Evaluation of Transvaginal Bilateral Uterine Artery Ligation as A Conservative Treatment for Refractory Menorrhagia

Refaat I. Alsheemy*,Samia M. Eid,* and Abd- Elrahman*

* Obstetrics and Gynecology Department, Al-Azhar Faculty of Medicine, Egypt.
eidsamia@yahoo.com

Abstract: Background: Excessive menstrual loss, or menorrhagia, is a significant health care problem in the developed world. Surgical management had been the standard of treatment in menorrhagia due to organic causes (eg, fibroids) or when medical therapy fails to alleviate symptoms. A number of minimally invasive treatment options are now available, but the final consensus on the best treatment modality is still to be determined. The novel operation of bilateral uterine artery ligation (BUAL operation) as an alternative to hysterectomy seems to be a promising treatment of both menorrhagia and most of the associated uterine pathology. **Our objective:** was to determine the feasibility of transvaginal bilateral uterine artery ligation as a conservative minimally invasive treatment for refractory menorrhagia. **Methods:** The study included 50 women of gynecology outpatient department of Damietta university hospital (Al-Azhar University) attendants with refractory menorrhagia; where other types of therapy as medical and hormonal had failed to control the bleeding. For all cases; pre and post-procedural clinical assessment and ultrasound Doppler study were done to evaluate the changes. **Results:** At 12 months postoperative, there was a statistically significant decrease in the following measured outcomes: menstrual blood loss (84%); dysmenorrhea (85.7%); dyspareunia (33.3%); uterine volume (30.1%). **Conclusion:** Transvaginal bilateral uterine artery ligation**(VBUAL)** was found to be a safe, efficacious, feasible, cost-effective procedure with good patient satisfaction rates with a conservative approach for treating refractory menorrhagia.
[Refaat I. Alsheemy, Samia M. Eid and Abd- Elrahman S. **Evaluation of Transvaginal Bilateral Uterine Artery Ligation as A Conservative Treatment for Refractory Menorrhagia.** *J Am Sci* 2015;11(3):91-98]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 12

Keywords: refractory menorrhagia, cesareanscar defects, niche, pelvic pain, dysmenorrhea, not yet classified causes of abnormal uterine bleeding, myometrial hyperplasia, uterine artery occlusion, VBUAL.

1. Introduction

Menorrhagia is defined as menstruation at regular cycle intervals but with excessive flow or duration and is one of the most common gynecologic complaints in contemporary gynecology. Clinically, menorrhagia is defined as total blood loss exceeding 80 ml per cycle or menses lasting longer than 7 days **(Noorhasan *et al.*, 2010).** The World Health Organization (WHO) reports that 18 million women aged 30-55 years perceive their menstrual bleeding to be exorbitant. Reports show that only 10% of these women experience blood loss severe enough to cause anemia or be clinically defined as menorrhagia In practice, measuring menstrual blood loss is difficult. Thus, the diagnosis is usually based upon the patient's history A normal menstrual cycle is 21-35 days in duration, with bleeding lasting an average of 7 days and flow measuring 25-80 ml (**Jensen** *et al.* **2011**). The FIGO classification system: causes of AUB in the reproductive years is stratified into 9 basic categories that are arranged according to the acronym **PALM-COEIN** (palm-coein): polyp; adenomyosis; leiomyoma; malignancy and hyperplasia; coagulopathy; ovulatory disorders; endometrium; iatrogenic; and not yet classified **(Munroe** *et al.* **2012).** Not yet classified group still unknown and may include myometrial hyperplasia, previous C.S scar defect and uterine Arterio-venous (A-V) fistula**.** C.S scar defect one of not yet classified causes that causes bleeding due to increased vascularity, congestion and accumulation of blood in the defect **(Al-Sheemy., 2014).**

Aim of the work

The purposes of this study is to evaluate the operation of transvaginal bilateral uterine artery ligation **(VBUAL)**operation as a conservative method for treating refractory menorrhagia, by clinical and trans-vaginal ultrasound follow up.

2. Patient and methods

This study included 50 women and was carried out in the Department of Obstetrics and Gynecology, Al-Azhar University Hospital (Damietta) in the period from July 2012 to January 2015.

Study design: Prospective cross-sectional clinical study.

Inclusion criteria: 22-52 years old women have refractory menorrhagia, Uterine sizeless than12 weeks.

Exclusion criteria: pregnancy, genital malignancies, women on IUCD, pelvic inflammatory disease, cervical fibroid and uterine size more than 12 weeks were excluded from the study.

