before the age of 60 years[1]. In Hong Kong, 9% of gynaecological hospital admissions were related to menorrhagia or dysfunctional uterine bleeding, while 64% of abdominal hysterectomies and 65% of laparoscopic hysterectomies for benign conditions were performed for heavy menstrual bleeding with or without fibroids[2]. Regardless of the type of hysterectomy, it poses significant surgical risks.

As the choice of operation has been moving

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towards more conservative procedures with minimally invasive approaches, endometrial ablation has been gaining popularity during the past two decades.

According to the 2007 National Institute for Health and Clinical Excellence guidelines on heavy menstrual bleeding, either first- or second-generation endometrial ablation has been suggested as first-line treatment for those in whom surgery is deemed contra-indicated or medical treatment has failed[3].

First-generation endometrial ablation refers to the use of laser, rollerball, and other resection techniques[4-6]. Whereas, second-generation endometrial ablation refers to the use of heated balloon systems, hot saline circulation, microwaves, monopolar / bipolar electrical devices, laser devices, and cryosurgery[7-12].

For hysteroscopic endometrial ablation with rollerballs and / or resectoscopes, numerous studies attest to their short-term success in reducing the menstrual flow with minimal complications[13-15]. However, there are still concerns regarding long-term results and need for treatment. Dickersin et al[16] reported that free from symptoms seemed to diminish with time; 30% of his patients underwent hysterectomy within 4 years after their ablation.

Previous studies had explored possible predictive factors for successful endometrial ablation. Some reported an inverse correlation of patient age[17,18], while others did not[19]. Previous tubal ligation and use of hormonal agents for preoperative endometrial preparation were also suggested as possible adverse influence on treatment success[14,20,21]. To date, long-term studies on endometrial ablation have not determined which patient groups benefit most from the procedure.

The aim of this study was to review the long-term success and safety of hysteroscopic endometrial ablation in the treatment of dysfunctional uterine bleeding in Chinese patients attending a regional hospital in Hong Kong. Correlation analyses were performed to assess whether patient factors or preoperative use of hormonal endometrial preparations might affect treatment outcomes.

Methods

Between 1998 and 2005, 134 consecutive pre-menopausal women aged 37 to 55 (median, 48) years who underwent hysteroscopic endometrial ablation at the Department of Obstetrics and Gynaecology at the Pamela Youde Nethersole Eastern Hospital, Hong Kong were reviewed.

The procedure was offered to women with menorrhagia or menometrorrhagia who had refused hysterectomy, in those in whom such surgery was deemed contra-indicated, or they had failed to respond to medical treatment.

Every patient underwent general examination, pelvic examination and transvaginal pelvic ultrasonography preoperatively, to ascertain the uterine size and detect any uterine abnormality. Approximately 75% of the patients had diagnostic hysteroscopy and curettage performed as an office procedure without anaesthesia. For those who did not have hysteroscopy, endometrial aspirate by Pipelle was performed to exclude endometrial hyperplasia or malignancy.

Exclusion criteria for endometrial ablation included: more than 12 weeks gravid uterine size, submucosal fibroid of more than 5 cm in diameter, required option for a future pregnancy, cervical or endometrial pre-malignant and malignant conditions.

Endometrial preparation with either a 6-week course of danazol or a single injection of gonadotrophin-releasing hormone analogue (GnRHa) was undertaken. In the initial years this depended on preoperative assessment of the individual, but after 2002 a single dose of GnRHa became the standard practice.

Endometrial ablation was performed under general or spinal anaesthesia with a 26-French resectohysteroscope, after the cervix was dilated with a Hegar dilator (up to size 10). The uterus was distended with 1.5% glycine solution placed 1 m above the patient. A combined electrocautery technique using a resecting loop, and rollerball diathermy with the cutting mode at 120 W and coagulation mode at 80 W were employed. Removed endometrial strips, myoma chips and polyps were sent for histological evaluation. Intra-operative absorption of glycine was estimated by calculating the balance of fluid input and output. Patients were allowed to resume an oral diet soon after the operation and were usually discharged on the same or next day. Follow-up at

the general gynaecology clinic was arranged to look into any menstrual or other newly arising symptoms.

Data were retrieved from either written or computerised medical records and a telephone survey was performed in March 2009 to detect (1) any treatment failure or long-term complications not documented in medical records, and (2) to assess patient satisfaction with the treatment.

