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COMPARISON OF TWO METHOD TREATMENTS OF ENDOMETRIAL ABLATION, THERMAL BALLOON ABLATION, AND HYSTEROSCOPY RESECTION, FOR PATIENTS WITH HEAVY MENSTRUAL BLEEDING

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. Author ZB designed the study. Author Samira Azimi wrote the protocol and interpreted the data. Authors TA, MZ, Saeed Alborzi and ZB anchored the field study. Author AB gathered the initial data and performed preliminary data analysis. Author SY managed the literature searches and produced the initial draft. All authors read and approved the final manuscript.

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ABSTRACT

Background: Heavy menstrual bleeding (HMB) is a common gynecological problem. Many women do not like the continuous use of hormones; neither do they prefer a rigorous treatment such as hysterectomy. Endometrial resection and ablation are intermediate treatments for heavy menstrual bleeding. Endometrial ablation with hysteroscopy resection requires a skilled surgeon. Surgery time is less in thermal balloon ablation (TBA), as a more recent technique of endometrial ablation and it also is simpler than old surgery techniques. The aim of this study was to compare two methods of treatment for endometrial ablation (hysteroscopy and TBA) for patients with menorrhagia.

Methods: This quasi experimental study was conducted during 2011–2013 on women with a history of menorrhagia referred to Babol Ayatollah Rouhani and Tehran Emam Hossein Hospitals (group A) and Shiraz Shahid Faghihi Hospital (group B),who were unresponsive to hormone therapy or were not candidates for hysterectomy. All women underwent endometrial ablation using TBA (group A) or hysteroscopy resection (group B). Relevant clinical data and complications were abstracted from medical records and the two procedures were then compared.

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Results: The mean age of patients in groups A and B was 43.38±5.91 and 38.5±4.21 years, respectively. Surgery complications were not seen in any of the patients in either group. Amenorrhea was more in the TBA group compared with hysteroscopyy resection and this difference was statistically significant (P=0.006), but hypomenorrhea was less in the TBA group than the hysteroscopy resection (P=0.021).
Success rate of treatment results after 12 months of endometrial ablation in TBA and hysteroscopy resection groups was 46(88.5%) and 52(92.9%), respectively, which was not statistically significant (P=0.51). In this study, the satisfaction of surgery with abnormal uterine bleeding 12 months after surgery in hysteroscopy resection and TBA groups, was not statistically significant (P=0.27).
Conclusion: The findings of this research indicate that outcomes with TBA and hysteroscopy resection were equally good for women with menorrhagia. However, there was not a difference in the success rate and satisfaction of surgery after one-year follow-up of treatment in the two groups.

Keywords: Endometrial ablation; Hysteroscopy; Uterine; Menorrhagia; Cavaterm.

1. INTRODUCTION

Heavy menstrual bleeding (HMB) is a significant health problem in women of reproductive and premenopausal age [1,2] that leads to anemia, fatigue and reduced quality of life [1,3]. Until the 1980s, before which medical treatments failed to provide adequate relief, hysterectomy was the only available treatment for HMB [4].

As alternatives to hysterectomy, laser ablation, transcervical resection, and roller ball ablation were performed under direct hysteroscopy vision for the treatment of HMB [5]. But these methods requiredthe skill to perform them [4]. So, the first "global" endometrial ablation, the Thermachoice™ (Ethicon Women's Health and Urology, Somerville, NJ) balloon was introduced in the US [4]. Thermal balloon ablation (TBA) is a less invasive procedure surgery for control of bleeding in women with HMB [6]. Thermal balloon ablation includes four kinds of devices: ThermaChoice®; Menotreat ™; Cavaterm ™; and Thermablate ™ [7]. Many women with HMB suffer from significant co-morbidities that prevent them from undergoing invasive surgical procedures [8].

However, although many studies about the effectiveness and safety of this approach have been published [3,8,9-12], unfortunately this procedure is rarely performed in Iran. In a previous study we have recognized the effectiveness and safety of this method [7].

