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Successful management of uterine arteriovenous malformation causing post abortal bleeding: A rare case report

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Abstract
Background: Uterine arteriovenous malformation (AVM) is a rare but potentially life-threatening condition, with fewer than 100 cases documented in literature. It may be congenital or acquired, with the postpartum period representing a particularly vulnerable window. Acquired cases are frequently associated with uterine instrumentation, including dilatation and curettage (D&C).
Case Presentation: We report a 29-year-old woman (P1L1A1) who presented with post abortal bleeding, two months following Dilatation and evacuation performed after medical termination of pregnancy for twin-to-twin transfusion syndrome. Transvaginal sonography and CT angiography confirmed the diagnosis of uterine AVM. The patient was successfully managed with uterine artery embolization (UAE), with resumption of normal menstrual cycles one-month post-procedure.
Conclusion: Uterine AVM must be considered in women presenting with post abortal bleeding following uterine instrumentation. Early recognition using Doppler ultrasonography and CT angiography, followed by timely uterine artery embolization, can achieve effective hemostasis while preserving uterine function and fertility.

Keywords: Uterine arteriovenous malformation, post abortal bleeding, uterine artery embolization, dilatation and curettage, CT angiography, transvaginal sonography, Digital subtraction angiography

Introduction

With less than 100 cases reported in the literature, Uterine arteriovenous malformation (AVM) is a rare, potentially life-threatening gynaecological condition [2, 5]. Although it is likely that they have so far been underreported [1]. Uterine arteriovenous malformation is a congenital or acquired entity characterised by aberrant communication between uterine arterial and venous system, without an intervening capillary network [2, 3, 5]. Congenital uterine AVM originate from a failure of differentiation of primitive vascular structures during fetal angiogenesis, giving rise to abnormal vascular communications (fine capillaries interlaced with myometrial vessels) that may extend to larger pelvic vessels in addition to the uterine arteries with multiple lesions involving other organs of the body [1, 3, 7]. Acquired arteriovenous malformations predominantly occur in women of reproductive age group and consist of true arteriovenous fistulous connections between intramural arterial branches and the myometrial venous plexus [3, 7]. These lesions are mostly attributed to trauma to the uterine vasculature and are associated with conditions, such as pregnancy, preceding history of uterine surgical instrumentation (caesarean section, curettage) and less commonly, trophoblastic disease, trauma during childbirth, cervical or endometrial malignancy, infection, and exposure to diethylstilbestrol [1, 2, 3, 7, 9]. The postpartum period is considered to be a particularly susceptible interval, during which uterine vascularity is heightened and any breach of the myometrium can precipitate abnormal arteriovenous communications. The resulting high-flow vascular shunts depicts classical presentation of uterine arteriovenous malformations which is often severe, recurrent and profuse vaginal bleeding with no obvious cause. Women may also present with either intermittent or continuous uterine bleeding, associated or not associated with menses or iatrogenic, acute abdominal pain with hemoperitoneum, or with symptoms suggestive of anemia or hypovolemic shock. It may also be diagnosed incidentally during ultrasound or other radiological imaging performed for varied reasons [1, 6, 9].
Transvaginal ultrasound with color doppler and spectral analysis is valuable, non-invasive

preferred initial imaging modality for first line of diagnosis, with color doppler showing mosaic pattern demonstrating high-velocity mixed arterial and venous flow [1, 3, 9].

Further confirmation can be done with CT Angiography, Magnetic resonance imaging (MRI) and hysteroscopy can also be used. Whereas, Digital Subtraction Angiography (DSA) remains gold-standard for diagnosis of an arteriovenous malformation (AVM).

The treatment modality of uterine arteriovenous malformation is largely dependent on the hemodynamic stability of the patient, with consideration given to patient's age, symptoms, desire for fertility, and site and size of uterine arteriovenous malformation lesion. In cases of hemodynamically stable patients with non-severe bleeding, conservative medical managements with various agents, includes non-steroidal anti-inflammatory drugs (NSAIDs), GnRH agonists, aromatase inhibitors, and tranexamic acid. In a hemodynamically unstable patient, uterine packing, insertion of a Foley catheter, or various other medical management can be attempted to control acute hemorrhage, eventually followed by hysterectomy. Uterine Artery Embolization (UAE) performed via pelvic angiography is now increasingly available and has gained broader acceptance as a treatment option, particularly in women desiring fertility [3].

