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STUDY OF THERMAL UTERINE BALLOON ABLATION FOR TREATMENT OF SUBJECTS WITH REFRACTORY DYSFUNCTIONAL UTERINE BLEEDING PRESENTING WITH MENORRHAGIA

Gynaecology

KEYWORDS: Thermal Uterine Balloon Ablation, Refractory Dysfunctional Uterine Bleeding.

Dr Ritu Jain — Assistent professor, Department of Gynaecology and Obstretrics, Rims, Raipur, CG, India-492001

Dr Ragini Verma — Professor and HOD, Department of Gynaecology and Obstretrics, GMC, Surat, India

Dr Brajendra kumar — Professor, Department of Medicine, RIMS, Raipur, CG, India-492001

ABSTRACT

Aim of this study was to establish the effectiveness of UBT for treatment of refractory DUB over a follow up period of 3 and 6 months & to study the complications of Thermal Uterine Ablation. This study of effectiveness of Thermachoice UBT system in 30 subjects of refractory DUB (refractive to medical therapy with TxA and/or COCs and/or Progestins) presenting with menorrhagia was carried out in the Department of Obstetrics and Gynaecology, NCH, Surat, from dec'06 to sep'09. After confirmation of the diagnosis and ensuring that the subjects fulfilled the selection criteria, they were subjected to the procedure of Thermachoice UBT in the proliferative phase of the menstrual cycle under appropriate anesthesia (GA or local analgesia with Para cervical block). 28 subjects (93.33%) were in reproductive age group. 29 subjects (96.67%) were multiparous. Average BMI of enrolled subjects was 21.72. All subjects had haemoglobin <12 gm/dL before commencing treatment. 26 subjects(86.67%) had endometrial thickness ≤10mm at the time of evaluation. Menstrual blood loss was reduced in 22 subjects(~96%) at 3 &6 months follow-up.Minor side effects in post operative period in form of abdominal cramps and low backache were seen in 12 subjects(39.6%), which easily responded to oral analgesics/antipyretics. 76% cases in the present study showed improved QOL, while 12% were neutral in outcome.36% subjects were very satisfied with treatment, 40% satisfied and 12% remained neutral.Incidence of very severe & severe anemia decreased from~4% & ~43% to 0% & 16%, respectively. Incidence of moderate anemia (8.1-10) decreased from 26% before treatment to 24%.Subjects having >10 gm% Hb rose from 26% pre treatment to 52% post treatment. ~83% of the subjects had endometrial atrophy post treatment (ET < 7mm). Uterine Balloon Therapy is **an simple, safe, quick, effective & potentially long term, minimally invasive treatment option for refractory DUB.**

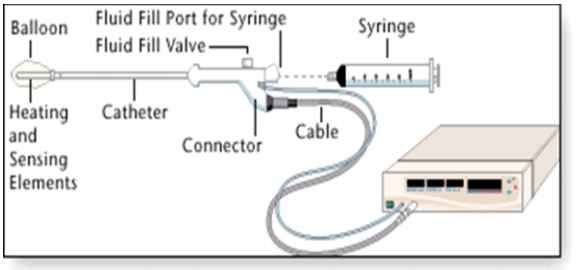
Introduction

Menstruation, though a physiological event, can sometimes be a cause of great discomfort for a woman. Dysfunctional uterine bleeding (DUB) which is abnormal uterine bleeding, occurring in the absence of an organic pelvic pathology accounts for 10-15 % of gynecological OPD attendances. One form of presentation of DUB is heavy menstrual bleeding (HMB) or menorrhagia. Menorrhagia is objectively defined as menstrual blood loss of more than 80 ml per cycle or lasting longer than 7 days, over several consecutive cycles. However, in practice, the diagnosis is based on woman's subjective assessment of blood loss. HMB has adverse implications for quality of life. Women may have difficulties with daily activities such as work, social activities, hobbies and holidays. Many women report anxiety, depression, embarrassment and problems in their sex lives because of HMB. Anemia is also common amongst these women with HMB, which further impairs the quality of life. Many changes have been seen in the field of diagnosis of DUB ranging from the once considered gold standard – Dilatation and Curettage (D and C) – to Endometrial sampling, use of TVS and Hysteroscopy, to name a few modalities.Similarly many options for management of DUB have been tried out, including medical management (NSAIDS, Antifibrinolytics, hormonal therapy, etc) and surgical management. (TCRE, endometrial balloon ablation, hysterectomy etc) according to the availability of resources, financial restraints and patient's preferences. This study of, use of Uterine Balloon Therapy (UBT) in subjects of refractory DUB, in our gynecological department, in NCH, Surat, was carried out to study the effectiveness and side effects of UBT in the management of DUB and to provide an alternative option to these subjects for DUB management.

