Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/20250
DOI URL: http://dx.doi.org/10.21474/IJAR01/20250

RESEARCH ARTICLE

MANAGEMENT OF TRAUMATIC ARTERIO-VENOUS FISTULAS IN THE LOWER LIMBS-A CASE SERIES

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Manuscript Info

Manuscript History
Received: 14 November 2024
Final Accepted: 16 December 2024
Published: January 2025

Abstract

Traumatic arterio-venousfistulas (AVF)are most commonly seen after a penetrating trauma causing direct arterial injury and often associated with bone fractures. Gunshot injuries are an important cause for non-iatrogenic traumatic AVFs. Extremities especially the lower limbs are most commonly affected sites. Most of the fistulas are small and resolve spontaneously, however larger fistulas with significant flow diversion develop symptoms. About two third of the patientswith fistulas present early while the rest have delayed presentation. We present a case series of five cases of traumatic AVFs, and their management .

Introduction:-

Arterio-venous fistulas (AVF) are abnormal connections between arteries and veins. AVFs are mostly surgically created for venous access,traumathe next common cause and congenital or genetic anomaliesbeing rare causes of AVF (1).Iatrogenic injury is the most often encountered traumatic cause of AVF while attempting for an arterial access in the groin (2). Traumatic AVF are 90% of the times due penetrating trauma causing direct arterial injury and often associated with bone fractures. Gunshot injury is an important cause in majority non-iatrogenic traumatic AVFsespecially in the lower limbs (3).Most of the fistulas are small and resolve spontaneously but larger fistulas with significant flow diversion develop significant symptoms and warrant intervention. About two third of these patients present early while the rest have delayed presentation (2) We present a case series of five cases of traumatic AVFs and how we managed them.

Methods:-

The present study is a retrospective study conducted at Christian medical college, Vellore using the hospital data management system and searching for traumatic arterio-venous fistulas in the lower limb from September 1st 2022 to August 31st 2024.

Results:-

There were a total of five cases of traumatic arterio-venous fistulas in the lower limb most common cause being a bullet injury (n=3) followed by trauma due to a road traffic accident (n=2).All cases had their inciting factor/injury more than 6 months prior to the presentation.

Symptoms :

The most common presenting complaint were dilated veins over the legs(n=5) ,discolouration(n=5) and non-healing ulcer over the gaiter's region(n=3).The first clinical diagnosis made in these patients was chronic venous

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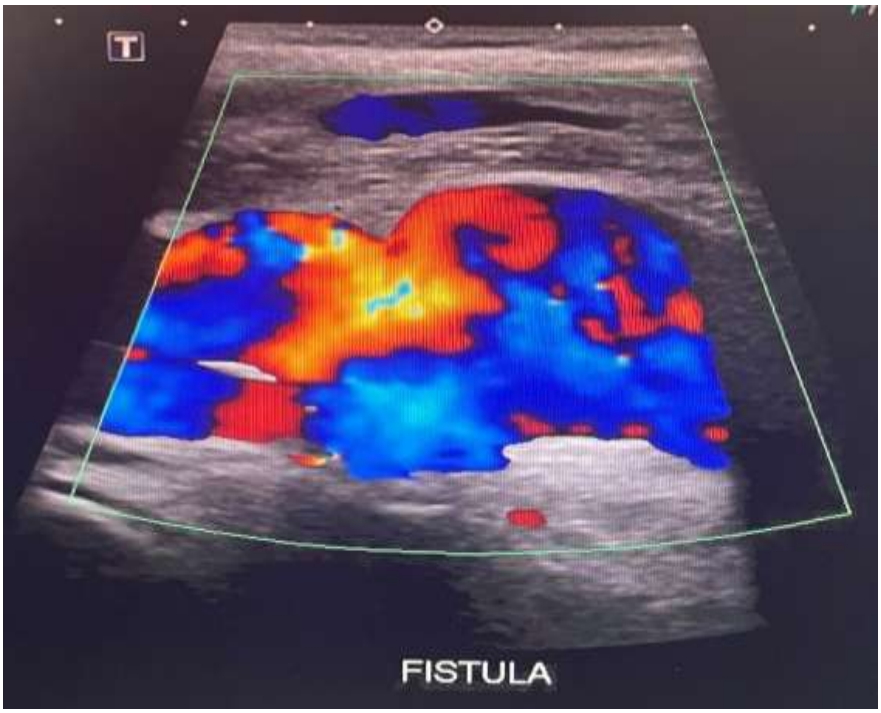
insufficiency.The most important clinical finding was thrill on palpation and bruit on auscultation over the dilated veins in all the patients in the series.

Investigations/imaging:

The first bedside investigation in all the cases was a duplex ultrasound which showed a pulsatile/arterial phase of flow in the veins. However a CT angiogram was done in all these patients to confirm the diagnosis, the size of the fistula and importantly to know the probable site of arterio-venous communication.



Duplex ultrasound at the site of arterio-venous fistula

CT angiogram showing filling of the IVC in arterial phase

Management:

All the cases in our series were managed surgically as they all had significant symptoms , one case was treated by open surgical repair and four cases by endovascular approach.

In the one case which was managed by open surgery, the fistulous communication was excluded by an interposition graft using a reversed saphenous vein as a conduit.

In rest of the four cases an endovascular approach using stent grafts to exclude the AV fistula was done.

DSA of the arterio-venous fistula in the mid leg

Exclusion of the AV fistula with a stent graft

Post-operative care: All cases recovered completely from their symptoms and all the three patients with ulcer have healed completely though one patient required a skin grafting. All patients were advised class -2 compression stockings and other edema preventive measures like manual lymphatic drainage and pneumatic compression therapy.

Discussion:-

Traumatic arterio-venous fistulas in the extremities, usually present with features of venous hypertension such as varicosities, pain, warmth and swelling.Limb size discrepancy can be presenting complaints in long standing cases. History of trauma particularly penetrating trauma even in the remote past should clue towards an AVF(3) Duplex ultrasound is the first line of imaging investigation. Low resistance flow in the feeding artery, communication between artery and vein, turbulence, and high-velocity flow at the fistula site and thick vein with high velocity flow are features of a AVF (4). CT angiography and MR angiography show early arterial phase contrast filling in veins. MR angiography has limited use in traumatic AVF due to retained particle and CT images are distorted due to metal artifacts (5). Selective angiography provides the most accurate anatomy of the AVF and hence is the gold standard investigation but it is invasive (6). Intervention is indicated in traumatic AVFs if they fail to regress spontaneously in two weeks(1).Open surgery in a traumatic arterio-venous fistula is a challenging one in view of multiple factors including-distorted tissue planes due to the previous trauma, excessive bleeding due to multiple engorged venous channels and difficulty to locate and isolate the fistula site.Endovascular approach has rapidly becoming the treatment modality of choice in these cases in view of less invasive nature of the procedure and availability of newer and more flexible stent grafts and other tools like coils, stent-grafts, cyanoacrylate glue (7). Open procedure is reserved only in selected patients. Untreated cases will have complications like venous hypertension with or without an ulcer, arterial insufficiency, high output cardiac failure, limb disparity and haemorrhage (8-10)

Conclusions:-

Gun-shot injuries are the most common cause for traumatic arterio-venous fistulas with extremities ,especially the lower limbs being frequently involved. Patients usually present late with symptoms of venous hypertension and secondary varicose veins. Careful history taking and clinical examination are crucial in diagnosis. Selective angiography with endovascular intervention is emerging modality of choice for its treatment.

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