

Inguinal Arteriovenous Malformation

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ABSTRACT

Arteriovenous malformations (AVMs) are rare disorders, with inguinal region involvement being particularly uncommon, as they typically manifest in the neck, limbs, trunk, and intracranial or extracranial sites. Despite their varied presentation across organs and tissues, AVMs can lead to cardiac failures due to high output, necessitating management even in asymptomatic cases. We present the case of a 37-year-old male with a known history of hypertension and severe depressive disorder, referred to the urology department for bilateral renal calculi evaluation. The patient complained of sudden-onset, moderate-intensity left-sided flank pain, with no signs of infection or constitutional symptoms. A non-contrast CT scan revealed bilateral renal calculi and an intriguing mass in the scroto-inguinal region.

Further investigation through contrast-enhanced computed tomography identified an AVM originating from the right internal iliac artery, located a few millimeters next to the scrotum. A multidisciplinary team, including interventional radiology, urology, and vascular surgery, collaborated to develop a curative strategy. Angioembolization was performed successfully in a single session, involving catheterization and ligation of the feeder vessel using a lipiodol-glue mixture.

Postoperatively, the patient remained stable with mild pyrexia (99°F), a heart rate of 76 bpm, and blood pressure fluctuating between 110-125 mmHg systolic and 72-80 mmHg diastolic. The absence of glue leakage upon saline injection confirmed the effectiveness of embolization. The patient experienced relief from pain and was mobilized on the second postoperative day. This case underscores the importance of a comprehensive approach in managing rare presentations of AVMs, emphasizing successful angioembolization as a viable therapeutic option.

Keywords: Arteriovenous Malformation, Inguinal Avm, Embolotherapy, Computed Tomography Angiography

Introduction

Vascular lesions, which include varicocele, hemangioma, lymphangioma, and arteriovenous malformations, are uncommon disorders that are not well documented in medical literature (Nakabayashi *et al.*, 2023). AVMs are characterized by the tangling of arteries and veins without the presence of capillaries. This leads to the rapid and high-pressure blood flow through these abnormal vessels, hindering the delivery of arterial blood to the tissues. As a result, varying degrees of ischemia occur (Sountoulides *et*

al., 2007) Arteriovenous malformations (AVM) are the least prevalent of all of them. AVM in the inguinal region are considered to be the rarest as they typically appear in the neck, limbs, trunk sites, intracranial, and extracranial they can present ubiquitously in any organs or tissues. AVM of any region can however exhibit cardiac failures due to high output that poses a necessity in managing them even when they are asymptomatic as in our case (Nazari *et al.*, 2023). The comprehension and effective management of arteriovenous malformations (AVMs) pose notable challenges. AVMs represent swift-flow vascular malformations characterized by an intricate network of primitive vessels directly linking arteries to veins. The inherent potential for arteriovenous shunting through these vessels contributes to an increased likelihood of vascular proliferation and recruitment (Greene and Orbach, 2011). AVMs most commonly affect the head and neck (47.4%) followed by the extremities (28.5%) (Greene and Orbach, 2011). They are typically progressive and their spontaneous regression is almost never seen (Tseng *et al.*, 2018). We present a case of AVM in inguinal region rarely found in medical literature. In our case a multidisciplinary approach was utilized.

Case Presentation

A male patient, 37 years old, married for 5 years. Known case of hypertension and severe depressive disorder, was referred to urology department for medical evaluation of bilateral renal calculi. He had ongoing left sided flank pain that was sudden in onset, dull in nature and moderate in intensity with no clinical stigma of ongoing infection. No other constitutional symptoms were reported with an unremarkable systemic review. His baseline investigations were insignificant however CT KUB without contrast was advised that was significant for bilateral renal calculi and a suspicious mass at scroto-inguinal region. The mass was located in right inguinal region and showed homogenous opacity with irregular margins. extending to the scrotum that seemed enlarged and pushed to the contra lateral side of the mass. Contrast-enhanced computed tomography (CT) scan revealed an AVM from the inguinal region a few millimeters next to scrotum with 1 main feeding vessel, arising from right internal iliac artery.