MATERIAL AND METHOD

A total of 30 gynecological subjects with history suggestive of Refractory DUB-menorrhagia were enrolled in the study with a follow up period of 3 months. A detailed history with reference to age, menstrual complaints (duration of cycle, duration of flow, flooding, premenstrual or postmenstrual spotting,dysmenorrhoea), Obstetrical history (especially with reference to time since last delivery or last abortion), contraceptive history (IUD insertion, OC pills, etc), past history s/o bleeding disorder, personal, surgical and medication history (intake of antihypertensive, anti diabetics, anti thyroid drugs, etc) and family history was taken. Detailed history of intake of medications for menorrhagia including the drugs taken, dosages and duration of therapy along with response was noted.A detailed and thorough physical examination including vital statistics, general examination (esp. pallor), vital signs, systemic examination including thyroid and breast examination, per abdominal examination was done. Per speculum and per vaginal examination were also done to exclude organic, pregnancy related or inflammatory cause of abnormal uterine bleeding. Hemoglobin estimation, blood grouping and typing was done in all subjects. Pelvic Ultrasound examination was done to note the size of uterus, endometrial thickness, any evidence of fibroids or adenomyosis, or adnexal abnormality. Pap smear was done in all subjects. Dilatation and Curettage was done in subjects with endometrial thickness greater than 10 mm.

PROCEDURE:- The sterile package containing the UBT Catheter and Syringe was opened. The connections of the umbilical cable and balloon to the base unit were made aligning the red dots on the umbilical cable to the controller base unit.



The pressure line (pre-attached to balloon catheter) was then connected to the connection port (luer lock) on the front panel of the controller unit snugly. The power was then turned on. Once initialized, the catheter was checked by developing a negative pressure of upto 180mm which was maintained without loss of pressure.After cervical dilatation upto number 8, a thorough endometrial curettage was done. A 30 mL syringe was next filled with D5W and connected to the balloon and the balloon was introduced into the uterine cavity upto the fundus guided by the uterocervical length measured by the uterine sound. The trumpet valve on top of balloon catheter was pressed and balloon filled slowly to a pressure of

160-180 mm Hg using 2-35 ml of D5W. The trumpet valve was then released to allow the pressure to stabilize.When a steady pressure of 160-180 mm Hg was maintained, the START button on controller was pressed to activate the heater. A temperature of 87°C was reached usually in around four minutes.The therapy cycle of eight minutes started spontaneously. Care was taken to maintain the uterine pressure of above 150 mm Hg.Once the therapy cycle was completed, the unit cooled down spontaneously after which the balloon was removed after removing the fluid.The subjects were monitored for postoperative morbidity. Subjects were discharged after 24 hours and called for follow up at Days 7, 30 and then monthly till 3 months then at 6th month after the procedure, to evaluate regarding symptomatic improvement in menstrual blood loss [amenorrhea, hypomenorrhea i.e decreased PBAC score, or eumenorrhea i.e PBAC score same as that prior to menorrhagia], immediate and late postoperative problems like abdominal / back pain, vaginal discharge and menstrual pattern in terms of continuing menorrhagia, reduced blood loss or amenorrhea, or other related complaints.

RESULTS

The subjects who underwent UBT were then followed up at monthly intervals for at least 3 months, and the effect of therapy on subsequent bleeding patterns was studied.

Table 1. Effect of therapy on bleeding patterns in present study.

	Number of Subjects (n=23)	Percentage
Eumenorrhoea	01	4.35%
Hypomenorrhoea	03	13.04%
Amenorrhoea	18	78.26%
Persistent menorrhagia	01	4.35%

In the present study-18 subjects had amenorrhoea, 3had hypomenorrhoea,1 each had eumenorrhoea and persistent menorrhagia (failure of management), 2 subjects had procedure/ technical failure and were subsequently treated with hysterectomy in the same sitting, while 5 subjects were lost to follow.So, out of 23 subjects there was only ONE failure i.e **Study Success rate = 95.65%,**

The following table compare the various patient characteristics and study results- Amenorrhea defined as absence of menstruation.

Hypomenorrhea defined as decrease in PBAC score post procedure.

Eumenorrhea defined as PBAC score same / less than that of prior to development of menorrhagia.

The study results were co-related with the age of the subjects.

Table 2. Study outcome and co-relation with the age.

