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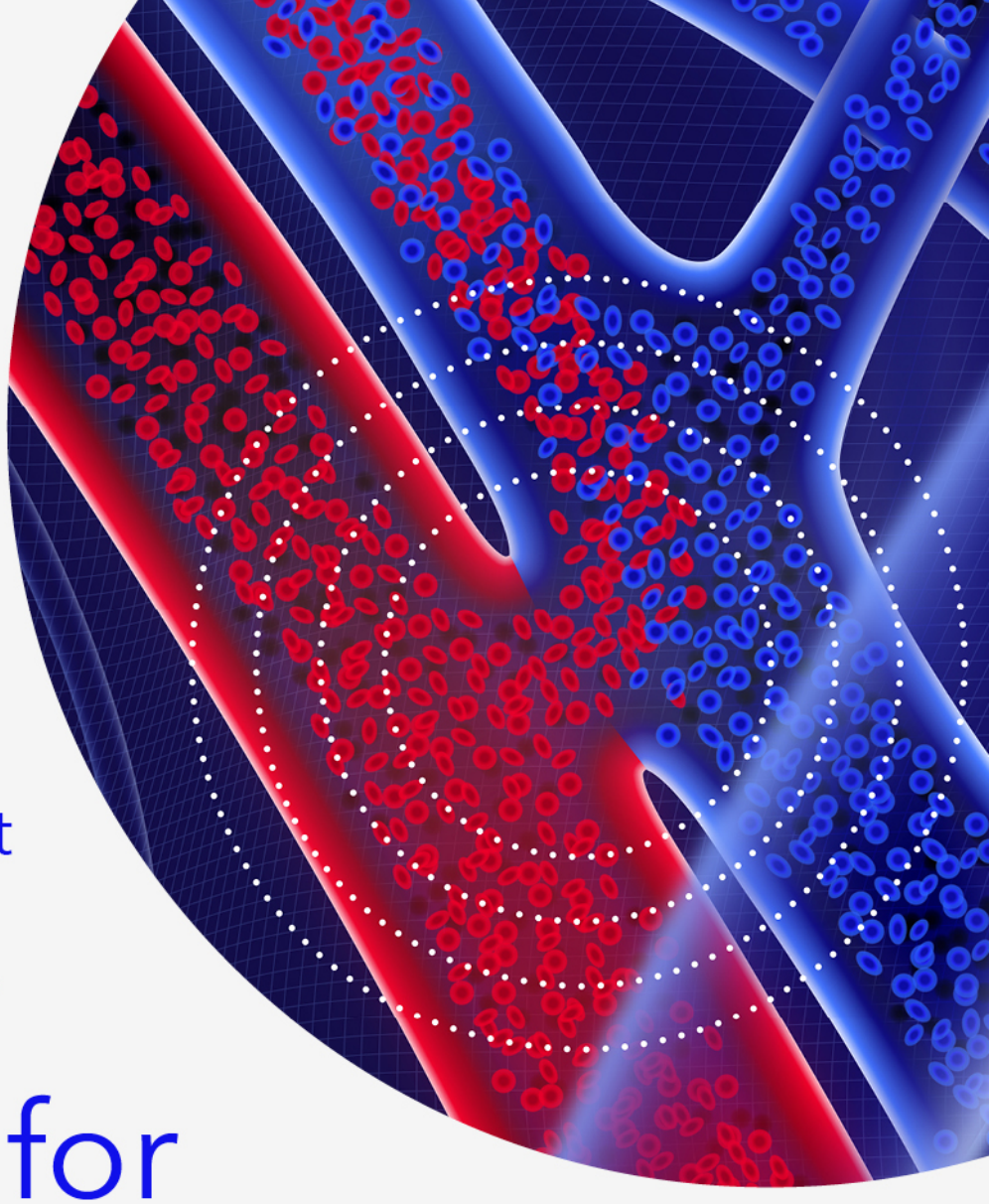