For each woman asked to join the study the nature of the procedure was explained carefully, a written consent and scientific committee agreement was taken and the following was done: careful history taken, the complaint of the patient was taken and carefully analyzed such as: abnormal uterine bleeding, dysmenorrhea, infertility, dyspareunia, and chronic pelvic pain. Each woman was asked about any previous uterine surgery. Transvaginal ultrasound was done both pre and post procedural evaluation was done and the following measurement should be taken:

Uterine volume (Uterine volume was assessed using a Viscosomi formula as follows:

4/3 W/2 x L/2 xT/2

Where

W= uterine width on transverse section passing through the uterine fundus

T = uterine thickness measured on sagittal section between the anterior and posterior walls

And**L**= uterine length measured on sagittal section from internal cervical os to fundus.

Fibroid volume was assessed by the formula:

4l3 abc

abc representing radii of the sphere in three dimensions). In cases of multiple fibroids, the average of all the leiomyoma volumes was determined

-Doppler study:

- Both Resistant index and Pulsility index of both uterine and intr-amyometrial blood vessels were measured at follicular phase before and after the operation.

- Presence of any turbulence which suggest uterine Arterio-Venous fistula.

Steps of operation

Each patient was asked to evacuate her bladder before being entered into the operating theater. She was arranged in the lithotomy position. After cleaning and draping, a repeat vaginal examination was performed to confirm the findings. The posterior vaginal wall was retracted with a Sims speculum, and the anterior lip of the cervix was held with a Vulsellum. A 3-cm transverse incision was made at the cervicovaginal junction. The bladder was reflected in the natural plane by sharp dissection and was retracted by a bladder retractor for 2 cm above the internal os. Gentle but-firm traction was then used to pull the uterus downward and sideways toward the contralateral side of the intended ligature in order to maximize the lateral access. The uterine artery was then visualized and palpated. A curved rounded needle was passed from the lateral to the medial side, and the uterine artery along with some myometrial tissue was ligated with 1–0 non absorbable suture. This procedure was repeated on the contra lateralside, after which, anterior vaginal-wall closure was performed with continuous 1–0 Vicryl stitches. Complete hemostasis was ensured at the end of the procedureCystoscopic examination was performed in some first cases to confirm bilateral ureteric patency.

Follow-up schedule

Subsequent follow-ups were done at 1 month, 3 months, 6 months, and 1 year post-procedure to assess: Reduction in menstrual blood loss, subjective relief in symptoms, ultrasonographic changes inuterine volume using a Viscosomi formula size, number, or echotexture of fibroids, changes in size of the uterus and fibroids. Doppler imaging at the level of the uterine artery at each visit to estimate RI, PI, S/D ratio and PSV.

Statistical analysis of data:

The collected data were organized, tabulated and statistically analyzed using SPSS version 16 running on IBM compatible computer.

Qualitative data were represented as relative frequency and percentage distribution; while quantitative data represented as mean, standard deviation (SD); minimum and maximum. Chi square test and independent samples t-test were used for comparison between groups; for comparison between two points of time, the paired samples (t) test was used.

3. Results

Our study included 50 women with refractory menorrhagia; as regard associated pathology there was no pathological lesion in 22%, uterine fibroid was found in 42% while uterine fibroid associated with adenomyosis was found in 8%, diffuse adenomyosis detected in 8%, cesarean scar defect was found in 16% and arterio-venous fistula was found in 4%.(Table 1).

Regarding preoperative pain which was found in 39 cases; dysmenorrhea reported in 14 cases, dyspareunia in 3 cases and pelvic heaviness in 22 cases; and there was significant decrease of pain at 3, 6, and 12 months postoperatively when compared to preoperative value (Table 2).

As regard preoperative bleeding, there was statistically significant decrease of abnormal uterine bleeding after 3, 6 and 12 months when compared to preoperative values (Table 2).

Also there was significant decrease in the duration of menstruation postoperatively; it ranged from 8 to 13 with a mean of 10.78±0.97 days preoperative; while at 12 months post operative, it ranged from 3 to 6 days with a mean of 4.66±0.56 days (Table 2).

The present study showed statistically significant increase in hemoglobin concentration postoperative; preoperatively, the mean of hemoglobin concentration was 9.66±1.057 g/dl; while at 12 months postoperativelyit was 10.68±0.91 g/dl (Table 2).

