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Pos Traumatic Arteriovenous ilio iliac Fistula in a Young Patient

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Abstract **Case Report**

Post-traumatic arteriovenous fistulas (AVFs) are rare vascular complications, often presenting with delayed and nonspecific symptoms, making their diagnosis challenging. This case report describes a 25-year-old male who developed an ilio-iliac AVF six years after a penetrating stab wound. The patient presented progressive dyspnea and right heart failure, leading to an incidental diagnosis of the fistula through advanced imaging. Endovascular repair with a covered stent was successfully performed, resulting in symptom resolution. This case highlights the importance of maintaining a high index of suspicion for AVFs in patients with prior trauma, as well as the evolving role of endovascular techniques in their management. Multidisciplinary collaboration is crucial in optimizing outcomes, particularly in complex vascular injuries.

Keywords: post-traumatic arteriovenous fistula, iliac vessels, endovascular repair, vascular trauma.

INTRODUCTION

Traumatic arteriovenous fistulas (AVFs) are rare but potentially serious complications of penetrating or blunt injuries, accounting for 1% to 2% of all traumatic vascular injuries. These lesions are characterized by a pathological direct communication between an artery and an adjacent vein, leading to significant hemodynamic alterations such as venous volume overload and redistribution of arterial blood flow [1, 2].

Post-traumatic ilio-iliac AVFs are even rarer due to the deep and protected location of the iliac vessels. These injuries are typically associated with high-energy trauma, such as gunshot wounds, motor vehicle accidents, or iatrogenic injuries during surgical or endovascular procedures [3, 4]. Stab wounds, although less common, are another documented cause of these fistulas. This type of injury occurs when a sharp object simultaneously penetrates adjacent arteries and veins, creating a pathological communication. Unlike high-energy injuries, stab wounds tend to produce localized anatomical damage, although their clinical manifestations may be delayed and challenging to diagnose initially [5, 6].

The clinical presentation of these fistulas varies widely, ranging from subtle findings such as murmurs or palpable thrills to more severe manifestations such as high-output heart failure, localized venous hypertension, or abdominal compartment syndrome. If left untreated, these lesions can progress to severe complications, including deep vein thrombosis or significant hemodynamic overload [7, 8].

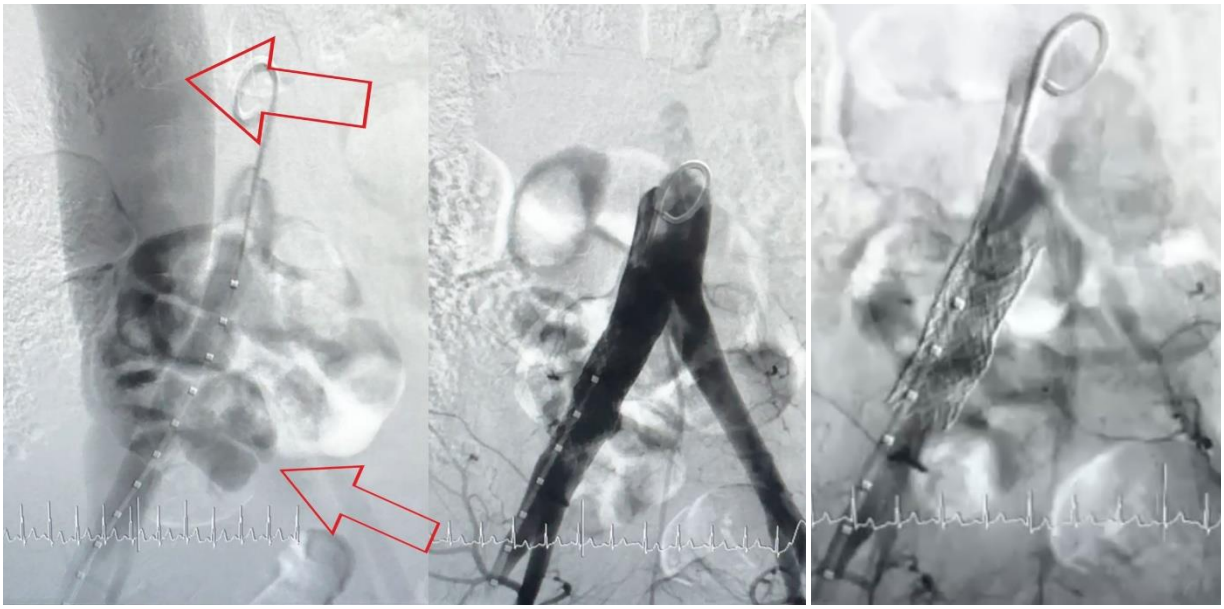
The diagnosis of ilio-iliac AVFs requires a high index of clinical suspicion, particularly in patients with a history of penetrating trauma in the abdominal or pelvic region. Diagnostic tools include computed tomography angiography (CTA), Doppler ultrasound, and, in some cases, conventional angiography, which allow detailed characterization of the lesion and treatment planning [9, 10].

