



# Uterine Artery Embolization after Internal Iliac Artery Ligation

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## Abstract

### Keywords

- uterine artery embolization
- internal iliac artery ligation
- UAE through collaterals

Uterine artery embolization (UAE) is one of the primary therapies to treat symptomatic uterine fibroids. Even if the patient underwent internal iliac artery ligation during a massive pelvic hemorrhage or peripartum bleeding previously, UAE can be done through the collaterals for any other reasons. We report a 44-year-old woman who underwent UAE for symptomatic multiple uterine fibroids after internal iliac artery ligation with collaterals originating from the left external iliac artery. We briefly present the case's details and review collaterals pathways after left internal iliac artery ligation that might be encountered during UAE.

## Introduction

One of the primary therapies available to women to treat symptomatic uterine fibroids is uterine artery embolization (UAE), with clinical failure rates ranging from 4 to 19% for this procedure.<sup>1</sup>

Bilateral ligation of the internal iliac artery is one option during a massive pelvic hemorrhage or peripartum bleeding, which will reduce the pelvic arterial blood flow by 49%. Collateral circulation will maintain the internal iliac artery's blood flow after bilateral ligation of the internal iliac artery.<sup>2</sup>

We report a rare case of UAE through collaterals arising from the left external iliac artery (EIA) after internal iliac

artery ligation providing blood flow to the uterine fibroids was successfully embolized.

## Case Report

A 44-year-old lady complained of progressive and intermittent menorrhagia for the last 4 years, a menstrual period lasting for an average of 2 weeks, heaviness, pelvic pressure, and pain. The patient rated the symptom's severity ten out of ten.

Her laboratory results were normal apart from a low level of hemoglobin 9 g/dL. Magnetic resonance imaging (MRI) demonstrated a markedly enlarged uterus with multiple intramural fibroids variable in size.

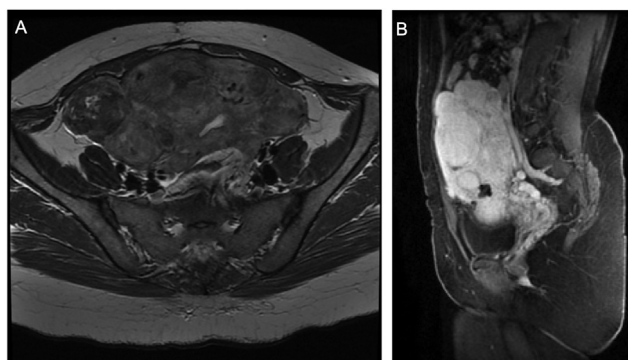
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**Fig. 1** A 44-year-old woman with multiple fibroids. A. T2- weighted axial image shows multiple intramural uterine fibroids. B. Sagittal fat sat post-contrast T1WI sagittal post-show multiple intramural enhancing uterine fibroids without signs of necrosis.

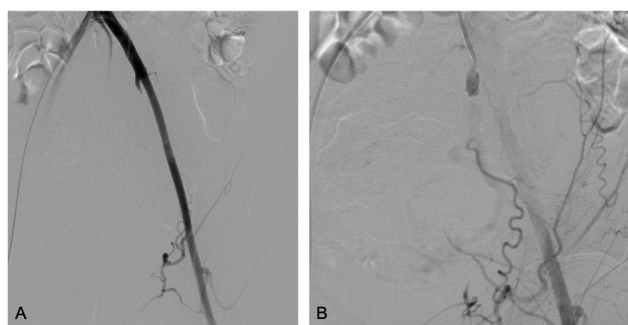
They all show intense enhancement on postcontrast images with no signs of necrosis; the largest is at the superior anterior aspect of the uterine body measuring  $5.6 \times 4.9 \times 5.9$  cm (**► Fig. 1**).

The patient also underwent UAE in 2011, and the access was retrograde right common femoral artery. The left common iliac artery (CIA) angiogram showed a total cutoff of the left internal iliac artery with multiple collaterals from the left EIA (**► Fig. 2**).

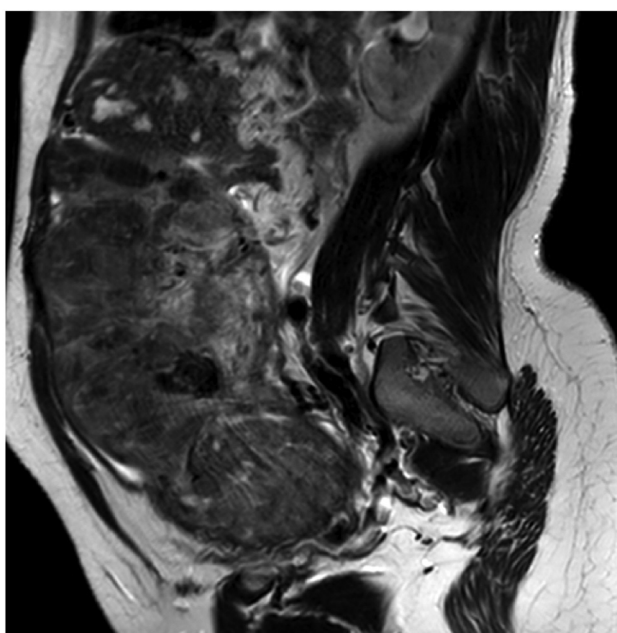
The right CIA was approached and an angiogram was done; it showed a sizeable uterine artery with multiple uterine fibroids blush using 135 cm renegade hi-flow micro-catheter, Boston Scientific with Transend 18 guidewire; the uterine artery was catheterized and embolized with polyvinyl alcohol (PVA) particles (Contour; Boston Scientific, Fremont, California, United States) sized 355 to 500 lumens to achieve hemostasis. Postembolization angiogram showed satisfactory stasis on the right side.