Uterine Artery Embolization (UAE) remains definitive diagnosis and treatment, in cases of life-threatening hemorrhage. Other surgical treatment options include hysteroscopic resection of the lesion, laparoscopic coagulation of uterine vessels, hysterectomy [2, 5, 9].

Here we report a case of hemodynamically stable patient presenting with profuse post-abortal vaginal bleeding caused by uterine AVM following dilatation and evacuation, managed by uterine artery embolization (UAE), with restoration of menstrual function.

Case Report

A 29-year-old woman, admitted for medical termination of pregnancy for twin-to-twin transfusion syndrome at 24 weeks of gestation. Her past obstetric history revealed uncomplicated vaginal delivery eight years ago. The termination had been complicated by incomplete evacuation, necessitating dilatation and evacuation, following which she was discharged in a stable condition.

However, at two months post-abortal period, she presented to the gynaecological emergency department with a profuse vaginal bleeding associated with passage of clots that began earlier that afternoon. She had no history of concurrent fever, pain, or any other systemic complaints.

On admission, the patient was haemodynamically stable. Abdominal examination was unremarkable. Per speculum examination revealed a moderate amount of active bleed through the cervical os, with no visible cervical or vaginal laceration. Haematological investigations including complete blood count, coagulation profile, and serum beta-human chorionic gonadotropin (β-hCG) were within normal limits.

Suspecting retained products of conception, transvaginal sonography (TVS) with color doppler was performed. TVS demonstrated a well-defined, heterogeneously hypoechoic area at the posterior wall and fundal junction of the uterus, measuring approximately 3cm×2.5cm, with multiple tortuous, anechoic channels within it. Colour Doppler evaluation revealed prominent internal vascularity with low-resistance, high-velocity arterial waveforms, strongly suggestive of uterine AVM.

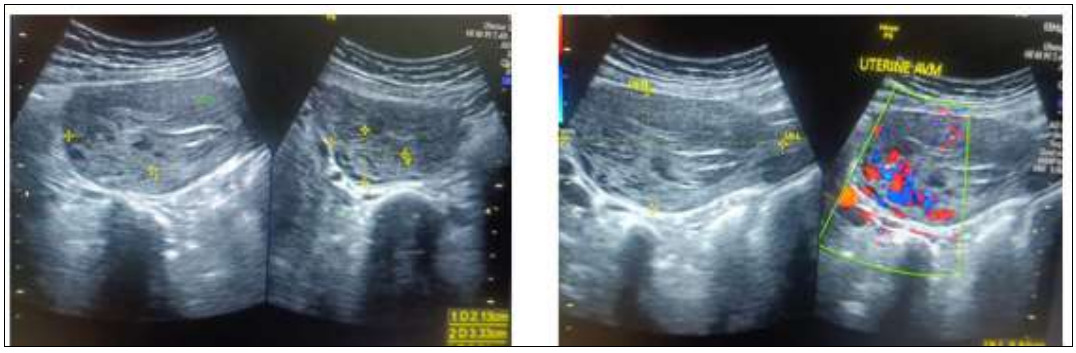

Fig 1: Ultrasound Images depicting uterine AVM

Contrast-enhanced computed tomography (CECT) of the abdomen and pelvis was performed for definitive characterisation (Fig2A-D). Imaging revealed a bulky uterus with heterogeneous myometrial enhancement and markedly increased bilateral parametrial vascularity. A well-defined vascular nidus was identified along the fundus and posterior myometrium, supplied predominantly by the right uterine artery, with several small aneurysmal dilatations within the nidus. Early venous filling consistent with arteriovenous shunting was demonstrated. These findings confirmed the diagnosis of uterine AVM.

