Pelvic Arteriovenous Malformation

An Important Differential Diagnosis of a Complex Adnexal Mass

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Congenital pelvic arteriovenous malformations (PAVMs) are rare and may present a challenge because only 1 or 2 cases may be encountered during a radiologists' clinical career. In the pelvis, these masses are more frequently acquired, resulting from neoplasms, pelvic trauma, or surgical procedures. Patients with PAVMs may have a number of nonspecific symptoms, including pain, dyspareunia, vaginal bleeding, and changes in bowel and bladder function. On imaging, they may appear as masses that may raise concern about malignancy. We present such a case, which appeared as a complex adnexal mass. Only 1 case similar in appearance to ours has been reported in the literature so far, by Kelly et al.[1]

Abbreviations
AVM, arteriovenous malformation; CT, computed tomography; PAVM, pelvic arteriovenous malformation

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Case Report

A 22-year-old female patient had intermittent pain on the left side of her lower abdomen since puberty (ie, 12 years of age). There was no history of any gynecologic intervention. Her menstrual cycle was regular with normal flow. No relationship of the pain could be established with the menstrual cycle. There were no symptoms related to the bowel and bladder. General systemic, cardiac, and pulmonary examination findings were normal. Her abdomen was soft and nontender with no palpable masses. On auscultation, no bruit was heard. A gynecologic examination could not be performed. Imaging studies were advised.

On sonography, there was a 3.5 × 3-cm mass limited to the left adnexa with solid and cystic components (Figure 1). On a color Doppler examination, increased flow was seen within the cystic component (Figure 2). On non–contrast-enhanced computed tomography (CT), a well-defined hypodense mass was seen limited to the left adnexa (Figure 3A). It showed nodular and tortuous

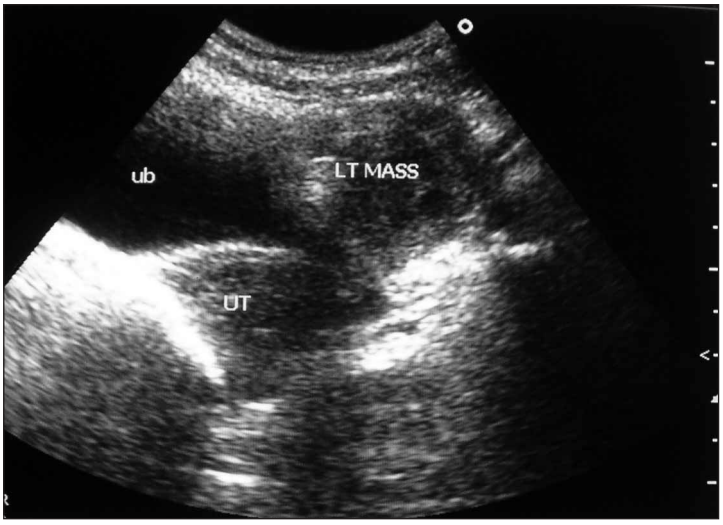
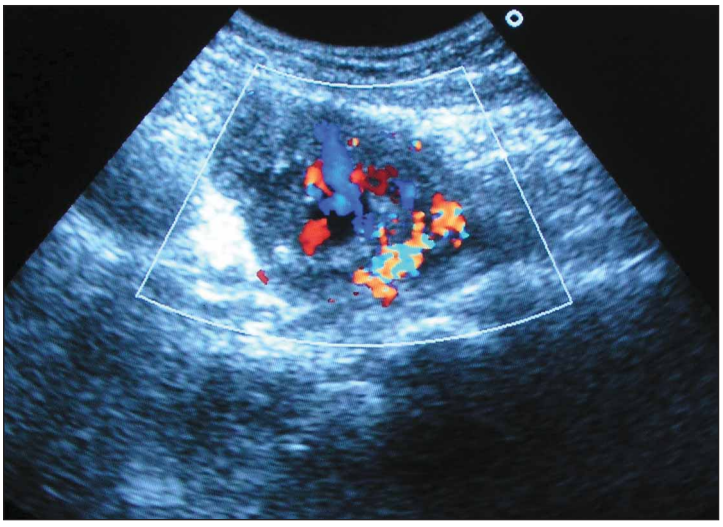


