CEA: Ischemia Monitoring

Although controversial, most patients undergoing carotid endarterectomy have some form of neuromonitoring performed to detect cerebral ischemia during the period of carotid cross clamping. The goals are to (1) detect and (2) intervene upon deficits in neurologic status whether the cause be hypoperfusion or emboli and treatment be shunt placement or hemodynamic manipulation. The widely considered gold standard of ischemia monitoring is keeping the patient awake which allows for continuous neurocognitive monitoring, however the GALA trial (2008) and a cochrane review showed no benefit compared to general anesthesia. Various monitoring techniques are used when general anesthesia is required or preferred.

Stump Pressure: Measures the pressure of the distal internal carotid artery stump (i.e. the portion closest to the brain). Serves as a measure of collateral flow through the Circle of Willis and vertebrobasilar arterial system. May prove adequate CPP on the ipsilateral side, but does little to detect actual ischemia.
EEG: May not detect subcortical or smaller ischemic areas. Is sensitive to hemodynamic, temperature, and anesthetic level changes (must maintain steady depth of anesthesia during cross clamp). It also requires additional staff with technical expertise to interpret.
SSEP: Has the advantage over EEG of examining some subcortical structures along the sensory pathway, However, looks at a smaller "strip" of cortical structures, and has the same limitations of being affected by hemodynamics, temperature, and anesthetic depth. Also requires additional staffing with technical expertise.
Cerebral Oximetry: Major limitation is that it primarily monitors cortical structures perfused by the ACA (even though the MCA is the most likely to receive an emboli).
Jugular venous oximetry: Included for completeness, I'm not sure this is still routinely done.
Transcranial doppler: Excellent sensitivity at detecting air and micro (and macro) emboli down the MCA but doesn't look at other arteries. This high sensitivity comes with a lot of false positives. Requires technical expertise and can be finicky to setup and maintain.
Awake Patient: I already mentioned this, I just wanted it in bold so you don't forget it.

All of the non-awake techniques are plagued with false positives and negatives which is problematic as the treatments, hemodynamic manipulation and shunt placement, carry their own risks. Although many studies exist, differing cutoffs (e.g. stump pressure limits range from 25 mmHg to 45 mmHg) within each technique make for heterogeneous data sets and make meta-analysis difficult. No one technique has been proven to be superior to the other in terms of a patient-centered outcome benefit. Consequently a thorough understanding of logistics, mechanistic theory, strengths, and limitations of each technique is mandatory.

Further Reading:
Herrick IA, Chui J, Higashida RT, Gelb AW: Occlusive Cerebrovascular Disease: Anesthetic Considerations, Contrell and Patel's Neuroanesthesia, 6th edition. Edited by Contrell JE, and Patel P. Elsevier, 2017, pp 277-97
Shalabi A, Chang J: Anesthesia for Vascular Surgery, Miller's Anesthesia, 9th edition. Edited by Gropper MA et al. Elsevier, 2020, pp 1862-3