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Review article – *Special issue: Panvascular medicine*

Contemporary management of arteriovenous haemodialysis fistula aneurysms

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ABSTRACT

Introduction: Aneurysms develop in up to 60% of patients with an arteriovenous fistula. Frequently arteriovenous fistula aneurysms are asymptomatic with the presence of symptoms potentially heralding the development a significant complication. A range of surgical and endovascular techniques are available to manage arteriovenous fistula aneurysms but clinical guidelines regarding the appropriate application of each approach are lacking. This review will examine the presentation, indications for treatment and management options for arteriovenous fistula aneurysms.

Methods: A non-systematic review of published literature in the following databases was performed: Medline, Science Direct, Scopus and the Cochrane Database of Systematic Reviews. Publications relating to arteriovenous fistula aneurysms and treatment options between January 1973 and June 2016 were considered for inclusion. Articles pertaining to aneurysms and pseudoaneurysms of prosthetic arteriovenous access sites were excluded. The literature search was supplemented by a review of the author's experience.

Results: Arteriovenous fistula aneurysms are defined by an expansion of the intimal, medial and adventitial layers of the vessel wall to a diameter of more than 18 mm. Treatment of arteriovenous fistula aneurysm is indicated if there is pain, risk of haemorrhage and flow disturbance (either low or high flow). When deciding on whether to actively treat or observe, the diameter of the arteriovenous fistula aneurysm and cosmetic concerns should not be considered in isolation. Commonly applied approaches for treating arteriovenous fistula aneurysm are resection with interposition, remodelling and insertion of an endovascular stent graft. Although various surgical and endovascular options have been reported, there are no prospective studies directly comparing techniques.

Conclusions: Asymptomatic aneurysms can be safely observed. Due to a lack of sufficient evidence base, no individual management strategy can currently be recommended for aneuryms requiring treatment. Finally, symptomatic aneurysms, mainly which are in the high risk of bleeding, should be indicated for the treatment as soon as possible.

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Contents

Introduction

Renal replacement therapy for patients with end stage renal failure comprises haemodialysis, peritoneal dialysis and renal transplantation. For haemodialysis to commence a permanent arteriovenous access (AVA) must be obtained. AVA can be achieved with either an arteriovenous fistula (AVF) or an arteriovenous graft (AVG). Where feasible an AVF is favoured because of a reduced risk of infection and higher patency rates [1].

An AVF can be complicated by thrombosis, stenosis, steal syndrome, low or high flow and arteriovenous fistula aneurysm (AVFA). In comparison to other AVF complications, aneurysm formation is not uncommon but it has a poorly described evidence base.

Definition

A true aneurysm has been defined by The Society for Vascular Surgery as a focal dilatation of intimal, medial and adventitial layers of the vessel wall [2]. The most recent Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines defined a true aneurysm as an abnormal blood-filled dilation of the blood vessel wall secondary to disease of the vessel wall [1].

In contrast, a pseudoaneurysm is defined by The Society for Vascular Surgery as a focal dilatation of the vessel wall by neointimal and fibrous tissue [2]. The description of a pseudoaneurysm by K/DOQI is a vascular abnormality that appears like an aneurysm but is lined by external fibrous tissue as opposed to a true vessel wall [1]. Guidelines from the Vascular Access Society regarding the definitions of aneurysms and pseudoaneurysms have not yet been formulated [3].

In terms of aneurysm size, current guidelines offer no strict criteria to define and classify AVFA. The suggested diameter of a usable AVF is 6 mm in the K/DOQI guidelines [1], which is three times greater than the diameter of a typical autologous vein [4,5]. In the published literature, the reported sizes of AVFA range between 19.5 and 80 mm, which encompass a more than threefold expansion of the advocated diameter of an AVF vein. As such, Valenti et al. [6] defined AVFA as any segment of vein with a diameter greater than 18 mm and Balaz et al. [7] proposed a definition of AVFA as a dilatation of all three vein layers to at least a diameter of 18 mm. This denotes an increase of the diameter of a vein in a maturated AVF by three times (3×6 mm = 18 mm).

Classification

To our knowledge, there are just a couple of classification systems for AVFA that have been reported to date: one by Valenti et al. [6] constructed from their own clinical findings and one by Balaz et al. [7] based on a review of published evidence.

Depending on the shape of the aneurysm Valenti et al. [6] categorised AVFAs into four different groups:

Type 1: Without a ''camel hump''
- 1a: dilatation lengthways along the vein; the vein is uniformly dilated from the site of the arterial anastomosis along the majority or all of its length. The configuration is akin to a hosepipe.
- 1b: An aneurysm after the anastomosis; the vein is dilated proximally. This type of aneurysm is usually within 5 cm of the arterial anastomosis.

Type 2: With a ''camel hump''

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