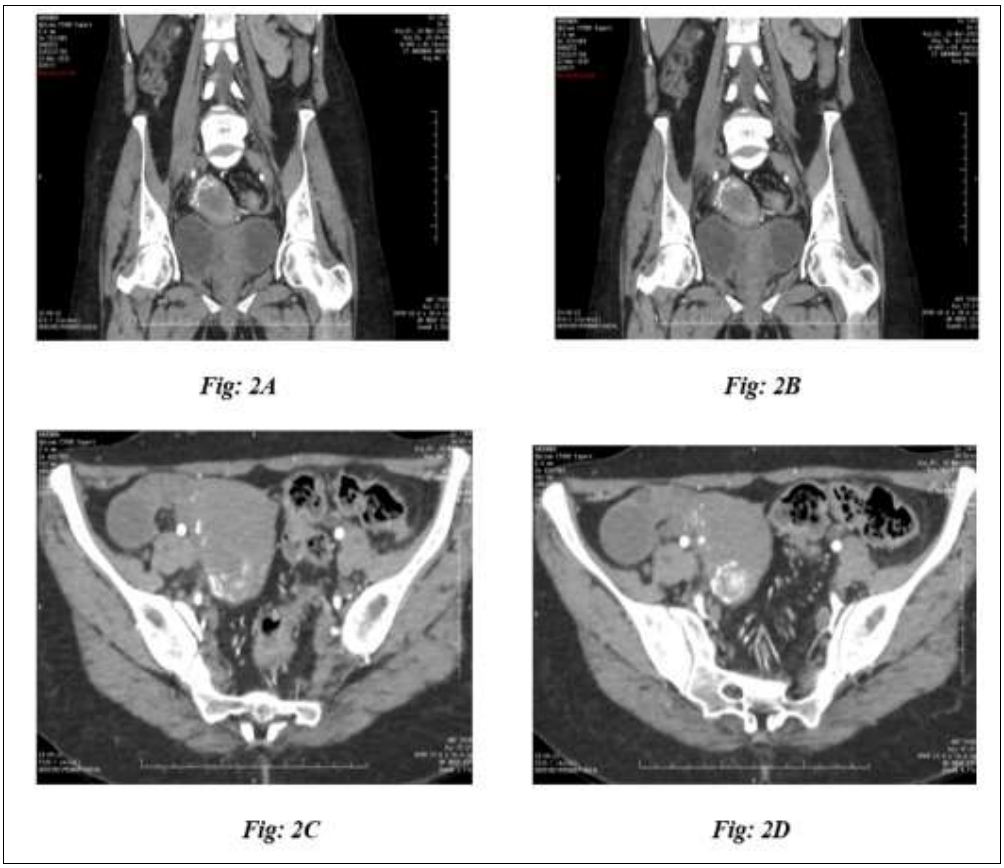

Fig 2A–D: CT angiographic evaluation (coronal and axial images) demonstrating uterine AVM

Following multidisciplinary consultation with interventional radiologist, the patient was counselled regarding the diagnosis, the risks of conservative versus interventional management, and the fertility-sparing potential of UAE.

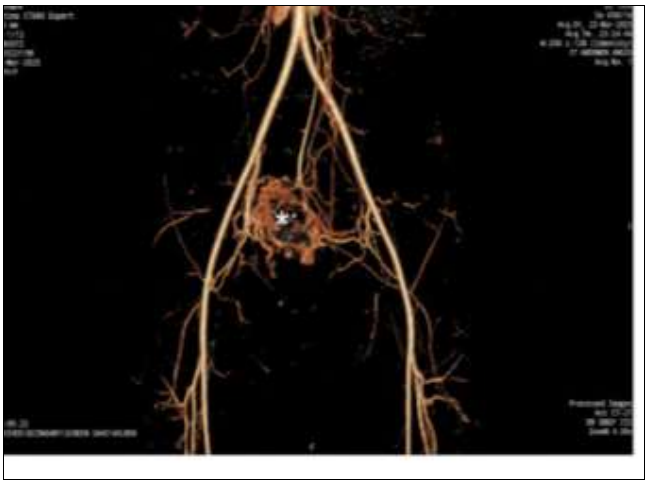

Fig 3: 3D volume-rendered CT angiogram showing vascular anatomy and feeding vessels"

Informed consent was obtained. Under fluoroscopic guidance, selective UAE was performed via right femoral arterial access. Polyvinyl alcohol (PVA) particles were used for embolization of the feeding vessels.