Primary outcome measures include the success of treatment defined by improvement of menorrhagia (either amenorrhoea, hypomenorrhoea or eumenorrhoea), having a second operation (repeated endometrial ablation or a hysterectomy), and patient satisfaction. Patient satisfaction was evaluated using a 5-point ordinal scale (ranging from 1 = very dissatisfied to 5 = very satisfied). Secondary outcomes included short- and long-term complications of the procedure and factors associated with successful treatment.

The data were analysed by means of analysis of variance for continuous variables and the Chi-square test for categorical variables using the Statistical Package for the Social Sciences (Windows version 15.0). A p value of less than 0.05 was considered statistically significant.

The study was approved by the local Ethics Committee and all patients gave their written consent prior to the operation and verbal consent prior to the telephone survey.

Results

A total of 134 patients underwent hysteroscopic endometrial ablation during the study period (Table 1). The median length of follow-up was 85 (range, 38-128) months. All patients were Chinese women aged 37 to 55 (median, 46) years. Of the 134 women, 51 had had previous tubal ligations, 81 had uterine fibroids and six had evidence of adenomyosis on ultrasound; 16 patients had significant symptoms of dysmenorrhoea before the operation for a median duration of 18 (range, 2-120) months. A total of 117 (87%) patients received hormones for preoperative endometrial preparation; 33 (25%) received a 6-week course of danazol and 84 (63%) received a single injection of GnRHa. The procedures were performed under either general (62%) or spinal (38%) anaesthesia.

Table 1. Patients' demographics

Demographics	Data
Age (years)	
<40	7 (5%)
40-44	44 (33%)
45-49	65 (49%)
≥50	18 (13%)
Median (range)	46 (37-55)
Median parity (range)	2 (0-6)
Mode of delivery	
Never	6
Vaginal deliveries only	100
Caesarean deliveries only	23
Both	5
Previous tubal ligation	51 (38%)
Presence of fibroid	81 (60%)
Submucosal fibroid	46 (34%)
Presence of adenomyosis	6 (4%)
Presence of endometrial polyp	15 (11%)
Preoperative dysmenorrhoea	16 (12%)

Forty-six (34%) patients were associated with submucosal fibroids and 15 (11%) with endometrial polyps, for which concurrent hysteroscopic myomectomy and polypectomy were performed as necessary.

Table 2 shows the operative outcomes. The median operating time was 30 (range, 8-80) minutes, the median blood loss was 10 (range, 2-80) ml, and the median fluid deficit was 400 (range, 10-2000) ml. Approximately 93% of the patients were discharged within 24 hours and all of them within 3 days.

After the operation, over 96% of the patients experienced significantly reduced flow (45%) or were rendered amenorrheic (51%); only five (4%) had persistently heavy flow. Four of the latter presented within 1 year and one within 2 years of the operation. One of them had a repeated endometrial ablation that also failed, and then had a hysterectomy. Two others proceeded straight to hysterectomy, owing to persistent heavy flow with or without enlarging fibroids. In total, three (2%) patients underwent second operation for persistent heavy menstrual flow.

Correlation studies showed a positive relationship between preoperative endometrial preparation by either

Table 2. Operative outcomes

Outcome	Data
Operating time (mins)	30 (8-80)*
Operative blood loss (ml)	10 (2-80)*
Fluid deficit (ml)	400 (10-2000)*
Postoperative hospital stay (days)	1 (0-3)*
Follow-up period (months)	85 (38-128)*
Postoperative menstrual flow	
Amenorrhoea	69 (51%)
Reduced flow	60 (45%)
Heavy flow	5 (4%)
Postoperative dysmenorrhoea	13 (10%)
Treatment failure	5 (4%)
<24 months	4 (3%)
24-48 months	1 (1%)
>48 months	0
Repeated endometrial ablation	1 (1%)
Hysterectomy due to treatment failure	3 (2%)

* Median (range)

GnRHa or danazol with treatment success (p<0.001) [Table 3]. Risk of hysterectomy due to failure of endometrial ablation was also significantly increased in patients who did not receive endometrial preparation (p=0.042), while it did not seem to affect operating time, operative blood loss, and fluid deficit (Table 4).