Age (in years)	Amenorrhea	Hypomenorrhea	Eumenorrhea	Menorrhagia (FAILURE)
20-40 (6)	4 (66.67%)	1 (16.67%)	1 (16.67%)	0
41-50 (15)	12 (80%)	2 (13.3%)	0	1 (6.67%)
>51 (2)	2 (100%)	0	0	0

p value = 0.76 NON SIGNIFICANT

The table suggests that apparently the percentage of amenorrhea goes on increasing as the age increases, and hence accordingly percentage of hypomenorrhea and eumenorrhea was higher in lower age group, though the difference were not statistically significant.

The procedure results were co-related with the BMI of the subjects-

Table 3.Co-relation of procedure results with BMI of the subjects.

BMI (kg/m2)	Amenorrhea	Hypomenorrhea	Eumenorrhea	Menorrhagia
18-20 (8)	7 (87.5%)	0	1 (12.5%)	0
20.1-22 (7)	5 (71.43%)	2 (28.57%)	0	0
22.1-24 (6)	5 (83.33%)	1 (16.67%)	0	0
>24.1 (2)	1 (50%)	0	0	1 (50%)

Apparently as the BMI increases, the chances of failure of therapy increases. But otherwise also- the post post procedure results were quite satisfactory [amenorrhea rates >70% in BMI range between 18-24, provided thermal ablation was preceeded by a thorough endometrial curettage, The co-relation of the uterine position and study results was made, and is as follows-

Table 4. Co-relation between uterine position and procedure results

Uterine position	Amenorrhea	Hypomenorrhea	Eumenorrhea	Menorrhagia
Anteverted (14)	12 (85.71%)	2 (14.29%)	0	0
Retroverted (9)	6 (66.67%)	1 (11.1%)	1 (11.1%)	1 (11.1%)

p value = 0.39 NON SIGNIFICANT

The only failure that occurred in the present study was in a retroverted uterus, but since the sample size studied was small, the tests of statistical significance could not be applied. Amongst the successful results - amenorrhea rate was slightly higher (85.7%) in the anteverted group as compared to 66.6% in the retroverted group, though the difference was not statistically significant.

The following table depicts the co-relation between pre procedure ET and study results-

Table5. Study results in relation with the pre procedure ET

ET (in mm)	Amenorrhea	Hypomenorrhea	Eumenorrhea	Menorrhagia
2-7 (7)	6 (85.71%)	1 (14.29%)	0	0
7.1-10 (14)	12 (85.71%)	1 (7.14%)	0	1 (7.14%)
>10 (2)	0	1 (50%)	1 (50%)	0

p value = 0.69 NON SIGNIFICANT

The table suggests that the chances of failure increases as the pre procedure ET increases.Also the subsequent menstrual pattern- i.e the development of amenorrhoea decreases if pre procedure ET is greater, accordingly there are more chances of developing subsequent hypomenorrhea or eumenorrhea.

The pressure at which the therapy cycle was performed was subsequently co-related with the study results-

Table 6. Relation between the study result and the pressure used in the balloon

Pressure (in mm of Hg)	Amenorrhea	Hypomenorrhea	Eumenorrhea	Menorrhagia
150-175 (9)	7 (77.78%)	1 (11.1%)	1 (11.1%)	0
176-200 (16)	13 (81.25%)	2 (12.5%)	0	1 (6.25)

p value = 0.95 NON SIGNIFICANT

The number of subjects developing subsequent hypomenorrhea and eumenorrhea was more at lower pressure range.

Table 7. Comparison of pre & post procedure Hb levels.

Hb	Pre procedure Hb (n=23)¤	%	Post procedure Hb (n=23)	%
<5	1	4.35	0	0
5.1-8	10	43.48	4	16
8.1-10	6	26.09	6	24
>10	6	26.09	13	52

¤ The pre procedure data of the 23 subjects who were available for follow up was compared to their post procedure data.

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This table shows that the incidence of severe anemia (Hb 5.1-8) decreased from 43.48% before treatment to 16%[It was still 16% after treatment probably because of non compliance with post procedure oral iron therapy.]. While those subjects having very severe anemia (Hb <5gm%) decreased from 4.35% to 0%.Subjects having Hb 8.1-10 decreased from 26 to 24%, while those with >10 gm% Hb rose from 26% pre treatment to 52% post treatment..

Table 8. Comparison of pre & post procedure ET :

ET	No. of subjects pre procedure (n=23)¤	%	No. of subjects post procedure (n=23)	%
2-7	8	34.78%	19	82.6%
7.1-10	13	56.52%	4	17.39%
>10	2	8.69%	0	0%

¤ The pre procedure and post procedure ET comparison was done for the 23 subjects who were available for follow up.

