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CASE REPORT

The Enlarged Fibroid Uterus: Aberrant Arterial Supply via the Omental Artery

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Abstract Uterine artery embolization is considered a first-line therapy for symptomatic fibroids and is occasionally required to mitigate operative risk prior to total abdominal hysterectomy or myomectomy. We present a pictorial review of parasitized omental artery supply to the enlarged fibroid uterus in three patients undergoing preoperative uterine artery embolization. A detailed understanding of variant uterine blood supplies is crucial when performing fibroid embolization. Although omental artery supply to the fibroid uterus is an unusual finding, aortography to include mesenteric arteries may be necessary when anomalous blood supply to the enlarged fibroid uterus is suspected.

Keywords Uterine artery embolization · Uterine fibroid embolization · Fibroids · Hysterectomy · Myomectomy · Arterial embolization · Omental artery

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Introduction

Uterine fibroids are the most common benign neoplasm of the female reproductive tract [1]. Uterine fibroids may be single or multiple and cause menstrual disturbances and bulk-related symptoms such as pain, urinary frequency, constipation, and bloating. Although uterine artery embolization (UAE) is considered a first-line therapy for the treatment of symptomatic fibroids, myomectomy or total abdominal hysterectomy (TAH) may be a more appropriate treatment in certain clinical scenarios or based on patient preference. For instance, myomectomy is considered the treatment of choice for women who desire future fertility due to limited available data on fertility following UAE using permanent embolic agents [2]. In addition, TAH is often indicated if uterine size or rate of fibroid growth is excessive, particularly if malignant degeneration is of clinical concern.

In patients with enlarged or massively enlarged fibroid uteri, fibroids may parasitize blood supply from adjacent abdominal or pelvic structures. If not recognized, persistent parasitized blood supply to the fibroid uterus can limit the clinical benefit of UAE or complicate surgical

interventions [3]. We provide a pictorial review of three cases of aberrant omental arterial supply to the enlarged fibroid uterus.

Case Reports

Institutional review board approval was obtained for this retrospective review. From 2008 to 2017, 24 women with enlarged fibroid uteri underwent arteriography and

Table 1 Patient demographics, pertinent patient and previous surgical history, uterine size, and largest fibroid dimensions

Patient	Age	Pertinent history	Previous abdominal surgery	Future fertility desired	Uterine size (cm)	Largest fibroid size (cm)
1	45	Concern for leiomyosarcoma	No	No	16.5	14.8
2	43	Prior UAE	No	No	36.6	36.6
3	39	Pre-menopausal	Myomectomy	Yes	26	13.0

