Clinical Care of Patients Undergoing Uterine Artery Embolization

Thuong G. Van Ha, M.D.,¹ and Natasha Li¹

ABSTRACT

Uterine artery embolization (UAE) is a relatively recent, safe, and minimally invasive procedure for women experiencing symptomatic fibroids. This process of percutaneous occlusion of blood vessels to disrupt blood flow will consequently impede nourishment to the uterine fibroids and cause infarction. To have proper patient treatment to optimize overall clinical success, guidelines should be rigorously followed. This article will delineate a suitable patient care process for UAE in which subsequent interventional radiologists can employ.

KEYWORDS: Fibroids, uterine artery embolization, uterine fibroid embolization, patient care

Objectives: Upon completion of this article, the reader should understand the entire process of uterine artery embolization, including preprocedural workup, periprocedural care, and postprocedural care and follow-up.

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Uterine fibroid is the most common noncancerous tumor found in women of childbearing age, although not all women with fibroids are symptomatic.^{1,2} Fibroids occur more commonly in African-American women compared with Caucasian women. Symptoms attributable to uterine fibroids include bleeding and bulk-related diseases. Fibroids may be classified by location as subserosal, intramural, and submucosal fibroids, which develop under the outer portion of the uterus and expand outward, within the wall of the uterus, and under the lining of the uterus, respectively. The methods of treating uterine fibroids include uterine artery embolization (UAE), ablative therapy (including high-intensity focus ultrasound), surgical intervention (including hysterectomy or myomectomy), and medical therapy with Leuprolide.

UAE has been shown to be a safe and effective therapy for patients experiencing symptomatic uterine fibroids.^{3–5} This practice entails occlusion of large-caliber fibroid arteries to diminish blood flow to the fibroid without causing permanent damage to the uterus.⁶ Consequently the fibroid becomes ischemic and shrinks through a process known as *hyaline degeneration*. Currently UAE is the most widely available, minimally invasive method with the most rapid recovery period for treating uterine fibroids^{7,8} while at the same time significantly increasing the patient's general quality of life.⁹

Interventional radiologists must be more actively involved in the entire process of UAE patient care. Although degree of patient management may be outside the standard scope of patient care to which some interventional radiologists are accustomed, due to the nature

¹Section of Vascular and Interventional Radiology, University of Chicago Hospitals, Chicago, Illinois.

Address for correspondence and reprint requests: Thuong G. Van Ha, M.D., Section of Vascular and Interventional Radiology, University of Chicago Hospitals, 5840 S. Maryland Avenue, MC 2026, Chicago, IL 60637.

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of UAE as a clinical treatment with extensive patient care issues, it is imperative that a clinical care process be set up to optimize clinical success and patient satisfaction.

DIAGNOSIS

Only ~50% of uterine fibroid cases are symptomatic,¹⁰ and many women are undiagnosed if routine gynecologic examinations are not performed. However, for those who do suffer from symptoms, pelvic pain, pelvic pressure, menorrhagia, urinary frequency, and/or constipation may be experienced. A detailed history is necessary to elicit the signs and symptoms of fibroid disease and to distinguish it from other diseases. If a gynecologic history and examination suggest the presence of fibroids, laboratory tests should be performed to rule out other etiologies as the source of the experienced symptoms. If the symptoms are hindering or debilitating, the patient should be referred for imaging with ultrasound or magnetic resonance imaging.

Ultrasound is usually a good screening examination for uterine fibroids, though many investigators prefer magnetic resonance imaging due to better delineation of pelvic anatomy and pathology. If the findings are deemed consistent with uterine fibroids, several options are available for their treatment. In our practice, several patients are referred to the interventional radiologist for consultation from our own or outside gynecology colleagues if they think that the patient may benefit from a UAE procedure. Just as frequently, we have self-referred patients who sought our opinion, at times regardless of what they have been told by the primary care physician or gynecologist. Whatever route a patient takes to be seen by our interventional radiology group, an initial consultation with an interventional radiologist for UAE must be scheduled prior to embarking further on the UAE treatment. In addition, we believe that it is important to note that involvement of a gynecologist is paramount as their expertise contributes greatly to care of patients who are being evaluated. For this reason, if a self-referred patient in our clinic does not have a referring gynecologist, we

refer that patient to one of our colleagues in our hospital.

