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CASE REPORT

Unusual differential diagnoses for unilateral lower limb swelling: a case of arteriovenous malformation and deep vein thrombosis

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ABSTRACT

Background: Unilateral lower limb swelling presents a broad differential diagnosis, often attributed to deep vein thrombosis (DVT), lymphedema, or cellulitis. However, arteriovenous malformation (AVM) remains a rare but critical consideration.

Case Presentation: An 89-year-old Middle Eastern man with a known case of AVM of the left thigh presented with worsening swelling and patchy skin discoloration in the affected limb. The patient also had a history of DVT and was bed-bound due to an old stroke for several years. Initial Doppler studies ruled out recurrent DVT. Further imaging with computed tomography angiography identified an arteriovenous fistula between the common femoral artery and vein, likely secondary to post-thrombotic recanalization. In addition to embolization and stenting, vascular surgery introduced an external pneumatic compression device to reduce venous congestion and manage limb swelling. This approach was adopted to provide symptomatic relief while minimizing the risks associated with invasive interventions.

Conclusion: This case highlighted the importance of considering AVM in patients with unexplained limb swelling post-DVT. Advanced imaging techniques play a crucial role in diagnosis, and a multidisciplinary approach is essential for optimal management.

Keywords: Arteriovenous malformation, deep vein thrombosis, unilateral limb swelling, multidisciplinary approach, case report.

Introduction

Unilateral lower limb swelling is a common clinical presentation that is typically attributed to conditions such as deep vein thrombosis (DVT), lymphedema, or cellulitis. However, vascular anomalies like arteriovenous malformations (AVMs) represent an unusual but important differential diagnosis. AVMs are high-flow vascular malformations resulting from abnormal direct communications between arteries and veins without an intervening capillary bed [1]. Although AVMs are congenital in nature, their clinical manifestations might become evident later in life, particularly when exacerbated by complications such as DVT or post-thrombotic recanalization. The presence of an AVM can lead to persistent limb swelling and significant morbidity due to high-flow shunting, resulting in venous hypertension and tissue ischemia.

The significance of reporting this case lies in its demonstration of an atypical presentation of unilateral lower limb swelling where AVM formation is secondary to DVT recanalization. This rare sequence of events underscores the need for a high index of suspicion and comprehensive imaging to achieve an accurate diagnosis. Furthermore, it highlights the value of a multidisciplinary

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approach in managing complex vascular conditions. The case not only contributes to the existing literature by documenting an uncommon complication of DVT but also serves as a reminder to clinicians to consider vascular malformations in the differential diagnosis of unexplained limb swelling [2].

Case Presentation

An 89-year-old Middle Eastern man with a known case of AVM of the left thigh presented with worsening swelling and patchy skin discoloration in the affected limb. The patient also had a history of DVT and was bed-bound due to an old stroke for several years. In this case, the rare complication of arteriovenous (AV) malformation formation secondary to recanalization following a DVT was explored, which leads to persistent limb swelling and venous congestion.

The patient experienced persistent left lower limb swelling over the past year [3]. Treatment history included embolization and stenting of a high-flow AVM on October 9, 2024, and diagnostic angiogram of the right lower limb on October 17, 2024. Post-procedure, the left lower limb swelling worsened despite maintaining vascularity [4]. Discharge from Sheikh Shakbout Medical City occurred on October 21, 2024. Subsequently, the patient developed red patches and blistering over the anterior thigh, attributed to a topical cream prescribed by a dermatologist [5].

Home care nurses later observed progressive swelling and skin discoloration of the left thigh. The patient denied fever throughout the illness. Persistent swelling despite intervention raised suspicion of an underlying vascular anomaly. Doppler ultrasound ruled out recurrent DVT but revealed venous congestion, leading to further imaging. Computed tomography (CT) angiography confirmed an AV fistula between the common femoral artery (CFA) and vein, likely the result of aberrant recanalization.

Physical examination showed a swollen left lower limb from the inguinal region to the foot and it was warmer than the right foot and was also non-palpable. The Doppler examination of the posterior tibial artery showed a weak monophasic signal, and for anterior tibial and peroneal arteries, it showed biphasic signals. The foot was swollen but without visible skin damage. The Doppler study demonstrated characteristic bidirectional flow and a "yin-yang" pattern in the common femoral vein (CFV), consistent with a high-flow AV fistula (Figure 1).

