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Brachio basilic arteriovenous fistula with transposition of the basilic vein: a multicenter study

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Background/aim: The aim of this paper was to present our 3-year multicenter experience in creating a vascular access using the basilic vein. The third choice in creating vascular access is the brachio basilic arteriovenous fistula (AVFs) with transposition of the basilic vein.

Materials and methods: During 2010–2012, out of a total of 874 AVFs that were performed in our two centers, 54 were brachio basilic fistulas (6.71%), performed on 54 patients. All surgical procedures were performed by two surgical teams, one for each center. There were no significant differences regarding the patients' age, sex, and comorbidities between the two centers.

Results: We reported a total of six postoperative complications (11.10%): two wound infections, two arm edemas, one hematoma, and one bleeding (due to a collateral ligature slippage), which required surgical intervention the same day. None of the other complications required another surgery. The first year patency rate was 89.79% (four fistulas failed due to thrombosis and one due to perforation) and the second year patency rate was 62.12%.

Conclusion: The brachio basilic AVF with transposition of the basilic vein, according to the latest guidelines, remains a well-documented and feasible third option in creating vascular access with better results than graft fistulas.

Key words: Brachio basilic arteriovenous fistula, transposed basilic vein, vascular access, hemodialysis

1. Introduction

A functional vascular access site is the lifeline for patients with end stage kidney disease that require chronic hemodialysis.

The first choice in creating vascular access is the radiocephalic arteriovenous fistula (AVF) (1). Due to some factors such as age, diabetes, atherosclerosis, and small diameter veins, the distal venous capital is often not suitable; therefore, vascular surgeons developed new vascular access sites such as the proximal fistulas (brachiocephalic, brachio basilic, and brachio humeral). As a result, the usage of profound veins had to be transposed occasionally. The first authors that introduced this technique were Carcardo et al. (2) and Dagher et al. (3) in 1970 and Koontz and Helling (4) in 1983. According to the 2001NKF-K/DOQI Clinical Practice Guidelines for Vascular Access, the brachio basilic AVF with transposition of the basilic vein is the third choice in

creating vascular access after the radiocephalic AVF and the brachiocephalic AVF (5). Of course, patients that are not suitable for hemodialysis have the option of peritoneal dialysis. The technique regarding the placement of the peritoneal catheter was improved when the laparoscopic approach was introduced (6–8).

The basilic vein, approximately at the junction of the lower and middle thirds of the upper arm, pierces the fascia and continues along its course to drain into the brachial vein (9). Due to this course, the basilic vein is in close proximity with the medial antebrachial cutaneous nerve, the brachial artery, and the median nerve. Therefore, in order to avoid injuries and to obtain successful cannulation, the basilic vein needs to be transposed, usually anteriorly and laterally, displacing it from these structures. The goal of the present paper is to present our experience and results with this procedure during the course of 3 years, through a multicenter retrospective study.

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2. Materials and methods

We performed a retrospective study on patients that underwent a brachiobasilic AVF with transposition of the basilic vein between January 2010 and December 2012 in our two centers: the Second Surgery Clinic, University of Medicine and Pharmacy “V. Babes” Timisoara, Timisoara County Hospital no 1, Romania and the Department of General Surgery, “Carol Davila” Nephrology Clinical Hospital, Bucharest, Romania. Data were extracted on: sex, age, date of surgery, date of revision, diabetes mellitus, hypertension, coronary artery disease, hepatitis, tobacco use, anticoagulant treatment, previous vascular access procedures, and anemia. We performed 54 brachiobasilic AVFs with transposition of the basilic vein on 54 patients. Twenty-three procedures were performed at the Timisoara center and 31 were performed at the Bucharest center. Twenty-four patients were female and 30 were male. The mean age for all patients was 60.57 years with a range of 34–81 years. There were no significant differences regarding the patients’ sex, age, and comorbidities between the two centers. The characteristics and comorbidities of the patients are shown in Table 1, and a detailed list of all vascular procedures performed on the patients before the brachiobasilic AVF are shown in Table 2.

All patients underwent the two-stage procedure and were operated on by only two surgical teams, one for each center. In the first stage, the brachiobasilic AVF was created. In the second stage, we performed the basilic vein transposition under a lateral flap of the skin, in a median position, after complete dissection of the basilic vein and ligation of all collaterals. The mean period of time between the first and the second stage was 45 days (with a range of 30–60 days).

Table 1. Patients demographics and comorbidities: DM-diabetes mellitus, HT-hypertension, CAD-coronary artery disease, Hep-hepatitis, Sm-smokers, Ac-usage of anticoagulants, An-anemia, VA- previous vascular access procedures.