Uterine size was shown to have an inverse relationship with treatment success (p=0.021). A success rate of 100% was observed when the uterus was either normal or bulky in size, while it dropped to 96% for a size equivalent to 6 to 8 weeks gravid uterus and 60% if it was larger than 10 weeks gravid uterus (Table 5).

Immediate complications included excessive absorption of distending medium during the operation and endometritis. In seven (5%) patients, the fluid absorption was more than 1500 ml and six (4%) of them were managed with diuretic treatment and monitoring of electrolytes. They all recovered well, with normalisation of electrolytes by the first day after the operation. Endometritis occurred in five (4%) of the patients in the early postoperative period, all of whom were successfully treated with oral antibiotics. There were no instances of uterine perforation, significant blood loss treated by transfusion, or visceral injuries.

Upon follow-up for up to 128 months, 13 (10%) patients complained of significant cyclical pelvic pain. Pelvic ultrasonography (USG) showed haematometra in four (3%) patients, in three of whom the symptoms resolved after simple drainage. The remaining patient who also had haematosalpinges underwent cannulation of the cervical canal which failed (due to severe scarring and stenosis). She then underwent laparoscopic bilateral salpingectomy and hysterotomy for drainage and enjoyed relief of symptoms.

Among the 134 patients in this series, 122 had completed the telephone survey; 89% of the latter were satisfied with the results of hysteroscopic endometrial ablation, while 7% were not. The latter claimed to experience no improvement in menstrual flow or significant cyclical pelvic pain. One hundred and ten (90%) patients said they would have chosen the same

Table 3. Effect of endometrial preparation on treatment success*

	Success (n=129)	Failed (n=5)	Total (n=134)
Preoperative GnRHa / danazol	116 (89.9%)	1 (20.0%)	117 (87.3%)
No endometrial preparation	13 (10.1%)	4 (80.0%)	17 (12.7%)

* GnRHa denotes gonadotrophin-releasing hormone analogue; Pearson Chi-square asymp sig. (2-sided), p<0.001

Table 4. Effects of endometrial preparation on operative outcomes*

	Median (range)		
	Operating time (mins)	Operative blood loss (ml)	Fluid deficit (ml)
Preoperative GnRHa / danazol	25 (8-80)	10 (2-80)	300 (10-1000)
No endometrial preparation	30 (20-60)	10 (10-80)	500 (10-1500)
p Value (ANOVA)	0.057	0.273	0.486

* GnRHa denotes gonadotrophin-releasing hormone analogue, and ANOVA analysis of variance

Table 5. Correlation of uterine size with treatment success*

Uterine size (Gravid week)	Success	Failure	Total
Normal	40 (100%)	0 (0%)	40
Bulky	23 (100%)	0 (0%)	23
6 weeks	42 (96%)	2 (5%)	44
8 weeks	21 (96%)	1 (5%)	22
≥10 weeks	3 (60%)	2 (40%)	5
Total	129	5	134

* Pearson Chi-square asymp sig. (2-sided), p<0.001

operation for treatment of their heavy dysfunctional uterine bleeding if given the choice again and would recommend the procedure to their friends with similar problems (Table 6).

Discussion

Hysteroscopic endometrial ablation was introduced in the 1990s and has been advocated as first-line surgical treatment for menorrhagia in a recent UK national guideline[3]. It is being increasingly used for treatment of dysfunctional uterine bleeding, particularly on menorrhagia. To our knowledge, there has not been any locally published data concerning its long-term efficacy and safety.

According to the territory-wide audit on gynaecological endoscopic surgery in the Hong Kong SAR[22], the number of endometrial ablations performed has increased from 82 in 1997 to 192 in 2002, and 14 units within the territory offer the procedure.

Hysteroscopic endometrial ablation was introduced as a more conservative alternative to hysterectomy for selected women, advantages of the procedure being: reduced operative risks, shorter operating times and postoperative hospital stays with possibly lower costs[23,24]. On the other hand, controversies persist regarding the risk of failure, long-term effectiveness, need for multiple treatments, and long-term safety. There were also some concerns about the initial set-up costs and expertise required for this relatively new technique.