Treatment may be surgical or endovascular, depending on the patient's characteristics and resource availability. Endovascular techniques have gained popularity in recent years due to their lower morbidity and shorter recovery times. However, in complex trauma scenarios or in settings without specialized equipment, surgical repair remains an effective alternative [11-13].

CLINICAL CASE

A 25-year-old male patient suffered a stab wound to the lumbar region 6 years ago, as a result of a passion-crime. At that time he was discharged with no apparent injuries. A few months ago he went to a Cardiology consult for presenting dyspnea on minimal exertion, he was admitted to the hospital where tests were performed, revealing heart failure and right ventricular overload, without being able to determine the cause. Additionally, the patient presented ascites and an umbilical hernia, so he was evaluated by the General Surgery service, who noticed in a chest CT scan with intravenous contrast the presence of marked contrast in the superior cava vein in the arterial phase; after that and in accordance with the clinical history they decided to request an aortoiliac and lower limb angio-CT, in which the presence of a right ilioiliac arteriovenous fistula was confirmed.

The patient was presented to the Vascular Surgery service, who performed an endovascular repair of the fistula, by placing a coated stent as shown in the figure below.



A B C

Figure 1: A. right ilioiliac arteriovenous fistula; B and C. Control after stent placement

The hernia was subsequently repaired surgically and he was discharged in good condition with medication to control the heart failure that had already developed.

DISCUSSION

Post-traumatic arteriovenous fistulas (AVFs) are rare vascular complications that often present with delayed and non-specific symptoms, making their timely diagnosis challenging. The case presented here exemplifies the hemodynamic and clinical complexities associated with an ilio-iliac AVF following a penetrating stab wound, highlighting the importance of maintaining a high index of suspicion in patients with a history of trauma.

The pathophysiology underlying AVFs involves direct communication between an artery and vein, bypassing the capillary bed and leading to high-output cardiac states. This mechanism explains the development of heart failure and right ventricular overload in this patient, consistent with the hemodynamic burden imposed by large-volume shunting. High-output cardiac failure has been increasingly reported in patients with undiagnosed AVFs, reinforcing the need for a systematic cardiovascular evaluation in these scenarios [1, 2].

Delayed diagnosis is a common challenge in cases of traumatic AVFs. This patient's history demonstrates the subtle progression of symptoms over six years, from asymptomatic to severe dyspnea and ascites. Advanced imaging modalities such as computed tomography angiography (CTA) and contrast-enhanced studies play a pivotal role in diagnosing AVFs, offering detailed visualization of the arteriovenous communication and surrounding vascular structures. Studies confirm that CTA has a sensitivity exceeding 95% for vascular injuries, making it the diagnostic modality of choice in such cases [3-5]. In addition, emerging techniques such as four-dimensional flow magnetic resonance imaging (4D-flow MRI) have demonstrated potential in non-invasively quantifying shunting volume and mapping hemodynamic alterations in complex AVFs [6].

The management of AVFs has evolved significantly with the advent of endovascular therapies, which now represent the first-line approach in most

cases. Endovascular stent placement, as performed in this patient, is associated with high success rates, reduced perioperative complications, and shorter hospital stays compared to open surgical repair [7, 8]. A recent multicenter review demonstrated a 95% success rate for endovascular AVF closures, with only 5% requiring conversion to surgical repair due to anatomical challenges [9]. Nonetheless, surgical intervention remains essential in settings where endovascular resources are unavailable or in cases of failed endovascular repair [10].

Another key feature of this case is the multidisciplinary approach required for optimal patient care. Collaboration among cardiology, general surgery, and vascular surgery was instrumental in addressing both the vascular pathology and secondary complications such as umbilical hernia and ascites. Such coordinated care aligns with current recommendations advocating for integrated management strategies in vascular trauma patients to improve functional and long-term outcomes [11, 12].

Finally, this case underscores the importance of long-term follow-up for patients with repaired AVFs, as complications such as stent occlusion or recurrence of symptoms can occur. A systematic follow-up protocol using Doppler ultrasound or CTA at regular intervals is recommended to ensure patency and monitor for late complications [13, 14].

Conclusion

In conclusion, this case highlights the complexities of post-traumatic AVFs, emphasizing the importance of early recognition, advanced imaging, and minimally invasive therapeutic options. Future studies should explore the role of novel diagnostic tools and refine treatment algorithms to further enhance outcomes, particularly in resource-constrained settings.

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