ELSEVIER

Patients Characteristics and Outcome of 518 Arteriovenous Fistulas for Hemodialysis in a Sub-Saharan African Setting

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Background: To present the particular aspects of arteriovenous fistula (AVF) for hemodialysis in sub-Saharan Africa in terms of patients' characteristics, patency and complication rates, as well as factors influencing them.

Methods: From November 2002 to November 2009, 518 fistulas were constructed on adults. Demographic data, patency, and complications were analyzed. The association between age, sex, and comorbidities (HIV, hypertension, diabetes) on one hand and complications as well as AVF patency on the other was sought.

Results: Males represented 73.7% of the patient population, and the mean age of the population was 45.3 years. As far as etiologies of end-stage renal disease (ESRD) and comorbidities are concerned, chronic glomerulonephritis was the leading cause of ESRD (134; 25.9%), followed by hypertension (22.3%), although prevalent in 83.2% of patients, and diabetes (20.1%), although prevalent in 22.2%. No cause for the ESRD could be identified in 89 patients (17.2%). Only 20.64% had AVF as the initial vascular access. The main types of AVF constructed were radiocephalic (68%) and brachiocephalic (24.9%). The median follow-up period was 275 days. The cumulative patency rate at 1 year and 2 years was 76% and 51%, respectively. Altogether, 188 complications occurred in 16% of the AVFs. Aneurysms, failure to mature, and thrombosis were the most frequent complications occurring in 27.65%, 14.89%, and 10.63% of cases, respectively. The management options for the complications included the creation of a new access for 63 complications (33.51%) and nonoperative management in 44.14% of the cases. We found no adverse effect of comorbid factors like diabetes mellitus ($\chi^2 = 3.58$, $P > 0.05$) and HIV-positive status ($\chi^2 = 0.64$, $P > 0.05$) on the complications rate.

Conclusion: According to our patients' characteristics, there is a possibility of constructing AVF on nearly every hemodialysis patient with a good outcome.

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INTRODUCTION

Since the advent of hemodialysis in 1944, and the subsequent use of arteriovenous fistulae (AVFs) as a long-term vascular access,[1] there has been a drastic increase in both the availability of hemodialysis and long-term survival of patients with chronic renal failure. This has resulted in permanent vascular access procedures in dialysis (AVFs, prosthetic arteriovenous grafts, and autologous vein grafts) becoming the most common operations performed by vascular surgeons. Because of data illustrating superiority of AVF in terms of patency rates, lower complication rate, and lower costs, it has been recommended in countries such as United States that AVF should be constructed in at least 50% of patients on chronic hemodialysis.[2] This goal has even been raised to 65% in recent guidelines.[3]

In developing countries and particularly in sub-Saharan Africa, there are very few reports concerning vascular access surgery[4,5] compared with North Africa[6,7], as hemodialysis is not yet widespread in these areas. In Cameroon, since the year 2000, hemodialysis is accessible to many. Therefore, construction and maintenance of vascular accesses has become a challenge.

In this report, we present the particularities of AVF for hemodialysis in our setting. Specifically, we sought to audit the patients' characteristics, the complications, patency rates, and to determine factors that affect these outcomes. To the best of our knowledge, this is the largest published report concerning vascular access surgery in sub-Saharan Africa.

METHODS

We retrospectively evaluated upper-limb AVFs performed between November 2002 and 2009 at the Yaoundé General Hospital—a university teaching hospital with most modern facilities for vascular surgery and hemodialysis—in Cameroon. The cases included in the study were consecutive adult patients with end-stage renal disease (ESRD) referred for the creation of AVF (8 patients aged <16 years were not considered for this study). Primary (firstly created) and secondary (all subsequently constructed) AVFs were included for evaluation. Outpatient and inpatient hospital records were reviewed. All the patients underwent preoperative general and local examination according to the recommended reporting standards. The general evaluation was aimed at identifying comorbid conditions, such as heart failure, peripheral arterial disease, stroke, diabetes mellitus, and high blood pressure; medical history; and vascular access history. The local evaluation was focused on the potential access site. It included the following steps: 1) brachial pressures; 2) examination of the skin to exclude lesions or scars on the site; 3) vein examination using a tourniquet or a blood pressure cuff to ascertain the distensibility, continuity, and compressibility; 4) palpation and Doppler exploration of the radial, brachial, and ulna arteries. At the end of this procedure, a decision on the following was made: 1) the patient's suitability for surgery; 2) type of AVF to be performed: radiocephalic (RCAVF), brachiocephalic (BCAVF), brachiobasilic, or cubitobasilic; and 3) the need for a treatment (treatment of heart failure, sepsis, severe anemia, or skin infection) before surgery. A preoperative ultrasonography was mandatory only in obese patients or in cases of a secondary fistula with a poor venous visibility.

In our practice, we start first by placing a wrist RCAVF on the nondominant arm, if anatomically favorable. From there, we moved to a BCAVF. Our next choices are a RCAVF and then a BCAVF on the dominant arm. The brachiobasilic AVF and the other possibilities are realized as last alternative.

All the operations were performed by the two vascular surgeons of the team either as an ambulatory or a 1-day hospital stay procedure. Local anesthesia with 1% lidocaine was used for every patient. Operative details, such as the quality of veins and the perioperative complications, were noted by the surgeon. The thrill and a hand-held Doppler were used for perioperative quality control. The postoperative management included analgesics and dressing every 4 days. Patients were advised to avoid exerting pressure or any compression on the upper limb. No venous punctures or blood pressure measurements with inflatable cuffs were permitted on the upper limb concerned.

Follow-up visits with the vascular surgeon were scheduled (two times during the first week and then weekly during the first month postoperatively). Dressings, suture removal, and assessment of fistula patency by physical examination were done during these visits. The fistulas were allowed to mature for a minimum of 4 weeks. If maturation was not achieved 3 months after surgery, this was considered as a failure to mature. The decision on the first puncture of the access was jointly taken by the attending surgeon and the nephrologists. Postoperative complications were followed up by the surgeon and the nephrologists. Functionality was determined by the ability to access the fistula for hemodialysis. Complications were graded according to the time of occurrence as immediate (within 48 hours after the surgery), early (before