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Ultrasound-Based Diagnosis of a Giant Left Iliofemoral Arteriovenous Malformation: A Case Report

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Abstract

Arteriovenous Malformation (AVM) is a congenital vascular malformation classified as a high-flow vascular malformation. For AVM, Digital Subtraction Angiography (DSA) is central to both establishing a definitive diagnosis and performing interventional procedures. While ultrasound serves as a valuable noninvasive tool for initial screening and monitoring, it is not typically employed for critical diagnostic or therapeutic decisions. This paper reports a 46-year-old female with a giant left gluteal internal iliac AVM. Conventional ultrasound revealed a 129 mm × 70 mm cystic-solid mass with coarse vascular echoes and arteriovenous fistula-type blood flow. The patient recovered and was discharged after vascular embolization. Literature analysis shows AVM is characterized by high-flow vascular clusters and high-velocity, low-resistance blood flow. Ultrasound can noninvasively clarify lesion structure and blood supply, playing a vital role in differentiating venous malformations, hemangiomas and superficial space-occupying lesions.

Keywords

Arteriovenous Malformation (AVM), Iliac Arteriovenous, Ultrasonic Diagnosis

1. Introduction

Arteriovenous Malformation (AVM) is a congenital high-flow vascular malformation characterized by abnormal direct connections between arteries and veins without an intervening capillary network. This results in arteriovenous shunt-

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ing through a tangled vascular nidus [1]. While AVMs most frequently occur in the head and neck region, they can also rarely involve pelvic vessels such as the internal iliac arteries. In the diagnosis and treatment process of AVM, Digital Subtraction Angiography (DSA) occupies a central position and is the cornerstone for diagnosis and interventional treatment. However, due to its limitations in precise diagnosis, ultrasound is used less in the final stages of diagnosis and treatment, and is commonly used for screening and follow-up examinations [2]. We report a case of internal iliac arteriovenous malformation confirmed by interventional surgery in our hospital, and analyze its imaging characteristics and the clinical value of ultrasound examination in conjunction with the literature.

2. Case Presentation

A 46-year-old female patient presented to our hospital with a 15-year history of a painless mass in the left gluteal region, which has shown significant enlargement over the past month. During the physical examination, the skin temperature over the mass was higher than that on the opposite side, with localized bluish-purple vascular shadows visible, and vascular murmurs were audible upon auscultation. The routine ultrasound examination revealed a 129*70 mm cystic-solid mass in the left hip with unclear boundaries. Multiple large vascular echoes were observed within the mass, and an arteriovenous fistula blood flow spectrum was detected within the blood vessels (Figure 1). Ultrasound suggested a solid mass in the left buttock, and arteriovenous fistula needed to be ruled out. Pelvic Computed Tomography (CT) suggested the presence of multiple convoluted and dilated blood vessels and vascular malformations in the left gluteal subcutaneous region, consistent with arteriovenous malformation possibly accompanied by adjacent soft tissue infection and edema (Figure 2). Magnetic Resonance Imaging (MRI) demonstrated a mass with characteristic "flow void signal", suggesting high-flow vascular channels. Serpiginous flow voids were evident on both T1-Weighted Imaging

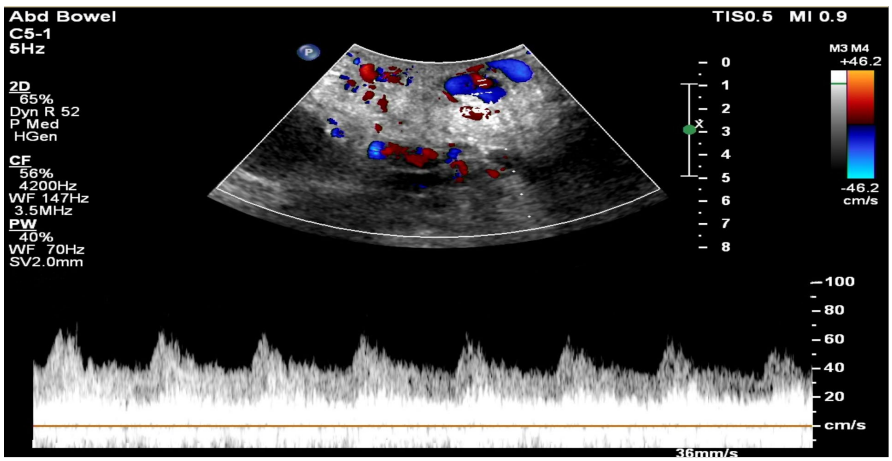

Figure 1. Continuous Wave Doppler (CWD) of blood vessels within the "mass" demonstrated a High-Velocity Low-Resistance (HVLR) blood flow spectrum.