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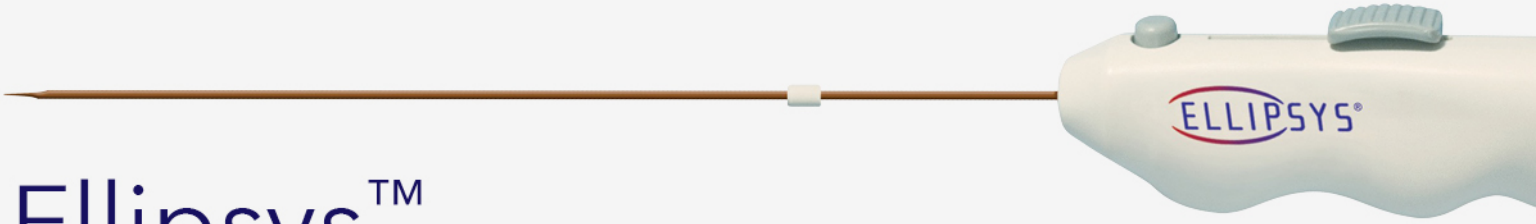

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CASE REPORT

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Radio-cephalic fistula recovered with drainage to median basilic vein by straightening of the forearm cephalic vein: A case report

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Abstract

The distal arteriovenous fistula (AVF) has less complications and better patency than the proximal fistula, when it works properly. The complications of outflow of the fistula are complex, and it is necessary to analyze all solutions to solve the problem. We introduce a novel approach to solve outflow problems of a radio-cephalic AVF by straightening of the forearm cephalic vein with drainage into the median basilic vein.

1 | INTRODUCTION

The arteriovenous fistula (AVF) is considered the best vascular access for hemodialysis patients by the scientific community.[1–3] The distal AVF has less complications and better patency than the proximal AVF.[2] However, even though the former sometimes requires longer maturation time and intervention procedures, it is the best access when it works properly.

Maintaining the distal access is a challenge for both the dialysis team and the vascular surgeon. Several interventions for the recovery of a distal AVF with outflow problems are described in the literature.[4] Rotation of the basilic vein in the forearm[5] or of the brachial vein in the elbow may be solutions for the recovery of a distal AVF with outflow problems.[6] Such solutions have good post-procedure patency.[4] Other more creative solutions can be used, depending on the vascular network.[7]

The use of the forearm cephalic vein to solve distal AVF problems is uncommon. We introduce a novel approach to solve outflow problems of a radio-cephalic AVF by straightening of the forearm cephalic vein with drainage into the median basilic vein.

2 | CASE REPORT

We present the case of a 48-year-old male patient with autosomal dominant polycystic disease with hypertension. Radio-cephalic AVF (RC-AVF) with side-to-end anastomosis was created on his left arm in

September 2018 and he began hemodialysis treatment through this fistula in October 2020.

The patient was transferred from the hospital to our dialysis unit in December. Physical examination detected intense collateral circulation in the forearm. The forearm cephalic vein was tortuous, with a weak thrill and a hyperpulsatile pulse. The drainage vein failed to collapse in the arm elevation test. The venous pressure on the monitor was very high (250–300 mmHg) and hemostasis time was 20 min.

Ultrasonographic evaluation showed that the forearm cephalic vein on the lateral side of the forearm was very tortuous, with a diameter of 5.7 mm, with no flow to the cephalic vein due to thrombosis of the latter (no evidence of punctures). The median cephalic vein at the elbow had fibrosis and occlusion, but the median basilic vein was patent (no evidence of thrombus or segment with a reduced diameter) with a diameter of 4.8 mm and the basilic vein with a diameter of 5.2 mm (Figure 1). The AVF remained functional due to the presence of collateral veins in the forearm which drained into the ulnar vein, with a diameter of 5.3 mm. The brachial artery flow was 600 ml/min with index-resistance equal to 0.6.

We decided to isolate and straighten the forearm cephalic vein after rotating it toward the median basilic vein (Figure 2). Such procedure provided a good flow from the fistula into the median basilic vein, solving the fistula's problem. The procedure was carried out in January. The fistula was successfully cannulated in the first postoperative day.

