



## Treatment of arteriovenous fistula stenosis with proximal radial artery occlusion in 4 hemodialysis patients: PTA

\*Corresponding Author: **Shengyin Ma**

Tel: 0557-3972842; Email: [mashengyin1@foxmail.com](mailto:mashengyin1@foxmail.com)

### Abstract

Percutaneous Transluminal Angioplasty (PTA) is an effective method for treating arteriovenous fistulas stenosis. In our blood purification center, we found 4 patients with poor blood flow. Ultrasound or X-ray angiography found that the proximal radial artery was occlusive, and the fistula was mainly supplied with blood from the distal radial artery. We did not open occlusive radial artery. And PTA was used to treat fistulas vein outflow and/or anastomotic stenosis. Half a year later, one patient gave up the failing fistula, and the other three patients underwent PTA multiple times, and fistulas was unobstructed at present. We suggest that PTA is an effective treatment for stenosis of the radiocephalic arteriovenous fistulas anastomosis and/or venous outflow in patients with proximal radial artery occlusion.

**Chao Chen; Jun Gao; Feng Gong; Hui Zhang; Shengyin Ma\***

Department of Nephrology, Wanbei Coal Electricity Group General Hospital, Su Zhou, China.

**Received:** Jul 15 2024

**Accepted:** Aug 06, 2024

**Published Online:** Aug 13, 2024

**Journal:** Annals of Surgical Case Reports & Images

**Online edition:** <https://annsri.org>

**Copyright:** © **Ma S** (2024). This Article is distributed under the terms of Creative Commons Attribution 4.0 International License.

**Cite this article:** Chen C, Gao J, Gong F, Zhang H, Ma S. Treatment of arteriovenous fistula stenosis with proximal radial artery occlusion in 4 hemodialysis patients: PTA. *Ann Surg Case Rep Images*. 2024; 1(5): 1042.

**Keywords:** Hemodialysis; Arteriovenous fistulas; Endovascular; Proximal radial artery occlusion; Stenosis.

### Introduction

At present, the preferred vascular access for hemodialysis patients is autologous Arteriovenous Fistula (AVF). Stenosis is an important cause of arteriovenous fistula dysfunction. Endovascular intervention is usually used to treat stenosis of vascular access. In our blood purification center, 4 patients were found to have radiocephalic AVF, in which the proximal end of the fistula was occlusive, and the fistula was mainly supplied by the distal end of the radial artery. Endovascular intervention was applied to treat the stenosis of the anastomosis and/or venous outflow of the fistula in these 4 patients [1-3].

### Case description

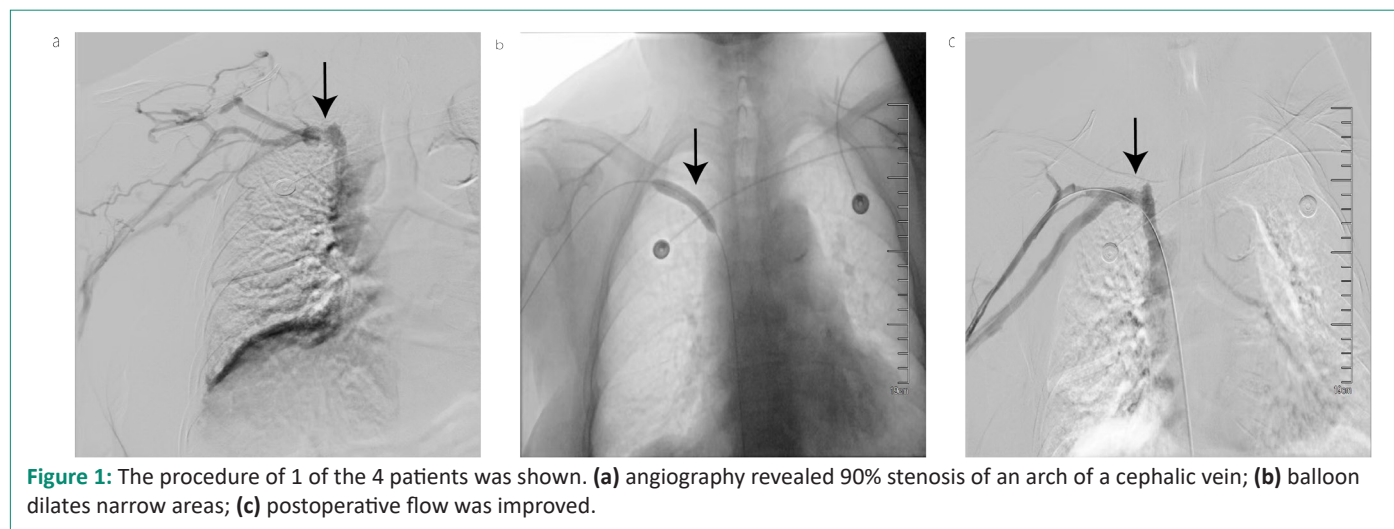
Since 2021, 4 patients, 3 males and 1 female, were referred to our hemodialysis center, with an average age of 41.75 years and an average dialysis time of 4 years. Color ultrasound or angiography examination due to poor fistula flow revealed that

the proximal radial artery was blocked, and the fistula blood supplying artery was the distal radial artery. There is also a fistula anastomosis and/or venous outflow stenosis (greater than 50% versus proximal reference diameter). PTA was proposed for treatment. All patients signed informed consent.

