

ROLE OF TRANS-CATHETER EMBOLIZATION OF UTERINE ARTERY IN UTERINE BLEEDING

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ABSTRACT

Background: Abnormal uterine bleeding in terms of menstrual disorders and postmenopausal bleeding are common clinical problems in both primary and secondary care. Advances in diagnostic and therapeutic technologies have offered opportunities to improve the outcomes of women suffering with these complaints. Interventional radiology is a relatively new, exciting and rapidly evolving subspecialty of radiology in which both vascular and non-vascular diseases are treated by minimally invasive approaches. Uterine-artery embolization was introduced as an alternative technique for treating cases with vaginal bleeding. Since then it has become increasingly accepted as a minimally invasive, uterine-sparing procedure. **Aim of the work:** The aim of this work is to evaluate role of trans-arterial embolization of uterine artery in uterine bleeding. **Patients and methods:** The study was carried out on twenty patients suffering from uterine bleeding for different causes. Those patient undergoes pelvic us (trans abdominal & trans vaginal), Doppler Us exam & in some cases MRI to determine cause of abnormal uterine bleeding before the embolization. Then after embolization those patient had been followed up for 6 months with pelvic UD & Doppler. In 7 patient interstitial fibroids was diagnosed as the cause of the abnormal uterine bleeding. other 6 patient uterine AVM (all of them after gynecological procedure) was the cause. In the rest (7 patient) no specific lesion was diagnosed by US or MRI only increased vascularity of the uterus was detected by the Doppler exam. **Results:** The most common presenting symptoms of the patients abnormal bleeding, were anemia, low back pain, had frequency of micturition and dyspareunia. All our 20 patient had marked improvement – most shows disappearance of symptoms - after the procedure. All severs from post embolization syndrome (nausea, vomiting & abdominal pain). No major complication had occurred for any of our patient. **Conclusion:** UAE is the best treatment for abnormal uterine bleeding that not only stop the bleeding but also preserve uterus & can keep the patient fertile for further conception. UAE is save & has no major complication, however, it's a high coast technique.

Keywords: uterine bleeding, Fibroids, embolization.

INTRODUCTION

Abnormal uterine bleeding in terms of menstrual disorders and postmenopausal bleeding are common clinical problems in both primary and secondary care. Advances in diagnostic and therapeutic technologies have offered opportunities to improve the outcomes of women suffering with these complaints (6). Interventional radiology is a relatively new, exciting and rapidly evolving subspecialty of radiology in which both vascular and non-vascular diseases are treated by minimally invasive approaches by the manipulation of small catheters and catheter based instruments (3).

Use of UAE to treat serious postpartum hemorrhage also has been reported to be effective in facilitating the cessation of bleeding without complications or sequelae that affect fertility(9).

Advantages - from the patient's perspective- UAE is a treatment method with a short hospitalization period, minimal trauma and no external scars. It also has psychological advantages no organ loss to mar the patient's self-image as a woman and minimal anxiety with no general anesthesia (5).

PATIENTS AND METHODS

The study included twenty patients. Their ages ranged from 25-52 years. All patients included in our selection criteria had abnormal uterine

bleeding. The main symptoms were bleeding in the form of menorrhagia and menorrhoea, dyspareunia. The diagnoses of uterine abnormalities were established as a cause of their symptoms by clinical examination, pelvic ultrasound & color Doppler exam. Laboratory assessment included Hb%, bleeding profile, kidney functions, AIDS virus, Hepatitis viruses and liver function levels were performed in some of the cases.

Technique:

The patient would be fasting for 6 hours and the groin shaved. A urinary catheter is introduced. The procedure was performed with the patient fully conscious & in 2 cases under conscious sedation in the presence of an anesthesiologist.

Vascular access was obtained via the right femoral approach using the Seldinger technique. In five cases bilateral femoral approach was performed.

A 6-French sheath was introduced in the right common femoral artery to facilitate catheter exchange over which a 5-French pigtail catheter was placed at the level of the renal arteries. Contrast injection using an automatic injector was performed to acquire a flush aortogram with the center over the pelvis.

