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## The indications and outcome of percutaneous trans-arterial embolization of the uterine artery: A single center experience

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### Abstract

**Objectives:** The aim of this Cross-Sectional study was to identify the various indications and its outcome of Uterine artery embolization.

**Materials & Methods:** Adult Patients, symptomatic, who underwent Uterine artery embolization for obstetrical and gynaecological indications, availability of pre and post procedural imaging and clinical data were included from the interventional radiology department and Maternity hospital between January 2009 - December 2019.

**Results:** A total of 16 women, 11 (68.8%) with uterine fibroids, 5 (31.4%) with post-partum haemorrhage due to placental disease, one with arteriovenous malformation, and one with cervical ectopic pregnancy were observed. Bleeding almost ceased in 50%, but symptoms recurred in 25% of the patients, 3 of whom required hysterectomy. Pain post-procedure was common (100%) followed by transient vaginal bleeding (81.2%). Less common complications included radial artery thrombosis, development of small pseudoaneurysm of the radial artery and non-target embolization noticed. However, large prospective studies are required to establish the long-term outcomes and effectiveness.

**Keywords:** Uterine artery embolization, uterine fibroid, bleeding, post-partum haemorrhage, arteriovenous malformation, cervical pregnancy

### Introduction

Uterine artery embolization (UAE) was first introduced in 1995 as an alternative technique for treatment of uterine fibroids. Since that time, it has become increasingly accepted as a minimally invasive procedure that preserved uterus for future fertility, and more than 100,000 procedures have been performed during the past decades mainly in the United States and Western Europe [1]. It is a safe and efficient technique used by interventional radiology for more than 20 years. It is considered an alternative to hysterectomy in treatment of women with symptomatic uterine fibroid [2, 3]. Many studies have proven efficacy of UAE in the management and prevention of massive gynecological bleeding associated with arteriovenous malformations, cervical neoplasia and ectopic cervical pregnancy [4].

UAE is used effectively in management of placenta accreta, reducing the incidence of intraoperative hemorrhage and post-operational morbidities [5]. UAE also seem to be a valuable alternative treatment to hysterectomy in women with uterine bleeding due to adenomyosis [6].

No serious complications are reported with UAE. Reported complications are divided into intraoperative (procedural) and post-operative. Intraoperative complications are extremely uncommon and has less than 1% incidence. Naming some of these complications like access site hematoma, pseudoaneurysm, arteriovenous fistula, arterial thrombosis and infections. [7] Non target embolization is another complication that can lead to non-target organ embolization of ovarian arteries which subsequently cause amenorrhea. Post-operative complications are uterine ischemia and infarction, infection of necrotic fibroid and uterus, and expulsion of fibroid or large fibroid fragments). Using aseptic technique and prophylactic antibiotic during UAE reduce the risk of infection [7]. High risk procedural failure is more common in women with relatively small uterine volumes or with single fibroid tumor [8].

Studies reporting the long-term effect of UAE are limited in number. Menopausal symptoms which are usually transient in nature have been noticed, and the likelihood of developing ovarian

failure increases with age [9].

Uterine artery embolization has been in use at interventional radiology and Maternity Hospital at KSMC since 2006. There has been no study in our center reviewing the indications and efficacy of this procedure. Globally accepted as a safe and minimally invasive procedure for treatment of common conditions like fibroids, adenomyosis, post-partum hemorrhage and rare conditions like uterine arteriovenous malformations/fistulas, dysfunctional uterine bleeding and cervical ectopic pregnancy. Hence there is a need for studying the current use of UAE, including its success rate and outcome, at our center, so that the results can be applied to our larger population.

The aim of our study was to review the indications of UAE at Maternity hospital at KSMC, the UAE procedure technical success rate, efficacy of this treatment and post-procedure clinical, biochemical and radiological outcomes and to identify the intra-procedural and post-procedural complications.

### Patients and Methods

A Cross-Sectional, Record based study was conducted at Interventional Radiology department and maternity hospital in a large tertiary care center, King Saud Medical City (KSMC) for patients who underwent UAE for obstetrical and gynecological indications for a period of eleven years between January 2009 to December 2019.

Patient records were selected based on these inclusion criteria: Age >18 years, symptomatic patients, patients who underwent UAE, availability of pre and post procedure imaging, availability of pre and post procedure clinical data. The exclusion criteria were: patients who refused the procedure, unfit for sedation or General Anesthesia, suspected or diagnosed uterine malignancy and unstable patients. We observed only 20 cases who satisfied the above criteria in the study period. Out of which 16 records were with complete information and were

included for analysis.