Group	Male	Female	Age	DM	HT	CAD	Hep	Sm	Ac	An	VA
Timisoara	13	10	59.52	12	17	13	6	11	10	20	14
Bucharest	17	14	61.35	14	18	17	7	14	13	21	16
Total	30	24	60.57	26	35	30	13	25	23	41	30

Table 2. Detailed list of other vascular procedures performed before the brachiobasilic fistula.

Vascular access procedure	Number of patients		Total number of patients
Dialysis catheter	1 catheter	2 catheters	19
	14	5	
Arteriovenous fistula	1 previous fistula	2 previous fistulas	21
	17	4	

3. Results

During the 3 years, a total of 874 AVFs were performed in our two clinics, out of which 54 were brachiobasilic AVF with basilic vein transposition. Thirty of them were performed on male patients and 24 on female patients. The mean age was 60.57 years (with a range of 34–81 years). The left arm was used in 45 patients and the right arm in 9 patients. Out of the 54 fistulas, only 49 were cannulated for hemodialysis. Two patients died of nonrelated causes, one fistula failed to mature, and two patients did not require hemodialysis anymore. For 24 of the patients, this was their first vascular access procedure, a suitable forearm or upper arm cephalic vein being absent. Thirty patients had a history of other vascular access procedures, including radiocephalic AVF, brachiocephalic AVF, and central venous dialysis catheters. There were six (11.10%) postoperative complications, as shown in Table 3: two wound infections that responded to oral antibiotics, two arm edemas, one hematoma, and one bleeding caused by a collateral ligature slippage, which was resolved surgically on the same day. All other complications were resolved without having to perform another surgical procedure.

4. Discussion

The brachiobasilic AVF with transposition of the basilic vein is a well-documented and feasible third option in the management of vascular access. Due to its profound localization, the basilic vein is less punctured and therefore remains a good reserve vein for vascular access. In some cases, due to the longer period needed before cannulation (due to the two-stage procedure), patients will require better planning, or if time is not an option, they will require dialysis catheters. Literature data support different

Table 3. Postoperative complications.

Complication	Number	Percentage
Wound infection	2	3.70%
Arm edema	2	3.70%
Hematoma	1	1.85%
Bleeding	1	1.85%
Total	6	11.10%

technical approaches for this procedure. We performed the anastomosis using a 6.0 double-armed monofilament polypropylene suture, but it can also be performed using titanium clips if available (10). The second stage procedure could also be performed either by the use of multiple small incisions (11) or by the use of an endoscope (12). By performing the two-stage procedure we can avoid an unnecessary upper arm dissection in case of a fistula that failed to grow adequately. Additionally, there is a smaller risk of lesions to the basilic vein by dissecting a thickened arterialized vein because the collaterals are easier to dissect and ligate and because the vein is less susceptible to torque and devascularization during mobilization.

Out of all the fistulas created in our two centers during this time period, 6.17% of them were brachiobasilic. Other studies in the literature have shown similar percentages (13). This value also corresponds with the DOQI recommendations. We encountered a postoperative complication rate (11.10%) similar to other reports (14–15) and out of the 49 fistulas that were used for

hemodialysis, 44 were patent after the first year. This means a 1-year patency rate of 89.79% ($P = 0.015$). Literature data suggest a 1-year patency rate of 54%–90% (16–19). Four of the five fistulas that were not patent after year 1 failed due to thrombosis, and the remaining one failed due to perforation. We can only report 2-year patency for 31 fistulas is 62.12% ($P = 0.020$), which is also in agreement with literature data (16–19).

Taking into consideration all of the above mentioned studies and results, the brachiobasilic AVF still remains a better option than the graft fistulas. Literature data show a better patency for brachiobasilic AVF than for AVFs using grafts due to the higher complication rates such as thrombosis and infection for the grafts (20–22). A 1-year patency rate of 54%–90% is achievable and in specialized centers it is between 80% and 90%. The brachiobasilic AVF with basilic vein transposition is an option that all vascular access surgeons should consider for their patients, where anatomical particularities permit.

In conclusion, the need for long-term, reliable vascular access remains critical. Therefore, the management of vascular access must be conducted according to the latest guidelines. The arteriovenous fistula, as imagined by Brescia and Cimino (23), still remains the first choice. The brachiobasilic AVF with transposition of the basilic vein has earned an honorable third choice in creating vascular access due to its high patency rates in comparison with the usage of grafts. It represents the final hope for native veins in the creation of an AVF, and because the basilic vein usually has a larger diameter than the cephalic vein, the surgery can be just as easily performed by any surgeon with experience in vascular access management.

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