

Leaking Pseudoaneurysm Post Brachiocephalic AV Fistula - A Case Report

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Abstract: A 43 years old female patient with history of end stage renal disease who had undergone left brachiocephalic AV fistula creation for maintenance hemodialysis presented to the casualty on postoperative day-20 (30/1/22) with spurting of blood from the fistula site since that morning. Past history-patient was a known case of chronic kidney disease that was on maintenance hemodialysis (2 cycles /week) and had undergone left brachiocephalic AV fistula creation on 10/1/22. On presentation this time with bleeding, her blood pressure was 80/50 mmhg, with pulse rate of 120bpm. After immediate control of bleeding with tight bandage, patient was stabilized and was examined. Then the patient was shifted to the emergency operation theatre and the repair was done.

1. Introduction

A well-functioning vascular access (VA) is a prerequisite in dialysis patients. Complications of VA are common and represent a major cause of hospitalization in haemodialysis patients with 36–39% of admissions related to dialysis access.

Of the many complications that may threaten the longevity of VA, aneurysms represent a significant challenge which threatens the both the arteriovenous fistula (AVF) and the patient.

An aneurysm in an AVF can be defined as an abnormal localized dilatation of the vessel and it can be classified based on extent of vessel wall involved as: true aneurysm or false (pseudo) aneurysm, based on location (arterial/venous/graft) and based on site (anastomotic/puncture site/native vessel and whole outflow vein).

The risk of rupture of small stable aneurysms is low as they are thick walled and covered with skin. Clinical concerns are raised when an aneurysm presents with a rapid increase in size, pain, thinning and degeneration of the overlying skin and/or infection. This situation can lead to rupture subcutaneously or a free rupture through the skin

If an aneurysm has ruptured or there is a risk of imminent rupture (skin ulceration and scab/infection), emergency ligation of the aneurysm is required. If the site is perianastomotic and involves the artery then reconstruction may be required. On occasions, the fistula may be salvaged but the priority in such situations is to prevent and control life threatening haemorrhage as flow volumes are high in aneurysmal VA.

2. Case Report

A 43 years old female who was a known case of chronic kidney disease with left brachiocephalic arterio-venous fistula creation done for maintenance hemodialysis presented to the casualty on postoperative day 20 (30/1/22)

with spurting of blood from the fistula site since that morning.

History of present illness:

Patient was apparently normal seven days back until she developed gaping of the wound following suture removal at the av fistula creation site followed by appearance of a small peanut sized cherry red swelling which gradually increased to a present size of 3*2.5 cm in the last 3 days.

The swelling ruptured spontaneously without history of any trauma with a sudden gush of blood with a loss of approximately 150 ml of blood and therefore they bandaged it with the cloth tightly as an emergency measure.

Past history

Patient was a known case of end stage renal disease (ESRD) stage 5 who was on maintenance hemodialysis for which left brachiocephalic AV fistula creation was done on 10/1/22

No history of diabetes/hypertension/coronary artery disease/cerebrovascular disease.

At this time of presentation patient was semiconscious with the following vitals.

Blood pressure: 80/50 mmhg

Pulse rate: 120bpm

SpO₂: 97% at room air

GRBS: 75mg/dl

Patient was immediately resuscitated until her vitals are stabilized along with the simultaneous application of appropriate pressure at AV fistula site to control the bleeding.

Later patient was referred to the CTVS (cardio-thoracic vascular surgery) department for further management.

Under CTVS attention, a tourniquet was applied above the site of the bleeding and the dressing was opened and the site was examined on examination (figure 1):



Figure 1: Wound at the time of presentation

A horizontal elliptical gaping of size approximately 3*2 cm present along the previous left brachiocephalic av fistula suture site (flexor region of the left elbow) with protrusion of cherry red swelling through the defect which was soft in consistency and pulsatile in nature.

- Left Radial Pulse: feeble
- Extremities: cold
- With capillary filling time: approximately 3 sec
- Allens test: negative

Provisional diagnosis:

Leaking pseudoaneurysm from previous av fistula repair site

There was no time for Doppler of the aneurysm as it was leaking. So the patient was shifted to the emergency operating room for the repair of leaking pseudoaneurysm.