There was significant decrease of CS scar defect size postoperatively when compared to preoperative value; it ranged from 5 to 9 mm with a mean of 7.2±2.2

preoperatively; while at 12 months postoperative, it ranged from 3.5 to 6.2 with a mean of 4.0±1.2 mm (Table 2).

Postoperatively there was statistically significant increase in resistance index (RI) at 3, 6, 12 months when compared to preoperative value; mean RI0.716±0.103 preoperatively, while at 12 months postoperatively, it increased to 0.763±0.099 (Table 2).

The uterine volume showed a statistically significant decrease postoperatively; the mean of uterine volume was388.44±38.41 mm preoperatively; while at 12 months postoperatively, it was 271.33±33.59 mm (Table 2).

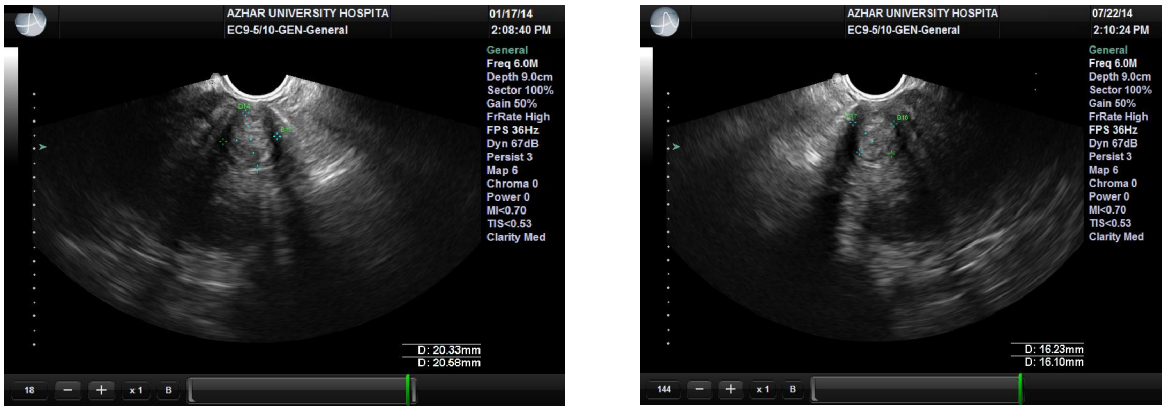
The fibroid volume showed a statistically significant decrease postoperatively; the mean percentage of decrease in mean fibroid volume was 15.2% at 3 months postoperative; while at 12 months postoperatively, it was32% (Table 2).

Table (1): Distribution of studied cases regarding ultra sonographic findings

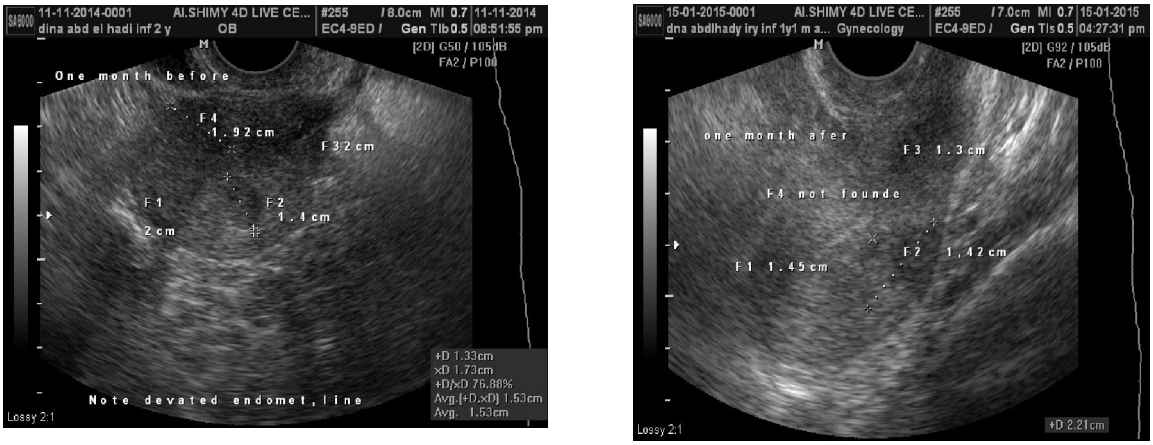
	Number of cases	Percentage (%)
No lesion	11	22.0%
Uterine fibroid less than 3cm	6	12.0%
Uterine fibroid more than3 cm	15	30.0%
Uterine fibroid with adenomyosis	4	8.0%
Diffuse adenomyosis	4	8.0%
Cesarean scar defect	8	16.0%
Arterio- venous fistula	2	4.0%

Table (2): Distribution of studied cases as regard results data.