The data collection form had variables – Age, Marital status, clinical indications - Fibroid, Post-Partum Haemorrhage, ectopic pregnancy, AV Malformation, Placental Disease. Initial presentation – bleeding, pelvic/abdominal pain, mass/pressure effect, and lower urinary tract symptoms. Pre-Post laboratory findings - CBC, Coagulation profile, Renal function test, Ultrasonography. Pre-Post Procedures - Access site: Radial/Femoral, Sedative status, uterine artery: unilateral/bilateral, embolic agent.

The confidentiality of the details was maintained by the researchers as per local National Bioethics rules and regulations. This study was approved by the Institutional Review Board [HIRI-26-Jan20-04] with and informed consent waiver.

### Statistical Analysis

The data was analyzed using SPSS 25.0 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). The categorical variables were presented as frequency and percentage for underlying diseases, USG findings, UAE Procedures, Complications, follow-up details. The continuous variables are shown as Mean, standard deviation, and the parametric t-test of pre-post procedure for coagulation parameters INR, Platelet. The findings were presented as descriptive, inferential statistics and tested at 5% level of significance.

### Results

In our experience, in the past 11 years, UAE was performed for 16 patients and their age ranged between 18-48 years with an average age  $38.2 \pm 1.9$ , with 14 (87.5%) married women and 2 (12.5%) single. Eleven (68.8%) patients had uterine fibroid, 5 (31.4%) patients with postpartum hemorrhage due to placental disease (Placenta Previa, accreta or increta), one patient with arteriovenous malformation, and one patient with cervical ectopic pregnancy [Table 1].

**Table 1:** UAE indication and Pre UAE-Imaging of 16 patients

Variables	n	%
*Underlying Diseases		
Uterine Fibroid	11	68.8
Post-Partum Haemorrhage due to Placental disease	5	31.4
AVM Malformation	1	6.3
Ectopic Pregnancy	1	6.2
*Ultrasonography findings		
Intramural Fibroid	8	50
Submucous Fibroid	1	6.2
Placenta Previa Major (Accreta to Increta)	4	25
Arteriovenous malformation in Posterior Myometrium	1	6.2
Gestational Sac (Viable) in the lower cervix	1	6.2

In all cases the procedure was technically possible, and the bleeding almost ceased in 50.1%. However, persistent bleeding was observed in 8 (50%) of patients, 3 (27.3%) of uterine fibroid required hysterectomy procedure within 3 years post UAE.

Most common complications observed shortly after the procedure were abdominal & Pelvic pain in 16 (100%), followed by vaginal bleeding in 13 (81.2%). Less common complications included radial artery thrombosis in 1 (6.3%) patient, one patient (6.3%) developed small pseudoaneurysm of the radial artery, and one patient (6.3%) had non-target embolization.

### Discussion

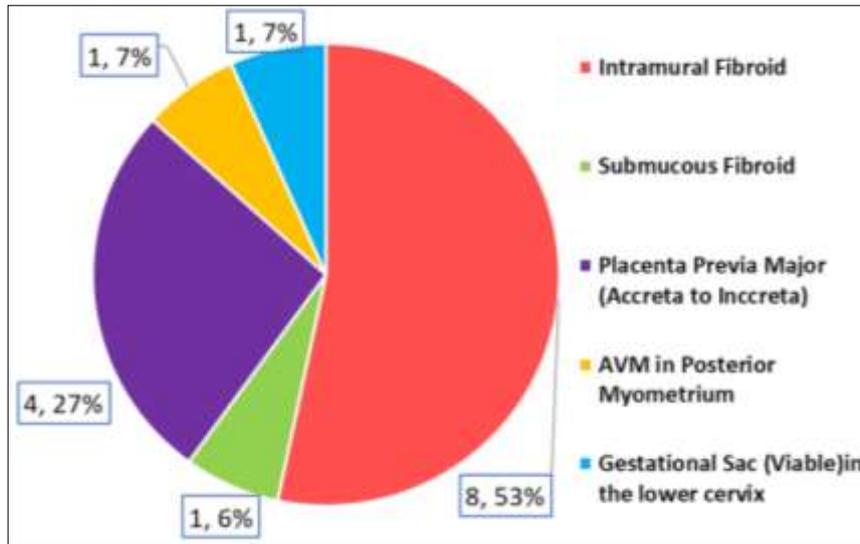
Uterine artery embolization involved a small incision in the groin to access the femoral artery, or in the distal forearm to

access the radial artery, Cannulation of uterine arteries and any significant feeders to fibroids, embolization done using Permanent or temporary embolic materials. It was usually performed using moderate sedation and the patients stay overnight at the hospital for pain control.

