Surgical repair of saccular aneurysms of an arteriovenous fistula for hemodialysis using aneurismorrhaphy technique

Correção cirúrgica de aneurismas saculares de fistula arteriovenosa para hemodiálise utilizando a técnica de aneurismorrhafia

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Abstract

One of the most common complications of arteriovenous fistulas (AVF) is aneurysm formation due to weakening of the venous wall after repeated punctures. Its rupture causes severe bleeding that can lead to death. We report the case of a patient with two AVF saccular aneurysms treated by aneurismorrhaphy. The technique and the postoperative follow-up are presented in detail. Aneurismorrhaphy is a good option to repair the AVF wall when the aneurysmal segment is short, thus avoiding the placement of prosthetic grafts and the performance of two anastomoses.

Keywords: Arteriovenous shunt, surgical; aneurysm; renal dialysis.

Introduction

Patients with chronic renal failure use central venous catheters or arteriovenous fistulas (AVF) as vascular access for hemodialysis. An AVF is close to an ideal access. The use of native veins for performing an AVF results in better patency rates, and the incidence of complications is lower, when compared to a prosthesis¹. Therefore, it is important to extend the AVF patency by endovascular or conventional surgical procedures. Thrombosis, infection, aneurysmal formation and stenosis are the most common complications related to AVF. Aneurysms are defined as fusiform or saccular dilatations with a diameter three times larger than that of the upstream and downstream segments of the access site². They are usually formed by weakening of the venous wall resulting from repeated punctures³. Most of the time, the problem is considered to be merely cosmetic and one has only to avoid further punctures in the aneurysmal segment³. Repair is indicated in the presence of pain, infection, limited puncture sites, skin erosion, rapid expansion and low flow associated with stenosis¹,³. Currently, several procedures are used to repair AVF aneurysms: aneurismorrhaphy, resection with prosthetic interposition, stent graft implantation and combined procedures.

This paper addresses the case of an AVF aneurysm treated by aneurismorrhaphy. The Ethics Committee of

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Hospital Universitário Onofre Lopes (Universidade Federal do Rio de Janeiro) has determined that, in case reports, only the informed consent forms signed by the patients are necessary.

Case report

A 54-year-old female patient with hypertension, lupus and chronic renal failure for 10 years, has been in hemodialysis treatment for 5 years through a right radiocephalic AVF. Six months before admission, she noticed an increase in the AVF diameter near the wrist and local pain. AVF flow during hemodialysis sessions was satisfactory, above 600 mL/minute.

Upon physical examination, she presented two saccular AVF dilatations near the anastomosis, both measuring about 2 cm. The skin overlying the aneurysm was very thin and the aneurysms pulsatility was quite visible. The AVF had a good thrill.

The patient underwent brachial plexus block. A longitudinal incision directly over the main axis of the AVF was made to avoid the aneurysms. A careful dissection was performed to release the aneurysms from adhesions to the subcutaneous tissues, in order to because the vein walls were very thin, and to prevent damage to the extremely thin skin. After isolating the aneurysms and the proximal and distal segments of the AVF, the patient was given systemic heparin (5,000 UI) (Figure 1).

The AVF was clamped proximally and distally to the aneurysms in order to interrupt the blood flow. Satinsky clamps were placed at the base of the aneurysms close to the normal segment of the AVF, and then the aneurysms were resected.

The defects on the wall resulting from aneurysm resection were carefully observed and small additional areas were resected (Figure 2). The vein wall was sutured with 6-0 polypropylene. The AVF presented good thrill and, after hemostasis, the skin was sutured with a 4-0 nylon (Figure 3).

The surgical wound healed uneventfully. During this period, hemodialysis through a catheter was not necessary, because the AVF could still be punctured on the forearm and arm, away from the operated site.

After a 2-year follow-up, the AVF remains patent and there is no sign of aneurysm recurrence in the area, or formation of other aneurysms.

Figure 1. Two radiocephalic arteriovenous fistulas with two saccular aneurysms near the anastomosis.

Figure 2. Site after aneurysm removal. The surgical nipper touches the defect in the arteriovenous fistula wall resulting from resection.

Figure 3. Aspect after aneurysmorrrhaphy.
Discussion

The rupture of an AVF aneurysm causes severe bleeding that may lead to death, and it is more likely to occur when there is thinning of the overlying skin, rapid aneurysm growth and involvement of the anastomosis.2,3

Currently, repairing AVF aneurysms is indicated based on KDOQI recommendations.4

Our patient had an AVF aneurysm associated with local pain and thinning of the skin overlying the aneurysms, and adjacent to the anastomosis.

One of the recommended techniques for aneurysm repair is application of the “exceeding” (redundant) vein wall, which precludes the need for resection, according to Lo and Tan.5

Surgical follow-up of pseudoaneurysms and AVF true aneurysms shows acceptable primary patency after the intervention, so it is justified, according to Georgiadis et al.6 The authors also report that the best technical results are observed in AVF aneurysms with native veins, true aneurysms, forearm aneurysms and when there are one or two aneurysms.

Stent grafting is another option of treatment, but it is usually indicated for pseudoaneurysm repair – not true aneurysms – and mainly for AVF with prosthesis.7,8

Prosthetic interposition after aneurysmorraphy is also an alternative that may prevent the development of intimal hyperplasia, according to Balaz et al.9 Aneurysmorraphy may also be performed by resection of the overlying skin, especially if it is damaged. In cases of associated stenosis, the affected segment may undergo resection and reconstruction by end-to-end anastomosis.2

According to Kouvelos et al.10 endovascular and conventional surgical procedures may also be used to treat AVF with prosthesis on the thigh with aneurysm and associated stenosis.

In our case, the aneurysm had one saccular dilatation on each side of the AVF in a relatively short extent. After resection, the good macroscopic aspect of the vein wall and the short extension that required suturing led us to choose the lateral aneurysmorraphy technique. An alternative would be the resection of the entire segment followed by prosthetic interposition.

Wall suturing is a good alternative to repair small aneurysms, for it avoids the use of prostheses and performance of two anastomoses.

References


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