The table shows that ET 2-7 mm was seen in 82.6% subjects post treatment as compared to 34.78% of pre treatment group.The number of subjects having ET of 7-10 mm decreased from 56.52% to 17.34%. Those having 'suspected' endometrial hyperplasia decreased from 8.69% to 0%.

Subject satisfaction and the impact on quality of life was assessed at the 3 month follow up visit.

Table 9. Effect on QOL(Quality of life) in present study

	Number of subjects (n=23)	Percentage (%)
Very satisfied	09	39.13%
Satisfied	10	43.48%
Neutral	03	13.04%
Not satisfied	01	4.35%

In the present study, of the 23 subjects available for follow up most of the subjects (82.6%) were satisfied with complete remission of symptoms and had improved quality of life after therapy, while only 4% of subjects were not satisfied with QOL at the end of treatment.

Intra operative difficulties in present study :- We had to face certain intra operative difficulties during the study ,the balloon insertion was difficult in **Two** subjects due to cervical stenosis, the procedure was then completed under laparoscopic guidance; while two subject had equipment/technical failure.

Early postoperative adverse events in present study:-The major early postoperative adverse events in present study were abdominal cramps and low backache seen in 39.6% of subjects,for which the subjects were counseled pre-operatively, all of them responded to simple analgesics; while 6.6% of subjects had fever which settled with oral antipyretics

FOLLOW UP :- 22 of these subjects were available for 12 month follow up, and the amenorrhea rate was 81.82% (18 subjects), thus proving that Uterine Balloon Therapy is **an effective**, **potentially long term, minimally invasive treatment option for refractory DUB.**

DISCUSSION:-

The variety of medical therapeutic options for women with DUB is increasing and if properly deployed has the potential to eliminate a large number of the surgeries for the same. *Management is based upon* – exclusion of organic disease of genital tract, diagnosis of underlying dysfunction, if possible and assessment of nature and severity of DUB.

Medical Treatment: **General supportive treatment**: Menstrual calendar maintenance, diet, oral iron therapy, Blood transfusion if indicated & treatment of cause of Secondary DUB.**Non hormonal:** PG-synthetase Inhibitors, Antifibrinolytics - EACA, Tranexemic Acid, Ethamsylate. **Hormonal:** Progestin, Estrogen,Combined oral contraceptive pills, Danazol, GnRH Analogues. ***Surgical treatment:*** **1.Dilatation and Curettage2.Hysteroscopic/First generation-** Endometrial laser ablation, Resectoscopic endometrial ablation, **3.Non hysteroscopic / Second generation methods**[1]-Thermal Balloon Endometrial Ablation [TBEA] as- *Thermachoice*, Cavaterm[2], Radiofrequency Thermal ablation, Hydrothermal ablation, 3-D Bipolar ablation, Microwave Endometrial ablation, Laser Interstitial hyperthermy, Cryoablation.4. **Hysterectomy5.*THERMACHOICE-UBT:-Pretreatment preparation:*** The lining of Uterus should be thinned prior to Thermachoice-UBT therapy. This can be accomplished by-timing the procedure in early proliferative phase of menstrual cycle.[3] performing Suction / Sharp curettage immediately prior to performing the thermablation or administering pretreatment with drugs as Danazol or GnRH analogues. ***Device description: The UBT (Uterine Balloon Thermal Ablation) system is a software controlled device designed to ablate uterine tissue by thermal energy. It consists of a 16 cm long and 4.5 mm wide catheter with a silicone balloon at its distal end, which houses the heating element. The catheter is connected to a control unit that monitors, displays and controls preset intrauterine balloon pressure, temperature and duration of treatment. After the balloon catheter insertion, sterile 5% Dextrose is injected into the balloon until the intrauterine pressure stabilizes between 160 and 180 mmHg. The fluid within the balloon is heated to approximately 87°C and the treatment automatically continues at that temperature for 8 minutes. For safety, the device automatically deactivates if the pressure or the temperature fluctuates below or above preset values. New Generation UBT Balloon:It is made of silicone instead of Latex, so there are fewer problems of latex allergy or intolerance.It contains a propeller fan within the balloon which circulates the fluid throughout the cavity for even heating. The balloon is designed to ensure a snug fit in the uterine cavity. Anaesthesia requirement:-*** Increasingly, UBT is being carried out under local anesthesia or conscious sedation[4]. Premedication with Non Steroidal Anti Inflammatory Drugs given orally to alleviate uterine pain is necessary. Intraoperative medication may include local injection of 1% lignocaine or bupivacaine with or without epinephrine 1:100000 and / or a combination of rapid short acting Opioids such as Fentanyl and a benzodiazepine such as midazolam.The operation is usually well tolerated by majority of the subjects. In some subjects, a short General Anesthesia may be required. ***Adverse events:-*** Post-treatment cramping was reported in 39.6% of the subjects. The cramps/pain ranged from mild to severe as reported during the intra-operative and immediate post-operative period. This cramping typically lasted a few hours and rarely continued beyond the first day following ablation. The use of non-steroidal anti-inflammatory drugs (NSAIDs) prior to and following UBT was usually sufficient to manage cramping and pelvic pain. Nausea and vomiting were reported in 6.6% of the subjects in the immediate hours following the procedure. This may be attributed to general anesthesia, and was usually managed with medication. **Following complications can ocuur:-** Perforation of the Uterus, Thermal Injury to Adjacent Tissue [5,6]., Heated Liquid Escaping Into the Vascular Spaces and/or Cervix, Vagina, Fallopian Tubes, and Abdominal Cavity,Electrical Burn, Hemorrhage, Infection or Sepsis, Endometritis, Hematometra, Post-ablation-tubal sterilization syndrome[7].