In our study, the main indications were: symptomatic uterine fibroid, and those who were at risk of massive uterine bleeding due to Placenta Previa with or without accreta, ectopic cervical pregnancy and arteriovenous malformations [Figure 1]. Selected patients were assessed by an assigned gynecologist who referred and discussed the case with an experienced interventional radiologist. All patients had a full assessment with complete blood counts, renal functions test. Imaging was done initially for all patients- the most feasible technique was abdominal and

pelvic ultrasonography that confirmed the existing indications for UAE [Table 1]. MRI was done for elective patients when accessible. Technique, complications and possible outcomes of UAE were discussed with patients. They were optimized for the procedure by confirming the availability of normal coagulation

profile. There was statistically significant decrease of  $0.84 \pm 0.36$  to  $0.46 \pm 0.13$  in INR values ( $P=0.022$ ) and an insignificant reduction in the platelet count from  $232.3 \pm 46.6$  to  $154.6 \pm 46.6$  ( $10^9/L$ ) pre and post procedure.



**Fig 1:** Indications of 16 patients

Intravenous Broad spectrum Antibiotic prophylaxis with oral non-steroidal anti-inflammatory drugs were administered prior to procedure in all patients. In order to perform the UAE procedure, patients were transferred to the Angio suite in the interventional radiology department that is located in a separate building requiring arrangement of an ambulance to facilitate the patient transport.

UAE was performed by an experienced interventional radiologist. Procedure was done under local anesthesia. About 9(56.3%) required no anesthesia and 7 (43.8%) had received moderate sedation. Usual UAE access was through femoral artery in 14 (87.5%), and only two (12.6%) was through left radial artery. All patients underwent bilateral UAE, with embolic agent being used; PVA 500-700 microns (56.3%), and gel foam (12.5%), [Table 2].

Access site hemostasis was achieved in most patients by manual compression. Closure device or arterial band was used if needed. No complications Related to closure devices in femoral access. Radial bands used for radial access were faulty and didn't work properly.

**Table 2:** UAE Procedures of 16 patients

UAE Procedures	n	%
Number of Sessions - 1	16	100
Access - Femoral	15	93.8
- Radial	1	6.3
Sedation - No	9	56.3
- Yes	7	43.8
Number of Uterine Artery - 2	16	100
EMBO agent - Balloon Occlusion	3	18.8
- Gel Foam	2	12.5
- PVA (500-700microns)	9	56.3
- Gel Foam + PVA (500-700microns)	2	12.5

In previous studies assessing UAE complications, it was divided into intraoperative (procedural) and post-operative. Intraoperative complications were extremely uncommon, probably in order of less than 1% incidence [7]. No reported

intra-procedural complications were documented in patients who had femoral artery as an access for UAE. In contrast to patients with radial artery access. Rare complications were observed in three of our patients in this study. First was radial artery thrombosis, second was development of small radial artery pseudoaneurysm. Possible cause was faulty radial bands. Third case was complicated by non-target embolization. These rare complications were managed conservatively with no long-term disabilities or need for further interventions. Regarding the latter one, it was observed immediately after injecting the embolic agent, as there was absence in the pulse in distal lower limb arteries. For that patient with Placenta Previa, UAE procedure was carried out in an emergency situation. There was massive intraoperative hemorrhage, temporary balloon occlusion applied to the bilateral uterine arteries, followed by blind embolization with gel foam due to absence of portable fluoroscopy machine at the time of procedure. All patients were observed closely and managed conservatively and no long comorbidities were documented.

**Table 3:** Observed Complications of 16 patients

Complications	n	%
Short Term - Pain	16	100
- Vaginal Bleeding	13	81.2
- Non target Embolization	1	6.3
- Radial artery Thrombosis	1	6.3
- Radial artery Pseudoaneurysm	1	6.3
Long Term - Persistent Bleeding	8	50

Most common of the complications developed shortly after the procedure were in the form of mild to moderate abdominal and pelvic pain, it was managed with intravenous analgesics on the day of the procedure. Subsequently pain was managed well using pethidine and ibuprofen. Transient vaginal bleeding was also observed in 13(81.2%), no intervention was needed [Table 3]. Less hospitalization was noticed for most patients in our study. Patients were discharged home in a stable condition with oral analgesics and antibiotic for one week duration. These

medications were part of a special protocol (hospital protocol) designed for patients undergoing UAE.

