

CASE REPORT



## Uterine arteriovenous malformation, diagnosis and treatment: Case series

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### ABSTRACT

**Introduction:** Uterine arteriovenous malformations (UAVMs) are rare vascular anomalies causing abnormal uterine bleeding (AUB), ranging from mild spotting to severe hemorrhage. Often acquired post-uterine trauma, UAVMs require prompt diagnosis and tailored treatment to prevent life-threatening complications.

**Methods:** This retrospective case series analyzes three patients diagnosed with UAVMs at Menzel Temim Hospital between 2023 and 2024. Diagnosis was confirmed using Doppler ultrasonography and computed tomography angiography (CTA), with treatments including hysteroscopic resection and uterine artery embolization (UAE).

**Results:** All patients presented with persistent AUB. Doppler ultrasound revealed hypervascular lesions with turbulent flow, and CTA confirmed UAVM size and vascular supply. Treatments achieved bleeding resolution and uterine preservation, with follow-up showing no recurrence.

**Discussion:** Early diagnosis with Doppler ultrasound and CTA differentiates UAVMs from other AUB causes. Minimally invasive treatments like hysteroscopic resection and UAE preserve fertility, offering alternatives to hysterectomy.

**Conclusion:** UAVMs should be suspected in women with AUB post-uterine trauma. A multidisciplinary approach ensures optimal outcomes, with further research needed to standardize protocols.

### KEY WORDS

Uterine arteriovenous malformation (UAVM); Abnormal uterine bleeding (AUB); Doppler ultrasonography; Computed tomography angiography (CTA); Uterine artery embolization (UAE); Hysteroscopic resection

### ARTICLE HISTORY

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### Introduction

Uterine arteriovenous malformations (UAVMs) are uncommon vascular anomalies characterized by abnormal connections between uterine arteries and veins, bypassing the capillary network. They typically present with abnormal uterine bleeding (AUB), ranging from chronic spotting to acute hemorrhage. Acquired UAVMs, often linked to uterine trauma such as cesarean sections, abortions, or dilation and curettage (D&C), are more common than congenital forms [1, 2]. Their rarity and clinical similarity to retained products of conception (RPOC) or gestational trophoblastic disease (GTD) pose diagnostic challenges [3]. Doppler ultrasonography and computed tomography angiography (CTA) are critical for accurate diagnosis, guiding minimally invasive treatments like hysteroscopic resection and uterine artery embolization (UAE) to preserve fertility [4, 5]. This case series describes three UAVM cases at Menzel Temim Hospital (2023–2024), highlighting diagnostic and treatment strategies.

### Methodology

This retrospective case series was conducted at Menzel Temim Hospital, Nabeul, Tunisia, between January 2023 and December 2024.

### Study type

Retrospective case series.

### Inclusion criteria

Women diagnosed with UAVMs via Doppler ultrasonography and CTA, presenting with AUB post-uterine trauma, aged 18–40 years, treated at our institution.

### Exclusion criteria

Patients with other causes of AUB (e.g., RPOC, GTD) or

incomplete medical records.

### Data collection

Data were extracted from electronic medical records, including patient demographics, medical history, imaging findings, treatment details, and follow-up outcomes (hemoglobin levels, menstrual cycle status, pregnancy outcomes, and radiology results).

### Imaging protocols

Initial pelvic ultrasound with Doppler assessed vascularity (turbulent flow, resistance index <0.5). CTA confirmed UAVM size, location, and vascular supply. Follow-up Doppler ultrasound was performed at 3 and 6 months post-treatment.

### Treatment protocols

Treatments were individualized based on UAVM size, bleeding severity, and fertility goals. Options included hysteroscopic resection (using a diathermic loop) or UAE (targeting feeding vessels with embolic agents).

### Ethical considerations

Written informed consent was obtained for publication. Ethical approval was not required per institutional policy for case reports.

### Case Presentation

#### Case 1

##### Patient disease

UAVM presenting with persistent AUB

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### Disease history

A 25-year-old woman with a history of voluntary termination of pregnancy (IVG) three months prior presented with continuous vaginal bleeding. She was hemodynamically stable (hemoglobin: 10.2 g/dL). Gynecological examination showed intrauterine bleeding without infection or cervical pathology.