The large variation in the numbers of cases performed in different units in Hong Kong may be a reflection of these concerns. From the above-mentioned

Table 6. Patients' satisfaction towards hysteroscopic endometrial ablation

Patients' satisfaction	No. of patients
5: Very satisfied	102 (84%)
4: Satisfied	7 (6%)
3: Neutral	4 (3%)
2: Dissatisfied	4 (3%)
1: Very dissatisfied	5 (4%)

local territory-wide audit in 2002, it appears that 40% of the procedures were being performed in a single unit and more than half of the hospitals performed less than 10 annually.

While acquiring of suitable skills requires individual training, the long-term efficacy and safety of the procedure is reassuring. Rosati et al[19] reported a success rate of 93.8% with hysteroscopic endometrial ablation and the subsequent hysterectomy rate of 3.9% at a mean follow-up of 48.2 months. Litta et al[17] reported corresponding rates of 77.4% and 11.3% after a mean follow-up of 53.2 months, while Fürst et al[25] reported corresponding rates of 78% and 22% after 10 years of follow-up. No major complications were reported in any of these series.

In our series of 134 patients, successful treatment was defined as amenorrhoea or hypomenorrhoea after the operation. It was achieved in 96% of the patients after a median follow-up of 85 months. Only three (2%) of the patients underwent hysterectomy due to treatment failure. This shows a very high success rate, with a significant number of hysterectomies being avoided in patients with heavy menstrual flow not responding to medical treatment.

Women's expectations and preferences are important considerations in the management of menorrhagia. While some prefer complete cessation of menses after treatment by hysterectomy, many are satisfied with the lighter flows achieved by hysteroscopic endometrial ablation. Compared with hysterectomy, hysteroscopic endometrial ablation confers benefits, including: lower surgical risks, shorter hospital stays, and earlier return to work. Whilst being a less invasive surgical alternative, it allows good control of symptoms and at the same time preserving the uterus may be

psychologically important to some women. Thus, endometrial ablation may be regarded as having a similar success rate with hysterectomy for the treatment of menorrhagia[3], which was consistent with the almost 90% satisfaction rate in our series even though 52% of the patients developed amenorrhoea.

Previous studies showed contradictory results regarding the effects of preoperative hormonal endometrial preparation. Some reported shorter operating times, less fluid absorption, and better menstrual outcome after the use of such preparations, including danazol, GnRHa or progestogens. Others showed no significant difference associated with their routine use and did not recommend them[17]. In our series, preoperative endometrial preparation with either GnRHa or danazol was associated with treatment success, and appeared to reduce the need of hysterectomy due to treatment failure. On the contrary, we did not encounter any correlations indicative of reduced operating time, operative blood loss, and fluid absorption associated with such treatment. However, there was a non-significant trend towards a reduced fluid deficit (a median of 300 ml in those who received endometrial preparation compared to 500 ml in those who did not).

Based on our data, we recommend preoperative endometrial preparation to improve treatment success. Since 2002, it has become a standard practice in our unit to prescribe a single dose of GnRHa 6 weeks before hysteroscopic endometrial ablation.

In our series, another important factor associated with treatment success was uterine size. No failure was encountered in the 63 patients in whom the uterus was either normal in size or just bulky; the failure rate increased sharply to 40% with a uterus larger than or equal to 10 weeks gravid size. Hysteroscopic endometrial ablation in patients with a larger uterus is more likely to fail and is not recommended if its size is larger than that of a 10 weeks conceptus.

In line with previous studies, there was also a trend of increased likelihood for treatment failure in patients with uterine fibroids and / or adenomyosis; four out of five such cases in our series were associated with uterine fibroids and / or adenomyosis, but the correlation did not reach statistical significance (p=0.379).

There has been concern over long-term success after hysteroscopic endometrial ablation. Some studies showed that the success rate declined with longer follow-up[19,26] and there was an inverse correlation between the success rate and patient age[18,19]. In our series though, all cases of failure presented within the first 2 years and 80% presented in 1 year; there being no statistically significant difference in treatment success with prolonged follow-up (p=0.514). Even for younger patients, treatment success was maintained with time and there were no recurrences of menorrhagia after initial success.

