



Case Report *Interventional Radiology*

## Repeat uterine artery embolization for uterine leiomyomas: Indications, strategies, and outcomes – A case report

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### ABSTRACT

Uterine leiomyoma is a frequent cause of abnormal uterine bleeding, especially among African Americans. It is also associated with dysmenorrhea, pelvic pain, infertility, and complicated pregnancies. While hysterectomy and myomectomy are more common forms of treatment for uterine leiomyoma in the United States, uterine artery embolization (UAE) offers a uterus-preserving alternative, with lower rates of major complications, although with an increased risk of reintervention. This case study presents a 45-year-old African American female with persistent abnormal uterine bleeding post-initial UAE, underscoring the importance of strategic techniques during repeat embolization to ensure efficacy. The patient underwent a successful repeat UAE procedure, demonstrating its safety and effectiveness in treating abnormal uterine bleeding while preserving fertility. In this case, the presence of collateral vessels may have contributed to the previous treatment failure. Specific procedural techniques are discussed, and long-term monitoring is recommended for optimal outcomes.

**Keywords:** Abnormal uterine bleeding, Case report, Failed uterine artery embolization, Repeat uterine artery embolization, Uterine leiomyoma

### INTRODUCTION

Uterine leiomyomas (fibroids) are benign smooth muscle tumors that occur in 25% of reproductive women. Fibroids are especially prevalent in African Americans, with a 2–3 times higher incidence than in white women. Symptomatic fibroids can cause heavy menses, abnormal uterine bleeding, pelvic pressure or pain, bladder dysfunction, and infertility. Hysterectomy and myomectomy are the more common forms of treatment for leiomyoma in the U.S. However, Uterine Artery Embolization (UAE) is an effective option for women who desire to preserve the uterus, avoid major surgery, and avoid loss of reproductive potential.

UAE is a minimally invasive procedure used to treat symptomatic uterine fibroids. Outcomes of large studies including the Fibroid Registry for Outcomes Data (FIBROID) for Uterine Embolization concluded that UAE results in a durable improvement in quality of life.<sup>[1]</sup> Compared to other surgical forms of treatment, UAE has a significantly lower rate of major complications. However, there is an increased risk of reintervention in the future.<sup>[2]</sup> The randomized trial of embolization versus surgery treatment for fibroids (REST) trial, which compares 5-year outcomes

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between UAE and hysterectomy/myomectomy, showed no difference in quality of life, complications, and satisfaction but a higher reintervention rate in the UAE group.<sup>[3]</sup> The overall failure rate of the UAE is 9.4%.<sup>[4]</sup> In the case of a failed initial UAE, a repeat UAE can be offered since studies suggest that symptoms appear to respond well to repeat embolization.<sup>[5]</sup>

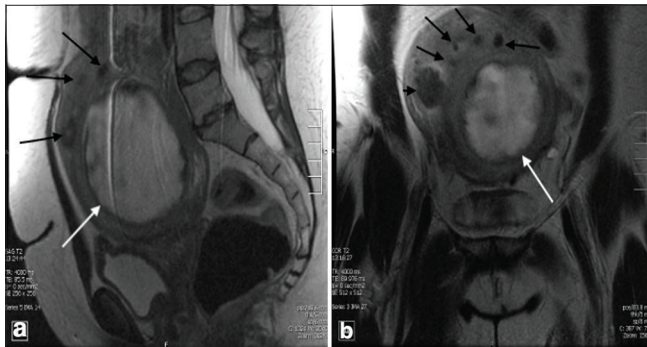
Another non-invasive option to treat fibroid is magnetic resonance imaging-guided focused ultrasound surgery (MRgFUS), where ultrasound waves are used to heat up and destroy the tumor. Compared to UAE, MRgFUS is associated with less post-procedure pain in the median McGill Pain Score and less opioid use, with comparable safety and effectiveness. This finding was not found in another study.<sup>[6]</sup>

This case report examines the outcome of a repeat UAE and highlights the strategic techniques to ensure proper and sufficient embolization.

