



Management of Suspected Uterine AVM/Fistula

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PURPOSE

To identify key variables that can help guide the management of suspected uterine arteriovenous malformations (AVM)/fistulas (AVF) in the post-procedural setting.

BACKGROUND

- Uterine AVMs may be congenital (presenting before surgical intervention) or acquired (more common), such as trauma causing arterial connection to the myometrial plexus.¹⁻⁴
- Ultrasound is performed for patients presenting with vaginal bleeding or emergent angiography for unstable patients. Sonographic findings include a heterogenous lesion with mixed arterial and venous waveform.
- MRI can be used in stable patients with indeterminate lesions.

Figure 1: MRI with contrast from a 38 y.o female with a history of dilation and curettage, presenting with profuse vaginal bleeding two months later.

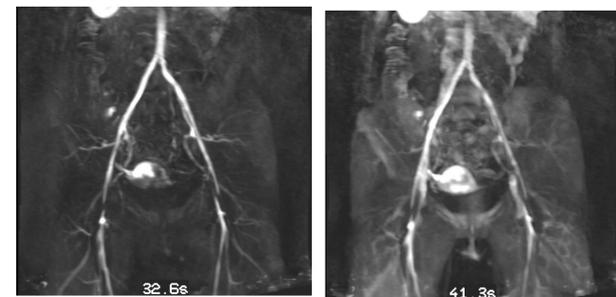


Figure 2: Angiogram from the same patient showed hypertrophied uterine artery.

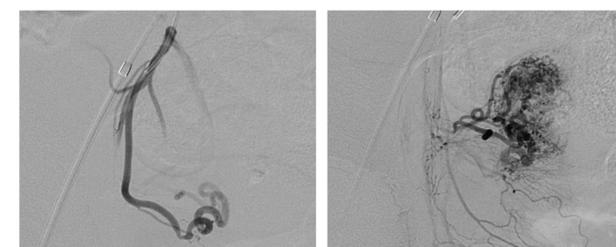
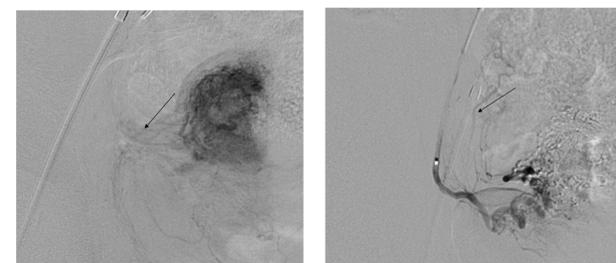


Figure 3: Slow (but still early) fine draining vein, was seen especially during the injection of nBCA.



METHODS

- A single-institution search for ultrasound and angiographic findings suspicious for uterine AVMs/AVF between September 2012 and September 2021 was performed.
- Patients were filtered for vaginal bleeding.
- Patients were included if initial ultrasound imaging was either suggestive or equivocal for uterine AVM/AVF or if emergent angiography revealed uterine AVM/AVF.
- Patients were divided into three groups:
 - immediate intervention, failed medical management and successful medical management groups.
- Several key variables were then documented and a descriptive analysis was performed, variables included:
 - Age, Hematocrit, Units transfused, Lesion Size and Hemodynamic stability
- Patient outcomes including complications and re-bleeding rates were documented.

Figure 4a. 25 y/o female who presented with heavy vaginal bleeding, hemodynamically stable, hematocrit of 30.8. She underwent ultrasound, which demonstrated a large heterogenous area of mixed arterial and venous waveform. Follow-up MRA demonstrated irregular shunting into a saccular area within the endometrial canal corresponding to the lesion found on ultrasound.

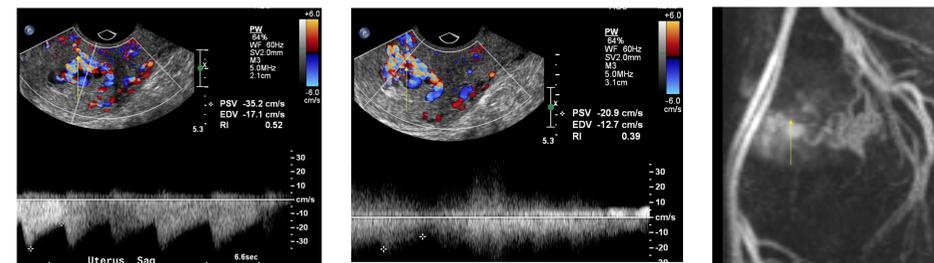
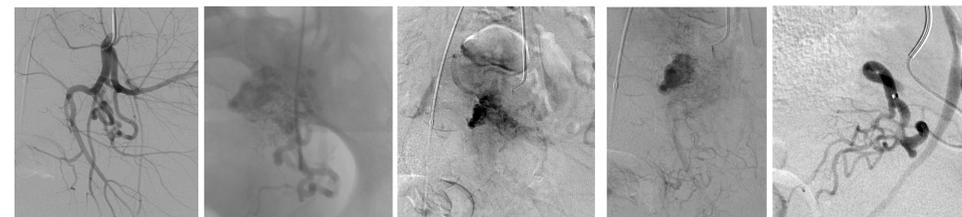


Figure 4b. The patient was initially managed conservatively, however bleeding was persistent and it was ultimately decided to embolize the lesion. Angiography demonstrated a hypertrophied left uterine artery with microfistulous shunting into a saccular nidus which drained into several small veins. The patient was subsequently embolized with Gelfoam bilaterally. The patient had complete resolution of symptoms without reintervention and went on to have a normal pregnancy years later.



