

Stent Placement in the Right Subclavian Artery

Treating a young woman's spontaneous dissection.

BY VINAY KUMAR, MD

A 48-year-old woman was evaluated for sudden onset of right upper-extremity pain associated with numbness and coldness of hand. According to the patient, the symptoms developed 4 days after an uneventful hysterectomy. She stated that she had never experienced such symptoms before. Her medical history was significant for hypertension and smoking for the previous 20 years. A duplex ultrasound performed at an outside hospital was unremarkable for deep venous thrombosis of the upper extremity.

Examination in the office was remarkable for an absent right radial pulse, pale right upper extremity, and a weak right-hand grip. The tip of her third finger showed tender blue spots, signifying distal embolization. Examination with a Doppler probe identified the presence of weak radial and ulnar artery pulsations. The left radial artery was well palpable. A contrast-enhanced CT scan of the chest later demonstrated an intimal tear and dissection at the origin of the right subclavian artery (Figure 1).

ARTERIOGRAPHY

Aortic arch and selective angiogram of the innominate artery performed via a femoral approach confirmed the presence of dissection in the right subclavian artery with near total occlusion of the lumen. The right carotid artery was normal, and the dissection did not extend beyond the origin of the vertebral artery (Figure 2).

PROCEDURE

The procedure was performed in the operating room under local infiltration anesthesia (2% lidocaine) supplemented with sedation. The right femoral artery was percutaneously accessed, and a 7-cm X 10-cm hemostatic sheath was placed. Five thousand units of heparin was administered intravenously, and a pigtail catheter was placed in the aortic arch. After an arch angiogram was performed, the innominate artery was cannulated with a JB2 catheter (Cook Medical, Bloomington, IN), and a .035-inch Glidewire (Terumo Interventional Systems, Somerset, NJ) was advanced into the right subclavian artery. The short hemo-



Figure 1. CT angiogram of the chest showing dissection of the right subclavian artery.

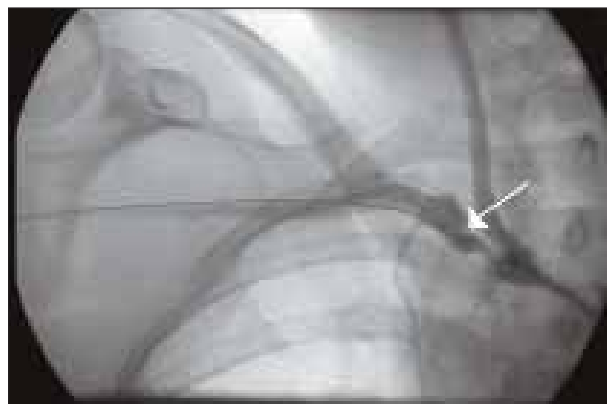


Figure 2. Selective right subclavian angiogram showing dissection, thrombus, and filling of the vertebral artery.

static sheath was replaced with a 7-F X 90-cm-long hemostatic sheath (Brite Tip, Cordis Corporation, Warren, NJ), which was advanced and positioned at the origin of the right subclavian artery. Glow 'N Tell tape (VascuTape Radiopaque Tape, LeMaitre Vascular, Burlington, MA) was applied to the anterior chest wall for accurate measurements. Selective innominate artery angiogram was performed through the sheath in the left anterior oblique view, which confirmed a 20-mm-long flow-limiting dissection of the right subclavian artery with presence of a thrombus.

The Glidewire was exchanged for a .035-inch stiff Glidewire,



Figure 3. Positioning the iCast stent (iCast, Atrium Medical Corporation, Hudson, NH) before deployment.

and a 7-mm X 22-mm balloon-expandable covered stent (iCast) was advanced and positioned across the dissection. The stent was placed flush with the origin of the right vertebral artery (Figure 3) and deployed by the inflation of the balloon at 8 atm. Because the vessel diameter was measured to be 8 mm, angioplasty was repeated with a larger-diameter 8-mm X 40-mm angioplasty balloon (PowerFlex, Cordis Corporation).

The completion angiogram demonstrated complete resolution of the dissection and no residual stenosis. The right carotid, vertebral, and internal mammary arteries were well visualized (Figure 4). The hemostatic sheath was withdrawn, and the puncture site was closed with a closure device (Angio-Seal, St. Jude Medical, Inc., St. Paul, MN). The radial artery immediately became palpable, and the patient recovered neurological functions within a week. At 4-month follow-up, the patient remains asymptomatic.

DISCUSSION

Spontaneous dissection of the subclavian artery in young women is a rare occurrence. The condition is difficult to diagnose because symptoms are often attributed to musculoskeletal pain. Diagnosis is considered by the lack of palpable pulsations at the wrist as well as blood pressure differential between the two arms and is confirmed either by a contrast-enhanced CT scan of the chest or an aortic arch arteriography.

Treatment is often surgical, either by direct repair of the subclavian artery or by constructing a bypass graft between the right carotid and the subclavian arteries with the use of a vein or a synthetic graft. Endovascular treatment is frequently challenging due to the location of the intimal tear, presence of thrombus, and proximity to the vertebral, internal mammary, and carotid arteries.

Although it was decided to treat the dissection by stent placement, location of the lesion and presence of thrombus were two major concerns. It was also important to choose a



Figure 4. Completion angiogram showing resolution of dissection and flow in the carotid, vertebral, and internal mammary arteries.

precise stent length so that it could be deployed at the origin of the subclavian artery without compromising circulation to the carotid or vertebral arteries.

It was believed that the lesion could be approached either from a brachial or a femoral artery. However, the brachial approach was felt to be risky due to fear of dislodgement of the thrombus into the carotid artery or aortic arch during guidewire placement. The femoral approach was used because it was believed to be safe, with the potential for embolization downstream and therefore was easier to deal with. Originally, thrombolysis was also considered, but due to concerns about clot embolization, the idea was abandoned.

A balloon-expandable stent was an obvious choice because it could be deployed precisely. Because a bare-metal stent may allow prolapse of thrombotic material through the stent struts, which may lead to subsequent thrombosis, a covered stent was chosen.

A 7-mm X 22-mm iCast PTFE-covered balloon-expandable stent was selected, which can be delivered over a .035-inch stiff wire through a 7-F hemostatic sheath. Stent graft design allows dilatation to a larger diameter with the use of an angioplasty balloon, which proved beneficial in this case. During stent deployment, migration was a definite concern due to respiratory movement; however, the stent was successfully deployed without breath holding.

CONCLUSION

Acute dissection of the right subclavian artery with upper-extremity ischemia can be safely treated percutaneously by placing a balloon-expandable PTFE-covered stent from a remote site. ■

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