### Preferred treatment

Hysteroscopic resection to preserve fertility, given her young age and nulliparous status.

### Given treatment

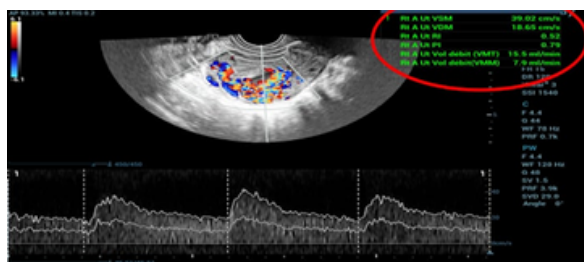
Doppler ultrasound revealed a 19 mm intrauterine mass with turbulent flow (vascular score 1, RI 0.4) (Figure 1). CTA confirmed a fundal UAVM supplied by the right hypogastric artery. Bilateral hypogastric artery ligation was performed to reduce blood flow, followed by hysteroscopic resection using a diathermic loop.

### Results

Bleeding ceased immediately post-procedure. Hemoglobin stabilized at 11.0 g/dL. No intraoperative complications occurred.

### Follow-up result

At 3 and 6 months, Doppler ultrasound showed no residual vascularity. Menstrual cycles normalized (regular, 28–30 days). No pregnancy was reported during follow-up. The patient remained asymptomatic with no recurrence at 6 months.



**Figure 1.** Doppler Ultrasound Showing High-Velocity Flow in a Suspected Uterine Arteriovenous Malformation.

### Case 2

#### Patient disease

UAVM presenting with moderate, continuous AUB.

#### Disease history

A 20-year-old nulliparous woman presented with AUB persisting 20 days post-medical abortion with misoprostol. Hemoglobin was 9.8 g/dL. No prior surgical history was noted.

#### Preferred treatment

Hysteroscopic resection to preserve fertility.

#### Given treatment

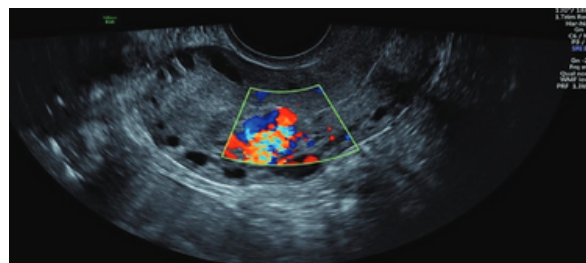
Doppler ultrasound identified a 28 mm intrauterine mass with significant vascularity (Doppler score 3, RI 0.3) (Figure 2). CTA confirmed an 18 × 13 mm fundal UAVM. Hysteroscopic resection was performed, with intraoperative bleeding managed by Foley catheter tamponade for 24 hours.

#### Results

Bleeding resolved post-procedure. Hemoglobin increased to 10.5 g/dL. No complications were reported.

### Follow-up result

Follow-up Doppler ultrasound at 3 and 6 months showed no residual vascularity. Menstrual cycles resumed normally (27–29 days). The patient reported no pregnancy and remained asymptomatic at 6 months.



**Figure 2.** Doppler Ultrasound with Increased Vascular Flow in a Fundal AVM.

### Case 3

#### Patient disease

UAVM presenting with heavy vaginal bleeding.

#### Disease history

A 36-year-old multiparous woman with a history of two spontaneous abortions and one ectopic pregnancy presented with heavy bleeding post-uterine evacuation. Hemoglobin was 8.5 g/dL, indicating significant blood loss.

#### Preferred treatment

UAE due to severe bleeding and larger UAVM size.