According to our hospital records, there were no operations performed on the left internal iliac artery.

After the requirement of details of the previous complete occlusion of the left internal iliac artery, which was thought to be dissection, we called the patient to our vascular and interventional radiology (VIR) clinic and asked her details about her past medical and surgical history. The patient gives a history of cesarean section 13 years ago complicated by postpartum hemorrhage surgically corrected by ligation of the left internal iliac artery. Then we reviewed the patient's



**Fig. 2** A. Selective angiography of the left common iliac artery demonstrates complete contrast cutoff of the left internal iliac artery. B. Multiple collaterals from the left external iliac artery are seen.



**Fig. 3** Follow-up MRI Sagittal T2WI: The uterus shows interval uterine enlargement without significant interval improvement of the multiple fibroids.

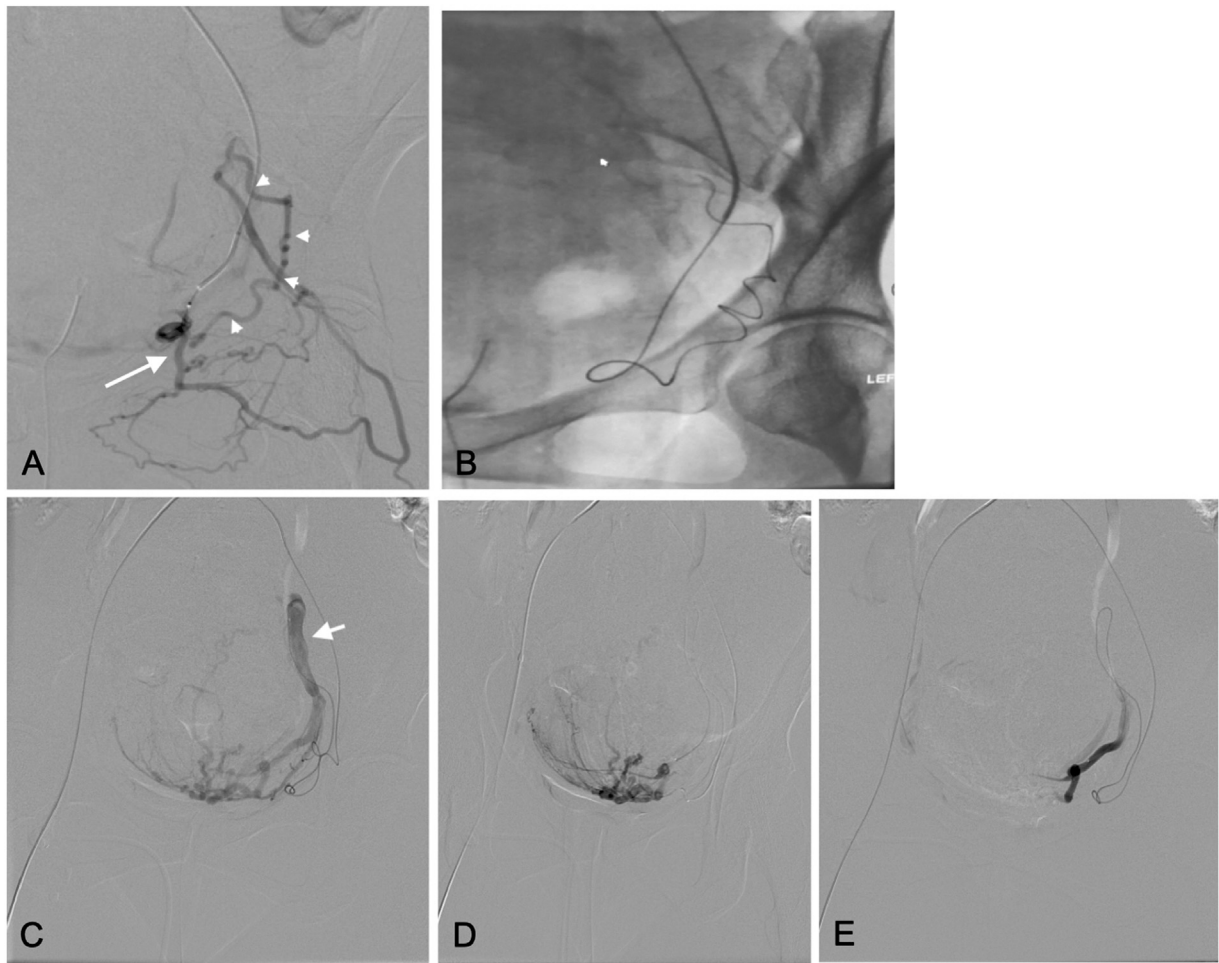
surgical note 13 years ago which confirm that. We decided to repeat the MRI and assess for repeated UAE. A follow-up MRI done within a month demonstrates again enlarged uterus with no significant interval improvement in the multiple fibroids on T2-weighted imaging with contrast enhancement (**► Fig. 3**).