Figure 1. Transverse gray scale sonogram showing a complex 3.5 × 3-cm left adnexal mass with multiple cystic areas within; ub indicates urinary bladder; and UT, uterus.

enhancement on contrast-enhanced CT (Figure 3B). Magnetic resonance imaging revealed that the above-mentioned mass was of mixed signal intensity on all pulse sequences with nodular and tortuous enhancement on contrast-enhanced images (Figure 4). On no imaging modality was the left ovary seen separately from the mass. The possibility of a PAVM was considered, and gadolinium-enhanced magnetic resonance angiography was performed, which confirmed the diagnosis (Figure 5). The feeding vessel was shown to be from the left internal iliac artery, and the mass was seen to be draining into the left renal vein via an ovarian vein. Few tortuous vessels were seen on the right side as well. The mass on the left side was embolized after digital subtraction angiography, which revealed the feeding vessel to be arising from the uterine artery, whereas drainage was via the ovarian vein. The patient remained asymptomatic 3 months after embolization.

Figure 2. Transverse color Doppler sonogram showing a complex left adnexal mass with solid and cystic components. The cystic component reveals increased flow.

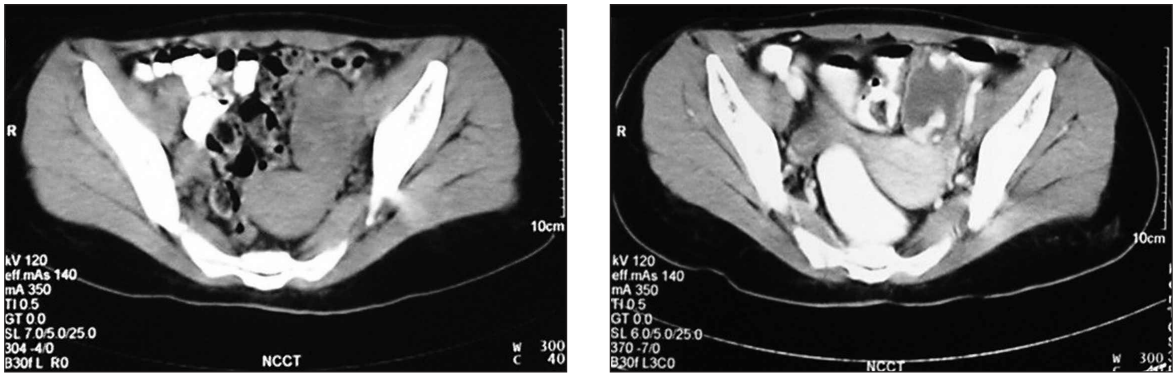


Discussion

As with arteriovenous malformations (AVMs) in other locations, PAVMs are twice as common in women as in men. Pelvic AVMs in women are typically related to previous gynecologic surgery, most commonly hysterectomy, but also with prior childbirth or gestational trophoblastic disease.[2] No such history is available in congenital cases, as in our patient. It is worth noting that PAVMs are considered distinct from uterine AVMs, also described as uterine cirsoid aneurysms, which are also associated with previous surgery, trophoblastic disease, and diethylstilbestrol exposure.[3]

The masses usually develop slowly over a long period before becoming symptomatic; however, rapid growth may occur, often in response to a hormonal influence (such as occurs in puberty or during pregnancy) or trauma.[4] In the patient described by Kelly et al,[1] the mass was seen to cause left ureteral obstruction with resultant left-sided hydronephrosis. There was in addition a left adrenal mass, and the patient was a hypertensive with a history of vaginal hysterectomy for high-grade cervical dysplasia. A combined surgical team approach by the gynecologic oncology and general surgery services was conducted, and both the pelvic and adrenal masses were excised with good results.[1]