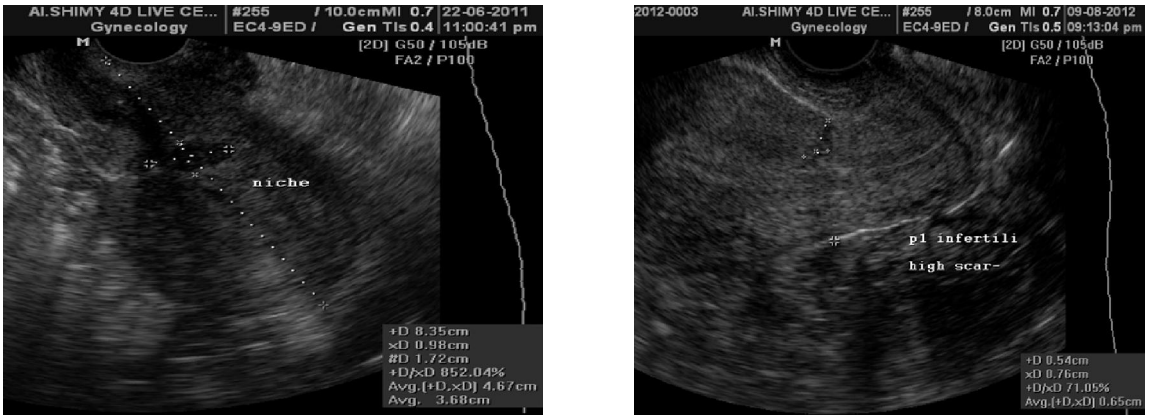
Variables	Preoperative	3 months postoperative	6 months postoperative	12 months postoperative	*t*	*P*
Mean Duration of menstrual flow	10.78	4.26	4.54	4.66	43.15	<0.001 **(S)***
Percentage reduction in mean blood loss	–	35.1%	50.2	84%	3.83	<0.001 **(S)***
Percentage reduction of pain	–	30.5%	65%	85.7%	3.50	<0.001 **(S)***
Mean Hemoglobin percentage(g/dl)	9.66	9.90	10.21	10.68	18.54	<0.001 **(S)***
Mean size of scar defect(mm)	7.2	5.2	4.3	4.0	16.31	<0.001 **(S)***
Mean uterine volume (mm3)	–	15.2%	25%	30.1%	78.76	<0.001 **(S)***
Percentage decrease in mean fibroid volume (mm3)	–	15.23%	25.57%	32.5%	79.24	<0.001 **(S)***
Resistance index(RI)	0.716	0.738	0.748	0.763	20.36	<0.001 **(S)***



Figure(1). Transvaginalsonography showed localized posterior wall lesion (localized adenomyosis) preoperative and 6 months after the operation



Figure(3). Transvaginalsonography shows multiple fibroid preoperative and 1 month after the operation.



Figure(2). Transvaginalsonography shows cesarean scar defect preoperative and 1 year after the operation

As regard final outcome, 12 cases (24.0%) got pregnant; 43 cases (86.0%) satisfied and 6 cases (12.0%) not satisfied. No cases had complications.

4. Discussion

Abnormal uterine bleeding is a common gynecologic complaint in premenopausal women that accounts for more than two-thirds of outpatient visits **(Helal *et al.*, 2011)**. Uterine artery embolization needs special equipment and has a risk of skin and/or ovarian radiation, which requires doses estimated to be 30 to 100 times higher than those needed for conventional radiographic examinations. **(El-Shiemy, 2011)**. Trial of developing asimple, inexpensive method for uterine artery occlusion is much needed especially in the developing countries. The novel operation of bilateral uterine artery ligation (BUAL operation) as an alternative to hysterectomy seems to be a promising treatment for menorrhagia and most of the associated uterine pathology **(Akinola *et al.*, 2005 & El-Shiemy., 2011),**

The present study was designed to evaluate vaginal bilateral uterine artery ligation **(VBUAL)** operation as a conservative method for treating refractory menorrhagia by both clinical and trans-vaginal ultrasound (TVS) follow up.

The present study included 50 women, selected from obstetrics and gynecology department of AL-Azhar University hospital (Damietta). All cases were refusing hysterectomy as an option of treatment. Patients expressed their desire for uterine preservation and avoidance of hysterectomy.