To our knowledge, there is no study that compares TBA (Cavaterm™) with other ablation techniques in Iran. We performed this study comparing the TBA (Cavaterm™) and hysteroscopy resection (waveform unipolar current) in women who suffer from HMB.

2. METHODS AND MATERIALS

This quasi experimental study was done from 2011 to 2013on women with history of heavy menstrual bleeding unresponsive to medical treatment or who were not candidates for hysterectomy but who were referred to Babol Ayatollah Rouhani, Shiraz Shahid Faghihi and Tehran Emam Hossein Hospitals. This study was approved by the ethics committee of the Medical Sciences University of Babol. Sample of size by article of Alaily using the formula N α=5%, β=20%, P1=90%, P2=60%, P=75%, q=25%, of 35 patients in the group Cavaterm and 25 in the group hysteroscopy, was considered.

Preoperative and postoperative PBAC Scoring System was used to record size of clots/ flooding row under the relevant day [13]. Score of 100 or greater indicated that the women had a heavy menstrual period or menorrhagia. An endometrial biopsy was used for all women in order to rule out endometrial cancer in three centers; We assessed all women by vaginal ultrasound in order to assess endometrial pathology and uterine congenital anomaly.

Inclusion criteria included: 1- Lack of response to drug treatment. 2-Unwillingness to fertility and childbearing. 3-Normal cervical cytology. 4- Lack of malignancy in endometrial histology. 5- Absence of urinary tract infection myoma.

Exclusion criteria included: 1- Submucosal myoma larger than 2 cm or myomatose uterine larger than 3 cm. 2- Length of the uterine cavity larger than 10 cm or smaller than 4 cm. 3- Evidence of endometrial hyperplasia or atypia. 4- Existence or appearance of abnormal cervix. 5- Adnexal mass without obvious pathology. 6- Uterine abnormalities, which prevent the opening of the balloon inside the uterus.

Women who were treated with TBA (Cavaterm™) were admitted in Ayatollah Rouhani Hospital in Babol and Emam Hossein Hospital in Tehran (group A), and the others who were treated with hysteroscopy resection were admitted in Shahid Faghihi Hospital in Shiraz (group B), because there was a device for the hysteroscopy resection procedure.

For all patients, the procedure was designed at day three to five of the menstrual cycle. Some of the women underwent TBA with disposable balloon (FDA approval obtained in 1997). The others were treated with hysteroscopy resection (waveform unipolar current). The procedures were carried out based on anesthesiologist's preference of patients who underwent the proper kind of anesthesia. After preparation of the Cavaterm™ (Pnn Medical SA, Morges, Switzerland), according to the manufacturer's instructions, the balloon was inflated with glucose 5% until a pressure of 230±10 mm/Hg was reached and this pressure was maintained throughout the entire procedure. Then, the fluid was heated up to a temperature of 75°C and maintained for 10 min. Patients were discharged one day after the procedure.

Women with heavy menstrual bleeding who were admitted in Shahid Faghihi Hospital Shiraz underwent hysteroscopy resection (waveform unipolar current).

Vaginal pain was postoperatively assessed by visual analogue scale (VAS). The VAS is a straight line based on a scale of 0–10, where 0 stands for no pain and 10 for maximum pain. Women were discharged the same day. Postoperative PBAC Scoring System was used to record size of clots/flooding row under the relevant day. Score of 100and above indicated that the women had HMB, and a score of zero defined "amenorrhea" [13]. The primary outcome was amenorrhea at 12 months post treatment. Secondary outcomes were pain, reduction in bleeding, patient satisfaction, quality of life and reinterventions.

