Aspiration Thrombectomy Using the Penumbra Catheter

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Editor:
Thromboembolic diseases are among the most prevalent medical problems today and cause stroke, myocardial ischemia, acute limb ischemia, and pulmonary embolism. Various treatment modalities exist, ranging from medical therapy to endovascular techniques. In the management of a thromboembolic condition causing a threatened limb, common options for treatment include surgical thromboembolectomy, percutaneous thrombectomy, and/or thrombolysis. In recent decades, many mechanical thromboembolectomy devices have become commercially available and have proven to be useful in the treatment of acute thrombi. These devices are often limited in efficacy when treating a chronic, organized thrombus. We recently encountered two cases in which an aspiration thrombectomy device (Penumbra, Alameda, California), which is typically used in the treatment of acute stroke, was used to aspirate chronic thrombi in a patient with a cold hand and in a patient with a chronically thrombosed common iliac vein stent.

A 59-year-old man with a 20-year history of poorly controlled diabetes and hypertension presented to the emergency department with left hand pain, numbness, and tingling in the dorsal and palmar surfaces of the fingers. On examination, the left hand was cold, with a weak radial pulse and a delayed capillary refill in the fingers. There was limited range of motion, particularly in the third and fourth digits, during active and passive movement. The forearm compartments were soft with no tenderness. A sensory examination had normal findings, and a Spurling test was negative. Doppler ultrasonography and left upper extremity arteriography demonstrated a focal occlusion of the radial artery at the level of the wrist and severely atherosclerotic ulnar artery with minimal detectable flow (Fig, a). An ACE Penumbra catheter system (Penumbra) was used to perform suction embolectomy of the distal radial artery. The rationale for the use of the Penumbra catheter system was the availability of catheters with small diameters. Digital subtraction angiography subsequently demonstrated a widely patent radial artery and flow to the digits (Fig, b). On histologic examination, the aspirated thrombus showed acute and chronic components. The patient was discharged and prescribed an anticoagulation regimen. Three months after embolectomy, the patient’s left hand continued to remain warm, with normal capillary refill in the digits and palpable radial pulse.

A 47-year-old woman with a history of recurrent left lower-extremity deep vein thrombosis was discovered to have a severe case of May–Thurner syndrome and underwent a left common iliac vein stent placement in 2011. The patient was discharged from the hospital on anticoagulation and remained in her usual state of health until July 2014, when a computed tomography (CT) study showed thrombosis of the left common iliac vein; the patient revealed that she had stopped taking warfarin 5 months before the CT scan. The patient underwent venography through a popliteal vein access, which revealed an occlusion of the left common iliac vein stent with extensive cross-pelvic and pubic collateral vessels (Fig, d). With the use of the ACE Penumbra aspiration catheter, approximately 60%–70% of the thrombus was successfully aspirated following multiple passes over the course of a few minutes (Fig e). The rationale for the use of the Penumbra catheter system was to see whether it could aspirate chronically organized thrombi. Gross examination of the aspirated thrombi showed acute and chronic fragments of thrombus, as confirmed by histologic examination. The patient was discharged home 4 hours later in stable condition on anticoagulation.

Chronic thrombosis can be difficult to manage; if amenable, current treatment methods include open surgery, angioplasty, and percutaneous stent placement, with variable long-term clinical results. The Penumbra aspiration device has already established its role in the treatment of ischemic stroke (1); the application of the Penumbra catheter system was recently reviewed in a technical paper (2). In addition, there are several case reports of the use of Penumbra devices in the removal of cerebral venous thrombosis and a basilar stent occlusion (3,4). The Penumbra device can be a favorable alternative for patients who cannot tolerate surgical interventions or in instances in which thrombolysis is contraindicated or not advantageous. The main limitation of the current Penumbra device is the small size of the catheter; the largest available in the market today measures only 5.4 F (inner diameter of 0.060 inches). Although small catheters are often

None of the authors have identified a conflict of interest.

http://dx.doi.org/10.1016/j.jvir.2014.11.028
required in the arterial system, larger catheters (eg, 8–14 F) are more desirable in the treatment of venous thrombosis.

REFERENCES


Figure. Application of the ACE Penumbra catheter system. (a–c) Images from a 59-year-old man with a significant medical history of vascular disease presented with a cold hand. (a) Arteriogram of distal radial artery demonstrates a short-segment occlusion (arrow) and severe atherosclerosis of the ulnar artery. (b) Digital subtraction angiography following Penumbra device aspiration shows restoration of flow to the hand along the radial artery distribution. (c) The occlusive thrombus that was aspirated from the distal radial artery is shown. (d–f) Images from a 47-year-old woman who presented with a 5-month-old thrombosis of the left common iliac vein stent. (d) Venogram demonstrates the occluded left common iliac vein stent with cross-pelvic and pubic collateral vessels. (e) Digital subtraction angiography immediately following multiple passes using the Penumbra catheter shows restored flow and absence of collateral vessels. (f) Thrombus aspirated in e is shown. Black arrow shows soft, acute thrombus; white arrow shows dense, chronic thrombus (confirmed by histologic study; not shown). (Available in color online at www.jvir.org.)

Treatment of Cystic Lymphangioma by Transcatheter Lymphatic Sclerotherapy and Embolization

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None of the authors have identified a conflict of interest.

http://dx.doi.org/10.1016/j.jvir.2014.11.027