Bilateral catheterization of the uterine arteries was achieved using a cobra 5-French or Robert's

catheters, introduced with or without hydrophilic guide wires. The tip of the catheter was placed in the origin of the internal iliac arteries. By means of road mapping performed with an injection of contrast, uterine arteries were catheterized via the anterior trunks of the internal iliac arteries. Diagnostic hand injection was performed in each uterine artery to show the hypervascularization of the uterus. The left uterine artery was catheterized first. On the right side, in case of using the cobra head catheter, a Simmons curve, or Waltman loop, was applied to the cobra catheter to catheterize the internal iliac and then the uterine arteries. When Roberts catheter was used, after catheterizing of the left side the catheter was pushed again into the aorta, then withdrawn downwards into the ipsi-lateral iliac artery then the uterine artery

In 5 patients we used a super selective Turmo SP catheter to catheterize the uterine artery. Free flow embolization was performed in the uterine arteries one after the other just beyond the junction of the descending and horizontal portions of the uterine arteries using Gelfom in 6, 300-500 micron PVA particles in 14 patients. However, the angiographic end point of embolization differed when using PVA then with the use of Gelfom. When polyvinyl particles are used, the usual point angiographic end-point was complete occlusion of the uterine artery to achieve stasis or near stasis. When Gelfom was used, the end point of embolization was cessation of flow in the branches supplying the lesion (disappearance of lesion-related hypervascularization), slow flow in the main uterine artery and preservation of retrograde tubo-ovarian flow and cervico vaginal artery. Stagnation of contrast medium was evidenced in the uterine capillary network at the end of embolization, and absence of flow was depicted in either uterine artery by injecting contrast medium into the internal iliac arteries. This was followed by another flush aortogram. When satisfactory embolization is established the catheter & sheath are withdrawn and firm groin compression is applied to the arterial puncture site for at least 15 minutes

The time of the procedure ranged from 45 minutes to 90 minutes with an average of 75 minutes.

After the completion of the embolization procedure the patients were observed in the angio suite for about 45 minutes. In our study all patients had one overnight stay. Post embolization syndrome was controlled by strong analgesics as opioids and non-steroidal anti-inflammatory drugs together with antibiotics, anti emetics and atropine.

The medications continued for 3 days after discharge which most of the symptoms were controlled. Some patients continued on the NSAID for 7-10 days. None of the patients had serious complications as infection, peritonitis or sloughing. There was no hospital readmission needed in any of the patients in the study. However, all the patients in our study had variable degrees of post embolization syndrome ranging from 3 to 14 days with the average of 7 days. The most common symptom was the cramping abdominal pain that decreased in intensity over the period of 3-7 days with its peak starting right after embolizing the second uterine artery. All patients returned to their normal life within one week.

None of our patient needed further interventional or operative techniques..All patients showed improvement of their symptoms& even 8 get pregnant after considerable period of time . The bleeding started to decreased dramatically after the procedure in 10 patient & after 1 week continuously till the period of 1 month in the rest . Follow up pelvic US & color Doppler were done at 3 and 6 months follow up intervals

RESULTS

Age:

Our patients ranged from 25-52 years and were divided into 4 age groups. 25-31 years, 32-38 years, 39-45 and 46-52 years old.

The first age group included 4 patients, the second age group included seven patients, the third included 6 patients and the fourth group included 3 patients.

Signs & Symptoms:

All 20 patients complained of abnormal bleeding, 5 were anemic, 7 had low back pain, five had frequency of micturition and one patient complained of dyspareunia.

Diagnosis:

Most patients in our study after being diagnosed clinically as having abnormal uterine bleeding they went to diagnostic imaging procedures in order to know the cause

All patients had their initial diagnosis and follow up by pelvic ultra sound& Doppler (trans abdominal & trans vaginal).

5 patients underwent pelvic MRI examinations after the initial pelvic US & Doppler .All these patients had limited sagittal T2WI pelvic MRI studies (Figure 1).

Type of the lesion:

In 7 patient interstitial fibroids was diagnosed as the cause of the abnormal uterine bleeding .other 6 patient uterine AVM (all of them after gynaecological procedure) was the cause.IN the rest (7 patient) no specific lesion was diagnosed by US

or MRI only increased vascularity of the uterus was detected by the Doppler exam (Table 1).

Procedure:

Sedation:

Embolization was performed in 2 patients under conscious sedation, other 18 patient no intra-procedural sedation was used.

Arterial Access:

15 patients had a single femoral approach while 5 patients had a bilateral femoral approach.

Technical Success:

Successful catheterization of the uterine arteries was encountered in 20 patients. All patients had both uterine arteries catheterized in the same sitting.