Medical records were reviewed for intra-operative and postoperative complications after hysteroscopy or TBA (Cavaterm™) operation, such as fluid overload, hematometria, infection, perforation of the uterus during the opening or entering into uterine cavity, laceration of cervix thermal damage to the intestine bleeding, and adnexal necrosis. In addition, women completed health status questionnaires included questions on the amenorrhea, reduction of menstrual flow, and heavy bleeding postoperative in the 12^{th}month after the end of treatment.

The patient's satisfaction was also assessed 12 months after surgery. The answer options included: Amenorrhea, normal menstruation, hypomenorrhea considered as treatment success 12 months after endometrial ablation (excellent, good, medium, and poor). The collected data were entered into SPSS program 18^{th} version and were analyzed with t-test, Chi-square, and Fisher exact tests. The data were coded and $P<0.05$ was considered the significant criteria.

3. RESULTS

All 52 patients underwent endometrial ablation by TBA (Cavaterm™) (group A) and 56 patients were treated with hysteroscopy resection (group B), followed up for 12 months. The mean age of patients in group A and group B were 43.38±5.91 and 38.5±4.21 years, respectively (Table 1).

In this study, 42(80%) and 38(67.8%) of women who were treated with TBA and hysteroscopy resection had a drug history such as: oral contraceptives; medroxyprogesterone; Danazol; Dekapeptid.

Ten patients (19.2%) who were treated with TBA and 18 patients (32.1%) who were treated with resection hysteroscopy did not have a history of any type of medical or surgical treatments.

None of the patients who were treated with endometrial ablation by thermal balloon and hysteroscopy resection had any complications intraoperative or postoperative.

After a follow-up 12 months postoperative, the patients who were treated with thermal balloon ablation (44.2%) had a higher amenorrhea rate than the patients who were treated with hysteroscopy resection (16.07%); this difference was statistically significant (P=0.006). In hysteroscopy resection hypomenorrhea was more than TBA method after 12 months (P=0.021) (Table 2). A subsequent hysterectomy for recurrent bleeding was not performed in the patients.

Table 1. Characteristics of the women with heavy menstrual bleeding undergoing endometrial ablation procedure

Variables	Cavaterm (n=52) Mean ±SD	Hysteroscopy (n=56) Mean ±SD	P-value
Age	43.38±5.91	38.5±4.21	<0.001
Parity	2.67±1.13	2.23±3.24	0.356
Abortion	0.4±0.69	0.53±0.34	0.212
Base line PBAC	361.3±227.5	372.4±125.6	0.752

Table 2. Comparison of menstrual bleeding type 12 months after Cavaterm and hysteroscopy resection methods

Menstrual bleeding type	Cavaterm (n=52) Frequency (%)	Hysteroscopy (n=56) Frequency (%)	P-value
Amenorrhea	23 (2.44%)	9(16.07%)	0.001
Hypomenorrhea	13(25%)	26(46.42%)	0.021
Normal menstruation	10 (19.2%)	17(35.30%)	0.182
Hypermenorrhea	6(11.5%)	4(1.7%)	0.431

The success rate of treatment (amenorrhea, hypomenorrhea, normal menstruation) after one-year follow-up in the two groups (thermal balloon ablation and hysteroscopy resection), was 46(88.5%) and 52(92.9%), respectively, and treatment failure (hypermenorrhea) was 6(11.5%) and 4(7.1%), respectively, but was not statistically significant (P=0.51).

In the current study, the satisfaction of surgery 12 months after surgery in patients with abnormal uterine bleeding after TBA and hysteroscopy resection was not statistically significant (P=0.27) (Table 3).

Table 3. Comparing patient satisfaction 12 months after Cavaterm and hysteroscopy resection methods

Endometrial ablation method	Frequency (%)	P-value
Cavaterm (n=52)	45 (86.5%)	0.278
Hysteroscopy resection (n=56)	52 (92.9%)	

Pathologic result reported proliferative endometrial in 43 patients (82.7%) of group A and 47 patients (83.9%) of group B. In nine patients (17.3%) of group A and nine patients (16%) of group B, the pathologic result reported fibroids or polyps (Table 4).