UAE uterine artery embolization

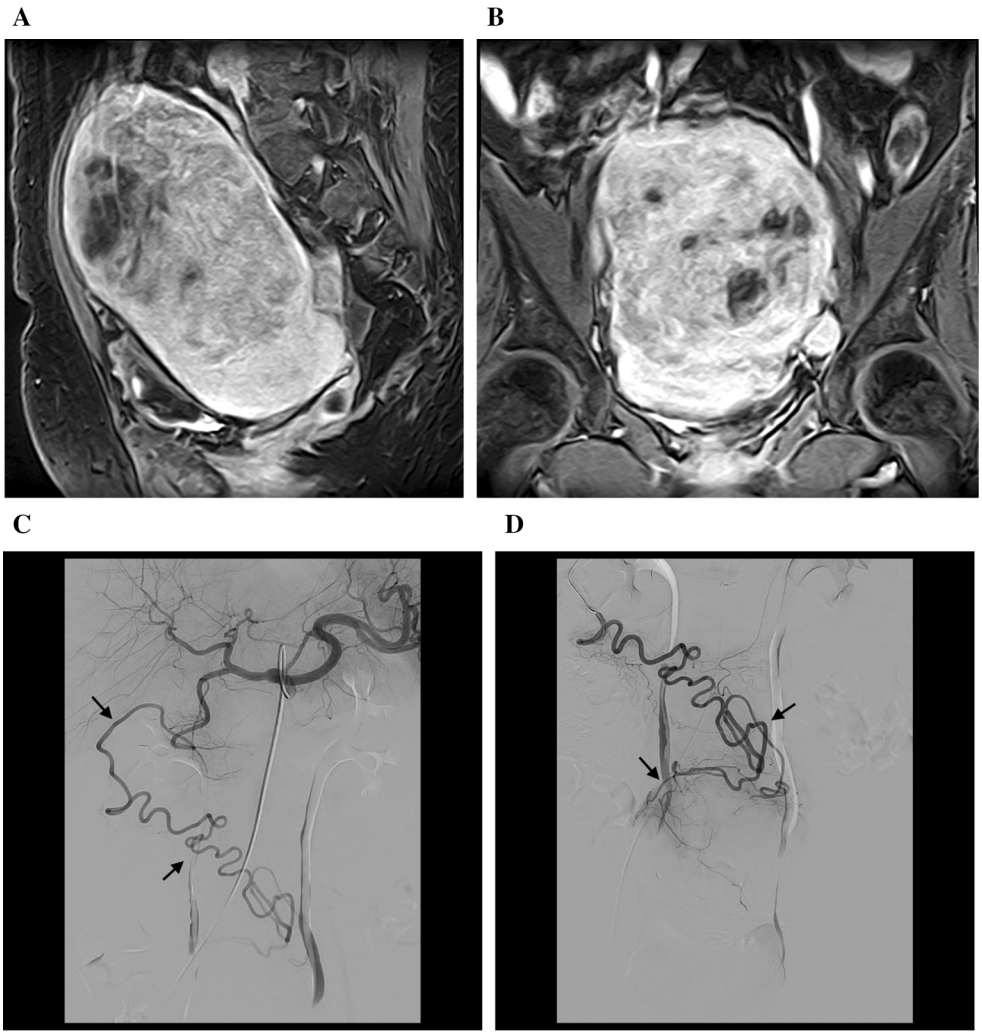

Fig. 1 Omental artery supply to the fibroid uterus. A 45-year-old woman (patient 1) undergoing uterine artery embolization for symptomatic fibroids. **A**, **B** Sagittal and coronal post-contrast T2-weighted fast-field echo MR images demonstrate an enlarged myomatous uterus. **C** Celiac arteriography demonstrates an enlarged, tortuous vessel arising from the gastroduodenal artery/right gastroepiploic artery, consistent with an omental artery branch (black arrows). **D** The parasitized omental artery courses caudally to supply a fundal fibroid (black arrows)