#### Given treatment

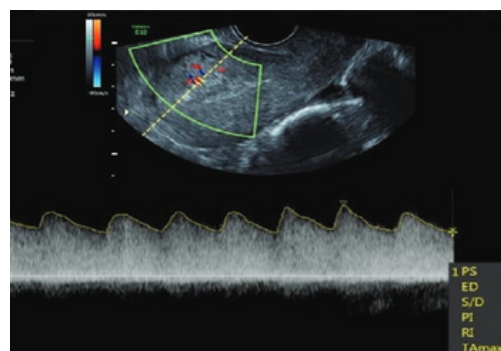
Doppler ultrasound revealed a 35 × 30 mm intrauterine lesion with turbulent flow (RI 0.35) (Figure 3). CTA confirmed a large UAVM fed by the left uterine artery. UAE was performed, targeting feeding vessels with embolic agents.

#### Results

Bleeding reduced significantly post-UAE, with hemoglobin stabilizing at 9.2 g/dL. The patient achieved hemodynamic stability.

#### Follow-up result

Follow-up Doppler ultrasound at 3 and 6 months showed reduced AVM size (15 × 10 mm) and no vascularity. Menstrual cycles normalized (30–32 days). No pregnancy was reported. The patient remained stable with no recurrence at 6 months (Table 1).



**Figure 3.** Extensive Uterine AVM Involving the Fundus and Posterior Uterine Wall on CT Angioscan.

**Table 1.** Comparative Table.

Case	Age	History	Imaging Findings	Treatment	Outcome	Follow-up (6 Months)
1	25	IVG 3 months prior	19 mm fundal UAVM, turbulent flow (RI 0.4), right hypogastric artery supply	Hysteroscopic resection + hypogastric artery ligation	Bleeding resolved, Hb 11.0 g/dL, normal menstrual cycles	No recurrence, normal ultrasound
2	20	Medical abortion (misoprostol)	18 × 13 mm fundal UAVM, high vascularity (RI 0.3)	Hysteroscopic resection + Foley catheter tamponade	Bleeding resolved, Hb 10.5 g/dL, normal menstrual cycles	No recurrence, normal ultrasound
3	36	Two spontaneous abortions, one ectopic pregnancy	35 × 30 mm UAVM, turbulent flow (RI 0.35), left uterine artery supply	UAE	Bleeding resolved, Hb 9.2 g/dL, normal menstrual cycles	Reduced AVM size, no recurrence

## Discussions

UAVMs are rare but critical causes of AUB, often linked to uterine trauma, as seen in all three cases [1, 6]. Misdiagnosis as RPOC or GTD can lead to inappropriate D&C, risking severe hemorrhage [2, 7]. Doppler ultrasonography, showing hypervascular lesions with low-resistance flow (RI <0.5), was pivotal for initial diagnosis in our cases [3, 8]. CTA provided detailed vascular mapping, guiding treatment [9].

Hysteroscopic resection (Cases 1 and 2) effectively managed localized UAVMs, with Foley catheter tamponade addressing intraoperative bleeding in Case 2, preserving fertility in young patients [4, 10]. UAE was optimal for Case 3's larger UAVM, aligning with trends favoring minimally invasive approaches [5, 11]. Post-treatment, all patients achieved normal menstrual cycles and stable hemoglobin levels, with no pregnancies reported during follow-up. Follow-up imaging confirmed resolution or significant reduction of UAVMs.

A multidisciplinary approach involving gynecologists and interventional radiologists ensured tailored management [12]. Challenges include the lack of standardized diagnostic criteria and long-term fertility data [13]. These cases highlight the efficacy of minimally invasive, fertility-preserving treatments for UAVMs.

## Conclusions

UAVMs are a rare but significant cause of AUB post-uterine trauma. Doppler ultrasound and CTA enable accurate diagnosis, distinguishing UAVMs from mimics. Minimally invasive treatments like hysteroscopic resection and UAE effectively control bleeding while preserving uterine function. A multidisciplinary approach is essential for optimal outcomes. Future research should focus on standardizing diagnostic protocols and assessing long-term reproductive outcomes.

## Disclosure Statement

### Consent for publication

Written informed consent was obtained from all patients for publication and accompanying images. Consent forms are available for review by the Editor-in-Chief.

### Availability of supporting data

Not applicable.

### Acknowledgements

None.

### Ethical approval

Not required per institutional policy for case reports.

### Competing interests

All authors declare no conflicts of interest.

### Funding

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### Author contributions

All authors read and approved the final manuscript.

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