

Rapid Ambulation After CAS

Achieve reduced hypotensive response, reduced nursing costs, and improved patient comfort.

BY GARY S. ROUBIN, MD, PhD

There are three main reasons why it is important for patients to ambulate quickly after carotid artery stenting (CAS). The first is patient comfort.

Patients do not enjoy having to lie in bed after an endovascular procedure. The sooner we can ambulate them, get them walking around and into the bathroom, the more comfortable they will be and the more reasonable they will find the procedure.

The second reason is cost efficiency in terms of patient care. It is more expensive to nurse a patient who has a sheath in place in a procedural care unit than to nurse a patient who has had his artery closed, no groin issues, and is ambulating.

The third and most important reason is reducing the hypotensive response that occurs when a stent is placed in the carotid bifurcation. We have observed during the last 10 years, with more than 1,600 patients, that the sooner we ambulate these patients, if only to sit them up in bed and move their arms and legs, the sooner we are able to overcome the normal physiological responses to the internal pressure of the stent in the carotid bifurcation. In our very large carotid stent practice, we are rarely, if ever, called about patients who are having any clinical issues with hypotension. Although we routinely see blood pressures in the 80 to 90 systolic pressure range after the procedure, with all of the measures we take in addition to ambulation, we simply do not have a problem with hypotension; essentially, it has become a nonclinical issue. If anything, we may administer 30 mg of oral pseudoephedrine every 6 hours. Early ambulation has been an important part of the various things we do to overcome hypotension.

TECHNIQUE

We use moderate doses of antithrombin agents, and bivalirudin (Angiomax, The Medicines Company, Parsippany, NJ) is our agent of choice. We have completed a very rigorous prospective study of this agent, with dramatically good results in terms of both neurological events and bleeding events. We use a bolus and, if the procedure goes

quickly, we do not even use an infusion; or, if we start the infusion of Angiomax, we stop the infusion as soon as the stent is placed. We are, in effect, rapidly reversing the anticoagulation, and then we can use a closure device.

Alternatively, we use a very moderate dose of heparin and we aim for an ACT in the 250 range. We are very comfortable if it is between 200 and 250; for example, we do not inject another bolus if we get a reading of 230. We think it is safer for the operator to administer the antithrombin agent through the carotid sheath as soon as it is in place.

If the anatomy is suitable, we use a closure device. For some patients, we use the Angio-Seal device (St. Jude Medical, St. Paul, MN); some patients are more suited for the Perclose A-T suture-mediated device (Abbott Vascular Devices, Redwood City, CA). By the time the patient leaves the lab, we have the closure device in place. If the patient is not suited for a closure device, we are able to remove the sheath very quickly due to the use of bivalirudin. We perform 95% of our cases through a 6-F sheath, which facilitates using a closure device or easy sheath removal and achieving ambulation. Some hospitals use 8-F sheaths and

TABLE 1. FACTORS REDUCING HYPOTENSION AFTER CAROTID STENTING

- Hold antihypertensive therapy
- Hydrate patients well
- Do not use sedation
- Routinely administer atropine
- Use conservatively sized balloons (5 mm) for postdilation
- Use short-acting direct thrombin inhibitors
- Use 6-F sheaths
- Use femoral closure devices
- Ambulate as rapidly as practical
- Educate staff on the benign nature of hypotension due to stent placement
- Don't overlook other causes!

8-F guides to perform CAS, but we think that is a disadvantage, especially in terms of early ambulation.

Another thing that helps us achieve early ambulation is to make sure that the patient is feeling well, and this largely means reducing or overcoming the issues of hypotension. We withhold blood pressure medications on the morning of the procedure and we hydrate the patient very well. We insist that the anatomy is suitable for a quick procedure (ie, a procedure that can normally be completed in 15 to 20 minutes); if it is not, we do not proceed. We believe that CAS should not be undertaken in anatomy that puts the patient at risk from a prolonged procedure because excessive manipulation, contrast, and procedure time will increase the risk of neurological events; for most patients, there is a good surgical alternative.

If we do see hypotension in the lab immediately after the procedure, we will increase the hydration, administer boluses of phenylephrine, and will use closure devices. With the use of moderate anticoagulation, we are able to return the patient to the nursing unit where the staff is experienced in watching the incision sites and graduating the return to ambulation during the next 2 hours. Typically, 2 to 4 hours after the procedure, the patient is sitting up, and moving around in bed, and is ready to ambulate (Table 1).

CLOSURE DEVICES

We perform our femoral punctures very carefully with fluoroscopic guidance to make sure we puncture above the femoral bifurcation. We routinely take an angulated view of the femoral puncture site at the start of the procedure so that we are able to check that we are not too high, and that we are below the inguinal ligament and above the femoral bifurcation. If the femoral artery has no moderate-to-severe stenotic disease, we believe the patient is a good candidate for closure. Depending on the need for additional procedures, the number of previous procedures, fibrosis around that groin, and the amount of apparent calcification in the artery, we will choose either a collagen plug device or a suture device.

Patient Selection

Patient selection depends on the device we are using. Ideally, the patient will have a femoral puncture entry point that is in the common femoral artery, 1 or 2 cm above the femoral bifurcation, but at the point below the inguinal ligament. We are reluctant to use closure devices if the femoral artery is free of moderate-to-severe stenotic disease, if the patient does not have a lot of severe peripheral disease, or if the patient has an occluded superficial femoral artery and disease of the origin of the deep femoral artery. If the patient has undergone many procedures and has a lot of fibrosis around the artery, but the artery itself looks good, we tend

to use a collagen plug. If the vessel is very calcified, we also tend to use a collagen plug. If the vessel is free from excessive calcium and free from severe fibrosis, then the patient is a good candidate for a suture-type closure device.

PHYSICIAN SKILL SET

Using femoral closure devices safely and effectively is similar to any other technique in peripheral or vascular intervention. It requires both knowledge of patient selection and correct, technical use of the devices. There is a learning curve. The technical aspects require approximately 10 to 20 cases before the physician becomes efficient in using these closure devices. The learning curve is similar for both devices—maybe a little longer for the suture devices than for the plug devices.

PATIENT CARE

When quickly ambulating the patient after CAS, patient care is somewhat different than care for non-rapid ambulation. Clearly, pulling the 6-F sheath on the floor is not a serious issue, particularly if you are using bivalirudin. These days, because we are not using prolonged or even long-acting antithrombin agents, the ability to safely pull the sheath within a couple of hours and still ambulate the patient fairly quickly is an option, even without a closure device. So, the patient who is not a good candidate can still have the sheath taken out within an hour or two, and can be ambulated fairly soon after that.

For many years, we have advocated that CAS should be undertaken without sedation—certainly without general anesthesia. A heavily sedated patient or a patient who has had general anesthesia is going to lie in bed for about 4 to 5 hours, which really amplifies the hypotension. Inactivity in a sedated patient who then has back pain and needs more pain relief further complicates the whole issue of hypotension.

CONCLUSION

Rapid ambulation after carotid stenting is a positive aspect of this less-invasive, patient-friendly alternative to carotid endarterectomy. The use of short-acting, direct thrombin inhibitors, 6-F systems, and femoral closure devices enhances the procedure. In addition to patient comfort, rapid ambulation lessens the hypotensive response to carotid stenting. ■

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