Catheters Used:

Puncture needles, introducer sheath, pig tail catheter and guide wires were used universally in all patients. In 10 patients 5F and 6F cobra head catheters were used. Roberts’s catheter was used in 5 patients. Super selective SP catheter was used in 5 patient only and was introduced into the cobra head catheter.

Embolizing Material:

300-500 µm PVA particles were injected in 14 patients and Gelfom were injected in 6 patients (Table 2).

Hospital Stay:

All patients had a hospital over night stay after the procedure.

Complications:

All 20 patients that were embolized suffered from post embolization syndrome in the form of severe abdominal cramping that usually started as soon as the second uterine artery is embolized due to the induced infarction, nausea, vomiting and fever. These symptoms lasted from seven to fourteen days. Symptoms were controlled by NSAID, anti emetics, anti pyretics and a course of antibiotics.

One patient suffered from symptoms of cystitis, 3 weeks after the procedure with query relevance to the UAE procedure. However, all symptoms disappeared after repeating the course of antibiotics for a week.

No major complications were encountered in all 20 patients included in our study.

Clinical Success:

All patients showed improvement in their bleeding symptoms during their first menses after the procedure. Other related symptoms improved gradually in 3-6 months of follow up.

No occurrence of new lesion was seen on pelvic MRI or sonographic follow up examinations after embolization.

Pregnancy:

8 patient concede pregnancy after UAE & other patients had no desire for future pregnancy or were not sexually active. In our opinion , saving ovarian branche of the uterine artery by selective or even superselective embolization is very important to concede pregnancy & conserve the ability to concede.

| Type of lesion | Interstitial Fibroid | Uterine AVM | Increased uterine vascularity | Total |
|-------------------|----------------------|-------------|-------------------------------|-------------|
| No. | 7 | 6 | 7 | 20 |
| Percentage | 35% | 30% | 30% | 100% |

Table 1, The different types of uterine lesions in the study

| Embolizing Material | PVA | Gelfom | Total |
|------------------------|------------|------------|-------------|
| No. of Patients | 14 | 6 | 20 |
| Percentage | 70% | 30% | 100% |

Table 2, Different embolizing material

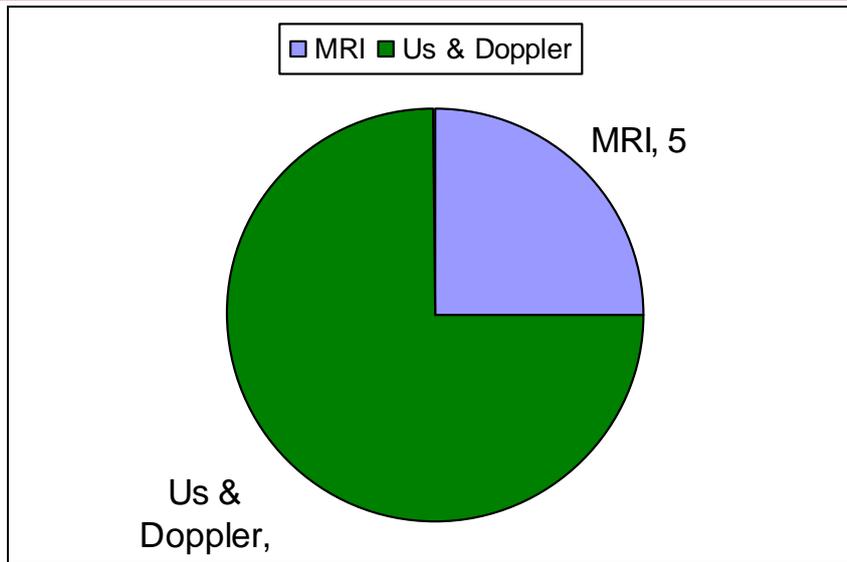
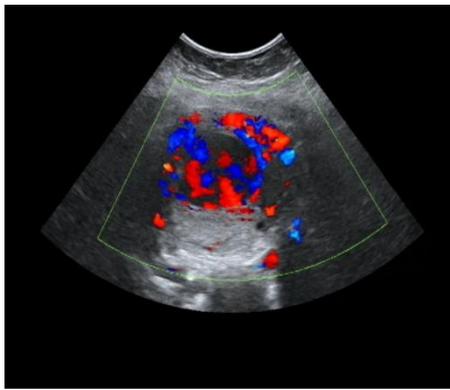
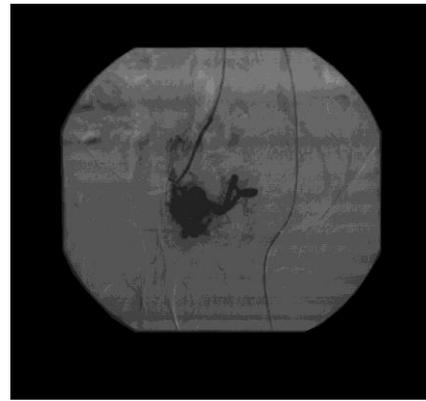