Repeated uterine embolization was planned. Right common femoral artery was accessed. Pelvic arteriography with the C2 catheter tip at the aortic bifurcation level revealed a total occlusion of the left internal iliac artery with retrograde supply through the deep circumflex iliac artery to the distal internal iliac artery again (**► Fig. 4**).

Then through the EIA, we passed to the deep circumflex iliac artery; we could pass a 135 cm Renegade hi-flow micro-catheter, Boston Scientific with Transend 18 guidewire retrogradely to the main trunk of the internal iliac artery. After that, the uterine artery was catheterized, and the angiogram showed large fibroids blush. The uterine artery was embolized using PVA particles sized 500 to 700 lumens until complete blood flow cessation for five cardiac beats (**► Fig. 4**) Then, we shifted to the right side, and the uterine artery showed minimal sharing with the large fibroid. The right uterine artery was embolized as well using the same size particles (**► Figs. 4 and 5**).

Then, the catheter and sheath were removed, and manual compression was performed for the punctured right common femoral artery.

The patient complained of abdominal cramping pain immediately after the procedure. The pain was managed through an intravenous analgesia pump containing 500 µg of fentanyl and 1 mg paracetamol. Her vital signs were normal. We checked the patient after the procedure for possible puncture site complications and was assessed for postembolization



**Fig. 4** A. Angiogram post-selection of left circumflex iliac artery showing communication through the deep circumflex iliac (long arrow) and opacification of the distal left internal iliac artery B. Post super selection of the deep circumflex iliac artery through the tortuous communications (arrowheads) using microcatheter coaxial system C. Super-selection angiogram of the distal left internal iliac artery (short arrow) showing the left uterine artery with residual uterine fibroids blush D. Left uterine artery angiogram E. Post-embolization angiogram shows complete cessation of the blood flow.



**Fig. 5** A. Right CIA angiogram showed minimal sharing to the large fibroid. B. The right uterine artery was embolized. C. Post-embolization demonstrates complete cessation.

syndrome that can present during the first 48 hours (nausea, vomiting, and abdominal pain). Pain killers and antibiotics were prescribed upon discharge from the clinic.

The patient was discharged in good condition the day after the UAE. A follow-up VIR clinic appointment was requested after 3 months. The patient's symptoms improved, according

to the patient, the severity of menorrhagia symptoms improved significantly, and her menstrual cycle had been regular after UAE. MRI was requested after 6 months, which is not yet done.

## Discussion

The uterine artery is the main blood supply to the uterus and it arises from the anterior division of the internal iliac artery; however, the uterus also receives blood supply from the ovarian and broad ligament arteries, which can supply sufficient blood to the uterus; as a result, the uterus will not be infarcted after UAE.<sup>3</sup>

When the internal iliac arteries are occluded, a network of collateral arteries supplies blood to the uterine arteries. The blood flow will reach the uterus through the collaterals from multiple branches of the aorta (inferior mesenteric artery, lumbar and vertebral arteries, and middle sacral), EIA (deep iliac circumflex and inferior epigastric artery), and femoral artery branches (medial femoral circumflex and lateral femoral circumflex).<sup>3</sup>

Bilateral internal iliac artery occlusion affects blood perfusion to the uterus. The occlusion is either proximal or distal to the posterior division of the internal iliac artery; in the case of proximal occlusion, reversed collateral flow from the iliolumbar and lateral sacral arteries will fill the anterior divisions of the internal iliac arteries and re-establish an antegrade blood flow in each uterine artery. If the occlusion is distal to the posterior division, reverse flow in the middle hemorrhoidal artery will reconstitute antegrade flow in each uterine artery. The blood flow will not be normal under these two conditions. For this reason, antegrade flow in each uterine artery persisted.<sup>3</sup>

The perfusion character of the uterus will change if there is bilateral occlusion of the internal iliac arteries; it does not

stop antegrade perfusion of the uterus through the uterine arteries.<sup>3</sup>

Burchell did a study in which he also observed that free blood flows from a severed uterine artery even after bilateral internal iliac ligation. Collateral circulation in the parts supplied by the internal iliac artery would be by the anastomosis after ligation of internal iliac arteries, which will be between the uterine and ovarian arteries, middle and the superior vesical arteries, iliolumbar with the last lumbar artery as well as between the lateral sacral with the middle sacral arteries.<sup>4</sup>

## Conclusion

Our case demonstrated a typical collateral flow from the deep circumflex iliac artery. Identification of potential collateral supplies is crucial to ensure complete embolization of the uterine artery and thus achieve optimal clinical results.

### Conflict of Interest

None declared.

## References

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