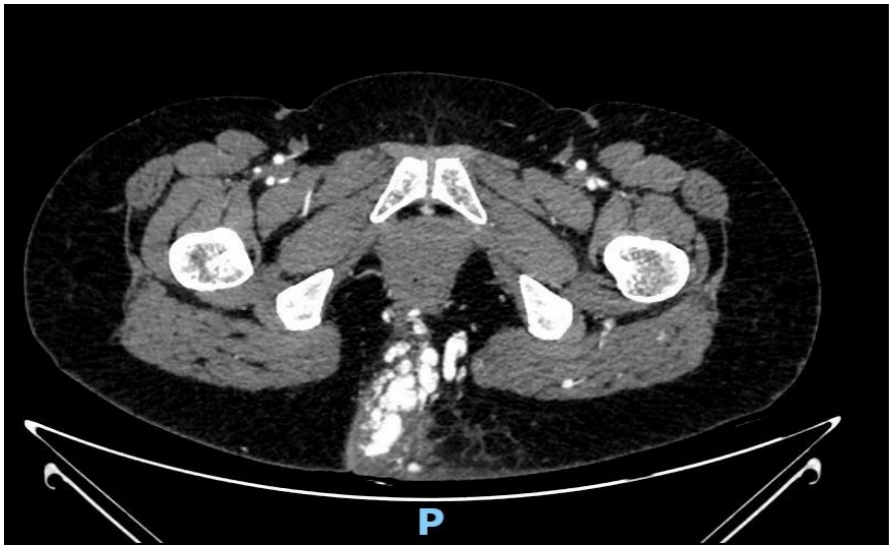

Figure 2. Axial view of Contrast-Enhanced CT (CECT) in the arterial phase demonstrated that the enhancement degree of the lesion was consistent with that of the surrounding blood vessels.

(T1WI) (**Figure 3**) and T2-Weighted Imaging (T2WI) (**Figure 4**) sequences, consistent with arteriovenous malformation AVM. During endovascular embolization therapy for the patient, bilateral internal iliac arteriography revealed an extensive arteriovenous malformation in the left gluteal region. The AVM was predominantly supplied by the left internal iliac artery, with additional collateral contribution from branches of the right internal iliac artery. Venous drainage occurred primarily through the left iliac vein system. Venous drainage primarily occurred through the left internal iliac vein. Post-embolization angiography showed the disappearance of the arteriovenous fistula. The postoperative diagnosis was a left internal iliac AVM. The patient recovered well postoperatively and was discharged on postoperative day 3.

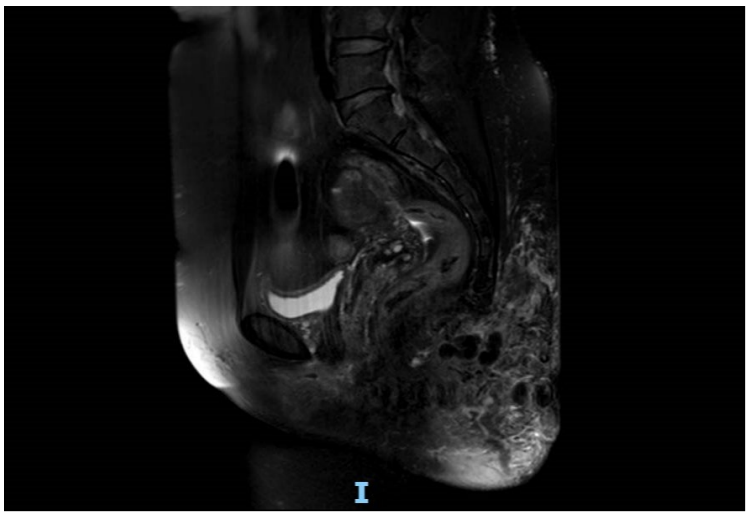

Figure 3. Sagittal T1-Weighted Imaging (T1WI) reveals flow void vascular shadows.