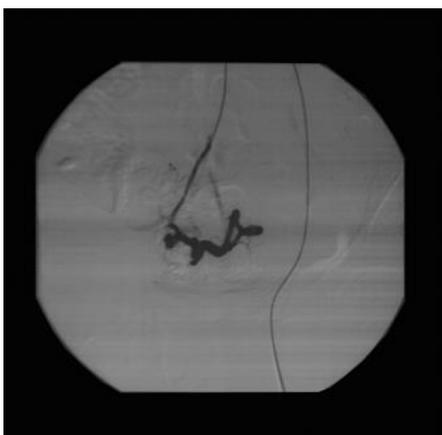
Figure 1, Diagnostic modalities used in the study of the cases



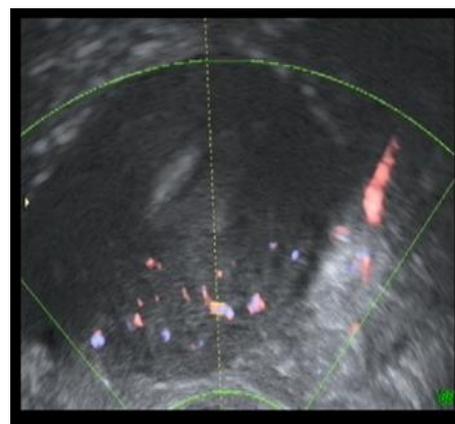
A



B



C



D

Figure (2): Color Doppler US & Digital subtraction angiogram (DSA): (A) Color Doppler exam of the uterus before embolization showing vascular lesion,(B) DSA before embolization showing the Lesion,(C) DSA after embolization shows disappearance of the vascular mass , (D)Color Doppler exam one month follow up shows marked reduction in size & vascularity of the lesion.

