



PHYSICIANS

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ACCESS SITES

- Femoral.

DIAGNOSTIC DEVICES USED

SHEATH SIZES

5-F short sheath.

FLUSH DIAGNOSTIC CATHETERS

5-F pigtail catheter to assess arch anatomy.

SELECTIVE DIAGNOSTIC CATHETERS

JB1 glide catheter. Occasionally a JB2 is used, or if the anatomy is very challenging, 4-F Simmons 1 nonglide catheter.

DIAGNOSTIC GUIDEWIRES

.035-inch hydrophilic wire. Note: .035-inch stiff hydrophilic or .038-inch hydrophilic wires are used when body is needed for tortuous anatomy.

DIAGNOSTIC NOTES

- Images of the femoral artery can be useful to assess the need for a long sheath in patients with a tortuous or diseased vessel. These should be obtained as soon as the short sheath is in place. Since we introduced the performance of the femoral artery run at the start of the procedure, once the sheath is in place, we have had no femoral artery injuries.
- Diagnostic angiogram should include images of the aortic arch, at least two views of the carotid bifurcations, intracranial circulation via injections of each carotid artery, and at least one of the vertebral arteries at the origin and in the head.
- It is very important to know perfusion and collaterals of the brain before the procedure. Control angiography of the brain before and after the procedure is essential because microembolization during this carotid stenting procedure is very commonly documented by transcranial Doppler during the procedure and by postprocedural diffusion-weighted imaging. Nonvisualization (macroembolism) of the anterior and middle cerebral

artery branches can be subtle without knowledge of preprocedural baseline particularly for nonneuroradiologists.

- Generally, selective internal carotid artery (ICA) injections are not necessary unless you are looking for an aneurysm or other vascular malformation. First, ensure there is no contraindication to entering the ICA with an angiogram in two planes. Do not enter the ICA if there is plaque or excessive tortuosity that may predispose to dissection.

INTERVENTIONAL DEVICES USED

INTERVENTIONAL SHEATHS OR GUIDE CATHETERS

- 6-F short sheath.
- Or 6-F Shuttle sheath: to place it in the common carotid artery, use 6.5-F slip catheter. When tortuous anatomy does not allow one to select the artery, use a 5-F, 125-cm Vitek catheter.

INTERVENTIONAL GUIDEWIRES

Steerable .014-inch guidewire, such as the Transend, or Synchro.

PTA BALLOONS

- For pre-stent angioplasty: Low-profile 1.5-mm to 2.5-mm balloon (eg, Maverick, Opensail, or Powersail), 15 mm to 30 mm length. A longer balloon may straighten a natural curve of vessel, causing dissection or spasm.
- For post-stent angioplasty: 5-mm to 6-mm balloon, such as the Symmetry or Savvy, is used when angioplasty is necessary.

STENTS

Use a self-expanding stent unless the lesion is in the distal cervical ICA. There are three FDA-approved carotid stent systems in the US market at this point. The smallest size available for the Xact stent is 7 mm or 6 mm to 8 mm tapered, which may be too big for some cases.

OTHER DEVICES

A distal protection device was approved with the stents described previously. Whenever any type of distal protection device is used, operators must be certain that there is adequate distance (>3 cm to 4 cm of relatively straight segment) between the lesion and petrous carotid artery to place the device. Also, the wall of cervical segment of ICA where the filter is placed against should not have stenosis or atherosclerotic disease.

INTERVENTIONAL NOTES

- For both pre- and post-angioplasty, nominal pressure for the balloon is used unless the lesion is heavily calcified. Higher pressure is used for heavily calcified lesions, which depends on the appearance of balloon at the time of inflation. Deflate the balloon slowly.
- Remove any slack in the system before deployment of the stent. Redundant system results in not only suboptimal placement of the stent but also rapid forward

movement of a wire or filter that may cause spasm/dissection in the distal ICA.

- A wire tip of a distal protection device is often in the distal petrous or cavernous portion of the ICA, and it needs to be included in one of the views at all times to avoid dissection or perforation distally.
- Accept up to 20% residual stenosis after angioplasty (with self-expandable stent).
- Do not go over nominal pressure for post dilation.

IMAGING

- Biplane fluoroscopy or excellent single plane fluoroscopy.
- Mobile C-arm guidance is not adequate.
- Include guide tip (when used) and wire tip in a field.
- Final angiogram of the brain via injection of treated carotid is mandatory.

OTHER MATERIALS USED

Groin closure device: currently, we prefer the Angioseal.

PHARMACEUTICALS

- Before the procedure: aspirin 325 mg, clopidogrel 75 mg for 7 days or 3 days with loading dose.
- During the procedure: heparin 5,000 units as soon as a sheath is in, alternatively 2,000 units with diagnostic portion of procedure, then add 3,000 units when the Shuttle sheath is being placed. Check activated clotting time (ACT) 20 minutes after bolus, add heparin to maintain ACT >250 seconds.
- After the procedure: Continue heparinization to maintain partial thromboplastin time ratio between 1.5 and 2.0. Continue aspirin indefinitely and administer clopidogrel for at least 4 weeks.

TESTS USED

ACT during procedure, keep greater than 250 seconds. ■