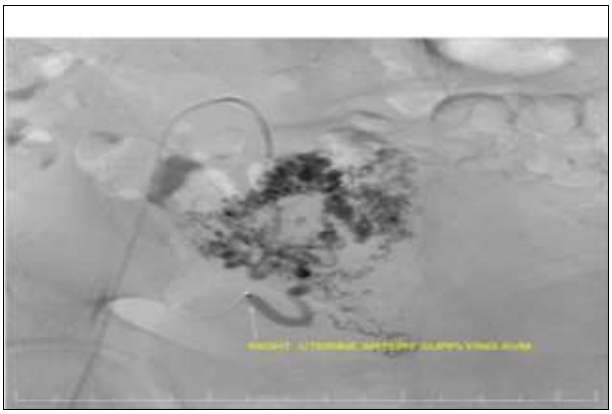

Fig 4: Selective Right Uterine Artery Angiogram"

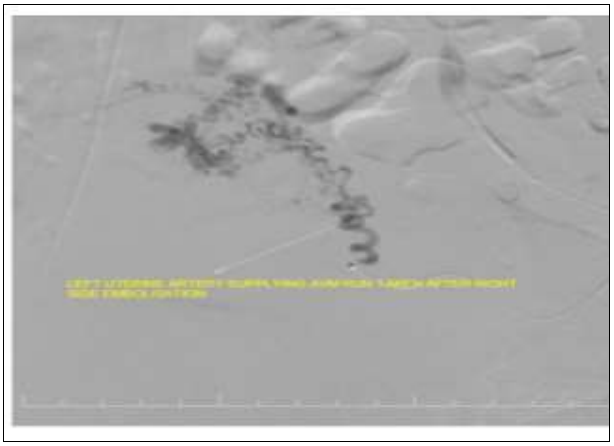

Fig 4 B: Selective Left Uterine Artery Angiogram

Angiography confirmed successful devascularisation of the AVM nidus with no residual arteriovenous shunting.

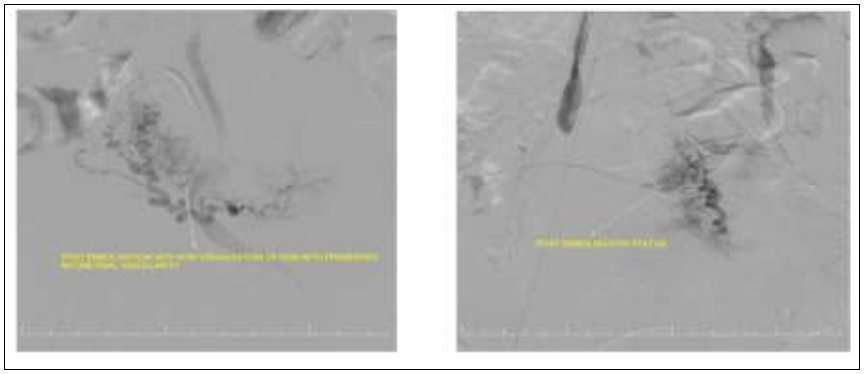

Fig 5: Post-embolization angiograms demonstrating complete obliteration of the AVM with preservation of normal uterine perfusion

The procedure was technically successful with no periprocedural complications. The patient was discharged on postoperative day four in a stable condition. One-month following the procedure, the patient resumed her regular menstrual cycle with no recurrent bleeding.

