Perioperative Stroke Prevention during Carotid Endarterectomy: An Anesthesiologist’s Perspective

Stanlies D’Souza
Baystate Health, dsouzastan@yahoo.com

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Symptomatic patient with transient ischemic attack (TIA) or stroke

Selective shunting: Done when ischemia is identified via a neuromonitoring technique.

- Monitors mainly cortical areas, not the white matter.
- Obesity
- Bleeding, neck hematoma, and airway compromise
- Hypertension
- Cerebral hyperperfusion syndrome with neurological compromise

6. Extubation & emergence from GA

Peripheral vascular disease
- Due to carotid artery stenosis, ipsilateral cerebral blood flow is reduced and clamping results in a further reduction. The blood flow to the ipsilateral area is dependent on collateral flow from the contralateral cerebral vessels through the circle of Willis. Therefore, BP should be maintained within the normal range during clamping.
- Unclamping can increase the blood flow through the dilated ipsilateral cerebral vessels. This can lead to cerebral hyperperfusion with adverse neurological outcomes. Thus, hypertension should be avoided during unclamping and in the postoperative period.

7. Carotid unclamping

Unclamping can increase the blood flow through the dilated ipsilateral cerebral vessels.

Shunting

- Provides blood flow from proximal to distal areas of the carotid cross clamp
- Routine shunting: No neuromonitoring required
- Selective shunting: Done when ischemia is identified via a neuromonitoring technique

Shunting increases the blood flow and prevents cerebral ischemia. Insertion of a shunt can lead to embolic stroke.

CARB

CEA can be done prior to CABG as a staged procedure or as a combined procedure (CEA followed by CABG). There is no difference in stroke rate between these two methods.1,2

Clipping of Ipsilateral intracranial aneurysm

When clipping is done first, temporary clipping can lead to cerebral ischemia in already compromised ipsilateral cerebral circulation. When CEA is done in a patient with an unsecured aneurysm, the increased blood flow after unclamping can result in rupture of the aneurysm. It is preferable to do CEA first followed by clipping in another setting. It is important to control the blood pressure (BP) during unclamping and in the postoperative period to prevent increased blood flow through the aneurysm.3,4

General (GA) vs. Regional Anesthesia (RA)

Combined superficial and deep cervical plexus block is the most commonly used RA technique. Neurological assessment can be done for perioperative stroke throughout the CEA when the procedure is performed under RA. But the benefit of RA in terms of neurological outcome is not proven.5,6

PaCO₂ Management

The ipsilateral cerebral vessels are maximally vasodilated and not responsive to the changes in PaCO₂, so hypercarbia diverts the blood flow to contralateral normal cerebral vessels. Hypocarbia increases the blood flow to the ipsilateral areas by diverting the blood to normal vasculature of the contralateral cerebral hemisphere. However, the benefit of induced hypocarbia is not proven, thus the current practice is to maintain normocarbia during CEA procedures.

REFERENCES:

CONCLUSION:

Perioperative management for stroke reduction includes identifying risk factors and managing hemodynamics optimally during critical periods of anesthesia and surgery, as discussed above. The benefits of selective shunting based on neuromonitoring technique has been proven, but there is no advantage in any one neuromonitoring technique over another.