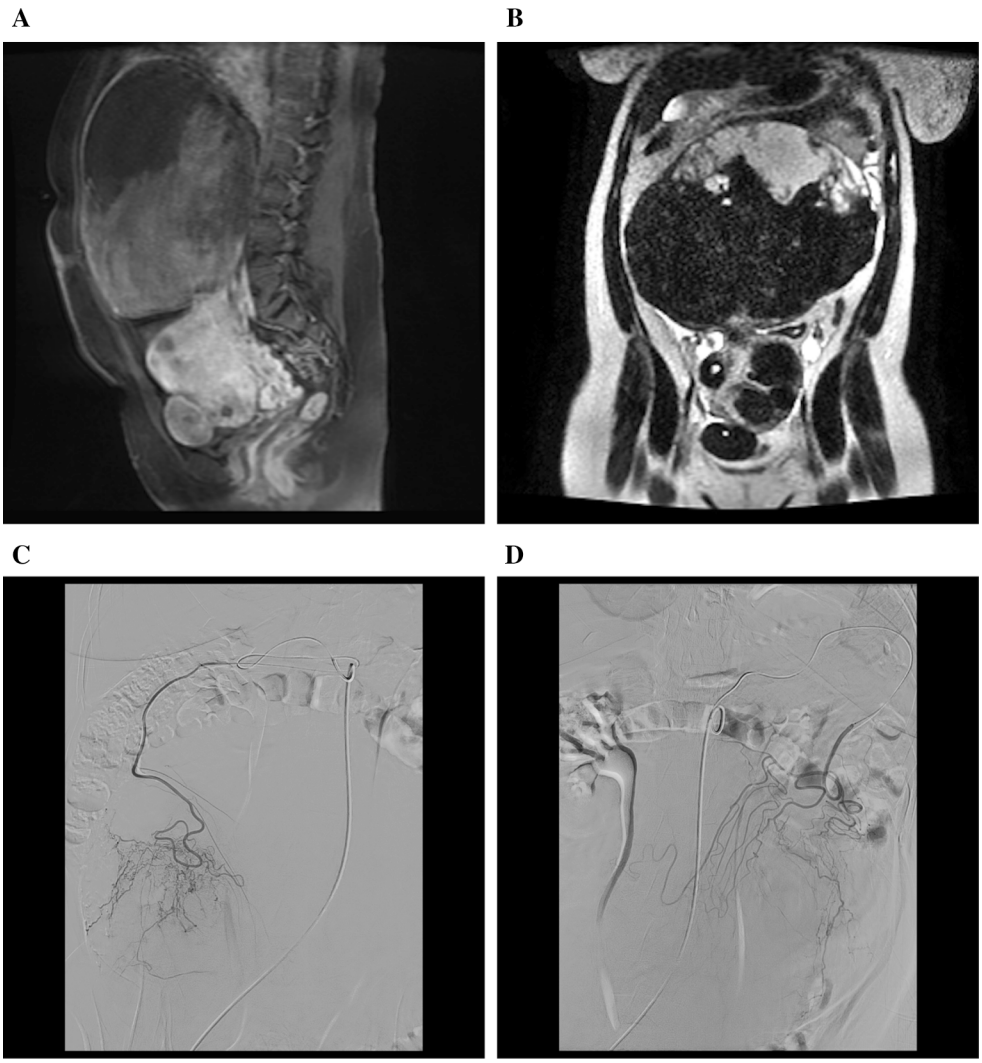

Fig. 2 Omental artery supply to the fibroid uterus. A 39-year-old woman (patient 3) undergoing pre-myomectomy workup and embolization. **A**, **B** Sagittal lava post-contrast and coronal T2-weighted single-shot fast spin-echo images demonstrate an enlarged myomatous uterus with dominant exophytic, partially necrotic fundal fibroid. Subselective angiography demonstrate uterine supply from the right (**C**) and left (**D**) omental arteries (black arrows)

embolization prior to myomectomy or TAH. UAE procedural technique has previously been described [4]. Although flush aortography is not routinely performed at our institution, flush aortography with the pigtail catheter positioned at the level of the mesenteric vessels was performed in all 24 patients given MRI and angiographic findings. In three of the 24 patients, enlarged fibroid uteri obtained a significant blood supply from omental arteries arising from right ($n = 1$), left ($n = 1$), and bilateral ($n = 1$) gastroepiploic arteries (Table 1, Figs. 1, 2, 3). In two patients, three omental arteries were embolized with gelfoam prior to surgical intervention (Table 2). In one patient, a markedly enlarged omental artery arising from the left gastroepiploic artery could not be selectively catheterized due to severe celiac artery stenosis caused by external compression by the markedly enlarged uterus (Fig. 2). However, the identified aberrant arterial supply to the fibroid uterus was discussed with the referring gynecological surgeon following angiography. Omentectomies were required in all three patients due to adherence of the omentum to the fibroid uterus.

Discussion

The uterus is most commonly supplied by single right and left uterine arteries. Markedly enlarged fibroid uteri parasitize blood flow from adjacent abdominal or pelvic structures to which they become adherent. When uterine arteriography demonstrates incomplete uterine parenchymal opacification or when small or absent uterine arteries are identified, flush aortography is important in order to

