Through-and-Through Brachio/Radio-Femoral Access Technique for Endovascular Recanalization of the Left Subclavian Artery

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Abstract

The authors illustrate the use of through-and-through brachio/radio-femoral access technique in two patients who presented with subclavian steal syndrome. This is an additional tool in the armamentarium of the endovascular specialist to improve management of complex cases with subclavian steal syndrome. This technique provides several advantages to improve efficiency and precision of the procedure while reserving the open surgical bypass option if needed.

Keywords
- endovascular
- through-and-through access
- left subclavian artery recanalization

Introduction

Through-and-through wire technique for endovascular interventions is commonly used for endovascular aortic and peripheral interventions.1,2 The purpose of this report was to enhance this literature and suggest an alternative pathway to recanalization of an occluded vessel/stent and precise angioplasty and/or placement of a stent.

Case Presentations

Case 1
A 67-year-old female patient with medically managed dyslipidemia and hypertension presented for evaluation for new left upper extremity tiredness, heaviness, and pain with activity. Cross-sectional imaging in the form of computed tomography angiography (CTA) and three-dimensional reconstruction demonstrated an occlusion of the left subclavian artery (LSCA) (Fig. 1). Recanalization of the LSCA was initiated through a left brachial artery approach. However, there was inability to assure whether the soft-angled glide-wire was traversing the true lumen or a subintimal plane of this vessel. Therefore, access was gained through the left common femoral artery (LCFA), and in a retrograde fashion through the aorta, the stump of the LSCA was probed with a second glidewire and recanalization of the LSCA was facilitated. Once access through the true lumen of the LSCA was achieved, the glidewire from the LCFA was used to probe the tip of the Kumpe catheter from the left brachial artery, and by traversing this catheter, we obtained through-and-through access from the left brachial to the LCFA (Fig. 2A). With this through-and-through wire in place, precise deployment of a 6-mm covered iCast (Atrium Medical Corporation, Merrimack, NH) stent (Fig. 2B) was facilitated without risking coverage of the left vertebral artery by gently tugging from each end at the through-and-through wire.

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Case 2

A 72-year-old female patient with a previously failed LSCA stent and left carotid to subclavian artery bypass presented for evaluation for new left upper extremity tiredness and a syncopal episode. CTA demonstrated an occlusion of the LSCA stent and left carotid to subclavian artery bypass (►Fig. 3). Recanalization of the LSCA stent was performed through a left radial artery and LCFA approach. In this instance, a stiff guide catheter was placed right at the origin for recanalization.

**Fig. 1** Computed tomography angiography three-dimensional reconstruction of the aorta and the left subclavian artery occlusion (white arrow).

**Case 2**

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**Fig. 2** (A) Accessing of the glidewire into the lumen of the Kumpe catheter through the left brachial artery (white arrow) coming from the left common femoral artery and (B) angiogram of the already deployed 6-mm iCast covered stent in the left subclavian artery (white arrow depicts the left vertebral artery).

**Fig. 3** Curved reformat computed tomography angiography with maximal intensity projections at 8 mm demonstrates occluded left subclavian artery stent (white arrow) and occluded left common carotid artery to subclavian artery bypass graft (curved black arrow). The left subclavian artery (black arrow) is predominately supplied by retrograde flow as seen at the left vertebral artery origin (black arrowhead).
of the LSCA stent and using the back end of the glidewire access was obtained into the LSCA (►Fig. 4A). Again, through-and-through access from the left radial to the LCFA was obtained and the LSCA stent was angioplastied (►Fig. 4B).

Discussion

Ischemic stroke is one of the leading causes of death and long-term disability worldwide. Carotid stenosis is responsible for a 2% risk of stroke per year. We present this case of rapid progression of disease in a patient who would not, under the current guidelines, have been subject to routine carotid screening. Furthermore, it presents with intraplaque hemorrhage, a marker for high risk of stroke and plaque progression. This case illustrates the value of additional imaging studies in patients who demonstrate atherosclerosis detected by screening ultrasound. CTA is widely available, relatively inexpensive, and specific for detection of cervical internal carotid artery stenosis. Magnetic resonance angiography (MRA) with vessel wall imaging is increasingly utilized to better characterize carotid plaques to identify vulnerable lesions especially with borderline luminal stenosis. MRA is the imaging modality of choice to best detect intraplaque hemorrhage, which is known to correlate with subsequent ischemic cerebrovascular events.

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References

1. Panuccio G, Rohlfis F, Makaloski V, Eleshra A, Tsilimparis N, Köbel T. Through-and-through suture technique to stabilize a sheath in branched endovascular aortic repair. J Endovasc Ther 2019;26(06):805–809

2. Rohlfis F, Larena-Avellaneda AA, Petersen JP, Debus ES, Köbel T. Through-and-through wire technique for endovascular damage control in traumatic proximal axillary artery transection. Vasc Med 2015;23(01):99–101

3. Brott TG, Halperin JL, Abbara S, et al; American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines American Stroke Association American Association of Neuroscience Nurses American Association of Neurological Surgeons American College of Radiology American Society of Neuroradiology Congress of Neurological Surgeons Society of Atherosclerosis Imaging and Prevention Society for Cardiovascular Angiography and Interventions Society of Interventional Radiology Society of Neuroradiology Society of NeuroInterventional Surgery Society for Vascular Medicine Society for Vascular Surgery American Academy of Neurology and Society of Cardiovascular Computed Tomography. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAC/PSC/SCAI/SIR/SNIS/SVM/SVS guideline on the management of patients with extracranial carotid and vertebral artery disease. Stroke 2011;42(08):e404–e540

4. Schindler A, Schinner R, Altaf N, et al. Prediction of stroke risk by detection of hemorrhage in carotid plaques: meta-analysis of individual patient data. JACC Cardiovasc Imaging 2020;13(2 Pt 1):395–406

5. Saba L, Yuan C, Hatsuhami TS, et al; Vessel Wall Imaging Study Group of the American Society of Neuroradiology. Carotid artery wall imaging: perspective and guidelines from the ASNR Vessel Wall Imaging Study Group and Expert Consensus Recommendations of the American Society of Neuroradiology. AJNR Am J Neuroradiol 2018;39(02):E9–E31