4. DISCUSSION

The findings of this investigation support the previous findings indicating that hysterectomy can be avoided by ablation of the endometrium [14,15]. The success rate of treatment in the present study after one-year follow-up in two groups (thermal balloon ablation and hysteroscopy resection) (88.5% and 92.9%, respectively) was comparable with other studies that have used these methods for destroying the endometrium [16-22]. Amenorrhea and hypermenorrhea were more in TBA and hysteroscopy resection groups, respectively, but there was not a difference in the treatment success and satisfaction of surgery within 12 months of surgery in patients with a history of menorrhagia in hysteroscopy resection and TBA groups. According to the followed research with Cavaterm system, some studies reported amenorrhea rates between 22% and 68%, respectively [23,24]. The rate of amenorrhea at 12 months after surgery in patients treated with TBA (44.2%) when compared with other types of bleeding (hypomenorrhea, normal menstruation and hypermenorrhea), was more than patients treated with hysteroscopy resection (16.07%), which was statistically significant. The rate of amenorrhea at 12 months in patients treated with TBA in our study was more than rates that were reported by Friberg et al. (31%) [25].

The study by Hawe et al. compared Nd:YAGLaser and Cavaterm methods for treating dysfunctional uterine bleeding after 12 months; In Cavaterm and Laser groups, the occurrence of amenorrhea was reported to be 29% and 39%, respectively (P=0.286) [26]; While the rate of amenorrhea in Cavaterm methods was reported as being less than in our study.

However, if we consider amenorrhea, hypomenorrhea, and normal menstruation as treatment success and hypermenorrhea as failure, comparison of resection and Cavaterm methods will not be significant in our study (P =0/51). In Hawe et al.'s study, the difference in the occurrence of amenorrhea or hypomenorrhea is not statistically significant [26].

Also in Vihko et al.'s study, Cavaterm and Menotreat had similar effectiveness [27]. Similar to those studies, in the study by El-Toukhy et al., the incidence of amenorrhea-hypomenorrhea was 74%–83% after 24 months treatment with Cavaterm [16].

Unlike in our study, in the study by Abbott et al. amenorrhea incidence in nova sure method was higher than Cavaterm; Thismaybe because of the differences in sample sizes. But asinour study, the favorable results about hemorrhage amount after surgery were similar in both groups [28]. In another study, Abbott et al. [29] used four methods, such as ELITT Laser, ELA Laser, Cavaterm, andnova sure. Although amenorrhea and hypomenorrhea composition was not significantly different in the four groups, there was a significant difference in the incidence of amenorrhea (P =0.02).

Table 4. Comparing of patient satisfaction after Cavaterm and hysteroscopy resection methods according to their pathological results

Pathological results		Satisfied frequency	Didn't satisfy frequency (%)	P-value
Proliferative endometrium	Cavaterm	37 (86%)	6 (14%)	0.14
	Hysteroscopic resection	45 (95.7%)	2 (4.3%)	
Fibroids or polyps	Cavaterm	8(88.9%)	1(11.1%)	1.000
	Hysteroscopic resection	7(77.8%)	2(22.2%)	

Brun et al. [22] compared thermal balloon hysteroscopy resection and, similar to our study, amenorrhea rate 12 months after surgery was higher in thermal balloon group.

In a double-blind clinical trial study, amenorrhea rate in nova sure and thermal balloon was 48% and 32%, respectively [30]. Also, in a meta-analysis, amenorrhea rate in thermal balloon was higher than bipolar radiofrequency, microwave and free fluid ablation methods [5]. In a 10-years-old clinical trial, amenorrhea rate in thermal balloon was higher than bipolar radiofrequency method [31].

In a 2013 study, first generation of ablation method was done with hysteroscopy golden standard techniques Laser trans-cervical resection and roller bar, and second generation of ablation methods was done with blinded technique. There was no difference in bleeding after surgery between first generation method and second generation method. Also, there is not sufficient evidence to suggest the superiority of one particular technique with regard to ablation and resection [21].

