PHYSICIAN
Steve Jenkins, MD

ACCESS SITES

- **Femoral: Used 90% of the time.**
- **Ipsilateral brachial artery access is used 10% of the time if the proximal vertebral artery is acutely angulated when imaged from the femoral access. This approach allows stent delivery to an obtuse angle and increases the procedure's success rate.**

DIAGNOSTIC DEVICES USED

SHEATH SIZES

5-F or 6-F sheath.

FLUSH DIAGNOSTIC CATHETERS

A 6-F pigtail catheter is used to perform aortic arch angiography in the left anterior oblique view.

SELECTIVE DIAGNOSTIC CATHETERS

5-F Berenstein is the diagnostic catheter of choice. Note: 4-F, 5-F, or 6-F Judkins right, internal mammary, or Vitek curved catheters are acceptable; multipurpose curves are used for the brachial access.

DIAGNOSTIC GUIDEWIRES

.035-inch hydrophilic wire or J-wire should be used to place the diagnostic catheter distal to the vertebral artery ostium. The manifold is connected and continuous pressure monitored while engaging the vertebral artery ostium.

DIAGNOSTIC NOTES

Diagnostic aortic arch and four-vessel angiography, including selective carotid and vertebral artery angiography with intracranial imaging should be performed in all patients using digital subtraction. The intracranial distribution of the anterior and posterior circulation and the circle of Willis are defined in all patients who are potential candidates for vertebral artery angioplasty.

INTERVENTIONAL DEVICES USED

INTERVENTIONAL GUIDEWIRES

A .014-inch soft guidewire is recommended for use with a rapid exchange or monorail balloon; a filter wire should be used in all vertebral arteries with an adequate landing zone distal to the index lesion.

INTERVENTIONAL SHEATHS OR GUIDE CATHETERS

A 6-F or 5-F Judkins right or multipurpose guiding catheter can be used to perform the intervention. A curve similar to the diagnostic imaging catheter should be chosen.

PTA BALLOONS

The balloon length is determined by the lesion length and should cover the lesion completely. The balloon diameter should be 0.5 mm less than the reference vessel diameter.

STENTS

Balloon-expandable coronary or peripheral stents on a .014-inch platform work well in the vertebral artery ostium position. Ensure that the proximal portion of the stent covers the vertebral ostium. It is not uncommon for the proximal stent to extend back into the subclavian artery by 1 mm to 2 mm. Both balloon-expandable and self-expanding stents are acceptable in the V1 and V2 position when the lesion does not involve the ostium of the vertebral artery.

OTHER DEVICES

Embolic protection devices (mentioned previously) are not FDA approved for use in the vertebral artery; however, it should be considered medical malpractice if they are not used with a comfortable landing zone distal to the index lesion.

INTERVENTIONAL NOTES

- One must be very diligent to keep the tip of the guidewire within view at all times during the procedure because a guidewire perforation can occur, causing fatal intracranial hemorrhage. This can happen with any guidewire, but is particularly of concern when a hydrophilic guidewire is used.
- Obviously, due to the risk of distal embolization of debris, debulking devices are not appropriate for use in the cerebral circulation. For this reason, a team approach including a neurologist, neurointerventional radiologist, and a cardiologist is advantageous. Because the most common location for vertebral artery stenoses is at or near its origin from the subclavian artery, considerable recoil often accompanies PTA alone. Historically, aorto-ostial atherosclerotic lesions in general have a poor response to PTA alone due to elastic recoil. We believe that primary stent placement is an attractive treatment option for atherosclerotic vertebral artery disease, and therefore we rarely perform balloon angioplasty alone.
- Clinical follow-up is performed at 3, 6, and 12 months, and yearly thereafter, if clinical relief of symptoms occurs. Any patient with angioplasty above the dura-mater is scheduled for a mandatory 1-year follow-up selective angiography of the angioplastied site.

IMAGING

- Digital subtraction techniques are essential when performing vertebral and intracranial angiography. A minimum image intensifier size of 12 inches is necessary to adequately image the intracranial vessels.
- Some new angiography suites allow the technique of digital subtraction rotational angiography, which limits contrast and provides up to 180 degrees of angles with which to view the lesion.

OTHER MATERIALS USED: CONTRAST

Nonionic, iso-osmolar contrast is used for intracranial angiography.

PHARMACEUTICALS

Heparin is not routinely used when performing diagnostic arch and four-vessel angiography with intracranial imaging. Low-dose, weight-adjusted heparin is utilized for vertebral angioplasty procedures to maintain an ACT >200 seconds. ■