The fistula worked free of problems or complications and with no need for further procedures after 14 months (Figure 3). The current brachial artery flow is 1200 ml/min with an index-resistance equal to 0.48.

3 | DISCUSSION

The patient had a pre-consultation before starting dialysis in our dialysis unit. The arteriovenous access was assessed by physical examination and ultrasound in the course of the consultation. We found the RC-AVF had outflow problems (stop-flow) with a great deal of collateral circulation in the forearm.

Based on this information, we decided to change the site of the venous cannulation to a vein in the forearm with drainage to the median basilic vein. Such option prevents traumatizing the forearm cephalic vein at the venous-cannulation site and making the dissection of the venous segment by the vascular surgeon difficult or impossible. The dialysis nursing team was informed of the new location for venous cannulation in order to preserve this segment of the forearm cephalic vein and to enable straightening the vein.

We have found no reference in the literature on straightening the cephalic vein of the forearm to solve flow problems. This technique can be used when the vein segment is long enough to be rotated into the median basilic vein.[4–6] Such procedure enables increasing the diameter of the basilic vein and the subsequent basilic transposition in the first stage.[8] The endovascular intervention may be a good option to solve this problem, with or without stent placement. On ultrasound examination, the vein had echogenic characteristics compatible with thrombosis and non-recent occlusion processes. This situation did not allow the use of angioplasty as an endovascular intervention. We opted for surgical intervention, because the thrombosis in the vein was a little long and it was not possible to pass the endovascular material through the thrombosis. This procedure allowed solving the

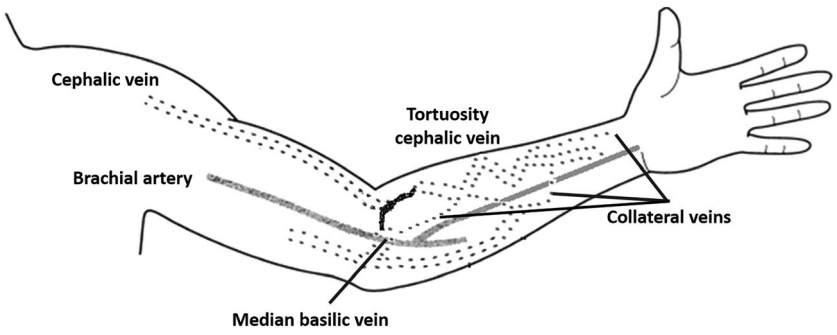

FIGURE 1 Radio-cephalic fistula with fibrosis in the cephalic vein and occlusion of the median cephalic vein in the elbow

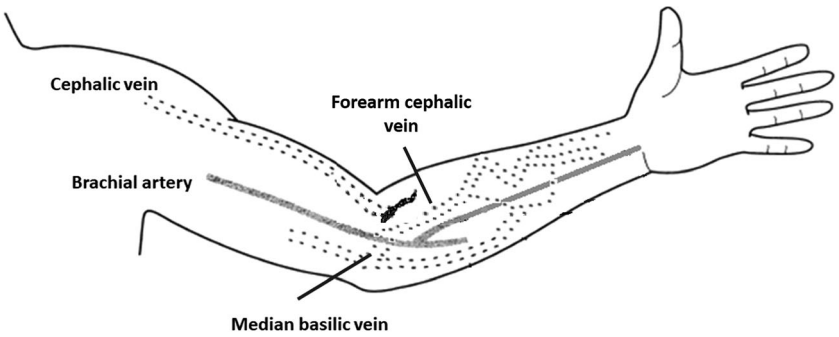

FIGURE 2 Radio-cephalic fistula recovered with drainage to the median basilic vein by straightening of the forearm cephalic vein