PATIENT SELECTION

To have good clinical success, patient selection is critical. In general, UAE is performed in patients who have fibroids with symptoms attributable to them. Contraindications for UAE are listed in Table 1. UAE is not recommended for those who have fibroids but are asymptomatic. In addition, UAE may result in infertility and pregnancy complications such as preterm delivery, spontaneous abortion, abnormal placentation, and postpartum hemorrhage.¹¹ Therefore, myomectomy should be the treatment of choice in patients who desire future fertility and are able to undergo myomectomy. Current studies do not support UAE as a procedure that can preserve or enhance fertility, though there have been reports of patients with successful pregnancy after UAE. Other contraindications are patients who are immunocompromised, have had previous pelvic irradiation, or are coagulopathic.¹² Additionally, fibroid location is important for patient selection. Although studies have shown that volume and not stalk diameter changes significantly after embolization of subserosal fibroid,¹³ UAE is still not recommended when the stalk diameter is less than one third the size of the diameter due to the possible risk of complications if detachment of the fibroid from the uterus occurs.^{5,14} Subserosal fibroids are also the least likely to respond to UAE treatment. Submucosal fibroids, on the other hand, are the most likely to result in sloughing and should be monitored for uterine infection postprocedurally, for serious complications can arise if secondary infections from sloughed fibroids go unnoticed.¹⁵

PREPROCEDURAL CARE/CONSULTATION

All of the following information is presented in the interventional radiology clinic before or during the UAE consultation. A thorough consultation is intended

Table 1 Contraindications to UAE

Author	Contraindication	Reason
Goldberg and Pereira, 2006 ¹¹	Desire future pregnancy	Could result in future pregnancy complications
Marshburn et al, 2006 ¹²	Immunocompromised	Patient would be at an extremely high risk for infection, sepsis, and necrosis
	Previous pelvic irradiation	May cause radiation injury due to overexposure to radiation
	Coagulopathic	Excessive bleeding will result from the small percutaneous incision
Schirf et al, 2006 ⁵	Subserosal fibroid with a	UAE may cause the fibroid to detach from the uterus,
Braude et al, 2000 ¹⁴	stalk diameter one third the size of the radial diameter	inducing further complications

UAE, uterine artery embolization.

to offer the patient information regarding the procedure, other treatment options, possible complications, and answers to any questions the patient has, as well as provide the interventional radiologist with a thorough outline of the patient's history, a focused physical exam, and imaging to decide the appropriate course of action and to identify any contraindications. During the initial consultation, a checklist of important information to be obtained is recommended to ensure that nothing is missed. It is important to conform to patient's realistic expectations during the procedure.

Information on UAE

The interventional radiologist should confer information to the patient regarding the risks, benefits, possible complications, as well as the procedural technique of UAE. Information to be shared with patients during the consultation include the following. There is an 85 to 90% success in reducing fibroid-related symptoms in all patients and a 40 to 60% reduction in uterine volume after UAE.^{12,16-19} The procedure should be scheduled after menses and before ovulation and will take approximately 1 hour to complete. Sometimes pain and possibly nausea and vasomotor symptoms are experienced postprocedurally. Some complications that can arise are uterine necrosis, expulsion of fibroid tissue, infection or sepsis, postembolization syndrome (PES), chronic vaginal discharge, amenorrhea, and UAE failure.³ Persons with prior procedures, prior medical care, African-American, smokers, and those with comorbidities have an elevated risk for complications.^{4,20}