## CASE REPORT

The patient is a 45-year-old African American female with a past medical history of asthma and hypothyroidism who presents for evaluation and possible treatment of her uterine fibroids and associated bleeding. The patient previously underwent UAE a year ago [Figures 1 and 2]. She has a long history of heavy uterine bleeding, which unfortunately did not significantly improve after her initial UAE treatment and current combined oral contraceptive regimen. The patient denies any pertinent family history. By her account, the previous UAE procedure went very well without any complications.

Given her lack of improvement, the patient wishes to be re-evaluated. Her dysfunctional uterine bleeding remains



**Figure 1:** A 44-year-old female who has a history of irregular menses, menorrhagia, urinary frequency, and pelvic pain. Sagittal and coronal T2-weighted magnetic resonance imaging of the pelvis demonstrated multiple small hypointense masses (black arrows), the largest at the right uterine fundus measures  $2.8 \times 2.8 \times 2.4$  cm (black arrowhead). There was a dominant hyperintense mass in the lower uterine segment (white arrow), measuring  $8.4 \times 7.6 \times 9.0$  cm. They all appear to be intramural.

constant but with varying degrees of intensity from light to heavy. She denies any pelvic pain, constipation, or urinary frequency. She is not taking any anticoagulation or antiplatelet medications. The patient denies prior uterine surgeries. She is otherwise relatively healthy, only receiving treatments for her asthma and hypothyroidism.

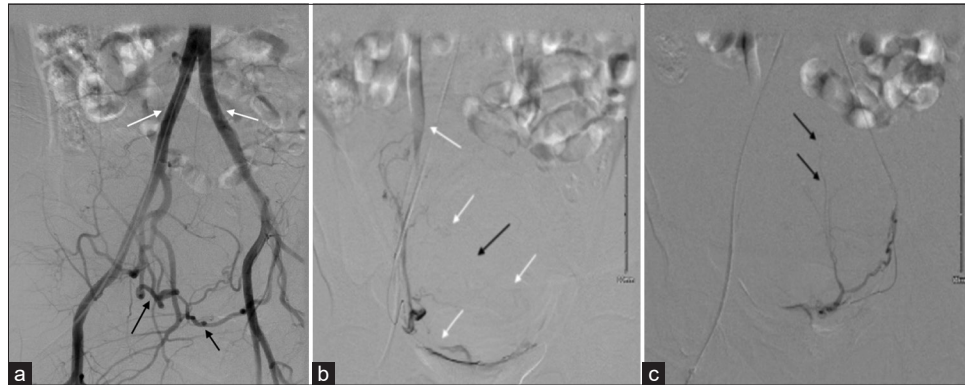
A complete pelvic ultrasound a month before the repeat UAE revealed that the uterus remains enlarged, measuring  $13 \times 6 \times 8$  cm. A posterior-located fibroid measures  $7.2 \times 5.9 \times 6.8$  cm and is seen distorting the endometrium. An anteriorly located fibroid measures  $3.5 \times 2.2 \times 2.4$  cm. The endometrial stripe is unremarkable (just under 9 mm in thickness). Both ovaries are normal.

A review of the genitourinary system is positive for menstrual bleeding and negative for dysuria and pelvic pain. A review of constitutional, cardiovascular, respiratory, gastrointestinal, and neurologic systems is all negative. A physical examination of the abdomen reveals it to be soft, distended due to fibroids, and non-tender. Bowel sounds are present on all four quadrants. Physical examination of other body parts is unremarkable.

Laboratories on the day of UAE include complete metabolic panel, complete blood count with differential, human chorionic gonadotropin serum qualitative, thyroid function test (thyroid-stimulating hormone and thyroxine), iron studies, and protime-international normalized ratio; results were all within normal range. Pertinent specific laboratory values include hemoglobin of 12.6 g/dL, hematocrit of 40.1%, mean corpuscular volume of 91 fL, and platelet count of 238 K/uL.

The patient and the attending interventional radiologist discussed in detail her continued abnormal uterine bleeding. Other potential causes of abnormal uterine bleeding are ruled out by the patient's obstetrics and gynecology physician. The attending interventional radiologist is concerned that the patient's prior procedure did not embolize enough of the uterus and/or fibroids for an effective treatment. Furthermore, the patient may have additional vascular supply to the fibroids that were not previously identified. Therefore, the attending interventional radiologist recommends a repeat UAE. The patient has no intentions of having children, thus concern for infertility is not an issue.

