Stenting for Brachial Artery Dissection and Stenosis

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ABSTRACT: Purpose. To report percutaneous transluminal angioplasty and stenting in a patient with brachial artery dissection and stenosis. Case report. A 79-year-old woman with a history of coronary artery disease and hypertension 10 months post 2-vessel coronary artery bypass surgery presented with pain, numbness, and weakness in her right hand that had been increasing in severity for several months. Her brachial, radial, and ulnar pulses were not palpable and a Doppler ultrasound was consistent with brachial artery stenosis. She was taken for angiography, which revealed a dissection of her right brachial artery with concomitant severe stenosis. Her right brachial artery was stented with two LifeStent FlexStar XL vascular stents (Bard Peripheral Vascular), with symptomatic relief and no evidence of restenosis at 1 year. Conclusion. Percutaneous angioplasty and stenting can be a viable option to treat patients with symptomatic upper extremity stenosis.

Key words: stenosis, restenosis, stenting, balloon angioplasty, vascular intervention

Brachial artery stenosis is a rare phenomenon often associated with atherosclerotic disease, giant cell arteritis, fibromuscular dysplasia, and trauma. Management generally depends on the underlying cause of the stenosis as well as the severity. In giant cell arteritis, the current mainstay of treatment is glucocorticoids due to the autoimmune nature of this disease process. However, when atherosclerotic disease or trauma is involved in the stenosis of an upper extremity, the course of action is not always clear. Options include surgical revascularization including vascular bypass, as well as the less invasive percutaneous catheter-based angioplasty. While there have been a handful of case reports detailing intervention on the subclavian artery, no such case involving stenting of the brachial artery has been detailed. Here, we report a case of dissection and stenosis of the right brachial artery which occurred in a 79-year-old woman approximately 10 months following coronary artery bypass surgery, treated with percutaneous intervention.

CASE REPORT
A 79-year-old woman with a past medical history of coronary artery disease and hypertension complained of pain and numbness in her right forearm and hand, increasing in severity. These symptoms had begun 10 months following uncomplicated cardiac surgery, a 2-vessel coronary bypass with 2 vein grafts and with bioprosthetic aortic valve replacement via median sternotomy. Prior to her cardiac surgery, she did have angiography which revealed severe 2-vessel disease including her left main and circumflex arteries, in addition to severe stenosis of her aortic valve. Angiographic approach at this time was via femoral access, and it was decided that the patient would benefit from CABG. Of note, during the surgery she did have an arterial line placed in her right radial artery for routine arterial pressure monitoring, which remained in place for the day following the surgery as well but was removed without complication. In the 3 to 4 months prior to her office visit, the patient stated that her right hand was, at times, cold and that she could not bear to have it uncovered. It was becoming increasingly weak, while the left hand was asymptomatic. On examination her right hand was pale and cool, and there were no palpable brachial, radial, or ulnar pulses. Prior to heart surgery she had been documented to have had a brachial cuff pressure of 146/80 mmHg on the right and 140/80 mmHg on the left. Radial and ulnar pulses had been 2+ on the right preoperatively. Noninvasive testing including a Doppler ultrasound of her right upper extremity at this time was consistent with stenosis of her brachial artery, and she was scheduled for angiography. Angiography via a right femoral artery approach revealed a severe stenosis...
of the proximal right brachial artery with what appeared to be a dissection plane extending to above the elbow. A 6 Fr JR4 guiding catheter (Cordis) had been placed into the right axillary artery using an angled Glidewire (Terumo). Aspirin and intravenous heparin had been administered. After angiography a 0.014" 300 cm BMW Universal wire (Abbott Vascular) had been placed and ultrasound imaging was attempted in the proximal brachial artery, but an Eagle Eye Gold Catheter intravascular ultrasound catheter (Volcano) would not pass into the diseased segment. The catheter was exchanged for a 4 mm x 120 mm Fox sv PTA catheter (Abbott Vascular) and dilatation performed at 4 atm for 20 seconds and more proximally, overlapping, at 4 atm for 38 seconds. However, the angiographic result revealed concerning luminal narrowing following angioplasty. Therefore, the balloon was replaced for a Quick-Cross 0.035" x 135 cm support catheter (Spectranetics) to enable placement of a 0.035" x 260 cm Rosen wire (Cook Medical) into the radial artery, after removal of the BMW Universal wire. The JR4 guide was removed and a 6 Fr 90 cm Destination sheath (Terumo) was placed. A 7 mm x 150 mm LifeStent FlexStar XL was deployed in the brachial artery and post dilated with a 6 mm x 120 mm Fox Plus PTA Catheter (Abbott Vascular) to 8 atm for 58 seconds and 4 atm for 24 seconds, overlapping and removed. A more proximal 8 mm x 80 mm LifeStent FlexStar XL was deployed and then post dilated with the Fox Plus 6 mm x 120 mm PTA catheter. Final angiograms revealed a widely patent lumen. Post intervention examination revealed that the right brachial, radial, and ulnar pulses were restored: 2+ brachial, 1+ radial, and trace ulnar. An upper extremity ultrasound of this patient at 6-month follow-up and 18-month follow-up was consistent with healthy flow in her right brachial, radial, and ulnar arteries with continued stent patency.