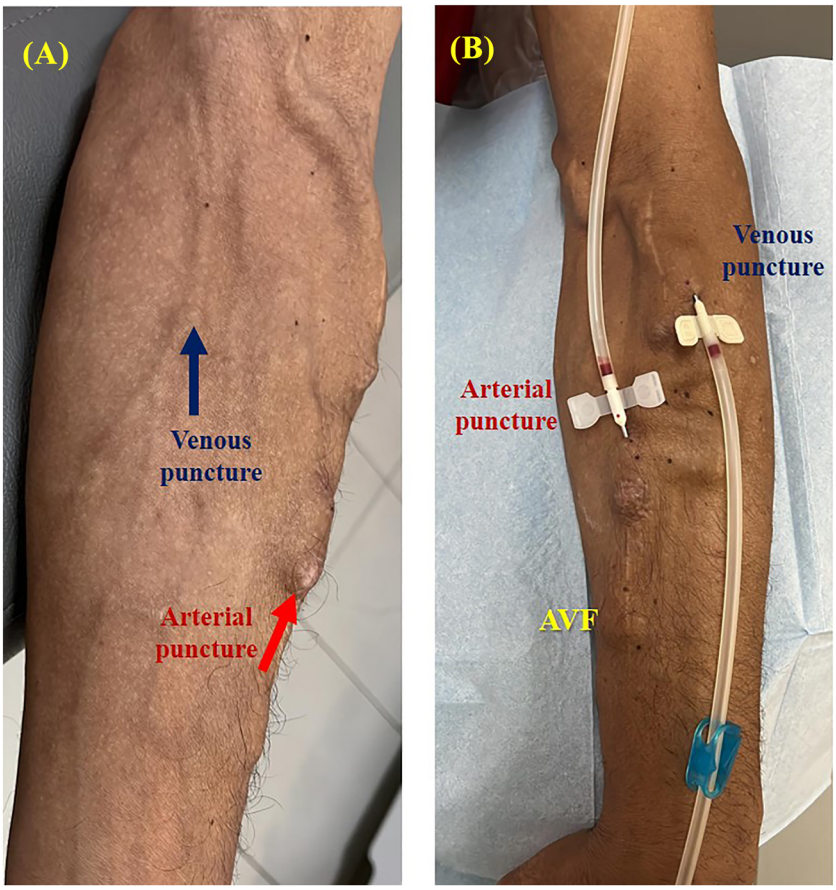

FIGURE 3 Radio-cephalic fistula recovered with drainage into the median basilic vein with puncture sites. (A) Before surgery; (B) after surgery

flow problem, implying less resistance in the venous network, which in turn allowed an increase in the flow in the brachial artery, with a decrease in the index-resistance. When the index-resistance increases, flow blood decreases, as the flow has more difficulty in passing into the venous network. In arteriovenous access, if the resistance index is close to 1.0, it means that the access does not have good permeability and is at risk of thrombosis.

The dialysis nurse must be careful with the venous cannulation site and mostly avoid the site where the anastomosis between the cephalic vein of the forearm and the median basilic vein occurs. The development of new strategies designed to reduce the error associated with venous cannulation is required.[9] A reasonable strategy might be photographing the recovery fistula and marking the site of the vein–vein anastomosis, depth, length, and diameter. It is important to teach the patient how to care for the fistula[10] and inform which vein segments should be avoided as cannulation sites.

The recovery of this AVF also enabled an appropriate management of the vascular network. Such solution increases the permeability of the RC-AVF, optimizes the diameter of the basilic vein, hinders the construction of a new access, and, thus, prevents the patient from placing a central venous catheter.

The dialysis unit must develop a vascular-access monitoring and surveillance program to identify problems that could compromise the fistula.[11] Dialysis nurses should be trained, in a practical setting,[12] how to identify vascular-access problems based on physical examination and on the information provided by the dialysis monitor.

The fistula has been working for 14 months with no complications or intervention. This procedure can be considered in patients with RC-AVF with outflow problems. However, the length of the cephalic vein of the forearm has to be taken into account so that it can be rotated into the median basilic vein.

4 | CONCLUSION

The procedure introduced above is a good option for a distal AVF with outflow problems. This type of fistula raises no technical difficulties but the careful analysis of the length of the vein before the procedure is required. Such solution enables the fistula recovery without placing a central venous catheter and arterialization of the basilic vein.

CONFLICT OF INTEREST

The authors do not have any conflict of interest and were not funded.

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