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Giant Pseudoaneurysm Complicating Arteriovenous Fistula in A Hemodialysis Patient

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Abstract

Arteriovenous fistula (AVF) is one of the recommended vascular access sites in chronic hemodialysis patients due to their low rate of complications. Development of pseudoaneurysms is among the documented complications in AVF utilization. We present a case of a 50-year old male, with chronic kidney disease on long term hemodialysis who presented with a pseudoaneurysm of radiocephalic AVF that was surgically repaired with an uneventful postoperative

Introduction

Vascular access with minimal complications provides repetitive access site in chronic kidney disease patients on renal replacement therapy. The gold standard vascular access for chronic hemodialysis patients is AVF rather than catheters because of worse complications and poor survival in the later [1].

AV fistulas are preferred over arteriovenous graft (AVG) because AVF has better long-term patency, lower orbidity, mortality and need for intervention when compared to AVG [2,3]. AVF are commonly created by anastomosing the radial artery to the cephalic vein (radiocephalic fistula), brachial artery to the cephalic vein (brachiocephalic fistula) or to basilic vein (brachiobasilic fistula) and ulnar artery to basilic vein (ulnar basilic fistula). A number of complications may develop with AVF. The most common complication is vein thrombosis [4]. Other complications include true or pseudoaneurysm [5], extremity swelling (giant fistula), infections, neuropathy and hand ischemia due to steal syndrome or thromboembolism [6]. The end result of these complications is loss of the hemodialysis venous access and morbidity secondary to the specific complications. Therefore, it is important to monitor the patient for these complications and treat them early.

Case Presentation

A 50-year-old male from Zanzibar with a history of hypertension and stage 5 chronic kidney disease on regular hemodialysis via a brachiocephalic arteriovenous fistula for more than three years was seen at our health facility presenting with a one-week history of swelling over the fistula puncture site on the left arm (Figure 1). He had no pain, fever or local neurological symptoms.

Examination revealed normal left radial and ulnar pulses with a non-tender, 5cm circular, expansive and pulsatile swelling. Color doppler ultrasonography showed a pseudoaneurysm of the left cephalic vein and a cubital cephalic vein thrombus (Figure 2).

CT-Angiography showed a large contrast filled outpouching arising from the AV fistula on the anterolateral aspect of the elbow joint measuring 4.9 x 3.8 x 3.4 cm in SI x AP x TR extent (Figure 3).

The patient underwent surgical repair in which a pseudoaneurysm of median cubital vein 5cm cephalad to AVF anastomosis was noted. Proximal and distal ligation of the vein was done with a complete aneurysm resection that was followed by an uneventful post-operative period (Figure 4).

Figure 1: Swelling over the fistula site

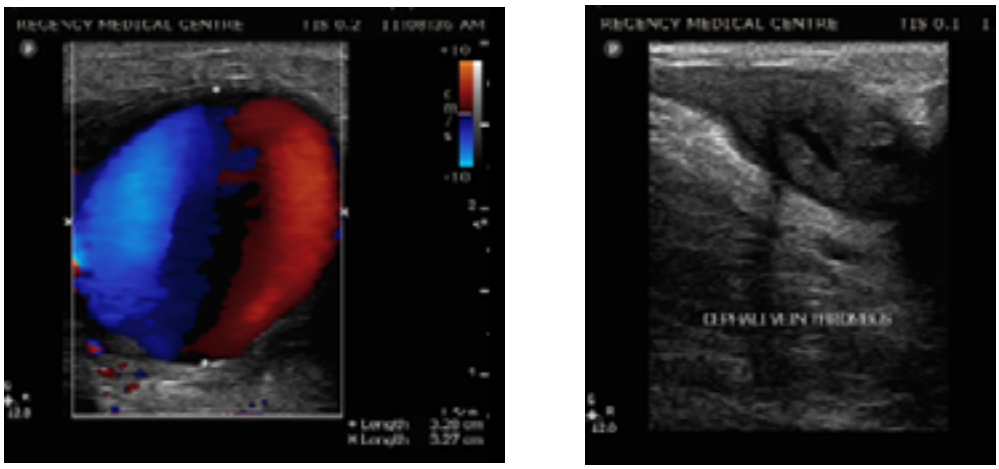

Figure 2: A. Duplex ultrasonography illustrating the yin-yang sign, caused by swirling motion of blood within the pseudoaneurysm cavity. B Cephalic vein thrombus

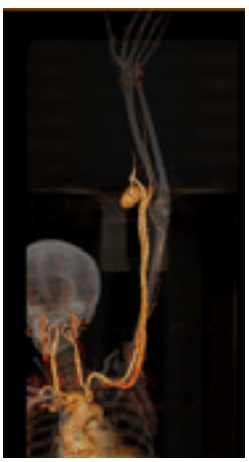

Figure 3: Three-dimensionally reconstructed CT angiography scan. A large outpouching from AV fistula (brachial artery and cephalic vein) is seen on the anterolateral aspect of the left elbow joint suggestive of pseudoaneurysm

Figure 4: Surgical repair of pseudoaneurysm

Discussion

AVF in the upper extremity are the preferred vascular access for hemodialysis patients, with up to one-third of patients developing complications like thrombosis, stenosis, aneurysms and infections [7]. False or pseudoaneurysms can be thought of as hematomas communicating with the lumen of the access, contained by fibrous tissue but devoid of endothelium or vascular wall structure [5]. They usually develop as a result of repeated puncture of cannulation site, which is possibly how our patient developed the pseudoaneurysm. Using buttonhole cannulation techniques may reduce the incidence of aneurysmal development, as described in one series [8]. True aneurysms are more difficult to define but they are abnormally dilated regions of a blood vessel containing all layers of the vascular wall. The etiology is unclear but proposed etiologies include increased venous pressure due to a central venous stenosis, repeated punctures at same site and in connective tissue disorders [9-11]. A high incidence is also reported in Alport's syndrome [12].

The incidence of aneurysms and pseudoaneurysms as a complication of AV fistulas ranges from 5% to as high as 60%, with majority occurring in the upper arm [6,9,13-15]. If left untreated, AV fistula aneurysms/ pseudoaneurysms can lead to skin breakdown, bleeding, rupture, thrombosis, poor flow resulting in inadequate dialysis and infection [10].

The effective combination of noninvasive radiological examination using duplex ultrasonography and CT angiography has been regarded as gold standard in detecting and mapping of AV fistula vascular complications in end-stage renal disease patients [16,17]. The presence of yin-yang pattern by duplex ultrasonography facilitates the diagnosis of AV pseudoaneurysm [18,19].

Kidney Disease Outcome Quality Initiative (K-DOQI) guidelines recommend that AVF aneurysms should not be cannulated and intervention should be performed [20]. Possible treatment options include ligation, placement of prosthetic interposition and use of percutaneous stent grafts [10]. Small pseudoaneurysms may be amenable to thrombin injection [21] or ultrasound compression [22].

Conclusion

We reported a case of giant pseudoaneurysm in an arteriovenous fistula vascular access that arose due to repeated cannulation in a patient on chronic hemodialysis. Diagnosis was confirmed with duplex ultrasonography combined with CT angiography. The aneurysm was surgically repaired with no complications.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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