From left to right (Digital subtraction angiogram from the left internal iliac a., angiogram from the left uterine artery, complex filling of a central nidus which correlates with findings on the above ultrasound and MRA, subtraction angiogram demonstrating the nidus, subtraction angiogram demonstrating faint venous outflow from the nidus.

CONCLUSIONS

- Evaluation of age, hematocrit, transfusion requirements, hemodynamics, sonographic findings and lesion size, can help manage patients with suspected AVM/AVF.
- Patients who are able to be managed conservatively tended to be younger, have higher hematocrit levels, normal hemodynamics, less transfusion requirements and smaller lesions on sonography.
- Large volume studies may be able to demonstrate reliable criteria to divide patients into interventional and non-interventional groups.

RESULTS

- A total of 36 patients were identified with either suspected uterine AVM/AVF on ultrasound or angiography.
- Amongst patients attempting medical management, 17 subsequently required endovascular intervention (58.6%), while 12 patients continued with medical management alone (41.4%).
 - For patients with successful medical management, the average age was 29.4, hematocrit was 35.7 and units transfused were 0.19.
 - For patients who failed medical management, the average age was 31.5, hematocrit was 31.7, units transfused was 0.63 and 10.3% of cases became hemodynamically unstable.
 - Average lesion size (US) was 2.5cm for successfully medically managed patients and 3.05cm for patients failing medical management.
- Immediate intervention was performed in 7 cases (19.4%), while medical management was attempted in 29 cases (80.5%).
 - For patients who underwent immediate endovascular intervention the average age was 44, hematocrit was 28.95, units transfused was 2 units and 42.9% were hemodynamically unstable.
- In total, 66.7% of patients underwent embolization. Gelfoam was most commonly used, including in 50% of immediate interventions and 70.6% of delayed interventions. Glue and coils were used in 50% of immediate interventions. The technical success rate was 100%. Cessation of bleeding occurred in 83.3% of cases after one intervention and 100% after one or more interventions. No major complications occurred.

PATIENT VARIABLE SUMMARY

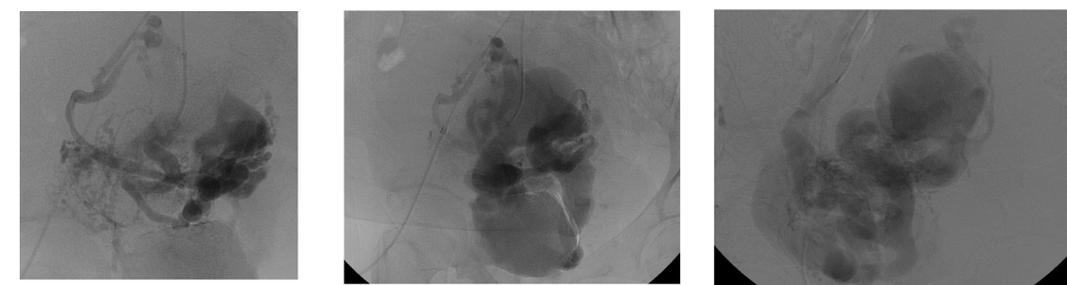
	SUCCESSFUL MEDICAL MANAGEMENT	FAILED MEDICAL MANAGEMENT	IMMEDIATE INTERVENTION
Total number of patients	12 (41.4%/33.3%)*	17 (58.6/47.2%)*	7 (19.4%)
Age	29.4	31.5	44
Hematocrit	35.7	31.7	28.95
Units transfused	0.19	0.63	2
Size of lesion on Ultrasound	2.5 cm	3.05 cm	N/A
Became hemodynamically unstable	0%	10.3%	42.9%

*Percentage out of the medically managed group / out of the total group

TECHNICAL AND CLINICAL SUMMARY

	FAILED MEDICAL MANAGEMENT	IMMEDIATE INTERVENTION
Patients embolized	17	12
Gelfoam as agent	12 (70.6%)	6 (50%)
Coils/Plugs as agent	0	3 (50%)
Required re-intervention	11.7%	16.7%
Major iatrogenic complications	0	0
Clinical succession of bleeding	100%	100%

Figure 6. 43 y.o female with a history of myomectomy and left oophorectomy in her birth country with reported imaging that showed a uterine AVM. Patient presented with massive vaginal bleeding requiring multiple units of blood. Angiography shows multiple arterioles filling a large venous sac which that drains into multiple large veins. Angiographic appearance is consistent with a Yakes IIIb. Of note, this was the only patient requiring re-intervention.



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