Follow up was recommended for all patients but unfortunately majority of our patients had no follow up after hospital discharge (62.5%). Follow up visit could have provided information about patient's satisfaction, UAE effectiveness and long-term impact on various important aspects like fertility, presence of menopausal symptoms that might suggest ovarian

failure that increase with age, rate of abortion and additional procedures needed in the future [10]. Most of these issues were missed in our study. Causes of dropping outpatient clinic follow up is still not completely known and it is under investigation. Possible cause could be contributed to our missed communication with patients and lack of their awareness about the importance of follow up [Table 4].

**Table 4:** Follow-up details of 16 patients

Reasons for Follow-up	n	%
Bleeding - Complete Resolution	5	31.3
- Decrease	3	18.8
- Increase	2	12.5
- No change	2	12.5
Pain - Complete Resolution	4	25
- Decrease	3	18.8
- No change	2	12.5
Mass Effect - Complete Resolution	4	25
- Decrease	1	6.3
- No change	2	12.5
Fertility - Increase	1	6.3
- No change	5	31.3
No Follow-up	10	62.5

In our study that involved 16 patients, retrospectively observed for the effectiveness and outcome of UAE, majority of cases were uterine fibroids (68.8%). Among these patients, there was much improvement of menstrual symptoms in 50%, significant resolution in the associated pelvic and abdominal pain in 43.8%, and improved pressure and lower urinary tract symptoms related to enlarged uterus in 31%.

Several studies have proven the efficiency of UAE in treating symptomatic uterine fibroid [1, 2]. They concluded that UAE can be used as a safe and alternative procedure to hysterectomy in women who want to preserve their uterus and that UAE should be offered for any patient with symptomatic uterine fibroid [3]. Failure rate was higher in women with relatively small uterine volumes or with single fibroid tumor [8].

UAE was performed to 5(31.4%) of our selected patients who had Placenta Previa and one case placenta accreta. Although our center is a tertiary center providing an advanced and specialized care in managing such cases of placental diseases with an average number of 136 cases managed per year with the least maternal morbidity and mortality, we noticed in our study very few numbers underwent UAE because most of the cases were treated as emergency/lifesaving. Also, presence of the interventional radiology department in a separate building was one of the limitations in offering these patients UAE. However, in our small sample we observed a reduction in the intraoperative hemorrhage and minimizing of the postoperative maternal morbidity and mortality.

Small series study in Lebanon highlighted the effectiveness of UAE in the management of placenta accreta in reducing the incidence of intraoperative hemorrhage and post-operational morbidities [5].

Ectopic cervical pregnancy was one of the indications for UAE in our study. UAE was performed for a patient who was diagnosed with ectopic pregnancy (confirmed by transvaginal

ultrasound), gestational sac seen in the lower cervix with positive cardiac activity. Laboratory markers (B-HCG) was also positive and high. After UAE negative fetal cardiac activity confirmed and B-HCG had dropped. Patient was subsequently taken for uterine evacuation of the product of conception. Minimal uterine bleeding and no maternal morbidity was observed.

Arteriovenous malformations were one of the causes of massive uterine bleeding that occurred more commonly in young patients. Initially such patients were treated with hysterectomy. Thorough literature review showed the efficacy of UAE in managing AVM [4]. We had one patient with AVM managed successfully with UAE. The patient was 18 years old single, presented with vaginal bleeding and low hemoglobin (6.6 g/dl). Pelvic ultrasound revealed the presence of arteriovenous malformation in the posterior myometrium. Post-UAE follow up patient's anemia was corrected and vaginal bleeding subsided. Follow-up pelvic ultrasound findings was suggestive of area of negative blood flow in the posterior myometrium.

This study has a number of limitations including its retrospective nature and small number of patients. Our small number of patients was attributed to multiple factors; awareness and acceptance of UAE effectiveness and outcomes by referring doctors and patients, that is highlighted in several other previous studies [2, 4, 5]. Other factors included the logistical difficulties in terms of transferring patients to interventional radiology department as patient should be essentially hemodynamically stable. This criterion was not met in most of our patients who presented as emergency life-threatening situation (placenta previa with bleeding). Most gynecologists and obstetricians preferred to proceed with surgical interventions and finally hysterectomy to decrease patient's morbidity and mortality. Also, absence of good and efficient liaison/ communication between the two departments was a major limiting factor that resulted in such a small number of cases.

