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Management of congenital arteriovenous fistula of the brachial artery

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ABSTRACT

Congenital AVF (arteriovenous fistula) is a rare vascular malformation that can occur anywhere in the body. Large and medium-sized congenital AVFs are extremely rare. Since clinical manifestations are not very specific, the patient's presentation could range from asymptomatic fistula to life-threatening congestive heart failure. Although embolization can be used as an alternative treatment for AVF, surgery is still the preferred method. A case of a 28-year-old male with a congenital AVF between the brachial artery and brachial vein presented with heart failure that was treated surgically is reported here.

Keywords: AVF, Congenital fistula, brachial-brachial fistula, arteriovenous fistula, vascular case report.

1. INTRODUCTION

An arteriovenous fistula (AVF) could be identified as "a vascular abnormality in which there are one or more direct or indirect communications between an artery and a vein without any intervening capillary bed" (Coursley et al., 1956). AVFs can exist almost anywhere in the body, depending on the etiology. Which could be divided into acquired or congenital. Acquired fistulas can be divided into surgically created or secondary to trauma, whether accidental or iatrogenic (Jayroe & Foley, 2021) Congenital large- and medium-sized AVFs are uncommon, despite the complex embryologic development. Congenital large and medium-sized AV malformations are estimated to be 0.08-1% of the population (White et al., 2016). Congenital AVF clinical manifestations are not very specific as the patient could have an asymptomatic fistula and could present as life-threatening congestive heart failure (El Youbi et al., 2022) Herein, we report a 28-years-old male patient with a congenital AVF between the brachial artery and the brachial vein in the arm presenting with HF Symptoms treated surgically.

2. CASE PRESENTATION

A 28-years-old male known case of Colloid cyst complicated by hydrocephalus, quadriparesis, urine incontinence and stool incontinence. That was resected at the age of 15, with full recovery of the complications. 2 months

prior to presentation, he woke up with shortness of breath, tachycardia and palpitations on/off not related to exertion, no aggravating or alleviating factors. Seen in his local hospital and got diagnosed with DCM (Dilated Cardiomyopathy), medications were given leading to improvement with no further attacks.

The patient was started on: Aspirin 81 mg OD, atorvastatin 20 mg OD, carvedilol 6.25 mg OD, furosemide 40 mg OD. The primary care physician referred the patient to our department after an incidental finding of a strong thrill in the right arm during examination. With the impression that the HF (Heart Failure) is secondary to high cardiac output caused by right arm fistula.

Investigations

Duplex of the right upper limb was done showing no sign of stenosis and triphasic waves in all arteries and an arteriovenous fistula between the brachial artery and brachial vein. Diagnostic angiography of the right upper limb was done which revealed: Fistula at the antecubital fossa between the brachial artery and brachial vein. The brachial artery was duplicated in mid-arm and then reunited in the antecubital fossa (Figure 1).

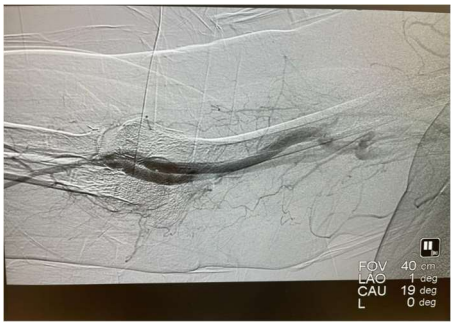

Figure 1 Diagnostic angiography image of the fistula between brachial artery and vein prior to surgery.

Treatment

Open ligation of the AVF was done via a lazy S incision in the antecubital fossa with ligation of all connected veins to the artery (Figure 2).

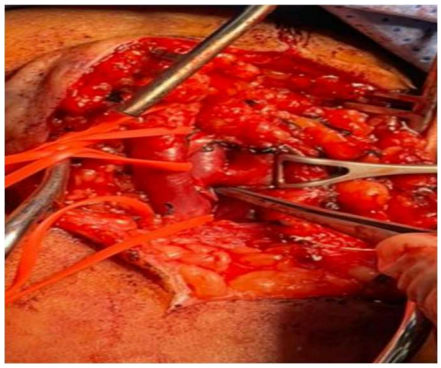

Figure 2 The site of communication of the fistula prior to ligation.

Completion angiogram was done and revealed good results with the ligation of the AVF (Figure 3).

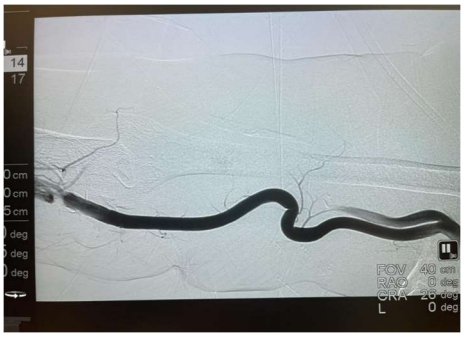

Figure 3 Diagnostic angiography image of the site of the ligated fistula after surgery.

3. DISCUSSION

Arteriovenous fistulas (AVF) are a rare vascular malformation. AVFs could be either acquired or congenital. Congenital AVFs can exist almost anywhere in the body. The anatomy of the fistula depends on its location in the body (Coursley et al., 1956; El Youbi et al., 2022; Jayroe & Foley, 2021; White et al., 2016). Clinical manifestations of patients with AVF are not specific and can vary from an asymptomatic fistula to life-threatening congestive heart failure. HF is a rare complication of AVF and it has been reported in other case reports (Hartley et al., 2020; Young et al., 1998).

Duplex Ultrasound, if the lesion is amenable to duplex interrogation, then it will be useful to diagnose arteriovenous abnormalities. This investigation, as with others, has its own advantages and disadvantages. These advantages include that it is a noninvasive investigation that doesn't expose the patient to any contrast or radiation and could be repeated as needed. The main disadvantage is that it is highly operative dependent, it also depends on the area of the lesion as it may be time consuming or affected by other factors.

Magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) are the studies of choice for the assessment of congenital AVMs. These tests are noninvasive and will help in planning for the surgery by showing anatomical details greatly as they can be reconstructed to give a three-dimensional image. The major disadvantage of this test is that its time consuming as it sometimes may last for over 2 hours, it also uses gadolinium contrast agent which is associated with a severely debilitating disease known as nephrogenic systemic fibrosis.

Computed tomography (CT) and CT angiography (CTA) are non-invasive imaging modality that are used to evaluate AVM. As with the MRA, the CTA can be used to evaluate the anatomy of the AVM and help in planning for surgery and it shows anatomic details not always attainable with MRI. However, the main disadvantage is that it requires exposure to ionizing radiation (Buda & Johanning, 2005). Duplex Ultrasound was the chosen modality for the initial investigation due to the location and the availability of competent operators.

Because of the small diameter of the arteries in the arm, the relative scarcity of genuine aneurysms in these arteries and the fact that these arteries are easily accessible, open surgery remains the primary treatment option (Sexton & Ricotta, 2011).

4. CONCLUSION

The development, congenital large- and medium-sized AVF are rare. The clinical manifestations are not very specific, the patient could present with asymptomatic fistula as well as life-threatening congestive heart failure. The aim of AVF treatment is to occlude it while leaving the peripheral hypervascularization without shunt and it could be done by a well-conducted surgical treatment or by embolization.

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Author Contributions

All authors have participated in collecting the data, writing the article and revising it critically for publication. All authors have read the final version of the manuscript and approved it for publication.

Ethical approval

Not applicable

Informed consent

Inform consent was obtained from the patient for publication of this report and accompanying images.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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