The results of a review of seven clinical trials on females with abnormal uterine bleeding treated with (abdominal, vaginal and laparoscopic) hysterectomy and endometrial ablation (resection, resection or laser, resection or roller bar, thermal balloon or Electro Daysksion), showed that hysterectomy is the most effective treatment for women with abnormal uterine bleeding, but it has more complications, insufficient data exist to compare the outcome of amenorrhea because of using different questionnaires in different studies, and the power of evidence to show that the hysterectomy is a better method than endometrial ablation in bleeding control is moderate [32].

In some of these studies, as in our study, amenorrhea rate one year after treatment in thermal balloon group was higher than other endometrial ablating methods, and in some studies the result was reverse, which may be due to the study method, sample size, surgical techniques, patient age, sub mucosal and intramural myoma, or follow-up duration time. However, the overall success rate of endometrial ablation techniques was not significantly different.

In addition, in our study patient satisfaction rates of Cavaterm (86.5%) and hysteroscopy resection(92.9%) 12 months after surgery were not statistically significant (P =0/27). In Brun JL et al.'s study, the satisfaction of patients treated with hysteroscopic resection and thermal balloon was 79% and 89%, respectively [22].

Also, in a meta-analysis in bipolar, microwave, radiofrequency, free fluid ablation and thermal balloon were evaluated, and 12 months after surgery there was no difference in the satisfactions of patients [5].

Also similar to the results of previous studies [16,22,33-36] assesing the adverse effects, these procedures had no major complication such as uterine perforation, heavy blood loss or thermal injures, and no morbidity was reported.

In the study by Gurtcheff SE et al. [37] complications such as thermal injury to the intestine, bleeding, uterus perforation and adnexal necrosis have been reported, although these side effects were reported in patients with a history of previous cesarean section.

But in another study performed in 2010, 116 premenopausal women with menorrhagia were treated with Cavaterm method and 26 cases had history of previous cesarean section. The results of this study showed women with a history of cesarean section did not have a bad outcome and this method of treatment can be used in these patients [38]. In our study, the patients with a history of cesarean section did not have any adverse outcome.

5. CONCLUSIONS

In the current study, there was not a difference in the treatment success and satisfaction 12 months after surgery in patients with a history of menorrhagia in

the two groups, but amenorrhea was more in thermal balloon ablation. Endometrial ablation among our patients showed a similar outcome to previous reported studies. It seems that these methods represent an excellent alternative to hysterectomy with high rate of success, very low rate of complications, and high patient satisfaction.

CONSENT

When a patient met the criteria, written informed consent was obtained.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