**Authors Intellectual Contribution in the Manuscript**

<b>Contribution Details (to be tick marked as applicable):</b>	<b>Dr. Nourah</b>	<b>Dr. Bader</b>	<b>Dr. Izzat</b>	<b>Dr. P.J. Parameaswari</b>	<b>Dr. Rubina</b>	<b>Dr. Mohideen</b>	<b>Dr. Syeda</b>	<b>Dr. Fatimah</b>
Concepts	√	√	√	-	√	√	√	√
Design	√	√	√	-	√	√	√	√
Definition of intellectual content	√	√	√	-	√	√	√	√
Literature search	√	√	√	-	√	√	√	√
Data acquisition	-	-	-	-	-	-	-	√
Statistical Data analysis	-	-	-	√	-	-	-	-
Manuscript preparation	-	-	-	√	-	-	-	√
Manuscript editing	-	-	-	√	-	-	-	√
Manuscript review	√	√	√	√	-	-	-	√
Guarantor	√	-	-	-	-	-	-	-

**Conclusion**

Our study with small sample size has demonstrated effectiveness and safety of UAE. Our findings were comparable to previous studies in the same field. Proper selection of patients, and informative counselling about the UAE procedure success rate and complications can improve the future awareness and use of UAE.

Clear pathway should be initiated between the two-concerned departments in order to increase the UAE use for different gynecological and obstetrical indications.

Patients follow up system especially for those who underwent such an important procedure need to be improved so, more studies can be held in the future clarifying some missed issues we have faced in our study. Interventional radiology can play an important role in follow up protocol as to request repeat imaging studies to assess the effectiveness and outcome.

**References**

1. Edwards RD, Moss JG, Lumsden MA, Wu O, Murray LS, Twaddle S, *et al.* Committee of the Randomized Trial of Embolization versus Surgical Treatment for Fibroids. Uterine-artery embolization versus surgery for symptomatic uterine fibroids. *N Engl J Med* 2007;356(4):360-70. Doi: 10.1056/NEJMoa062003. PMID: 17251532.
2. Hehenkamp WJ, Volkers NA, Birnie E, Reekers JA, Ankum WM. Symptomatic uterine fibroids: treatment with uterine artery embolization or hysterectomy--results from the randomized clinical Embolisation versus Hysterectomy (EMMY) Trial. *Radiology* 2008;246(3):823-32. Doi: 10.1148/radiol.2463070260. Epub 2008 Jan 9. PMID: 18187401.
3. van Overhagen H, Reekers JA. Uterine artery embolization for symptomatic leiomyomata. *Cardiovasc Intervent Radiol* 2015;38(3):536-42. Doi: 10.1007/s00270-014-1031-x. Epub 2014 Dec 4. PMID: 25465064.
4. Dragusin RC, Cernea N, Constantin C, Hertzog D, Deaconu A, *et al.* Indications and Outcome of Uterine Artery Embolization (UAE) in Gynaecological Conditions: Up-to-Date and the Results of our Experience. *Emerg Med (Los Angel)* 2016;6:342. doi: 10.4172/2165-7548.1000342
5. Noufaily A, Achou R, Ashram M, Mokbel M, Dabaj E, Snaifer E, *et al.* Uterine artery embolization for management of placenta accreta, a single-center experience and literature review. *Arab J Intervent Radiol* 2017;1:37-42.
6. de Bruijn AM, Smink M, Lohle PNM, Huirne JAF, Twisk JWR, Wong C, *et al.* Uterine Artery Embolization for the Treatment of Adenomyosis: A Systematic Review and Meta-Analysis. *J Vasc Interv Radiol* 2017;28(12):1629-1642.e1. Doi: 10.1016/j.jvir.2017.07.034. Epub 2017 Oct 9. PMID: 29032946.
7. Sterling KM, Vogelzang RL, Chrisman HB, Worthington-Kirsch RL, Machan LS, Goodwin SC, *et al.* Uterine fibroid embolization: management of complications. *Tech Vasc Interv Radiol* 2002;5(1):56-66. Doi: 10.1053/tvir.2002.124728. PMID: 12098108.
8. Volkers NA, Hehenkamp WJ, Birnie E, de Vries C, Holt C, Ankum WM, *et al.* Uterine artery embolization in the treatment of symptomatic uterine fibroid tumors (EMMY trial): periprocedural results and complications. *J Vasc Interv Radiol* 2006;17(3):471-80. Doi: 10.1097/01.rvi.0000203419.61593.84. PMID: 16567671.
9. Amato P, Roberts AC. Transient ovarian failure: a complication of uterine artery embolization. *Fertil Steril*. 2001;75(2):438-9. Doi: 10.1016/s0015-0282(00)01678-2. PMID: 11172854.