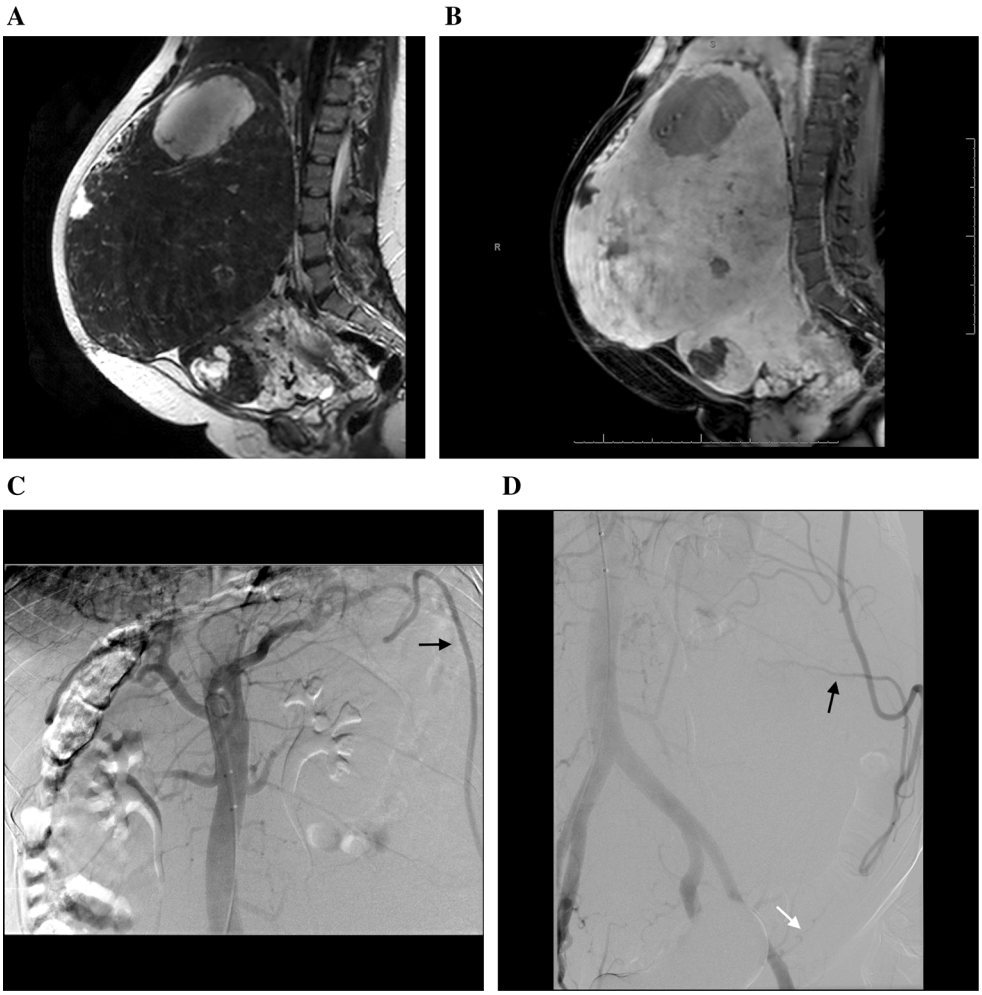

Fig. 3 Omental artery supply to the fibroid uterus. A 43-year-old woman (patient 2) with history of previous myomectomy undergoing preoperative workup and uterine artery embolization. **A**, **B** Sagittal T2 and T1 post-contrast MRI images show the massively enlarged, partially necrotic myomatous uterus causing significant intra-abdominal mass effect. **C**, **D** Abdominal aortography demonstrates parasitized left-sided omental artery originating from the distal splenic artery/left gastroepiploic artery (black arrows). **D** A round ligament artery arising from the left external iliac artery (white arrow) was also seen supplying the fibroid uterus

Table 2 Aberrant vasculature, embolization details, surgical details, perioperative blood loss, and transfusion history

Patient	Aberrant arterial supply	Arteries embolized	Embolic agent	Intended surgery/surgery performed	Blood loss (mL)	Complications	Transfusion requirement
1	Right omental artery	Left UA; right omental artery	Gelfoam	TAH/TAH and omentectomy	200	None	*N*
2	Bilateral OA; left omental artery; round ligament artery	Bilateral UA; bilateral OA; round ligament artery	Both	TAH/TAH and omentectomy	100	None	*N*
3	Right and left omental arteries	Bilateral UA; right and left omental arteries	Gelfoam	Myomectomy/ Myomectomy and omentectomy	150	None	*N*

OA ovarian artery; *UA* uterine artery; *TAH* total abdominal hysterectomy

identify aberrant uterine blood supply [5]. The ovarian arteries are the most common collateral supply to the fibroid uterus, reported in approximately 5–10% of patients [5]. The inferior mesenteric artery is the second most

common blood supply to the enlarged fibroid uterus reported in approximately 1.3% of cases [6]. Less common aberrant blood supply to the fibroid uterus include round ligament arteries (0.2%), additional internal iliac artery such as the internal pudendal artery (0.2%) and superior mesenteric artery branches [6, 7].

To our knowledge, identification of aberrant omental artery supply to the fibroid uterus and subsequent embolization has not been previously reported in the literature. Anatomically, omental arteries typically form an arcade from distal branches of the left and right gastroepiploic arteries arising from the splenic and gastroduodenal arteries, respectively. Omental branches from gastroepiploic arteries anastomose with omental branches arising from the middle colic artery. Therefore, omental arterial supply to the enlarged uterus may arise from either distal celiac or superior mesenteric artery branches. Subselective catheterization of omental arteries may be challenging, with increased patient radiation dose and procedure time, but should be considered to provide a more complete embolization in patients undergoing UAE. If distal embolization is not possible in preoperative patients, identification of omental artery supply can be communicated to the gynecologic surgeon for optimization of surgical planning.

A comprehensive understanding of the collateral supply to the enlarged fibroid uterus is crucial when treating uterine fibroids in order to maximize clinical success. Flush aortography to include mesenteric arteries proved beneficial in our case series of patients. In addition, collaboration between interventional radiologists and gynecologic surgeons is essential to optimizing care for patients with enlarged fibroid uteri prior to surgical intervention.

Compliance with Ethical Standards

Conflict of interest All the authors declare they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. For this type of retrospective analysis, formal consent is not required.

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