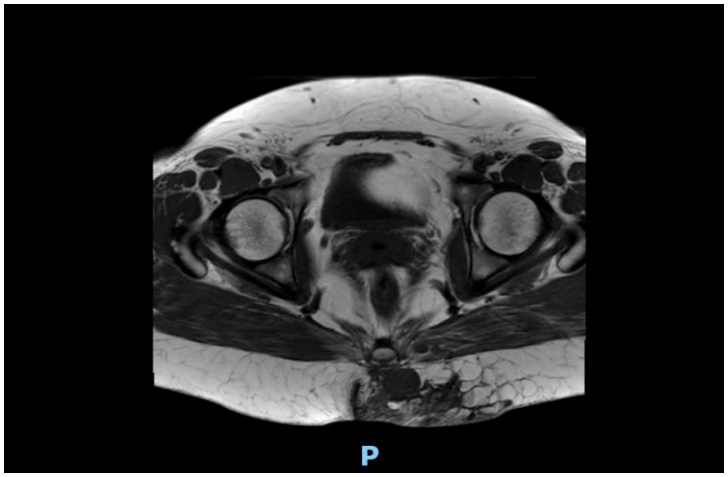

Figure 4. Axial T2-Weighted Imaging (T2WI) reveals flow void vascular shadows.

3. Discussion

An AVM consists of feeding arteries, draining veins, and an abnormal vascular nidus. The nidus replaces the capillary bed, and the direct communication between arteries and veins is the main feature of an AVM. Some scholars propose that a congenital AVM can induce venous dilation in adjacent tissues, which subsequently triggers the opening of microscopic arteriovenous communications within normal tissue, and these physiological arteriovenous communications ultimately lose their ability to mount a contractile response to local hemodynamic changes to develop into part of the pathological lesion [3]. AVM typically presents as a pulsatile mass with slightly elevated local skin temperature, may be accompanied by skin ulceration or bleeding, and in severe cases can be associated with high-output heart failure [4]. AVM is a congenital lesion present at birth. It typically becomes symptomatic and prompts medical attention during childhood or adolescence. This case involving an older patient is particularly rare.

Imaging examinations play a crucial role in the diagnosis and treatment decisions of AVM.AVM is a high-flow lesion. On two-dimensional ultrasound, it appears as linear vascular shadows. Color Doppler Flow Imaging (CDFI) reveals an irregular, turbulent mosaic pattern. The feeding artery shows an increased lumen diameter and high blood flow velocity, which on spectral analysis demonstrates a High-Velocity Low-Resistance (HVLR) waveform [5]. The AVM nidus exhibits a characteristic "flow void signal" on MRI, appearing hypointense on both T1WI and T2WI, shows heterogeneous enhancement on contrast-enhanced scan, and demonstrates distinct feeding arteries, the malformed vascular nidus itself, and draining veins on angiography [6].

Ultrasound examination, as an initial screening tool, can effectively indicate the high-flow characteristics of a lesion. For example, in this case, conventional ultrasound found abundant vascular echoes within the mixed mass, while Doppler spectral analysis detected the characteristic high-velocity low-resistance blood flow spectrum, providing key evidence for suspecting a high-flow vascular mal-

formation. However, definitive diagnosis and precise guidance for treatment require DSA. DSA can clearly and dynamically display the vascular structure of the malformation, as demonstrated in this case, it clearly showed a large malformation mass mainly supplied by the left internal iliac artery and drained through the left iliac vein. The "high-flow" nature suggested by ultrasonography, combined with the precise delineation of the complete pathological pathway—"feeding artery-nidus-draining vein"—by angiography, together form a solid foundation for selecting transarterial embolization. This allows the embolization therapy to be accurately targeted toward the abnormal blood flow channels, thereby achieving precise intervention. In addition, the flow voids observed in MRI also indirectly confirm the presence of rapidly flowing blood within the lesions.

This condition requires differentiation from venous malformation and hemangioma: 1) Venous malformation (VM) is among the most prevalent vascular malformations. Similar to AVM, it is a congenital vascular anomaly that progressively enlarges with somatic growth and lacks spontaneous regression. However, VM typically presents as a singular venous-channel composition. Imaging studies reveal tortuous, dilated venous channels with venous-pattern flow on spectral Doppler analysis. Aspiration following lesion puncture characteristically yields dark venous blood, which facilitates clinical differentiation [7]. 2) Congenital hemangioma (CH): Classified into three subtypes: rapidly involuting congenital hemangioma (RICH), partially involuting congenital hemangioma (PICH), and noninvoluting congenital hemangioma (NICH). Hemangiomas typically undergo spontaneous regression and present with minimal subjective symptoms. However, NICH exhibits proportionate growth, high-flow characteristics, and elevated cutaneous temperature-features resembling AVM. Early literature contains instances of misclassification between these entities. Crucially, these entities demonstrate fundamental pathological distinctions.