Other Treatment Options

All possible treatment options should be presented to the patient for proper decision making, higher success rate, and overall patient satisfaction. Some disadvantages to other therapies follow. High-intensity focused ultrasound is currently considered experimental and is not widely available but may have a large impact as a treatment modality for uterine fibroids in the near future. Hysterectomy is a procedure requiring a 4- to 5-week recovery period, with a 50% chance of having both major and minor complications,^{7,21} and results in infertility. Additionally, in a comparison of hysterectomy to UAE, hysterectomy patients reported significantly more pain 1 hour after treatment and significantly longer time to return back to daily activities.²² Myomectomy does not address the entire fibroid burden and has a symptom recurrence rate of ~35%.²³ Also, in a side-by-side study of myomectomy and UAE, myomectomy patients required more days off work and a longer hospital stay and experienced more adverse event.²⁴ However, is the recommended option for those

who want to maintain fertility if the procedure is appropriate. In the event of failure of myomectomy, patients can still undergo UAE. Medical therapy using Leuprolide (Lupron) is essentially a "drug-induced menopause" by inhibiting pituitary secretion of gonadotropins. Leuprolide can shrink fibroids prior to surgery and is used oftentimes as an adjuvant. However, effects are temporary and reverse after 3 months after termination of use, and there are many side effects associated with the use of Leuprolide.

Patient History

The best method of preventing complications is to methodically review the patient's medical and surgical history. A complete physical examination including a completed list of medications and laboratories should be reviewed to ensure no contraindications exist. We require a pelvic ultrasound and/or pelvic magnetic resonance imaging, endometrial biopsy, and laboratory values, including prothrombin time, partial thromboplastin time, complete blood count with platelets, serum blood urea nitrogen, and serum creatinine preprocedurally. Imaging obtained must substantiate the diagnosis and determine the size and locations of the fibroids. Among others, endometriosis, leiomyosarcoma, and adenomyosis may present with symptoms similar to uterine fibroids.²⁵⁻²⁷ Hence, it may be necessary to perform an endometrial biopsy. Additionally, a preuterine embolization assessment is used to compile all important patient information for the interventional radiologist (Table 2).

Preprocedural Orders

Once the patient has decided to undergo UAE, proper consent is required before further action is taken. Medical insurance approval is necessary in our practice. Written preprocedural instructions should be given to the patient. At our hospital, we have a preprinted form to distribute to patients in addition to a courtesy phone call the day prior to the procedure.

- Do not take any blood thinners for 48 hours prior to your procedure (coumadin, heparin, aspirin, plavix).
- Do not eat anything after midnight the night before your procedure.
- Bring all the medication you are taking with you.
- Arrange for someone to drive you home after the procedure.
- Go to the admitting office on the day of your scheduled procedure.
- After leaving the admitting office, go to the radiology department and register with the coordinator.

Additional instructions are necessary for patients with other medical problems such as diabetes or asthma.

Table 2 Preuterine Embolization Assessment

Date:	
Time:	
D.O.B.:	Age:
Patient number	
Name: first, last	
Referring physician	
Service:	
Pager #:	
Medical DX:	
Duration of symptoms:	
Medical Hx:	Surgical Hx:
Allergies:	
Hormonal therapy:	Birth control
	21-day cycle
	28-day cycle
MP:	
Duration of menses:	
Regular menses:	Yes No
Length of cycle:	
Amenorrhea:	Yes No
Menorrhagia:	Yes No
Blood transfusion required:	Yes No
Gravida:	
Para:	
NSVD	or C section
Plans for conception:	
Any history of pelvic malignancy?	
Any chronic infection?	
PID?	
Endometriosis?	
Any pelvic surgery?	
Urinary symptoms:	
Urgency:	Frequency:
UTI:	
GI:	
Constipation:	Bowel obstruction:

PERIPROCEDURAL CARE

While the patient is in the preprocedural area, a UAE checklist should be completed (Table 3). The patient is given intravenous fluids of 0.9 normal saline at "keep vein open" rate. A Foley catheter is inserted by the nursing staff. Without a Foley catheter, visualization of the pelvic vessels may be difficult as contrast containing urinary fluid in the bladder may interfere with the field of view. Antibiotics are given as prophylaxis (e.g., Cefazo-

Table 3 Uterine Artery Embolization Checklist

Name:
Med. history #:
Telephone #:
Date of birth
Consultation date:
Referred by:
____Ultrasound report obtained
____Endometrial biopsy. Report obtained
____Pelvic MRI appointment date _____
____Pelvic MRI report obtained
____Precertification obtained
____Lab requisitions given to patient
____Scheduled embolization date _____
____Requisition completed to schedule procedure
____Request for admission submitted
____Patient instructed to go to admitting
____Referring physician notified of plan

MRI, magnetic resonance imaging.

lin 1 g, intravenously). Antiemetics and anti-inflammatory medications are also given.

PROCEDURE

The same interventional radiologist who performed the consultation should preferably perform the UAE as well as rapport with patient has already been established. Midazolam and fentanyl are used for conscious sedation. Typically, at our institution, patient monitoring is done by nursing personnel. However, occasionally when the patient has an impaired airway, severe apnea, or asthma, an anesthesiologist will be involved. Radiation doses should be kept as low as reasonably achievable. Additionally, if the patient has a minor allergy to contrast agents, diphenhydramine and methylprednisone should be administered preprocedurally. Details of techniques of UAE are beyond the scope of this article, though a few points will be made here. Embolizing agents are injected through a catheter placed in the uterine arteries until the end point is achieved.²⁸ Accurate determination of the end point is critical to the success of the procedure, for a premature end point will result in an amplified likelihood of recurrence, and an overachieving end point with embolizing agents may result in nontarget embolization. Proper sizing of the catheter is compulsory, as larger catheters may induce vasospasm of the uterine artery and cause the observation of a false end point.

POSTPROCEDURAL CARE

Some practitioners perform UAE in an outpatient setting, discharging the patient the same day, unless there are issues that necessitate admission. In our practice, we routinely admit patients for 23 hours, as our experience

of discharging patients the same day has been suboptimal in term of adequate pain management in particular and patient care in general.

Overnight Care

Pain management is an imperative aspect of patient care for a UAE. For this reason, at our institution, the patient is equipped with a patient control analgesia (PCA) pump immediately after the procedure. The pump is set up before the procedure so that analgesia is available immediately. Morphine is the first-line drug unless the patient states an allergy or severe adverse response to morphine based on past experience. Alternative drugs include Dilaudid (Abbott Laboratories, North Chicago, IL, USA). A fentanyl patch (Janssen Pharmaceutica, Titusville, NJ, USA) or other alternative medications can be used. Along with the PCA pump, antiemetics such as phenergan (Wyeth-Ayerst, Madison, NJ, USA) are administered for nausea, diphenhydramine for pruritus, and dulcolax suppository (Micromedex, Greenwood Village, CO, USA) for constipation. The patient is admitted overnight with a PCA pump, and the floor nurse is contacted with appropriate contact information. The interventional radiologist on-call must be available for overnight care and emergency. The physician should be called for uncontrolled pain complaints or nausea or pruritis not responsive to antiemetics and diphenhydramine, respectively. On the subsequent day, the patient is evaluated for possible discontinuation of the PCA pump. If so, oral medication, Percocet (Endo Pharmaceuticals, Chadd Fords, PA, USA) or Vicodin (Purdue Pharma, Stamford, CT, USA) is prescribed and administered for pain management for the remainder of the patient's time in the hospital. A discussion with the patient regarding the outcome of the procedure and the postprocedural route is necessary, as well as an evaluation of the patient prior to discharge. Upon discharge the patient will be given a prescription of Percocet or Vicodin and ibuprofen for several days after discharge.