In the present study, the patients age was found ranged between 22 to 52 years with a mean of 37.46± 3.83 years. This comparable with **Ankita *et al.* (2011)** study which was designed to evaluate treatment of heavy mensturual bleeding who reported a mean age of the patients of 37.1±3.8 years and comparable also with those reported by **Akinola *et al.*(2005)** who recorded 21 women aged between 31 and 49 years and most of the women were older than 36 years. similarly, in other series **Akinola *et al.* (2009)** reported a mean age of 39.6±3.9 years, ranging from 25 to 55 years.On the other hand, **Nishida *et al.* (2009)** while evaluating the treatment of adenomyosis by uterine artery ligation they reported a mean age of

41.5±3.6 years and this is found higher than that reported in the present study, that mostly attributed to the fact that they recruited for BUAL, cases with adenomyosis only which is commoner in older group.

As regard the parity in this study the mean parity was found 3.1±1.1. These results were found in agreement with those reported by **Hassanin *et al.* (2008)** who described a significant prevalence of heavy menstrual bleeding in multipara with mean parity 5.1±1.1.

In the present study, as regard associated pathology there was no pathological lesion in 22%, uterine fibroid was found in 42% while uterine fibroid associated with adenomyosis was found in 8%, diffuse adenomyosis detected in 8%, cesarean scar defect was found in 16% and arterio-venous fistula was found in 4%.

Akinola *et al.* (2009) designed a study to examine the benefits of VBUAL in the treatment of fibroid and reported that the presenting symptoms were mainly menorrahgia and fibroid in 34% of the women, fibroid alone in 30% and menorrhagia alone in 18%.

In the present work, the average operating time was in range of 30-40 minutes and the average blood loss was found 100-200ml cystoscope was done in 10 cases until we gain experience then the remaining cases not studied as mentioned as we acquired the proper site of ligation away from bladder and ureters. None of the patients required urinary catheterization or blood transfusion in the postoperative period.

This comparable with **Ankita *et al.* (2011)** who reported that average operating time was in range of30-45 minutes.

In the present work, a mean duration of menstruation preoperatively was found to be 10.78±0.97 days, after 3 months postoperative, it decreased to 4.46±0.63 days while after 6 months it more decreased to 4.34±0.61 days and after 12 months postoperative, it was found 4.26±0.56 days and there was statistically significant decrease in duration of menstruation at 3, 6 and 12 months in comparison to their preoperative value.

These results were found in agreement with those reported by **Hassanin *et al.* (2008)** who described a significant improvement in the duration of bleeding with a reduction of 11.9±1.5 days. As it decreased from 17±7.1 days before the procedure to 5.1±3.3 days after the operation.

In this work the mean hemoglobin percentage was improved as it was 9.66±1.057 g/dl preoperatively while at after 3 months postoperatively it was 9.90±0.98 g/dl while after 6 months it was 10.21±0.69 g/dl and after 12 months postoperatively it was 10.68±0.91 g/dl. The significantly improve in hemoglobin concentration can be attributed to thecontinuesrapid decrease in amount of blood loss.

The results of the present work were found in agreement with those reported by **Akinola *et al.* (2009)** who showed that the mean hemoglobin levels at baseline, 6, 12, and 36 months postoperative were 9.28gm/1, 10.6 gm/1, 11.3gm/1 and 11.6 gm/1 respectively. The mean hemoglobin level showed a significant increase of 14.8% after 6 months 22.6% after 12 months and 25.5% after 36 months.

Similar result were reported by **Hassanin *et al.* (2008)** who found that the mean hemoglobin level also improved from 8.3±0.6 g/dl to 9.6±0.8 g/dl within 3 months post operatively.

As regard pain in this study, as a presentation it was present in 78 % of cases in the form of congestive dysmenorrhea in 14 cases 28%, dyspareunia in 3cases 6% and pelvic heaviness in 22 cases 44%.

In the present study, dysmenorrhea which present in 28% preoperatively decreased to 10% after 3 months post operatively and further decreased to 4% at 6 months and the same findings were maintained after 12 months. on the other hand, dysparunia is found in 6% preoperatively and after 3 months the same cases were still complaining of dysparunia but after 6 months 4% only still complaining and the same situation was found after 12 months of post operative follow up at the end of the study, there was significant reduction of pain post operatively in comparison to preoperative values. this may be attributed to decrease in uterine volume, decrease in niche size and proper decrease of pelvic congestion.