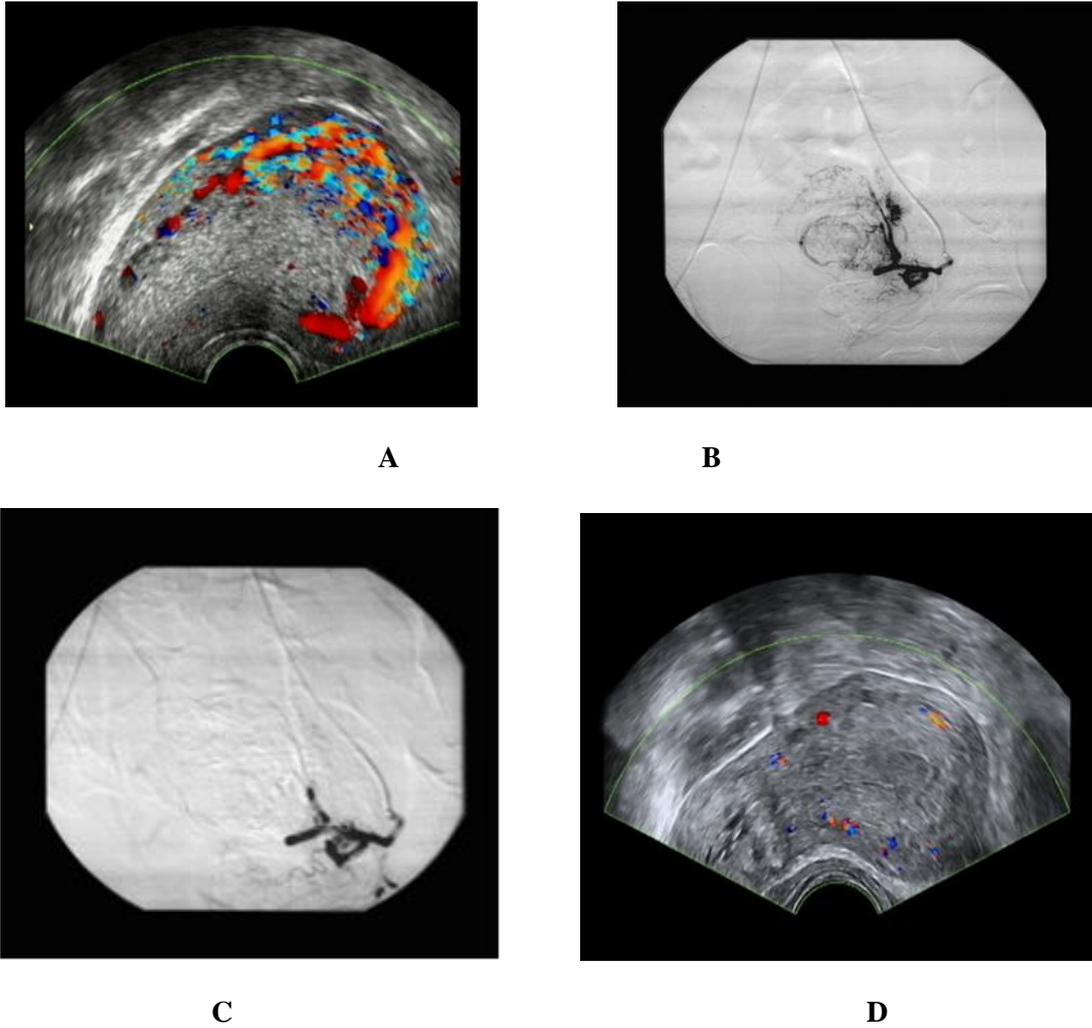
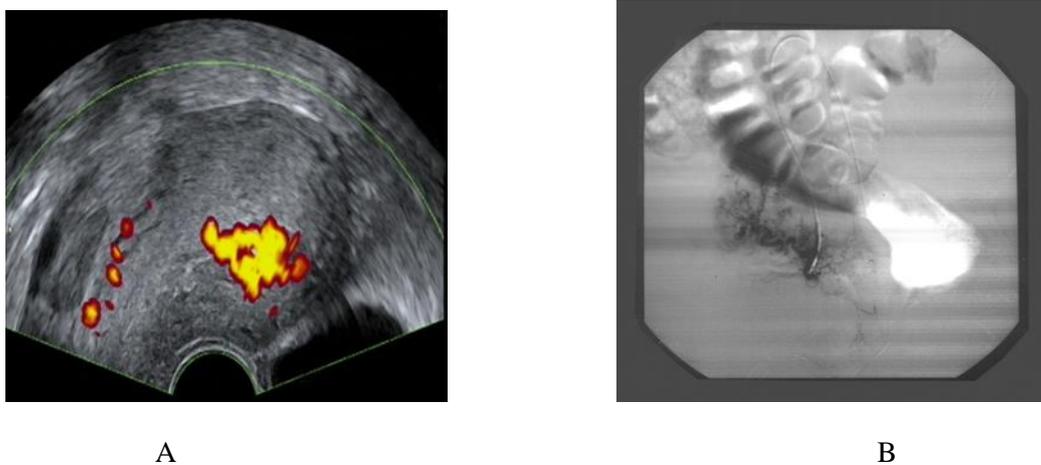


Figure (3): Color Doppler US & Digital subtraction angiogram (DSA): (A) Color Doppler exam of the uterus before embolization showing increased vascularity of uterus,(B) DSA before embolization showing hypertrophied end uterine arteries,(C) DSA after embolization shows disappearance of theof the hyperthroied end arteries , (D)Color Doppler exam one month follow up shows normal vascularity of uterus