Postdischarge

The patient should be given a list of after-surgery instructions. We have standard preprinted forms for this purpose (Table 4). At our institution, a nurse contacts all patients in 1 week to perform a postdischarge home check and relay any patient problems experienced at home to the appropriate physician service.

MANAGEMENT OF COMPLICATIONS

Complications can and do occur. It is important to be aware of these complications so when they occur, prompt management can optimize outcomes. Complications can be divided into those that arise from angiography and

Table 4 Discharge Instructions

Avoid excessive walking the first 24 hours.
Do not bend over or stoop down; if you notice any bleeding from your puncture site, apply pressure and notify your doctor immediately.
Take Motrin for pain; avoid aspirin.
You may shower or bathe and remove the Band-Aid the morning after surgery.
Drink plenty of fluids to help flush the contrast from your kidneys.
See your interventional radiology physician in 1–2 weeks.
See your gynecologist in 2 weeks for a follow-up examination.
Contact your gynecologist in 6 months for a follow-up pelvic ultrasound.
Contact numbers for questions or concerns provided.

those that are particular to UAE. Some of the complications worth noting are mentioned here.

Fibroid Sloughing

Fibroid sloughing is common in patients who have submucosal fibroids and undergo UAE. Controversy exists as to whether fibroid expulsion should be classified as a complication or a natural phenomenon of treatment.^{29,30} Although this may be a natural phenomenon, there are several subsequent complications that are related to fibroid expulsion. For this reason, it is necessary to closely follow all patients who experience expulsion.³¹ In the event of a prolapsing fibroid, possible treatment may include hysteroscopic removal and in severe cases, hysterectomy. A fibroid that is exposed through the cervix can regularly result in infection or endometritis. Infection is the most common cause of rehospitalization³² and should be carefully monitored. In this case, intravenous antibiotics should be administered. Myomectomy or hysterectomy may be required if sepsis occurs.

Postembolization Syndrome

PES is one of the most common complications after UAE. PES is characterized by flulike symptoms, including malaise, fever, local pain, and leukocytosis lasting up to 5 days.³³ We do not routinely work up patients with PES, as it will subside on its own with supportive measures. Antiemetic agents, pain reducers, and rest are solutions for reducing symptoms. Patients who appear toxic should be worked up for infection, including a complete physical examination, imaging studies, laboratory tests, and blood cultures.

Infection

A recent study found women undergoing UAE have a risk of 1.2% for developing infectious complications.¹⁵

Although this is a relatively low rate of infection, it is important to closely monitor the patient to ensure a quick response if infection does develop. Patients with infection should be treated with antibiotics immediately. A complete physical examination, laboratory tests, and blood cultures will determine if there is infection and the proper antibiotic to administer. Imaging studies will be useful in determining the extent of infection once it has been diagnosed but are less helpful in the actual diagnosis of infection itself. In the event of sepsis, surgical intervention might be sought out.

Necrosis

Although diffuse uterine necrosis is a very rare occurrence,³⁴ it is a dangerous complication that should be addressed. Necrosis is characterized by an inflammation of the uterus, fever, foul-smelling discharge, and infection. In the case of uterine necrosis, surgical intervention of hysterectomy is necessary. Magnetic resonance imaging may reveal lesions along the myometrium; however, diagnosis of a necrotic uterus is only made certain after hysterectomy when a gross specimen and microscopic analysis are obtained. For this reason, it is important to surgically intervene if severe infection persists.

CONCLUSION

UAE is a safe and effective treatment for uterine fibroids. It is important for the interventional radiology physician to actively participate in patient care from the initial process of consultation prior to the procedure, seeing the patient through the procedure, to offering postprocedural care and subsequent follow-up. In many cases, patient care cannot be articulated in a systematic approach that applies to all. However, it is important to set institutional guidelines to use as an outline for efficient patient care. This will be important to achieve overall patient satisfaction and high clinical success rate.

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