This comparable with those results were reported by **Ankita *et al.*, 2011** who found that the reduction in pain score as regard dysmenorrhea and dysparunia was found to be significant.In the present study, pelvic heaviness was reported in 44% preoperatively that was decreased by 20% after 3 months post operatively, then it was more decreased to be 14% after 6 months and further decreased to 8% after 12 months and there was statistically significant reduction in pelvic heaviness after 3 months, 6 months and at 12 months when compared to their pre operative value this may be attributed to decrease in uterine volume, decrease in fibroid size and decrease in pelvic congestion and proper healing of cesarean scar defect. These results are agreement with **Lee *et al.*, 2005** who reported that of 14 patients with preoperative pelvic pain or pressure, 13 reported complete disappearance and 1 reported no significant relief, after laparoscopic uterine artery ligation.

In the present study all cases presented with bleeding. **Cheng *et al.*, 2009** reported that the major complaints of their patients included excessive bleeding and pelvic pain. In the present work, all cases were presented preoperatively with uterine bleeding.

After 3 months postoperative, bleeding still present in 44% and after 6 months it was reduced to be found in 30% and finally after 12 months postoperatively it was reduced to be found in 16% the percentage of reduction in bleeding at the end of study was 84% and there was statistically significant reduction in bleeding at 3, 6 and 12 months postoperatively in comparison to their preoperative values.

In their work **lee *et al.,* 2005** reported that all women with an abnormal bleeding reported significant decrease.

In addition, **Akinola *et al.,* 2009** stated that the mean menstrual bleeding rating showed a significant reduction by 28.9 % after 6 months and a significant reduction by 55.6% after 12 months and they had further reduction by 64.9% after 36 months. In **Wang *et al.,* 2002**. series of menorrhagia the procedure resulted in 31% normal menstrual flow or hypomenorrhea, and 81% achieved a reduction in menstrual loss by 30% or more. In addition, **Wang *et al.,* 2002** reported a good control of menstrual bleeding and adequate relief of dysmenorrhea following laparoscopic uterine artery ligation **(LUAO)** for treatment of abnormal bleeding. They reported that 13 of 16 patients achieved bleeding control and 5 returned to normal menstrual flow or hypomenorrhea. 12 of 16 patient's achieveda good control of dysmenorrhea and 6 were analgesic free.

In this work the mean size of C,s defect was decreased as it was 7.2 mm preoperatively while at after 3 months postoperatively it was 5.2 mm while after 6 months it was 4.3 and after 12 months postoperatively it was 4.0 mm. The significantly decrease insize of C,s defect can be attributed to the decrease of vascularity and proper healing of defect.

As regard uterine artery Doppler finding in this study, there was statistically significant increase in both RI and pulsatility index (PI) at 3, 6 months and at 12 months when compared to their preoperative value.

These results are similar to that reported by **Ankita et al., 2011** who found a significant increase in both RI and pulsatility index (PI) after the operation. In contradictory to our results, **EL-Deek et al.(2002)** reported that 5 selected cases in the reproductive age were presented with refractory menorrhagia, treated by conservative bilateral uterine artery ligation aiming for preserving their fertility and were followed by transvaginal color Doppler sonography which display improvement of the blood in the spiral and myometerial arteries with normal mean preoperative value of their RI.

In the present work, a mean uterine volume was 388.44±28.41 ml preoperatively while after 12 months postoperatively, it was 271.33±33.59 ml and there was statistically significant decrease in uterine volume at 12 months when compared to their preoperative value. Thus, the percentage in reduction of uterine volume at the end of the study was 30.1%.

Akinola *et al.,* 2005 showed a reduction of 55.5% in uterine volume, after 12 months and emphasized that trans-vaginal bilateral uterine ligation is a safe, inexpensive and effective therapeutic option. This difference may be attributed to the fact that **Akinola *et al.,* 2005** select cases with multiple fibroids only.

Our results as regard uterine volume are found to be better than **Ankita *et al.,* 2011**, who reported that the reduction in the mean uterine volume measured at the third and sixth months postoperative were 15.31% and 19.38% consequently.