Transurethral resection of the prostate (TURP) syndrome has been described in hysteroscopic endometrial ablation where patients may present with dizziness, vomiting, headache, and shortness of breath. With excessive fluid absorption, circulatory overload, water intoxication and hyponatraemia may result. Glycine toxicity is also possible if it is used as the distending medium and an excess is absorbed. In our series, seven patients appeared to have absorbed more than 1.5 litres of fluid. They did not show any clinical sign of TURP syndrome however, and they responded well to single doses of diuretics. Hyponatraemia was noted in three patients, and was readily corrected overnight with normal saline infusions.

The main risk factor for TURP syndrome in hysteroscopic endometrial ablation is a prolonged operation. This in turn is associated with a large uterine size, presence of large or multiple submucosal fibroids being concurrently resected, and a vascular endometrium (in patients not undergoing endometrial preparation). The risk may be reduced by careful case selection, use of GnRHa for preoperative endometrial preparation, and when there is excessive fluid absorption resorting to a two-staged procedure. The amount of medium absorbed should be carefully monitored during the operation and excessive fluid absorption can be avoided.

Another more frequently occurring complication in the early postoperative period was endometritis, which ensued in five (4%) of our patients; all of them were successfully treated with antibiotics. Although no clinical studies have looked into the routine use of prophylactic antibiotics for patients undergoing major hysteroscopic operations, it could be considered on a case-by-case basis.

In our series, late complications included: cyclical pelvic pain and dysmenorrhoea, 13 (10%) of whom complained of significant postoperative pelvic pain or dysmenorrhoea postoperatively; in five (4%) of these patients haematometra were identified by pelvic ultrasound. While the overall prevalence of previous tubal ligation in the whole series was 38%, it was 80% in those with postoperative haematometra.

Tubal ligation has previously been identified as a risk factor for treatment failure during rollerball ablation and subsequent hysterectomy. This may be due to the association between tubal ligation and post-endometrial ablation syndrome. It is characterised by pain arising from distention of the proximal end of a fallopian tube caused by a combination of factors (regeneration of corneal endometrium, intra-uterine adhesions obstructing the outflow tract, and tubal ligation preventing menstrual blood emptying into peritoneal cavity[21,27,28]).

Cyclical pelvin pain with our without haematometra is one of the more common complications after hysteroscopic endometrial ablation, which may influence patient satisfaction with the operation and subsequent demands for hysterectomy. This should be well explained to patients preoperatively. Some authors suggested monthly dilatation of cervical canal in the initial 3 months after the operation but so far evidence to support such a practice is lacking.

Second generation of endometrial ablation has been increasingly used with the aim of making ablation easier, safer, quicker, and possibly more effective. Such ablation entails: heated balloon systems, hot saline circulation, microwaves, monopolar / bipolar electrical devices, laser devices, and cryosurgery. The immediate results regarding their efficacy and safety are encouraging, but long-term data are required before they become established in clinical practice.

Although hysteroscopic endometrial ablation is technically more demanding than second-generation ablation techniques, it allows direct visualisation of the endometrial cavity and removal of submucosal fibroids and endometrial polyp. Thus, second-generation endometrial ablation appears more useful in patients with a grossly normal uterine cavity, the hysteroscopic approach facilitates concurrent operations (hysteroscopic myomectomy, endometrial polypectomy or both).

Another advantage of hysteroscopic endometrial ablation is to enable visually directed endometrial biopsies. In an Italian series of 438 women undergoing the procedure, three were identified as having atypical endometrial hyperplasia, although all the preoperative endometrial biopsies had been negative[17]. Stovall et al[29] have also reported that in 4% of cases, pathology results at hysterectomy do not agree with findings after Noval cannula endometrial sampling. In our series, one patient with an endometrioid adenocarcinoma and one with a leiomyosarcoma were detected from resected endometrial samples. The first patient had had a Pipelle endometrial biopsy (which was negative), and the second had had preoperative hysteroscopy and curettage performed (without detection of malignancy). Both of these patients had staging laparotomies performed for their malignant conditions, which may well have been missed had they had second-generation endometrial ablation.

Conclusion

Hysteroscopic endometrial ablation is a safe and effective surgical treatment for dysfunctional uterine bleeding and has a high success rate, low risk of subsequent need for hysterectomy, and a high degree of patient satisfaction. Careful patient selection and preoperative endometrial preparation may help improve surgical outcomes. Adequate counselling on the merits and limitations of hysteroscopic endometrial ablation can allow women to have more realistic expectations from such treatment results and attain better patient satisfaction.

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