FINANCIAL DISCLOSURE

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kumar V, Tryposkiadis K, Gupta JK. Hysteroscopic local anesthetic intrauterine cornual block in office endometrial ablation: A randomized controlled trial. Fertil Steril. Nov 4; 2015.
pii: S0015-0282(15)02030-0.
DOI: 10.1016/j.fertnstert.2015.10.019
[Epub ahead of print]
2. Shapley M, Jordan K, Croft PR. An epidemiological survey of symptoms of menstrual loss in the community. Br J Gen Pract. 2004;54:359-63.
3. El-Nashar SA, Hopkins MR, Creedon DJ, Cliby WA, Famuyide AO. Efficacy of bipolar radiofrequency endometrial ablation vs thermal balloon ablation for management of menorrhagia: A population-based cohort. J Minim Invasive Gynecol. 2009;16(6):692-9.
4. Glazerman LR. Endometrial ablation as a treatment for heavy menstrual bleeding. Surg Technol Int. 2013;23:137-41.
5. Daniels JP, Middleton LJ, Champaneria R, Khan KS, Cooper K, Mol BW, Bhattacharya S. International heavy menstrual bleeding IPD Meta-analysis Collaborative Group. Second generation endometrial ablation techniques for heavy menstrual bleeding: Network meta-analysis. BMJ. 2012;344:e2564.
6. Penezic L, Riley K, Harkins G. Long-term patient satisfaction with thermal balloon ablation for abnormal uterine bleeding. JSLS. 2014;18:3.
7. Bouzari Z, Yazdani S, Azimi S, Delavar MA. Thermal balloon endometrial ablation in the treatment of heavy menstrual bleeding. Med Arch. 2014;68(6):411-3.
8. Ajao MO, El-Nashar SA, Khan Z, Hopkins MR, Creedon DJ, Famuyide AO. Nonresectoscopic endometrial ablation in high-risk surgical patients: A cohort study. J Minim Invasive Gynecol. 2013;20(4):487-91.
9. El-Nashar SA, Hopkins MR, Barnes SA, Pruthi RK, Gebhart JB, Cliby WA, Famuyide AO. Health-related quality of life and patient satisfaction after global endometrial ablation for menorrhagia in women with bleeding disorders: A follow-up survey and systematic review. Am J Obstet Gynecol. 2010;202(4): 348.e1-7.
10. Vitagliano A, Bertin M, Conte L, Borgato S, Leggieri C, Fagherazzi S. Thermal balloon ablation versus transcervical endometrial resection: Evaluation of postoperative pelvic pain in women treated for dysfunctional uterine bleeding. Clin Exp Obstet Gynecol. 2014; 41(4):405-8.
11. Gangadharan A, Revel A, Shushan A. Endometrial thermal balloon ablation in women with previous cesarean delivery: Pilot study. J Minim Invasive Gynecol. 2010;17(3): 358-60.
12. Chapa HO, Venegas G, Antonetti AG, Van Duyne CP, Sandate J, Bakker K. In-office endometrial ablation using a third generation uterine balloon therapy system: 12-month prospective follow-up on menstrual patterns and dysmenorrheal impact. J Reprod Med. 2009;54(11-12):678-84.
13. Higham JM, O'Brien PM, Shaw RW. Assessment of menstrual blood loss using a pictorial chart. Br J Obstet Gynaecol. 1990; 97(8):734-739.
14. Abbott JA, Garry R. The surgical management of menorrhagia. Hum Reprod Update. 2002; 8(1):68-78.