AVM comprises anomalous vascular plexuses containing arteriovenous shunts, whereas NICH represents a high-flow true soft tissue neoplasm. When diagnostic differentiation from AVM is required, angiography should be performed to definitively establish the presence or absence of arteriovenous shunting within the lesion [7]. It is crucial to differentiate between arteriovenous malformation, venous malformation, and hemangioma, as their treatment strategies differ significantly, and misdiagnosis can lead to serious consequences. Medical record review revealed that the patient was initially admitted to the Hand and Foot Surgery Department for a subcutaneous mass. Following an ultrasound examination, the patient was transferred to the Vascular Intervention Department. This condition is often misdiagnosed as a superficial space-occupying lesion due to the discovery of a mass, requiring differentiation. Ultrasound offers distinct advantages in this regard. Superficial space-occupying lesions such as epidermoid cysts and lipomas typically present as homogeneous echo patterns with no discernible blood flow signals [8]. In contrast, Color Doppler Ultrasound (CDUS) not only allows direct visualization of the lesion's structure, boundaries, and vascular supply, but also

enables spectral Doppler analysis to characterize the nature of the blood flow. While the diagnosis of AVM relies on angiography for definitive delineation of feeding arteries and draining veins [7], CDUS can also identify feeding arteries and draining veins when performed with appropriately configured transducers and frequencies. Given its noninvasive nature and practical convenience, the role of CDUS in the diagnosis and management of vascular malformations is increasingly expanding.

It should be noted that this case report is based on the findings of a single case and its conclusions are not generalisable. It is recommended to conduct prospective studies with larger sample sizes to establish standardized ultrasound diagnostic protocols and follow-up strategies for such rare arteriovenous malformations.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Fleetwood, I.G. and Steinberg, G.K. (2002) Arteriovenous Malformations. *The Lancet*, **359**, 863-873. https://doi.org/10.1016/s0140-6736(02)07946-1

[2] Dunham, G.M., Ingraham, C.R., Maki, J.H. and Vaidya, S.S. (2016) Finding the Nidus: Detection and Workup of Non-Central Nervous System Arteriovenous Malformations. *RadioGraphics*, **36**, 891-903. https://doi.org/10.1148/rg.2016150177

[3] Liu, D.G. (2009) Treatment of Arteriovenous Malformations. *Chinese Journal of Practical Stomatology*, **2**, 264-268.

[4] Schimmel, K., Ali, M.K., Tan, S.Y., Teng, J., Do, H.M., Steinberg, G.K., *et al.* (2021) Arteriovenous Malformations—Current Understanding of the Pathogenesis with Implications for Treatment. *International Journal of Molecular Sciences*, **22**, Article 9037. https://doi.org/10.3390/ijms22169037

[5] Wang, L.S., He, W., Zhang, H.Q., Wang, H., Wang, R.Y., Zhao, Y.L., and Tian, F.L. (2010) Application of Transcranial and Contrast Enhanced Transcranial Color-Coded Sonography in Intracranial Aneurysms. *Chinese Journal of Medical Ultrasound* (*Electronic Edition*), **7**, 8-11.

[6] Tang, J., Zhang, Y.G., Huang, J.Q., Meng, F.J., Cen, Y. and Xu, X.W. (2017) Surgical Treatment of Lower Extremity Vascular Malformations. *Chinese Journal of Reparative and Reconstructive Surgery*, **31**, 638-640.

[7] Chinese Society for the Study of Vascular Anomalies (CSSVA) (2019) Guidelines for the Diagnosis and Treatment of Hemangiomas and Vascular Malformations (2019 Edition). *Journal of Tissue Engineering and Reconstructive Surgery*, **15**, 277-317.

[8] Wei, X.L., Qi, X.J., Ma, M.L., *et al.* (2021) Ultrasonic Misdiagnosis Analysis of Giant Epidermoid Cyst in the Buttock. *Qinghai Medical Journal*, **51**, 45-46.