A Spontaneous Arterial Venous Fistula in a Patient on Hemodialysis; Case Report

Getasew Alemu[1], Addisu Ejigu[1], and Beniam Kassa[1]

[1]Addis Ababa University College of Health Sciences

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Introduction

Arteriovenous fistulas (AVFs) are a form of arteriovenous malformations clinically characterized by anomalous communications between arterial and venous systems that bypass the normal anatomic capillary beds (1). Broadly it can be divided into two forms based on the cause: acquired or congenital. Surgery, penetrating trauma, and percutaneous catheterization are the most common causes of acquired AVFs. Rarely AVFs can be formed in the absence of a clear cause and are called spontaneous AVFs which are rare with very few case reports in the literature (2-4). The anatomy of the fistula depends on the location in the body and where the causative factor was applied. Greater than 50% of traumatic AVFs happen in the lower extremity, and about one-third occur in the femoral vessels, while 15% take place in the popliteal vessels but AVF can occur at any site (5-8).

AVFs present clinically with progressively growing pulsatile mass on each respective site associated with or without complications including infection, thrombosis, aneurysm, hypertension, and heart failure demanding timely intervention (9).

Case report

History and examination

A 54-year-old female end-stage kidney disease patient on maintenance hemodialysis three times per week for the past 2 years after she was diagnosed to have pulmonary-renal syndrome for which she has been getting prednisolone 5mg orally daily since 2 years back. The pulmonary symptoms including cough with hemoptysis have improved with the prednisolone. She has an arteriovenous fistula (AVF) on the left arm used for hemodialysis currently and the AVF on the right arm is not functional. She also had toxic nodular goiter and hypertension for the past 10 years. Currently, she is on amlodipine 10mg orally per day, propylthiouracil (PTU) 100mg twice per day, erythropoietin alpha 4000 IU SC weekly, and prednisolone 5mg orally daily.

Her current presentation is progressively increasing pulsatile swelling over the right medial side of the midthigh which progressed over 7 months with numbness on the same side; it concerns her as its size started to increase over the past 3 months but it has not bothered her for the first 4months. She never had hemodialysis catheter insertion on the right femoral vein. There was no trauma, surgery, or venipuncture on the leg. There is no history of similar problems on another site. There is no history of smoking, alcohol drinking, or other substance use. There was no other chronic illness other than the mentioned ones. She had been treated for severe hospital-acquired pneumonia (HAP) for 1 week after she had been admitted for intervention for which parenteral antibiotics were given for 7 days.

On physical examination: she is well-looking and well-nourished woman with blood pressure, heart rate, respiratory rate, and oxygen saturation of 130/80, 80, 24, and 96% respectively. S1/2 was well heard and there was no murmur; there was a matured arteriovenous fistula (AVF) with palpable thrill on the left cubital

area and some on the right arm. There is an 8 - 9cm length pulsatile mass on the medial aspect of the thigh with palpable thrill.

Investigation and treatment

Complete blood count (CBC), HGB ranges from 8.4g/dl to 10g/dl with MCV of 82 + 5 but normal white blood cell and platelet count. Her liver function test (LFT), serum sodium, potassium, chlorine, ionized calcium, and phosphorus are normal. Her stable creatinine is about 4.5mg/dl – 5.5mg/dl with eGFR < 10ml/min/1.73m^2. Ferritin is 466ng/dl. Echocardiography shows mild concentric left ventricular hypertrophy (LVH) with preserved biventricular systolic function. Duplex arterial study of lower extremity report shows right middle superficial femoral artery (SFA) and superficial femoral vein (SFV) fistula with aneurysmal dilation and partial peripherally located thrombus. Computed tomography angiography (CTA) shows right SFA and SFV fistula with mild aneurismal dilatation at the AVF site (Figure 1).

After a diagnosis of spontaneous AVF was made, she was admitted to the vascular surgery ward while hemodialysis continued where the open surgical repair was done, the above medications continued (prednisolone was changed to hydrocortisone for 3 days).

Outcome and follow-up

After the repair was done, the patient was discharged with improvement to continue the chronic follow-up and hemodialysis. There was no other complication she developed during hospitalization.

Discussion

Systemic arteriovenous fistulas (AVF) are rare but correctable vascular abnormalities usually occurring following catheterization procedures, surgery, trauma, or aneurysms; Spontaneous fistulas have occasionally been described (10). There are cases reports of spontaneous arteriovenous fistulas on different vessels in the absence of triggering cause, subclavian artery and vein(10), superficial femoral artery and vein (11), left common iliac artery and vein (12) and popliteal artery and vein (4). The cause of spontaneous AVF formation may remain unknown and may need further study. Causes of AVF can be categorized irrespective of the vessel involved (Figure 2) for a simplified approach. Spontaneous arteriovenous fistulas are rare in clinical activity with very limited reports in the literature but it is crucial to diagnose it promptly to prevent further complications including complications including aneurysm, thrombus formation, and limb ischemia.

There has been a case report of spontaneous superficial femoral artery to femoral vein fistula in a 71-year-old female patient known to have multiple sclerosis in the background after her presentation with acute limb ischemia (11). There is a report of AVF in the right lower limb following HIV arthritis (3). Spontaneous right leg popliteal AVF had also been reported in a 79-year-old female where the cause remained unclear (4). The patient presented in this article had chronic kidney disease (CKD) on the background of hemodialysis (HD) for 2 years. The clinical correlation between CKD and/or HD remains unknown but the CKD, HD, uremia, and vasculopathy genes may contribute to the formation of AVF through different mechanisms including vascular shear stress force, blood stasis, and cellular immunity dysfunction or their synergy (13, 14). In conclusion, spontaneous arteriovenous fistula (AVF) could occur as sequelae of chronic kidney disease or hemodialysis but other common causes need to be excluded. Though there is a report of spontaneous AVF, generally AVF needs intervention (5, 6, 15).

Conclusion : spontaneous arteriovenous fistula could occur as sequelae of chronic kidney disease or hemodialysis but other common causes need to be excluded

Abbreviations

AVF Arteriovenous fistula

CKD Chronic Kidney disease

CTA Computed tomography angiography

HD Hemodialysis

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Author contribution

Authors were involved in the preparation, revision of the manuscript, and management of the patients

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Availability of data and material

All data sets on which the conclusion of the cases for this study are based are available as a medical record document and are available from the corresponding author on reasonable request from the editor

Declarations

Ethics approval and consent to participants

The institution doesn't require ethical approval for the publication of a case report and case series.

Consent for publication

Written informed consent was obtained from the patients. A copy of the written consent is available for review by the editor-in-chief of this journal.

Conflict of Interest

There is no potential conflict of interest concerning the research, authorship, and /or publication of this article.

Authors

Dr. Getasew Kassaw Alemu : Conceptualization, Data curation, Formal analysis, Investigation Writing – original draft, **Dr. Addisu Melkie Ejigu** : Resources, Supervision, Validation, Visualization, Writing – review & editing,**Dr. Beniam Yohannes Kassa** , Investigation, Resources, Writing – original draft, Writing – review & editing.

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