The patient was referred to interventional radiology and was counselled regarding the possible management of his incidental findings. His concerns regarding impotence were addressed with reassurance as them AVM in his case wasn't advancing towards scrotum yet however, with the expanding nature of this malformation, there could be future risks if left untreated. A multidisciplinary approach was taken that took interventional radiology, urology and vascular surgery on board with curative intents. A single session of angioembolization was performed under aseptic techniques. The feeder vessel which was internal iliac in his case was catheterized along with and ligated via lipodole glue mixture. There wasn't any leakage of glue on further injection of normal saline that confirmed the successful embolization. Post

operatively, the patient was stable with mild pyrexia of 99 Fahrenheit, bpm 76 and pressures fluctuant between 110-125 mm of Hg systolic and 72-80 mm of Hg diastolic. The patient was pain free and was mobilised on second post op day.

Discussion

Arteriovenous malformations (AVMs) are complex vascular anomalies characterized by abnormal connections between arteries and veins, leading to shunting of blood without the presence of a normal capillary network. While AVMs can occur in various anatomical locations, their occurrence in the inguinal region poses unique challenges in terms of diagnosis and management. A recent study has shed light on the multifactorial etiology of arteriovenous malformations, emphasizing the role of genetic factors, abnormal angiogenesis, and vascular dysregulation (Maddy *et al.*, 2023). AVMs in the extra cranial regions often present with a spectrum of symptoms, ranging from being asymptomatic like in our case or subtle signs such as localized pulsatile masses and bruits to more severe manifestations like pain, swelling, and skin changes. The variability in clinical presentation emphasizes the importance of maintaining a high index of suspicion, particularly in cases where patients experience persistent or worsening symptoms. The insidious nature of AVM growth can lead to delayed diagnosis, as symptoms may be initially attributed to more common conditions such as hernias or lymphatic malformations (Nakabayashi *et al.*, 2023). Accurate diagnosis of inguinal AVMs relies on a multimodal imaging approach. Doppler ultrasound serves as an initial screening tool, providing real-time information on blood flow dynamics and identifying the abnormal vascular architecture. Complementary imaging techniques, such as magnetic resonance angiography (MRA) and computed tomography angiography (CTA), offer detailed anatomical information, aiding in preoperative planning. Recent advancements in imaging technology, including three-dimensional reconstruction and contrast-enhanced techniques, have improved our ability to visualize the intricate vascular networks inherent in AVMs (Schimmel *et al.*, 2021). In the event of a sizable shunt via an arteriovenous fistula (AVF), hemodynamic repercussions such as cardiomegaly, elevated cardiac output, heightened cardiac index, and intermittent episodes of congestive heart failure may ensue. The choice of treatment modality depends on various factors, including lesion size, location, hemodynamic characteristics, and the patient's overall health. Advances in endovascular techniques have expanded the therapeutic armamentarium for AVMs (Yakes, 2004). Surgical resection, often indicated for complex or high-flow AVMs, has benefited from improved preoperative planning with the aid of advanced imaging. A comprehensive approach to treatment has the potential to yield favourable outcomes in diminishing morbidity. To mitigate complications associated with surgery, it is imperative to exert proactive control over blood flow to the lesion through preoperative embolotherapy, thereby enhancing the likelihood of achieving a complete resection and potential cure (Igari *et al.*, 2013). While the management of AVMs has

evolved, long-term outcomes and the potential for recurrence remain areas of ongoing research. Comprehensive follow-up protocols are essential to monitor for potential complications, assess treatment efficacy, and optimize patient outcomes. Longitudinal studies are needed to provide a clearer understanding of the natural history and recurrence rates associated with these lesions.

Conclusion

In conclusion, our case highlights the rarity of inguinal arteriovenous malformations (AVMs), a vascular anomaly uncommonly documented in medical literature. The successful management of this case exemplifies the importance of a multidisciplinary approach involving interventional radiology, urology, and vascular surgery. This collaborative effort, coupled with advancements in imaging technology and endovascular techniques, allowed for the timely diagnosis and curative intervention of a complex AVM, underscoring the significance of comprehensive care in addressing such exceptional clinical scenarios. Further research and long-term follow-up studies are warranted to enhance our understanding of the natural history and recurrence patterns associated with inguinal AVMs

Conflicts of Interest

The authors declare that they have no competing interests and there is no conflict of interest.

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