DISCUSSION

Upper-extremity vascular stenoses are uncommon and reportedly involve the brachial artery in about 12% of such chronic limb ischemia cases.2 Trauma, fibromuscular dysplasia, giant cell arteritis, and atherosclerosis are among the causes.3-7 The cause of brachial artery disease for our patient was unclear, although it was temporally associated with heart surgery. We had no reason to suspect fibromuscular dysplasia or giant cell arteritis in this patient. We believe the cause of the brachial artery stenosis in this patient to be most likely trauma or a complication associated with the CABG; however, in a patient with demonstrated coronary artery disease, we cannot rule out the possibility of atherosclerosis as the cause of this lesion. This patient was treated interventionally with angioplasty and stenting with a successful short and midterm outcome.

A literature search revealed only one report that describes stenting of the brachial artery. Duijm et al describe 22 cases of arteriovenous fistulae with inflow stenoses to determine the feasibility of ret-
CASE REPORT

We believe the stenoses in the patients described in this case series to be more similar to our patient in that the upper extremity lesions were caused by trauma as opposed to an autoimmune process. In this report, angioplasty and/or stent placement was successful (<30% residual stenosis) in 95% of patients at 1 week. Of the 19 patients with a successful intervention, 7 required repeat angioplasty before 1 year. Stents were placed in only 4 of the patients described. Because of the dearth of any published data regarding the stenting procedure of the brachial artery, this intervention seems to be novel. Furthermore, because this lesion included a dissection, it was determined that stenting would be the most beneficial intervention for this patient.

Further consideration to placing a stent in this patient was given due to the length of the lesion. The SilverHawk Plaque Excision System (Covidien) had been employed for plaque excision in treating a short segment atherosclerotic lesion of the right brachial artery successfully; this technique was not deemed to have been appropriate in this case given the patient’s very long lesion length.1 Given the lesion length and the appearance of dissection, and given the suboptimal result of angioplasty alone as the initial therapy in this patient case, stenting was our preferred

![Figure 2. Proximal right brachial artery post stenting with and without contrast showing patency (A and B).](image)

![Figure 3. Distal right brachial artery post stenting with and without contrast showing patency (A and B).](image)
interventional approach, especially because we would be able to land the stent prior to reaching the elbow. Unfortunately, should we encounter in-stent restenosis, our options may be limited to in-stent angioplasty, with the addition of adjunctive medication such as cilostazol, which might decrease subsequent restenosis, or possibly brachytherapy, if available. We do note that currently, there are no stents that are FDA approved for brachial artery placement, although in this case we do feel that the procedure has improved her quality of life and the case therefore has further implications for the utility of stenting in other peripheral vascular disease. Bypass surgery had been the original option that had been considered with the patient, but the patient objected to that treatment. While surgical revascularization will remain a possible ultimate option, fortunately, she has done well, thus far, at 1-year follow-up.

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**REFERENCES**


