

Effectiveness of Collateral Vein Embolization for Salvage of Immature Native Arteriovenous Fistulas

Osman Ahmed, MD, Mikin Patel, MD, MBA, Michael Ginsburg, MD, Danial Jilani, MPH, and Brian Funaki, MD

ABSTRACT

Purpose: To investigate the value of collateral vein embolization (CVE) as a salvage treatment for nonmaturing native arteriovenous fistulae (AVFs) in patients requiring hemodialysis.

Materials and Methods: A total of 49 patients undergoing CVE (N = 65) for immature native AVFs at a single institution were reviewed. The study included 42 patients treated by 56 embolizations. Average fistula age at time of intervention was 18.2 weeks. Each patient underwent angiographic evaluation for fistula immaturity, with clinical success defined by initiation of single-session hemodialysis through the native fistula.

Results: Fistula maturity was achieved in 32 of 42 patients (76.2%). No major complications occurred. Average time from CVE to fistula maturity was 38.4 days. Angioplasty done with CVE was found in a statistically higher percentage of patients with fistula success versus failure (31.3% vs 8.3%; $P = .039$). Radiocephalic fistulae were seen in a higher percentage of fistula failures compared with successes, but the results were not statistically significant (83.3% vs 59.4%; $P = .054$). Thirty-four patients underwent CVE without angioplasty, which resulted in successful fistula maturation in 22 cases (64.7%). Radiocephalic fistulae were again seen in a higher percentage of fistula failures compared with successes, but the findings did not meet statistical significance (81.8% vs 54.5%; $P = .052$).

Conclusions: Coil embolization of competing collateral vessels as a salvage treatment for nonfunctioning autologous AVFs is a viable treatment option in the majority of patients. Patients with radiocephalic fistulae may be at higher risk for primary fistula failure, but the present data are inconclusive.

ABBREVIATIONS

AVF = arteriovenous fistula, CVE = collateral vein embolization

Failure of a new arteriovenous fistula (AVF) to mature occurs when the access site is unsuitable for use by 3 months of creation (1). The cause of immaturity in nonthrombosed fistulas is most commonly an underlying stenosis that prevents high flow and subsequent arterialization of the outflow vein (2). In most cases,

fistula salvage can often be achieved by angioplasty alone (3–5).

A less common cause of fistula failure is collateral or side-branch veins that arise from the primary outflow vein, which may or may not be associated with a downstream stenosis (1). These veins can siphon blood from the primary vein and lead to low flow rates that ultimately prevent fistula maturation. One current treatment of this entity is endovascular coil embolization of these collateral veins, a procedure designed to redirect blood flow into the primary outflow and promote its growth to facilitate hemodialysis (2). The treatment of collateral veins remains controversial, however, as limited data suggest their existence is simply a byproduct of underlying stenoses treatable by angioplasty alone (6). The purpose of the present study was therefore to retrospectively investigate the value of collateral vein embolization (CVE) as a salvage treatment for non-

From the Department of Radiology (O.A., M.P., M.G., B.F.), University of Chicago Medicine, 5841 S. Maryland Ave., MC 2026, Chicago, IL 60636; and Wright State University Boonshoft School of Medicine (D.J.), Dayton, Ohio. Received May 28, 2014; final revision received August 11, 2014; accepted August 14, 2014. Address correspondence to O.A.; E-mail: osman1423@gmail.com

None of the authors have identified a conflict of interest.

© SIR, 2014

J Vasc Interv Radiol 2014; 25:1890–1894

<http://dx.doi.org/10.1016/j.jvir.2014.08.015>

maturing native AVFs in patients who require hemodialysis.

MATERIALS AND METHODS

A retrospective study was conducted following approval from our institutional review board. A query of the picture archiving and communication system database (Koninklijke Philips, Eindhoven, The Netherlands) was made for all CVE procedures performed in patients with AVFs between October 2003 and December 2013. All patients in this period presented with nonthrombosed dysfunctional upper-extremity radiocephalic or brachiocephalic AVFs as confirmed by operative notes. Clinically immature fistulae were referred to our department if the referring nephrology or vascular surgery service determined the presence of (i) insufficient vessel development by 1 month of creation, defined by the clinical absence of a palpable thrill; or (ii) difficulty cannulating the vein with a 17-gauge dialysis needle, resulting in inability to achieve flow rates greater than 300 mL/min needed for successful dialysis treatment by 12 weeks of fistula creation.

All cases were performed by a fellowship-trained attending interventional radiologist with or without assistance from a resident or fellow.