Discussion

Acquired arteriovenous malformations (AVMs) arise from aberrant communications between high-pressure arterial systems and low-pressure venous channels. Due to their rarity, the true incidence remains uncertain. The underlying pathophysiology is not yet fully elucidated. However, it is postulated that acquired AVMs may develop structural compromise, such as rupture or weakening, of adjacent arterial and venous walls. During the subsequent remodelling process, this vascular injury may facilitate the formation of an abnormal arteriovenous fistula. Such vascular weakening is frequently associated with intrauterine trauma, which may occur in the context of surgical interventions such as cesarean sections or abortions, D & C, or secondary to trophoblastic tissue retention following a molar pregnancy [8].

In our patient, the temporal relationship between D&C and the subsequent presentation with heavy vaginal bleeding strongly implicates uterine instrumentation as a precipitating or aggravating factor, consistent with the existing literature describing iatrogenic AVM formation following endometrial disruption.

Uterine artery embolization has emerged as the treatment of

choice for haemodynamically stable patients with uterine AVM, particularly those wishing to preserve fertility. The haemostasis is achieved by occluding the feeding vessels to the nidus by embolic agents such as PVA particles, gelatine sponge, or coils. UAE offers several advantages over surgical management, including a minimally invasive approach, shorter duration of recovery, and preservation of uterine anatomy. Success rates are reported in well-selected patients, with the majority of women resuming normal menstruation within one to three months post-procedure, as observed in our patient.

A critical clinical caveat deserves emphasis: blind curettage must be avoided in any patient with suspected uterine AVM. Unlike RPOC, where curettage is therapeutic, instrumentation of an AVM nidus can rupture the delicate abnormal vessels and precipitate catastrophic, potentially fatal haemorrhage.

Kelly *et al*. highlighted uterine artery embolization as the appropriate management approach of uterine arteriovenous malformation diagnosed by color Doppler [1].

Gallagher *et al*. reported necessity of early detection of uterine AVM in the postpartum patient with history of uterine instrumentation with undifferentiated bleeding. Following transvaginal ultrasound, UAE should be the first line of management for uterine arteriovenous malformation [3].

Errmili *et al*. highlighted embolization as a reference approach for managing hemodynamically stable patient diagnosed with Uterine AVM in the setting of persistent and recurrent abnormal uterine bleeding in the post-partum period [8].

These findings are consistent with the present case, where diagnostic work up illustrated with transvaginal color Doppler sonography followed by CECT angiography provided definitive anatomical characterisation of the nidus, its arterial supply, and associated aneurysmal components, directly guiding the embolization strategy. Notably, the normal β-hCG level was critical in excluding gestational trophoblastic disease, which can produce an identical sonographic appearance and similarly must be managed differently.

This case supports existing literature suggesting high index of suspicion of uterine arteriovenous malformation in the clinical setting of post-abortal persistent and recurrent bleeding with uterine artery embolization being the first line management modality diagnosed with transvaginal color doppler followed by CT angiography.

Conclusion

Uterine arteriovenous malformation should be considered in women presenting with post-abortal bleeding, particularly in the setting of prior uterine instrumentation. Early recognition using colour Doppler imaging is critical to avoid misdiagnosis and potentially hazardous interventions such as curettage. Timely diagnosis supported by cross-sectional imaging enables definitive characterisation. Uterine artery embolization represents a safe, effective, and fertility-preserving modality, preferred in haemodynamically stable patients.

This case highlights the importance of a systematic, multimodal diagnostic approach and the critical need to avoid blind curettage in suspected uterine AVM, thereby preventing potentially life-threatening complications.

Clinical Significance

Uterine arteriovenous malformation (AVM) is a potentially life-threatening cause of puerperal metrorrhagia and haemorrhage, with fewer than 100 cases reported in the literature. It poses significant diagnostic and therapeutic challenges for clinicians and may adversely affect future fertility. The clinical presentation often mimics retained products of conception or gestational trophoblastic neoplasia, necessitating a high index of suspicion, particularly in patients with a history of uterine instrumentation. Misdiagnosis and inappropriate curettage in the setting of an unrecognised AVM can result in catastrophic haemorrhage.

Declarations

- **Funding:** Nil
- **Conflict of interest:** Nil
- **Ethical approval:** Not required

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