Post Operative Care and Follow up: Most subjects can leave the hospital after approximately 2 hours of the procedure. Occasionally an overnight stay is recommended when UBT is performed under GA.Normal daily activities can be resumed by the end of 3rd day.Post op Cramps/mild pain may persist for 2 to 30 days, responds to early oral NSAIDs. Vaginal Discharge is watery, initially blood stained for 2-3 weeks, occasionally lasts longer. Sexual intercourse to be avoided till bleeding or heavy discharge has stopped. After UBT, regular Pap smear should be continued. Need for contraception to be explained to the subjects [8,9]. If women are placed on Hormone Replacement therapy, Progestins must be added to avoid increased risks of Ca endometrium. Tibolone[10] is a safe option after UBT. SERMs can also be used. **Failure:-**Young patients (<40 years) have more chances of

failure. Higher age ensures greater success of outcome[11.] Prolonged duration of symptoms is inversely associated with success rates. Retroverted position of Uterus was associated with 6 folds failure rate. Hypothesis[12] for this increase is that a retroverted uterus modifies the pressure in balloon. The precise site of the heater element within the cavity is not in uniform contact and one wall of uterine cavity is farther away from the heater element than it should be, thus leading to differences in ablation. Ablation is more likely to fail if endometrium is thick (> 7 mm).

CONCLUSION:-

In the present study, the Uterine balloon therapy was effective from 1st month onwards. Improvement in menstrual symptoms and satisfaction with the outcome of the treatment appears encouraging. With no intraoperative complications and minimal postoperative morbidity, it leads us to conclude that this therapy is a potentially safe and effective treatment option for refractory DUB, in situations where other modalities fail, are contraindicated, or difficult to perform. The current procedure does not require additional training or expertise in operative hysteroscopy. This procedure requires no cervical dilatation (5mm), is well tolerated under neurolept anaesthesia, and has potential to be offered as an office procedure under local anaesthesia The ease of use, patient tolerance, demonstrated safety profile and comparable efficacy of Thermachoice- UBT system provides an easily learned alternative to hysterectomy.

REFERENCES:-

1. Vilos G.A, Intrauterine surgery using co-axial bipolar electrode in normal saline solution. (Versa point) a pilot study 1999;72-74.
2. Fernandez H hums Reprod 1997; 912/911:2511-2514
3. Chimbira TH, CopeE, ABM, et al; Br. J Obstet-Gynae 86;46-50, 1979.
4. Fernandez H, Hum Reprod 1997; 912-911; 2511-2514.
5. Amso NN, Stabinsky SA et al. Br. J. Obstet Gynaec. 1998; 105:517-523.
6. Overton C., Hargreaves J., Mahesh A. 1997. Br. J. Obstet Gynae; 104, 1351-1359.
7. Townsenw DE, McCousland, et al Post ablation tubal ligation syndrome. Obs - Gyn 102:422-424, 1993.
8. Shirk G.J. Minimally invasive surgery for ablation of the endometrium. Clinical Obstet Gynaec, 48 (2); 325-336 <2006.
9. Vilos G.A Hysteroscopic and non-hysteroscopic endometrial ablation. Obstet. Gynaec clinical N Am, 31 (3); 687-704, 2004
10. ASRM Menopausal medicine vol 11 and 12 no 1, 2 2000, 2003, 2004.
11. Garry R., Shelly- Jones D., Mooney P. et al Obstet. Gynaec, 85, 24-29.
12. Gervaise A, Fernandez H et al 199; 11; 2723-2747.