After the upper limb was disinfected and local anesthesia, punctured and the sheath was placed. Under the guidance of color ultrasound, the ultra-slippery guide wire was placed along the sheath, which could not pass through the radial artery occlusion. The guide wire was passed through the anastomosis or vein stenosis site, and the balloon catheter was used to cover the stenosis site. Pressure was gradually increased until the balloon was fully opened, and decompression was performed 3 minutes later. Repeat the preceding steps two times. Color ultrasound showed a significant improvement in blood flow (stenosis less than 30%). After the operation, the patient underwent hemodialysis treatment, and the blood flow could reach more than 230 ml/min.

Among the four patients, 1 patient was admitted to the hospital for PTA due to poor fistula function about 1 month after endovascular treatment. And PTA was performed 5 times in half a year, the fistula was finally abandoned. The remaining 3 patients also underwent PTA for several times later due to poor flow, and two patients received a total of 7 endovascular treat-

ments by the end of December 2022, and the fistula of the 3 patients was unobstructed at present. The baseline demographic and clinical characteristics of the patient groups are shown in Table 1. The procedure of 1 of the 4 patients was shown in Figure 1. All patients signed preoperative consent forms and the study was approved by the hospital's medical ethics committee.



**Table 1:** Baseline demographic and clinical characteristic of patients.

	1	2	3	4
Age (years)	63	30	40	34
sex	Female	male	male	male
AVF (years)	5	4	2	4
Dialysis (years)	5	4	3	4
Type of stenosis	Venous outflow and anastomosis	Venous outflow and anastomosis	Venous outflow and anastomosis	Venous outflow and anastomosis
Hypertension	no	no	yes	no
Diabetes mellitus	no	no	no	no
Times of PTA	5	7	2	7
CVC	no	no	no	no

CVC: Central Venous Catheter; AVF: Arteriovenous Fistulas; PTA: Percutaneous Transluminal Angioplasty.

## Conclusion

At present, PTA is still recommended as the preferred treatment for stenosis or occlusion of vascular access. The 4 patients we reported were referred to the blood purification center of our hospital due to poor dialysis flow. After examination, it was found that the distal end of the fistula radial artery was blocked, and the guide wire was found unable to pass, so it was abandoned. The fistula anastomosis and venous outflow were given interventional treatment, and hemodialysis could be maintained in all patients after endovascular treatment.

Among the 4 patients in our center, 1 patient gave up after six months of fistula loss, and the other 3 patients were now unobstructed after multiple interventional treatment, and could still maintain hemodialysis. No major complications occurred after operation.

Seung Y et al. in South Korea also carried out interventional therapy on 12 patients of the same type, and their primary patency rate reached 54.5% after 12 months of postoperative follow-up, and there were no complications.

For those patients with arteriovenous fistula with proximal radial artery occlusion and blood supply from distal radial artery, surgical reconstruction of the fistula or abandonment of the AVF to Tunnel-Cuffed Catheter (TCC) or Arteriovenous Graft (AVG) is a solution. Nevertheless, the probability of failure of reconstructive AVF or AVG surgery is high due to the low basal blood pressure of patients. After communicating and agreeing with the patient, we treated arteriovenous fistula anastomosis and venous outflow stenosis by interventional treatment, and the patient could continue to maintain hemodialysis after PTA. This method can preserve the vascular access of patients, extend patency time of fistula, and reduce the catheterization of central veins. Therefore, our center believes that PTA is an effective way to treat such patients. However, the medical costs of such patients are large, often requiring multiple interventions a year.

We believe that PTA is an effective treatment for stenosis of the AVF supplying blood from distal radial artery.

---

**Declarations**

**Author contribution:** Shengyin Ma contributed to the conception of the study. Jun Gao, Feng Gong and Hui Zhang contributed significantly to analysis and manuscript preparation. Chao Chen performed the data analyses and wrote the manuscript.

**Conflicting interests:** The authors have no conflicts of interest to declare.

**Funding:** The authors did not receive any funding.

**Consent:** Informed consent for the procedure was obtained.

**References**

1. Lok CE, Huber TS, Lee T, et al. KDOQI clinical practice guideline for vascular access: 2019 update. *Am J Kidney Dis.* 2020; 75(Suppl 2): S1-S164.
2. Ashby D, Borman N, Burton J, et al. Renal Association Clinical Practice Guideline on Haemodialysis. *BMC Nephrology.* 2019; 20: 379.
3. Noh SY, Kim YJ, Goo DE, et al. Salvage of a Radiocephalic Arteriovenous Hemodialysis Fistula by Percutaneous Angioplasty to Increase Retrograde Flow from the Palmar Arch in Patients with an Occluded Radial Artery. *J Vasc Interv Radiol.* 2021; 32: 92-98.