The procedures, risks, benefits, and alternatives are discussed with the patient in detail. Risks include but are not limited to, access site hemorrhage/hematoma, pseudoaneurysm, infection, arterial injury, contrast/medical allergy, non-target embolization, myometrial injury, ovarian failure (menopause), fibroid passage, ileus, infertility, and postembolization syndrome (fever, pain, nausea, vomiting, malaise). The attending interventional radiologist explained to the patient the expectation of significant pelvic pain and vaginal discharge, which can last 2–3 days following the



**Figure 2:** A 44-year-old female with a history of uterine fibroid treated with uterine artery embolization presented with abnormal uterine bleeding. (a) Pre-embolization angiography of the common iliac artery (white arrows) and its branches, including prominent bilateral uterine arteries (black arrows). (b) Post-embolization angiography of the right uterine artery shows minimal filling and stasis of feeding vessels (black arrows). Several small collaterals (white arrows) may contribute to the treatment failure. (c) Post-embolization angiography of the left uterine artery shows minimal filling of feeding vessels but some branches (black arrows) going superiorly may contribute to treatment failure.

procedure. Close follow-up and careful pain management were recommended and emphasized to the patient. The patient understands the risks and expectations and wishes to proceed.

Using ultrasound guidance, the left radial artery was accessed with a 21-gauge needle. The needle was exchanged for a 5 Fr slim sheath over an access wire.

A 5 Fr flush catheter was then advanced through the sheath into the descending aorta over a 035" wire. A subsequent pelvic angiogram was unremarkable. Subsequent angiography was used to identify the origin of the right uterine artery. After advancing the 5 Fr catheter into the proximal uterine artery, a microwire/microcatheter combination was then advanced through the base catheter and into the distal aspect of the uterine artery. Embolization of the uterine artery was then carried out with 400- $\mu$ m and 600- $\mu$ m Hydropearl microspheres (Terumo, Tustin, CA) until satisfactory stasis was achieved [Figure 3]. Care was taken to avoid reflux.

Similarly, embolization was carried out with 400- $\mu$ m, 600- $\mu$ m, and 800- $\mu$ m Hydropearl microspheres (Terumo, Tustin, CA) until satisfactory stasis was achieved [Figure 4]. Of note, the dominant arterial supply to the uterus extended from the left uterine artery. Furthermore, collateralized filling to the contralateral uterine artery was identified once embolization was initiated, which is why the larger 800- $\mu$ m microspheres were also used. Contrast staining of the embolized uterus was noted.

The catheter and sheath were removed. Hemostasis of the left radial artery access site was successfully achieved using a TR-Band (Terumo, Tustin, CA). The patient tolerated the procedure well with no complications.



**Figure 3:** A 45-year-old female with a history of uterine fibroid treated with uterine artery embolization presented with abnormal uterine bleeding. (a) Pre-embolization angiography of the right uterine artery shows branches of the right uterine artery (black arrows) feeding the fibroids, with some collaterals (white arrows) to the left side. (b) Post-embolization angiography of the right uterine artery shows a lack of contrast filling (black arrows) from the obliteration of feeding vessels and collaterals. The contrast stasis of a small branch (white arrows) indicates adequate embolization.

The patient was discharged home with naproxen 500 mg and levofloxacin 500 mg for 7 days, promethazine 25 mg as needed for nausea, and oxycodone-acetaminophen 5–325 mg as needed for pain.

The patient followed up 44 days after undergoing the repeat UAE procedure. She reports experiencing pelvic pain for 3 days following the procedure, which she managed effectively with prescribed medications. The patient observes mild chunky light brown vaginal discharge post-procedure; however, she denies experiencing any associated dysuria or pelvic pain. She remains on her birth control regimen and reports a lightening of her menstrual period starting





**Figure 4:** A 45-year-old female with a history of uterine fibroid treated with uterine artery embolization presented with abnormal uterine bleeding. (a) Pre-embolization angiography illustrates feeding vessels from the left uterine artery (black arrows), with some collaterals (white arrows) to the right side. (b) Angiography from the left uterine artery shows prominent contrast filling of the right uterine artery (black arrows), due to collateral branches. (c) Post-embolization angiography shows attenuation of feeding vessels (black arrows) with minimal filling with stasis contralaterally (white arrows).

approximately 1 week after the procedure. The patient reports that her menstrual period is now regular with 4 days of light bleeding and denies any dysuria, fever, or constipation. A review of constitutional, cardiovascular, respiratory, gastrointestinal, and neurologic systems is all negative.