Many methods have been used to diagnose PAVMs. To date, pelvic angiography has been the preferred imaging method in the evaluation of a suspected PAVM because it can accurately define the size of the PAVM (unless partially or completely thrombosed), the vascular supply to the mass, and the presence of collateral vessels, and it allows endovascular embolization.[5,6] Magnetic



A B

Figure 3. A, Non–contrast-enhanced CT showing a well-defined hypodense left adnexal mass. **B**, Axial contrast-enhanced CT showing a well-defined hypodense mass limited to the left adnexa with areas of nodular enhancement.

resonance angiography is comparable to conventional angiography in evaluation of feeding and draining vessels and offers the added advantage of a 3-dimensional image data set that can be manipulated with multiplanar and maximum-intensity projection reconstruction. T1-weighted contrast-enhanced images obtained during 3-dimensional gadolinium-enhanced magnetic resonance angiography can be used to assess visceral involvement by a PAVM. However, one limitation of a magnetic resonance approach is sensitivity to artifacts arising from metallic clips or embolization materials.[5] Both enhanced CT and magnetic resonance imaging are helpful in showing the vascular etiology of the mass and to evaluate its extension and involvement of adjacent structures.[7]

The sonographic findings of PAVMs were first described by Torres et al.[8] These include multiple serpiginous anechoic structures within the pelvis. With real-time sonography, enlarged bounding vessels can be seen occasionally. The differential diagnosis of this entity on sonography includes multiloculated ovarian cysts and dilated fluid-filled bowel loops.[9]

Whereas asymptomatic or mildly symptomatic masses should not be treated,[10] management of symptomatic AVMs presents a diagnostic dilemma.[6] Intra-arterial embolization is a widely accepted therapy. Other management options include expectant management, surgical excision, percutaneous arterial embolization, and embolization followed by surgical removal.[2] Although intra-arterial embolization is generally a safe procedure, up to 20% of these cases can result in ischemic impairment of nearby visceral structures.[11] Chao et al[12] reported 2 cases with successful conservative treatment and recommended surgery after the repeated failure of embolization in those patients with persistent symptoms. However, both surgery and embolization have been associated with recurrence rates in more than 50% of cases.[1]

In conclusion, a PAVM is an important differential diagnosis of a complex adnexal mass because it can be very problematic for both the surgeon and patient in a case of surgical treatment without a correct preoperative diagnosis.

Figure 4. Axial T2-weighted fat-suppressed magnetic resonance image showing a well-defined hyperintense mass limited to the left adnexa. The uterus appears normal.

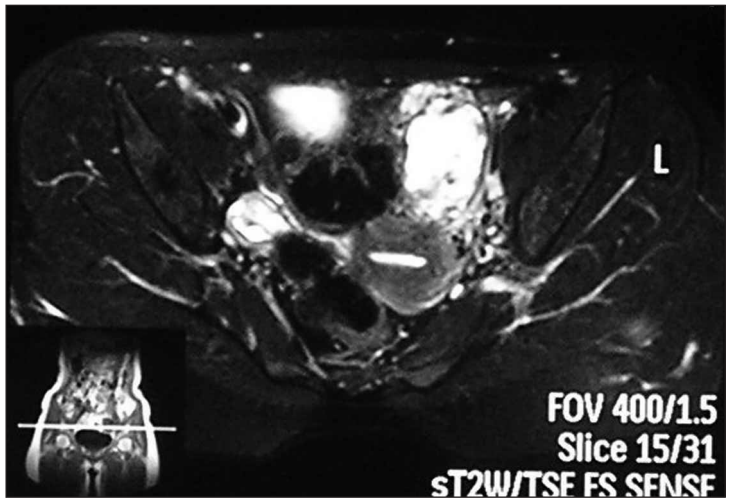


Figure 5. Gadolinium-enhanced maximum-intensity projection image showing a large vascular malformation with feeding vessels from the branches of the left internal iliac artery and drainage via the left ovarian vein. A few tortuous vessels are shown on the right side as well.

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