Procedural Technique

Patients with preexisting coagulopathy ($n = 6$) underwent correction of International Normalized Ratio to less than 1.7 before the procedure. All patients received weight-based antibiotic prophylaxis in keeping with institutional standards. Patients received 1 or 2 g intravenous cefazolin (Ancef; GlaxoSmithKline, Brentford, United Kingdom) with 500 mg of intravenous clindamycin (Cleocin; Pfizer, New York, New York) substituted in cases of severe documented allergy. All interventional radiology staff followed a strict standard surgical scrub protocol before the procedure. The fistula and surrounding arm or forearm were surgically prepared with povidone-iodine (Betadine; Purdue Pharma, Stamford,

Connecticut) or chlorhexidine solution (ChloraPrep One-Step; Enturia, Leawood, Kansas) and sterilely draped. The fistula was accessed by using a micro-puncture set (Cook, Bloomington, Indiana) under ultrasound guidance with the needle directed toward the venous limb. Iohexol contrast medium (Omnipaque; GE Healthcare, Waukesha, Wisconsin) diluted to 50% strength with normal saline solution was injected to obtain an angiogram of the fistula. Collateral veins arising from the primary outflow deemed necessary for intervention were selected and embolized with 0.035-inch pushable coils (Cook). Coil size was chosen to match the collateral vein diameter as measured on venography. Embolization was performed on a subjective basis whenever the primary operator believed at least 25% of blood flow on digital subtraction venography was diverted through accessory vessels. All collateral vessels identified that met this criteria were embolized (Fig). In the event an underlying stenosis was identified, angioplasty was performed before the embolization with the use of a high-pressure balloon. Embolization was then performed only if greater than 25% of blood flow persisted through the collateral vein(s).

Direct arterial puncture for assessment of the arterial limb of the fistula was not performed. Instead, the arteriovenous anastomosis and arterial limb were studied by a reflux injection of the fistula obtained with manual compression of the venous outflow. If this technique was not feasible ($n = 12$), the arterial limb was catheterized and injected by a second puncture of the venous tract with the needle directed toward the arterial limb. The 5-F catheter(s) was then removed, and hemostasis was achieved with manual compression.

Data Collection

All patients ($N = 49$) undergoing CVE procedures on native AVFs ($N = 65$) were reviewed. One patient was excluded for poor follow-up because fistula maturity could not be assessed. An additional two patients were excluded for technical failure, defined by an inability to successfully cannulate the collateral vessel. Finally, an

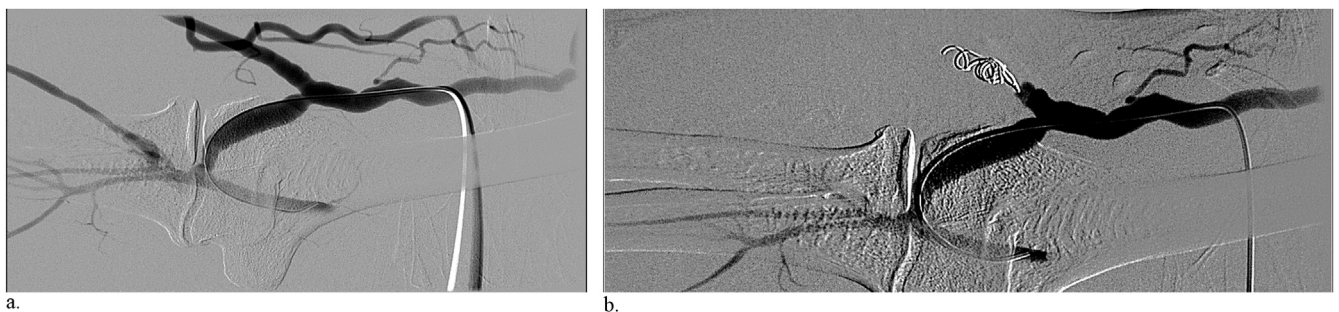


Figure. (a) Digital subtraction angiogram in a 67-year-old man with end-stage renal disease and new brachiocephalic fistula referred for fistula immaturity. Angiogram of the fistula demonstrates a large collateral vein arising from the primary venous outflow (arrow) without other diagnostic abnormality. This vessel was subsequently selected, and embolization was performed with four 0.035-inch, 8-mm pushable coils. (b) Postembolization image after CVE no longer demonstrates opacification of the collateral vessel. The patient subsequently underwent successful initiation of hemodialysis through the fistula.

Download English Version:

<https://daneshyari.com/en/article/4237938>

Download Persian Version:

<https://daneshyari.com/article/4237938>

[Daneshyari.com](https://daneshyari.com)