As regard satisfaction rate in this study it was 88% satisfied as regard bleeding, pelvic heaviness. Only 6 cases were not satisfied 4 cases of them was diffuse adenomyosis and another 2 cases was endometrial hyperplasia these cases developed repeated attacks of bleeding and there still partially unsatisified with the operation and preferred hystrectomy. These results were found in agreement with those reported by **Hassanin *et al.,* 2008** who described a significant increase in satisfaction rate about 80%. Pregnancyoccured in 12 cases 24%.In their large, multicenter study **Holub *et al.,* 2008** reported 27% pregnancy rate after uterine artery occlusion, and concluded that their study is the first of a larger series comparing pregnancies and deliveries after LUAO and uterine embolization The pregnant women from both studied groups did not show signs of significant fetal distress or growth retardation,in the reverse of women who became pregnant after UAE for fibroids who had an increased risk for preterm birth and cesarean section. Pregnancies after uterine embolization had higher rates for spontaneous abortion (56%). than did the pregnancies after surgical uterine artery occlusion (10.5%). Both laparoscopic and embolization depletion procedures are minimally invasive, preserve the uterus and ovarian blood supply, and allow achievement of pregnancy in women with symptomatic fibroids. The issue involving preliminary pregnancy outcome after uterine artery occlusion in UAE and Laparoscopic occlusion of uterine artery needs to be studied in large prospective trial.

In this study, there is no ureteric or bladder injury or post operative fever, and pain. A finding similar to that reported by **Akinola *et al.,* 2009** a fact that may be attributed to the proper elevation of urinary bladder and ureter before ligating the vessels.

Regarding complications, **Lee *et al.,* 2005** reported that there were no postoperative complications in their cases, and this may be attributed to two factors: the first is the small number of included cases in their study (14 cases) and, the

second is the surgical procedure of uterine artery ligation as they did it laparoscopically.

Hassanin *et al.*, 2008 reported that BUAL was found to be safe and with a success rate of 80%. The success rate recorded in the present study is higher by 8 % and this may be attributed to difference in treated condition between both studies. In addition **Akinola *et al.*, 2009** reported that the known failure rate of the procedure was 6% and patients satisfaction rating of 85.8%.

The possible mechanisms by which BUAL operation act is still controversial. We proposed a specific mechanism that act through a temporary ischemia to the uterus which stimulates certain a poptotic factors, antiangiogenic factors and other cytokines which act in destroying abnormal tissue while saving normal uterine tissue and through stimulated mast cells.

In fibroids, **Burbank., 2004** proposed that after uterine artery occlusion (UAO), by any means, both the uterine and myoma vessels occlude by clotting resulting in organ ischemia. After few hours, the uterus initiates fibrinolysis to lyse its own clots, and reperfusion begins. Fibroid do not initiate fibrinolysis which results in prolonged ischemia and fibroid death.

UAL via trans-vaginal approach proved to have a high safety profile, high feasibility, and low cost. These represent advantages over hysterectomy and other minimally invasive procedures, including endometrial ablation and uterine artery embolization techniques for the management of heavy menstrual bleeding **(Ankita *et al.*, 2011)**.

The procedure has relatively lower cost, requires average surgical skills, and is suitable for settings in low-income countries. UAL has the potential to treat women with chronic symmetrically enlarged uteri larger than 10 cm in size, for which endometrial ablation would be less effective **(EL-Shiemy *et al.*, 1999, El-Deek *et al.*, 2002, El-Nashar et al., 2007, El-Nashar and Hopkins, 2007)**.

The advantages of the procedure are reduction in postoperative pain, use of analgesia, hospitalstay, and recovery time along with the potential psychological benefits from the preservation of the uterus **(Liu *et al.*, 2001, Schutz *et al.*, 2002).**

Finally, **AL-sheemy (2013)** concluded that the operation is found to be promising as an alternative to hysterectomy especially suitable for relatively young females for whom hysterectomy was indicated. After more than 2 years of follow up most of women are still satisfied with the operation results.

Recommendation

1-Perform **VBUA**L operation in the treatment of refractory menorrhagia rather than uterine artery embolization.

2-VBUAL operation seems to be valid in not yet classified groups of abnormal uterine bleeding **(AUB-N).**

3-We recommended with another option for treatment of adenomyosis and endometrial hyperplasia rather than VBUAL.

4-Design large future controlled studies that will include large sample size for more validation and confirmation of the results.

5-Design further studies to compare VBUAL operation with other methods of operative uterine artery occlusion as laparoscopic BUAL, Doppler - assisted trans-vaginal uterine artery clamping as treatment options for refractory menorrhagia.

