



# Brachial Vein Transposition with Consecutive Skin Incisions in a Hemodialysis Patient with Absence of Adequate Superficial Veins: A Case Report

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The creation of an arteriovenous fistula instead of a synthetic vascular graft is a smart decision in hemodialysis patients who do not have a suitable superficial vein. Basilic vein transposition (BVT) is a viable option in most cases, except in patients who do not have a proper basilic vein. In patients with inadequate superficial veins, another source of the autogenous vein is the brachial vein, a deep vein of the upper arm. Most surgeons choose a full medial arm incision to perform brachial vein exploration. We describe a patient in whom BVT was not possible and so brachial vein transposition using skip incisions was performed, with good results.

**Key Words:** Brachial vein transposition, Basilic vein transposition, Skip incisions, Dialysis access, Arteriovenous fistula

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## INTRODUCTION

According to the National Kidney Foundation Kidney Disease Outcomes Quality Initiative guidelines for hemodialysis patients, an arteriovenous fistula (AVF) is preferable to a synthetic arteriovenous graft (AVG) due to its longer durability and fewer complications. Accordingly, even in cases where it is not possible to implant an AVF with cephalic or basilic veins and the tendency to implant an AVG is greater, the emphasis is still on implanting an AVF with other veins [1]. In this situation, transposition of the brachial vein can be useful for the creation of an AVF [2]. Dagher et al. [3] was the first to report the technique of performing basilic vein transposition (BVT) using three skip incisions. Compared to the basilic vein, brachial veins are located deeper and adjacent to the brachial artery and median nerve, which makes it difficult to explore safely. Thus far, most surgeons have used a full skin incision of the me-

dial border of the arm to transpose the brachial vein [4-6]. For the first time, we report the release of the brachial vein with three small skin incisions and brachial vein transposition (BrVT) in a patient who needed permanent autologous hemodialysis access and lacked a suitable superficial vein.

This case was approved by the ethics committee of Babol University of Medical Sciences with reference (IR.MUBABOL.REC.1399.282).

## CASE

A 66-year-old man, who had been undergoing hemodialysis for years, was referred for the creation of a proper long-term dialysis access. He had multiple AVFs in both upper extremities that had failed previously and was currently on dialysis through a left femoral vein double-lumen catheter. He had a right lung empyema a month ago and was still undergoing drainage and appropriate antibiotic treat-

ment. Because of the history of empyema, which increases the risk of infection in AVG, we decided to implant an AVF in the upper extremity again. Ultrasound mapping was performed for the patient in the operating room without tourniquet application to examine the basilic and brachial veins in both limbs. The basilic vein was thrombosed previously, but in the left upper limb, the brachial veins were open and the medial vein was 3 mm and joined by the axillary vein in the higher part of the upper arm. The paired brachial vein diameter was also 3 mm. Therefore, we planned the surgery to transpose the left medial brachial vein. BrVT was performed under local anesthesia with sedation with three skip incisions in the medial arm. Initially, a 4-cm horizontal skin incision was made distally in the arm to explore the brachial artery and vein. Then, the lateral branches were found and separated along the brachial vein. The connections between the two brachial veins were divided by simple sutures. The main difficulty with the restricted incision was to obtain proper exposure and this was resolved by cutting the brachial vein in the cubital part and changing its direction in different views. In the second stage, another 4-cm incision was made horizontally in the middle of the arm. The lateral branches of the brachial vein were carefully explored and separated from the lateral incisions at intervals between skin incisions. Finally, by incision of the skin across the

hairline in the axillary area, the brachial vein was explored and released from the elbow level. The vein was transposed anteriorly in a superficial tunnel and re-anastomosed higher up on the brachial artery by using a monofilament polypropylene 7.0 continuous end-to-side suture (Fig. 1). Mild edema occurred after the surgery, but no complications were observed 3 weeks postoperatively. After 45 days of maturation, the diameter of the vein reached 7 mm and hemodialysis was initiated successfully through the new autologous vascular access.

## DISCUSSION

The anatomical position of the brachial vein, located deep in the arm and adjacent to the brachial artery and median nerve, makes it difficult to explore safely. Therefore, most surgeons have chosen full medial arm incisions to perform brachial vein exploration [2, 4-9]. Skip incisions, compared to full incisions, have advantages such as a lower risk of surgical site infection, less arm edema after surgery, more beautiful appearance, and less postoperative pain. The main problem with this technical procedure is damage to the brachial vein during its release. This complication is very likely to occur if the surgeon does not have the necessary precision and skill. There is little information about



**Fig. 1.** The stages of brachial vein transposition with skip incisions. (A) Three small skin incisions were needed for safe brachial vein exploration and resection. (B) The brachial vein was transposed anteriorly and re-anastomosed to the brachial artery. (C) Final view after the subcutaneous tissue and skin were repaired.

comparing the side effects of the two skin incision methods for BrVT, but those evaluated in the BVT procedure. Shaikh et al. [10] reported that the skip incisions technique did not have significant benefits over long incision techniques, but was a valid alternative.

In this patient, our main concern was postoperative infection at the surgical site and severe edema of the arm after removal of one of the two remaining brachial veins in the limb. Therefore, like the Dagher et al's method [3], we decided to use skip incisions instead of a full incision in the medial border of the arm to reduce the length of the surgical incision and less tissue damage in the limb. The practical point in safe excision of the brachial vein at the incision interval is the initial separation of the vein from the antecubital region and its displacement in different directions to improve its tributaries. Another important issue to consider is the thin wall of the brachial vein. This is especially important in cases where the brachial vein is transposed in a one-stage procedure, because in these cases, arterialization has not yet occurred in the vein wall. Therefore, the vein may be damaged because of stretching during release and passage under healthy skin. We prefer to use a staged method for BrVT to achieve suitable strength in the vessel wall and a proper vein diameter.

In conclusion, the transposed brachial vein can be used for AVF creation in patients with inadequate superficial veins. In addition, BrVT with skip incisions maybe safe and comparable to full skin incision.

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## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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Conception and design: PT. Analysis and interpretation: PT, FM, YD. Data collection: AS. Writing the article: PT, FM, YD, AS. Critical revision of the article: PT, FM, YD. Final approval of the article: PT. Obtained funding: not applicable. Overall responsibility: PT.

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