The ultrasound conducted on October 4, 2024, showed extensive subcutaneous edema. Post-thrombotic changes were also observed. The suspected fistula between the left CFA and CFV, with bi-directional flow and a "yin-yang" sign, was noted in the CFV. CT Angiography done on October 7, 2024 showed the AV fistula between the CFA and CFV, diseased superficial femoral artery (SFA) with stenosis, and incomplete foot arch. Completion of the angiogram showed multiple collateral vessels from the CFA and SFA. Patient popliteal and posterior tibial arteries with areas of focal disease (Figure 2).

The primary diagnosis was the left lower limb swelling secondary to AV malformation. Post-procedure complications included persistent swelling and skin discoloration following embolization and stenting of the high-flow AVM.

The management plan included family counseling which emphasized the complexity of AVM with numerous feeding vessels and associated risks. Continuous monitoring through regular Doppler examinations to assess vascularity and pulse status every 4 hours. No immediate procedures were indicated for future interventions as vascularity was preserved. Management was further complicated by the contraindication to aggressive anticoagulation due to potential bleeding risks associated with the AVM.

Hence, embolization and stenting of high-flow AVM were conducted on October 9, 2024, and a diagnostic angiogram of the right lower limb was done on October 17, 2024. In addition to embolization and stenting, vascular surgery introduced an external pneumatic compression device to reduce venous congestion and manage limb swelling. This approach was adopted to provide symptomatic relief while minimizing the risks associated with invasive interventions. Further interventions would be considered upon clinical deterioration.

Discussion

This case underscores the challenges in managing a high-flow AVM in the presence of DVT, extensive vascular compromise, and limited anticoagulation therapy options. Unilateral lower limb swelling presented a wide differential diagnosis. According to studies, common causes include DVT, lymphedema, cellulitis, Baker's cyst, and pelvic masses, but rare vascular anomalies such as AVMs should also be considered [6].

Figure 1. *Doppler ultrasound showing bidirectional flow in the CFV ("yin-yang" sign), suggestive of an AV fistula.*