Operative Procedure:

Under tourniquet control & local anesthesia with monitored anaesthesia care, brachial artery was exposed 3cm above the left elbow joint through a 3cm transverse skin incision. (figure 2)

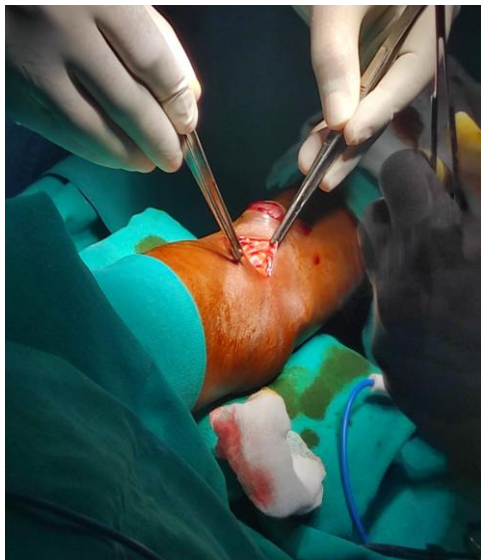


Figure 2: Exposure of brachial artery proximal to the pseudoaneurysm site and the control was achieved with silk (figure 3)



Figure 3

Then the pseudoaneurysm opened at the original AV fistula site, and the clots were extracted. (figure 4)



Figure 4: Clots extracted from the pseudoaneurysm site

Proximal and distal control of brachial artery was achieved at the fistula site and the fistula was disconnected and the venous ends were tied.

Pseudoaneurysm floor was recognized by the old prolene stitch.

Then the brachial artery was repaired with 6-0 prolene in 2 layers.

After the repair, good capillary filling was present at the nail bed.

Spo2: 99 % after releasing proximal clamps

Proximal clamp time: 25 minutes

Hemostasis achieved

Cleaning of wound done with betadine

Wound was closed in layers (figure 5)



Figure 5: Appearance after the closure of proximal brachial artery exploration site and the closure of previous av fistula site

Finger & wrist moments were present after the completion of procedure.

Post operative doppler done which showed good flow at the distal radial artery.

3. Discussion

In patient with end stage renal disease, hemodialysis has to be performed until the renal transplantation is performed. Therefore arteriovenous fistula is often created to provide vascular access for hemodialysis in chronic renal failure patients.

Arteriovenous fistulae are prone to developing their own complications which include the formation of an aneurysm. Long-standing high blood flow rates through an AV fistula results in shear forces that cause damage to the elastic fibers of the internal elastic lamina. The high flow rates and the resulting shear forces from repeated dialysis treatments limit time for healing, thereby causing destruction of the venous wall and aneurysm formation.

Aneurysm formation may also occur because of repeated punctures that can weaken the vein wall in some patients. The incidence of aneurysm formation is approximately 5% to 6%. These aneurysms are generally a mixture of true and pseudoaneurysms.

Microscopic examination of the true aneurysm demonstrates presence of all three layers of vessel wall along with wall thickening, extensive collagen infiltration with marked derangement of the wall architecture and is frequent with AVF.

In contrast, pseudoaneurysm represent a focal disruption of the vessel wall resulting in collection of blood confined by neointimal or fibrous tissue, reflect leaking of blood outside the lumen perioperatively as a result of surgical technique or occur later as a complication of infection or due to repeated cannulation in the same area of the arteriovenous graft (AVG).

Symptoms of aneurysms and pseudoaneurysms are similar and can include one or more of the following:

- Localized enlargement of the vein which is visible to the eye and may progressively grow larger.
- Increased blood flow through the fistula or graft
- Thinning of the skin over the fistula or graft
- A shiny appearance of the skin over the fistula or graft
- Pain

A ruptured aneurysm or an aneurysm that is about to rupture is considered an emergency.

It results in rapid blood loss which will lead to immediate collapse of the patient. Therefore it requires immediate stabilization along with parallel control of bleeding followed by the repair of the ruptured aneurysm.

4. Conclusion

Pseudoaneurysms are usually rare after any vascular surgery, however pseudoaneurysm formation can occur in an arteriovenous fistula surgery for patients on hemodialysis for chronic kidney disease.

The possible reason (predisposing factors) could be;

- 1) Patients of chronic kidney disease usually have high systolic blood pressure.
- 2) These patients usually had multiple venipunctures for blood sampling leading to the presence of thrombosed and the poor quality veins.
- 3) They have poor calcium (Ca²⁺) metabolism and hence they have calcific and rigid peripheral arteries.
- 4) Most of them are diabetic with associated atherosclerosis and microangiopathy.
- 5) These patients also have tissue edema as a result of fluid retention and hence they have poor tissue healing.
- 6) They are also redundant and usually have poor mobility because of inherent kidney disease.

Therefore these surgically created access arteriovenous fistulas for haemodialysis are usually associated with multiple complications.

Among them, the ruptured pseudoaneurysm being the most life threatening and dreaded of all resulting in possible fatal hemorrhage. The incidence of aneurysmal rupture of the AVF can be up to 5.3%.

Proximal arteriovenous fistula has higher incidence of aneurysmal complications than distal ones. Ligation of the brachial artery which was a 'grey zone' of unpredictable prognosis has yielded good results and can be safely performed in desperate situations with low complication rates.

The management of this rupture of pseudoaneurysms from AV fistula site warrants emergency procedure.

And it can be dealt with by several techniques such as surgical ligation and resection, stent and perivascular metal meshes.

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