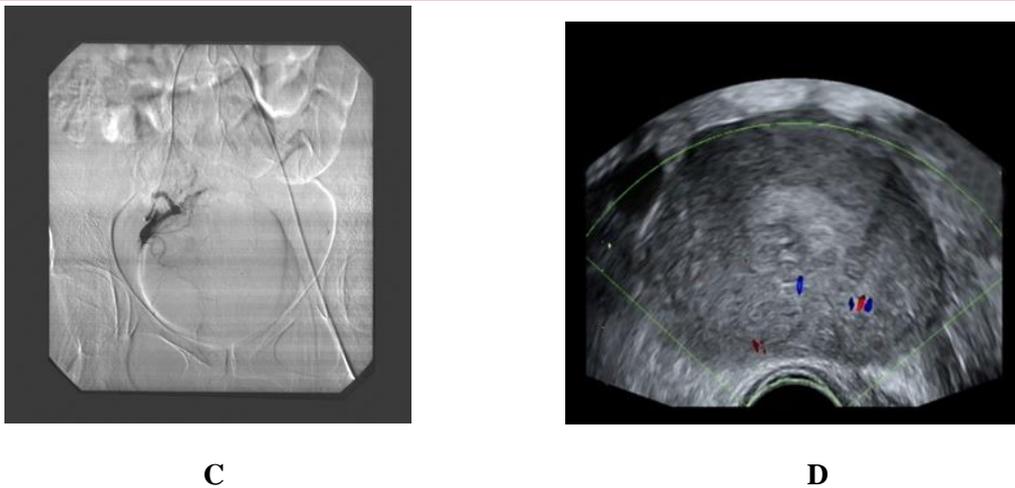


Figure (4): Color Doppler US & Digital subtraction angiogram (DSA): (A) Color Doppler exam of the uterus before embolization showing vascular lesion, (B) DSA before embolization showing the Lesion, (C) DSA after embolization shows disappearance of the vascular mass, (D) Color Doppler exam one month follow up shows marked reduction in size & vascularity of the lesion.

DISCUSSION

Since Ravina et al. reported their results in 1995, uterine artery embolization has received widespread attention as a non surgical alternative in the treatment of symptomatic uterine fibroids. However, because of the pace of development, confusion has arisen over the proper indications of various procedures and the relative roles of percutaneous and conventional surgical procedures. It is important to remember that for any given patient, alternative treatment may be valid, and preferred for sound clinical reasons (8). Abnormal uterine bleeding is common in patients who are between 35 and 49 years of age and occurring in 35-60% of women who are older than 40 years (1).

. In our study the age incidence ranged from 25-52 years of age with the peak incidence from 32-38 years of age.

As stated by Brunereau et al, 2009 and Levy, 2010 that abnormal uterine bleeding may be due to many causes. Uterine leiomyomata in front of these causes (2).

Diagnostic Laboratory assessment included Hb% to assess the degree of anemia, bleeding profile as prothrombin time and concentration (PT & PC) to avoid occurrence of haematoma, kidney functions to assess the kidney functions prior to IV contrast administration and HSG was performed in some cases. Pelvic US was used for diagnosis & assess any abnormality or lesion within uterus. Followed by US Doppler exam to assess the vascularity of the lesion & determine its nature (vascular or non vascular). MRI - in some cases - was also used to confirm the primary diagnosis.

We used US & DOPPLER as well as limited sagittal T2WIs in our follow up to assess the degree of shrinkage of the lesion and uterus.

Recent studies stressed on the importance and the value of contrast enhanced MRI T1WI to assess the viability of the uterine muscle after UAE. In this pulse sequence the healthy well perfused uterine muscles appear enhanced in comparison to the infarcted embolized lesion. These images can also be very valuable in assessing the viability of the uterine muscles in planning for future pregnancies after UAE.

The single femoral approach reported by Pelage et al, 2009 appeared to be safe and costs less than embolization with multiple catheters. A contralateral femoral puncture was therefore performed to cannulate the right uterine artery (7). Levy and Spies, 2010 performed uterine artery embolization and they preferred bilateral femoral approach in their study for several reasons. First, catheter exchange is facilitated without affecting catheter selection for the contralateral uterine artery. Second, simultaneous catheterization allows the angiographer to take advantage of differential flow rates in the uterine arteries and to perform embolization in the presence of arterial spasm. Finally, the ovarian and skin radiation is reduced when embolization is performed on both uterine arteries simultaneously, and pre- and post embolization imaging is performed during simultaneous bilateral uterine artery (4).

In our study we performed 15 patients via a single femoral approach and 5 via bilateral femoral approach. One cardiac patient in an attempt to reduce the time of the procedure according to the anesthesiologist request. Other patients had bilateral femoral puncture, as it was difficult to cannulate the ipsilateral uterine artery. We recommend adopting the single femoral approach and using Roberts catheter as it facilitates catheterization both uterine arteries easily.