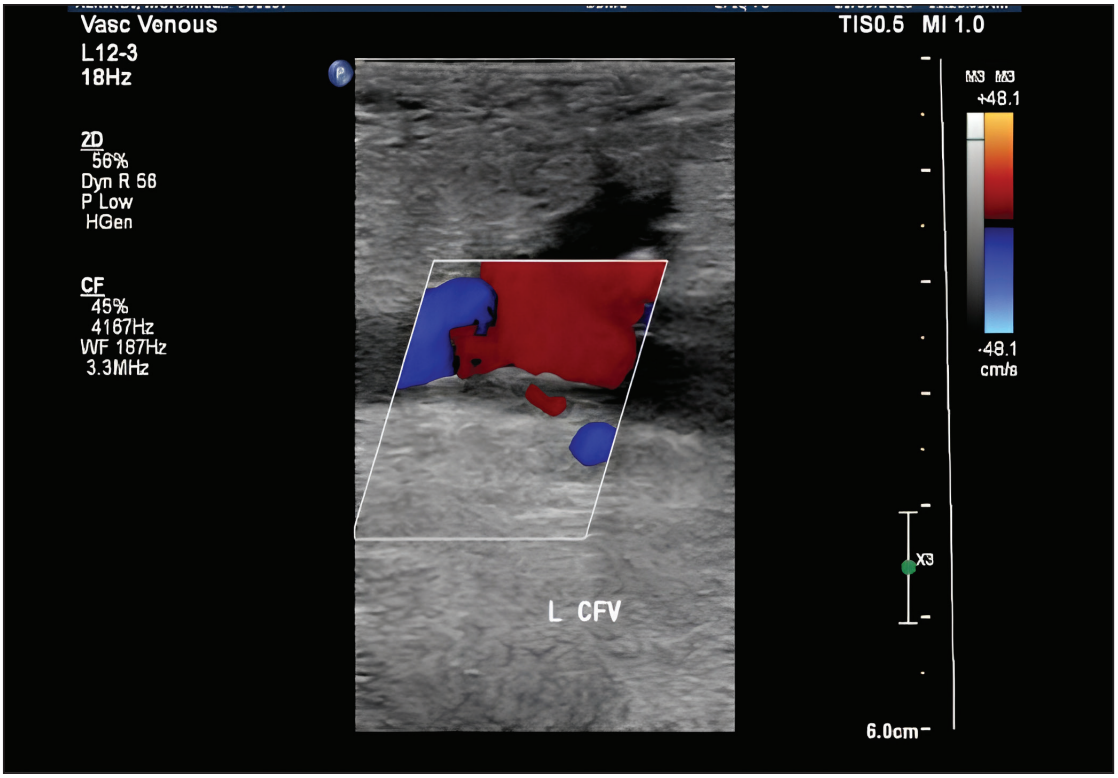

Figure 2. *CT angiography demonstrates an AV fistula between the CFA and vein.*

Common causes included DVT, lymphedema, cellulitis, Baker's cyst, and pelvic mass compression. However, AVM represents an unusual but critical consideration, particularly when standard causes like recurrent DVT are excluded. The decision to conclude AVM as the primary diagnosis was based on the absence of recurrent thrombosis on Doppler studies, the identification of an AV fistula between the CFA and vein on CT angiography, and the presence of high-flow shunting with characteristic bidirectional flow ("yin-yang" sign) [3]. The patient's history of prolonged immobility and prior DVT compounded the risk of post-procedural complications, making this case particularly complex.

In this case, angiogenic factors associated with the recanalization process likely led to the formation of an AV nidus [5]. This pathological connection between the CFA and vein resulted in high-flow shunting, exacerbating venous hypertension, and persistent limb swelling. Despite the worsening post-procedural swelling and discoloration, vascularity remains intact, suggesting that immediate invasive intervention is unnecessary. A multidisciplinary approach, involving close monitoring and family engagement, remains crucial to the patient's care.

The embolization and stenting aimed to restore vascular integrity; however, subsequent clinical deterioration underscored the intricacies of managing such cases [6]. External pneumatic compression devices offer a non-invasive option for managing venous congestion and lymphatic dysfunction [4]. In this patient, the device provided significant symptomatic relief, particularly in the setting of contraindications to aggressive anticoagulation therapy.

This case contributed to the limited literature on AV malformations arising as a complication of DVT and highlighted the importance of a high index of suspicion in patients with persistent swelling unresponsive to standard post-thrombotic treatments. Long-term management would require periodic imaging, Doppler studies, and the potential for further vascular interventions to address progressive complications [5,6].

Conclusion

This case highlighted the importance of considering AVM in patients with unexplained limb swelling post-DVT. Advanced imaging techniques play a crucial role in diagnosis, and a multidisciplinary approach is essential for optimal management.

List of Abbreviations

AV	Arteriovenous
AVM	Arteriovenous malformation
CFA	Common femoral artery
CFV	Common femoral vein
CT	Computed tomography
DVT	Deep vein thrombosis
SFA	Superficial femoral artery

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

Funding

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Consent for publication

Informed consent was obtained from the patient to publish this case report.

Ethical approval

Ethical approval is not required at our institute for an anonymous case report.

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References

1. Mouchtouris N, Jabbour PM, Starke RM, Hasan DM, Zanaty M. Biology of cerebral arteriovenous malformations with a focus on inflammation. J Cereb Blood Flow Metab. 2015 Feb;35(2):167–75. https://doi.org/10.1038/jcbfm.2015.10
2. Wassef M, Blei F, Adams D. Vascular anomalies classification: recommendations from the international society for the study of vascular anomalies. Pediatrics. 2015;136(1):e203–14. https://doi.org/10.1542/peds.2015-0848
3. Chen X, Lu X, Yan F, Xu W, Gao L, Zheng J, et al. Spontaneous thrombosis in main draining veins of unruptured cerebral arteriovenous malformations: a case report. Medicine. 2019;98(22):e15588. https://doi.org/10.1097/MD.0000000000015588
4. Moazzeni R. Unilateral leg swelling: differential diagnosis and case studies. Post-thrombotic syndrome and its unusual presentations. Heart Care Sydney. 2022. Available from: https://heartcare.sydney/unilateral-leg-swelling
5. Chikamatsu E, Mizukami Y, Ikuta K. Pelvic arteriovenous malformation with iliac vein thrombosis: a case report. J Card Surg. 2001;42(1):115. Available from: https://www.proquest.com/openview/3e6ab8c5182cd2e79cb33f4d9a6ddd04/1?pq-origsite=gscholar&cbl=29910
6. Geeky Medics. Leg swelling: history taking OSCE guide. Poole, England: Anonymous; 2023. Available from: https://geekymedics.com/leg-swelling-history-taking-osce-guide