15. Cromwell DA, Mahmood TA, Templeton A, van der Meulen JH. Surgery for menorrhagia within English regions: variation in rates of endometrial ablation and hysterectomy. BJOG. 2009;116(10):1373-9.
16. El-Toukhy T, Chandakas S, Grigoriadis T, Hill N, Erian J. Outcome of the first 220 cases of endometrial balloon ablation using Cavaterm plus. J Obstet Gynaecol. 2004;24(6): 680-3.
17. Amso NN, Fernandez H, Vilos G, Fortin C, McFaul P, Schaffer M, et al. Uterine endometrial thermal balloon therapy for the treatment of menorrhagia: Long-term multicentre follow-up study. Hum Reprod. 2003;18(5):1082-7.
18. Lok IH, Leung PL, Ng PS, Yuen PM. Life-table analysis of the success of thermal balloon endometrial ablation in the treatment of menorrhagia. Fertil Steril. 2003;80(5): 1255-9.
19. Andersson S, Mints M. Thermal balloon ablation for the treatment of menorrhagia in an outpatient setting. Acta Obstet Gynecol Scand. 2007;86(4):480-3.
20. Pai RD. Thermal balloon endometrial ablation in dysfunctional uterine bleeding. J Gynecol Endosc Surg. 2009;1(1):31-3.
21. Lethaby A, Penninx J, Hickey M, Garry R, Marjoribanks J. Endometrial resection and ablation techniques for heavy menstrual bleeding. Cochrane Database Syst Rev. 2013; 8:CD001501.
22. Brun JL, Raynal J, Burlet G, Galand B, Quéreux C, Bernard P. Cavaterm thermal balloon endometrial ablation versus hysteroscopic endometrial resection to treat menorrhagia: The French, multicenter, randomized study. J Minim Invasive Gynecol. 2006;13(5):424-30.
23. Hawe JA, Phillips AG, Chien PF, Erian J, Garry R. Cavaterm thermal balloon ablation for the treatment of menorrhagia. Br J Obstet Gynaecol. 1999;106(11):1143-1148.
24. Shaamash AH, Sayed EH. Prediction of successful menorrhagia treatment after thermal balloon endometrial ablation. J Obstet Gynaecol Res. 2004;30(3):210-216.
25. Friberg B, Ahlgren M. Thermal balloon endometrial destruction: The outcome of treatment of 117 women followed up for a maximum period of 4 years. Gynaecological Endoscopy. 2000;9(6):389-395.
26. Hawe J, Abbott J, Hunter D, Phillips G, Garry R. A randomised controlled trial comparing the Cavaterm endometrial ablation system with the Nd: YAG laser for the treatment of dysfunctional uterine bleeding. BJOG. 2003; 110(4):350-7.
27. Vihko KK, Raitala R, Taina E. Endometrial thermoablation for treatment of menorrhagia: comparison of two methods in outpatient setting. Acta Obstet Gynecol Scand. 2003; 82(3):269-74.
28. Abbott J, Hawe J, Hunter D, Garry R. A double-blind randomized trial comparing the Cavaterm and the NovaSure endometrial ablation systems for the treatment of dysfunctional uterine bleeding. Fertil Steril. 2003;80(1):203-8.
29. Abbott JA, Hawe J, Garry R. Quality of life should be considered the primary outcome for measuring success of endometrial ablation. J Am Assoc Gynecol Laparosc. 2003;10(4): 491-5.
30. Kleijn JH, Engels R, Bourdrez P, Mol BW, Bongers MY. Five-year follow up of a randomised controlled trial comparing NovaSure and ThermaChoice endometrial ablation. BJOG. 2008;115(2):193-8.
31. Herman MC, Penninx JP, Mol BW, Bongers MY. Ten-year follow-up of a randomised controlled trial comparing bipolar endometrial ablation with balloon ablation for heavy menstrual bleeding. BJOG. 2013;120(8):966-70.
32. Matteson KA, Abed H, Wheeler TL 2nd, Sung VW, Rahn DD, Schaffer JI, Balk EM. Society of Gynecologic Surgeons Systematic Review Group. A systematic review comparing hysterectomy with less-invasive treatments for abnormal uterine bleeding. J Minim Invasive Gynecol. 2012;19(1):13-28.
33. Alaily AB, Auld BJ, Diab Y. Endometrial ablation with the Cavaterm thermal balloon. J Obstet Gynaecol. 2003;23(1):51-4.
34. Roberts TE, Tsourapas A, Middleton LJ, Champaneria R, Daniels JP, Cooper KG, et al. Hysterectomy, endometrial ablation, and levonorgestrel releasing intrauterine system (Mirena) for treatment of heavy menstrual bleeding: Cost effectiveness analysis. BMJ. 2011;342:d2202.
35. Daniels JP. The long-term outcomes of endometrial ablation in the treatment of heavy menstrual bleeding. Curr Opin Obstet Gynecol. 2013;25(4):320-6
36. Lethaby A, Hickey M, Garry R, Penninx J. Endometrial resection / ablation techniques for

heavy menstrual bleeding. Cochrane Database Syst Rev. 2009;4:CD001501.

37. Gurtcheff SE, Sharp HT. Complications associated with global endometrial ablation: The utility of the MAUDE database. Obstet Gynecol. 2003;102:1278-1282.

38. Aparna G, Ariel R, Asher S. Endometrial Thermal ballon ablation in women with previous cesarean delivery: Pilot study. The Journal of minimally invasive gynecology. 2010;17(3):358-360.

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