The embolizing material used was gelfom or 300-500µm PVA particles. Free flow embolization was performed in the uterine arteries one after the other just beyond the junction of the descending and horizontal portions of the uterine arteries using 300-500 micron PVA particles in 14 patients or gelfomin 6patients.The angiographic end point of embolization differed when using PVA then with the use of Gelfom. When polyvinyl particles are used, the usual point angiographic end-point was complete occlusion of the uterine artery to achieve stasis or near stasis. When Gelfom was used, the end point of embolization was cessation of flow in the lesion branches (disappearance of Lesion-related hypervascularization), slow flow in the main uterine artery and preservation of retrograde tubo-ovarian flow and cervico vaginal artery. Stagnation of contrast medium was evidenced in the uterine capillary network at the end of embolization, and absence of flow was depicted in either uterine artery by injecting contrast medium into the iliac arteries. This was followed by another flush aortogram to insure that there are no residual feeders other than the embolized uterine arteries. When satisfactory embolization is established the catheter & sheath are withdrawn and firm groin compression is applied to the arterial puncture site for at least 15 minutes. We had successful selective catheterization in 20 cases (no 2nd session was needed). Successful embolization by achieving stasis or near stasis or the uterine arteries was established in all 20 cases. The time of the procedure ranged from 45 minutes to 90 minutes with an average of 75 minutes. After the completion of the embolization procedure the patients were observed in the angio suite for about 45 minutes. All our patients had one overnight stay. Post embolization syndrome was controlled by strong analgesics as opioids and non-steroidal anti-inflammatory drugs together with antibiotics, anti emetics and atropine. The medications continued for 3 days after discharge in which most of the symptoms were controlled. Few patients continued on the NSAID 7-10 days. None of the patients had serious complications as infection, peritonitis or sloughing. There was no hospital readmission for any of the patients. However, all the patients in our study had variable degrees of post embolization syndrome ranging from 3 to 14 days with the average of 7 days. The most common symptom was the cramping abdominal pain that decreased in intensity over the period of 3-7 days with its peak starting right after embolizing the second uterine artery. All patients returned to their normal life within one week.

All our patients showed improvement of their symptoms. The bleeding started to decrease immediately after the procedure in 10 –atient& the other 10 after 1 week continuously till the period of 1 month. All other bleeding related symptoms showed significant improvement. Follow up pelvic US & MRI 9 in some cases)were done at 1 and 6 months follow up intervals. All the lesions shoes reduction in size with marked decreased vascularity .In cases with Gelfom minimal non significantvascularity can be detected within the lesion.

We fond that the PVA an outcome regards the control of symptoms, reduction of the lesion size & vascularity better than Gelgom.

The amount of injected particulate was directly related to the size of the lesions and their vascular pattern with a different end point angiographic appearance of PVA particles and Gelfom.

In our first cases we adopted embolizing the uterine artery after the origin of the cervico-vaginal branch. Our end point was reaching stasis of contrast in the uterine artery, however, later we only embolized the abnormal lesion vasculature only aiming at leaving the main stem of the uterine artery patent (close to stasis). This technique showed similar control of the bleeding symptom with significant reduction in the post embolization syndrome by leaving as much as possible of the uterine muscle viable.

Our follow up was based on seeing the patient one week after the procedure and pelvic US (in all patients) or MRI studies(in 3 patients) in 1-6 months for evaluation of the reduction in the lesion size& vascularity. A questionnaire regarding the improvement in symptoms and satisfaction with the procedure was also employed at the time of the follow up imaging. Patients were clearly instructed to report any fever after or lasting more than one week or any persistent discharge. We recommend the imaging follow up of the patients to be based on pelvic US studies as it is easy , cheap , available and can identify any complications. We only performed limited sagittal T2WI to asses the size of the lesion, however, contrast enhanced study may be quite valuable in assign the viability of the uterine muscle

The follow up of the patients should be based on the improvement of their symptoms rather than following up on the reduction of the size of the Lesions.

Pregnancy:

Several pregnancies after uterine artery embolization for women with uterine fibroids have been reported in literature (Ravina et al, 2005)(Katsumori et al, 2002). However, in our

series, 8 patients conceive pregnancy after UAE & other patients had no desire for future pregnancy or were not sexually active. In our opinion, saving ovarian branches of the uterine artery by selective or even superselective embolization is very important to conceive pregnancy & conserve the ability to conceive.

CONCLUSION

Uterine artery embolization became an option for patients seeking organ conserving treatment offering both clinical success and low risk for significant complications. The uterine fibroid embolization can be performed safely and effectively as an outpatient procedure. Partnership between the interventional radiologist and gynecologist is essential. Logistics and protocols must be settled, financial affairs arranged satisfactorily, and good public relations assured.

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