References

1. Akinola OI, Fabamwo A0, Ottun AT and Akinniyi 0A (2005): Uterine artery ligation for management of uterine Fibroids. Int Gynecol Obstet; 912137-140.
2. Akinola OI, Fabamwo AO, Akinola RA, Ottun TA and Akpan AE (2009): Uterine artery ligation for the treatment of fibroids. Acta Obstetriciaet Gynecologica Scandinavica; 88: 1, 59 – 62.
3. Alsheemy, Samia M. Eid and Amro A el Karef (2014): Cesarean Section Niche assessment Histopathologically After Hysterectomy in Symptomatic Patients. Life Sci J; 11(10):163-171).
4. Al Sheemy R I (2013): Management of sympotomatic C. S defectingynecology. https://plus.google.com/110003202781198842355/../5WetQu4VL.
5. Ankita W, Radhika A, Gita R, and Kiran G (2011): Evaluation of Transvaginal Uterine Artery Ligation as a Minimally Invasive Conservative Treatment for Symptomatic Uterine Leiomyoma: A Pilot Study. Journal of Gynecologic Surgery 27: 4, 10.1089.
6. Burbank F (2004): Childbirth and myoma treatment by uterine artery occlusion: J Am Assoc Gynecol Laparosc; 11:138-152
7. Cheng Z-P, Tao X, Gong], Dai H and Yang W-H (2009): Early-stage morphological observations of myoma and myometrium after laparoscopic uterine artery occlusion treatment. European Journal of Obsttrics 8: Gynecology and Reproductive Biology.
8. El-Deek AM, Saleh SI, Mohamed ER and El-Sheimy RI (2002): Role of transvaginal color Doppler ultrasound in evaluation of the uterine and ovarian arteries blood flow in non pregnant females presented with abnormal uterine bleeding. MD thesis, Al-Azhar University (Girls), p 105-106.

9. El-Nashar SA and Hopkins MR (2007): Predictors of the treatment failure after global endometrial ablation: a population- based cohort study. Minim Inv Gynecol; 14:S40-41.
10. El-Shiemy RI (1999): Preliminary experience with uterine artery ligation for refractory menorrhagia. The Scientific Journal of Al-Azhar F acutly (Girls); 20: 1199.
11. El-Shiemy RI (1999): Bilateral Uterine Artery Ligation (BUAL) Operation as a Conservative Treatment of Refractory Menorrhagia. Available at http:/ /www.obgyn.net/ menopause/ menopause.asp? page= /hysteroscopy/ articles / bual_ operation. last accessed at 22-5-2009.
12. Hassanin IMA, Shahin AY, Abdel-Hafeez, AT and El-Nashar SA (2008): Bilateral uterine artery ligation via mini- laparotomy for heavy menstrual bleeding. International Journal of Gynecology and Obstetrics; 103: 222-226.
13. Helal AS, Abdel-Hady el-S, Mashaly Ael-M, Shafaie ME, Sherif L (2011): Modified thermal balloon endometrial ablation in low resource settings: a cost-effective method using Foley's catheter. Arch Gynecol Obstet; 284(3):671-5.
14. Holub Z, Mara M, Kuzel D, Iabor A and Eim I (2008): Pregnancy outcomes after uterine artery occlusion: prospective multicentric study. Fertil Steril; 90: 1886-1891.
15. Jensen JT, Parke S, Chullapram T, Mellinger U (2011): Effective treatment of heavy menstrual bleeding with estradiol valerate and dienogest: a randomized controlled trial. Obstet Gynecol.; 117(4):777-87.
16. Lee CA and Abdul-Kadir R. (2005): von Willebrand disease and women's health. Semin Hematol; 42(1):42-8.
17. Lukes AS, Moore KA, Gersten JK, Muse KN (2010): Tranexamic Acid Treatment for Heavy Menstrual Bleeding: A Randomized Controlled Trial. Obstet Gynecol.;116(4):865-875.
18. Munro MG, Critchley HD and Fraser IS (2012): The FIGO systems for nomenclature and classification of causes of abnormal uterine bleeding in the reproductive years: who needs them? Am J Obstet Gynecol; 207 (4):259-65.
19. Nishida M, Takano K, Arai U and Ichikawa R (2009): Conservative surgical management for diffuse uterine Adenomyosis. FertilSteril; 90:1885-1899.
20. Noorhasan DJ, Chullapram T, Weiss G(2010): Perimenarchal Menorrhagia: evaluation and management. J Pediatric.; 156 (1):162.

3/2/2015