## DISCUSSION

Given a poor outcome of the initial UAE, a repeat embolization is generally recommended since UAE has a lower risk of complications compared to other surgical treatments, and patients generally report improved symptoms afterward. Nevertheless, strategic techniques should be utilized during the embolization procedure to improve effectiveness and lower the need for reintervention. First, regardless of the embolic agents used, sufficient and appropriate embolic agent choice should be used to achieve the desired endpoint of 3–5 cardiac cycles of stasis within the uterine artery.<sup>[7]</sup> Stasis is achieved if contrast moves back and forth within the segment but with very slow forward progress. This approach minimizes post-procedure pain while maintaining efficacy.<sup>[8]</sup> Second, in the case when Terumo Hydropearl microspheres are used, the physician should opt to pack the vessels with gradually increased microsphere sizes distally to proximally. Larger microspheres should be considered if the endpoint is not yet achieved. Third, it is important to wait a few minutes after apparent occlusion and recheck the flow in uterine arteries to be sure that there is no early recanalization, which may lead to reperfusion of the fibroids and diminish the efficacy of the procedure.<sup>[9]</sup> Finally, ovarian supply and embolization should be considered

during a repeat embolization. While present in only about 5.8% of patients,<sup>[10]</sup> there can be additional vascular supply to the uterus and fibroids from the ovarian arteries, which will allow for less optimal results if not also treated.

Besides inadequate embolization and persistence of collaterals, other possible causes of UAE failure include formation of new fibroids or large fibroid with diameter >8.5 cm. A study showed that a history of hysteroscopic myomectomy is associated with higher risk of UAE failure.<sup>[4]</sup>

The promising outcome from the patient in this case report reassures the advantage and suitability of a repeat UAE. However, long-term outcomes should be monitored to examine effectiveness and potential complications. Future computed tomography (CT) or ultrasound may be scheduled to compare results pre- and post-operation. CT angiography can demonstrate collaterals from non-uterine sources such as an ovarian artery or inferior mesenteric artery, facilitating an effective treatment plan. The patient should also follow-up with an obstetrician and gynecologist to rule out other potential causes of abnormal uterine bleeding.

Fibroid expulsion is a possible event after UAE, characterized by the passage of sizable tumor fragments communicating with the endometrial cavity, typically within the first 3–6-month post-procedure. The transient chunky discharge experienced by this patient is likely attributed to this phenomenon. Symptoms can vary from mild cramping to significant bleeding, indicating the importance of patient education regarding the need for prompt medical attention if required.

This case also brings up the important question about how to objectively evaluate the success of UAE, which may correlate with the risk of symptom persistence or recurrence. The presence of collateral supply may point toward technical factors as a cause of treatment failure.

A clear limitation of this case report is that it only represents a single patient's experience, making it difficult to generalize optimal treatment options or outcomes to the general public. In addition, the lack of information on long-term outcomes is another key limitation, as it restricts the ability to assess the sustained efficacy and potential complications of the treatment.

## CONCLUSION

UAE is one of the treatments for fibroids with variable success rates, depending on the vascular anatomy with possible collaterals. A repeat UAE can be a viable and effective treatment for patients with persistent symptoms from initial treatment failure. The repeat procedure, with strategic techniques, can address potential issues such as incomplete embolization or unrecognized collateral blood supply. Long-term follow-up is recommended to ensure sustained symptom relief and to monitor for potential complications.

## Ethical approval

The Institutional Review Board approval is not required.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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## Conflicts of interest

There are no conflicts of interest.

## Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the

writing or editing of the manuscript and no images were manipulated using AI.

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