In their paper, Horiuchi and colleagues review their experience in 12 patients who underwent emergency middle cerebral artery (MCA) embolectomy for acute ischemia. These patients were those in whom intraarterial thrombolysis with urokinase had been unsuccessful because of either a failure to dissolve the clot or an inability to access the embolus. Flow was restored and there appeared to be improvement in neurological outcome in all 12 patients in this anecdotal group.

Clearly, there are difficulties with this type of retrospective anecdotal reporting, although it does serve the purpose of reemphasizing that emergency surgery for acute ischemia remains a viable alternative if thrombolysis and endovascular techniques are not successful. It will be interesting to see the results of larger series in which authors mechanically remove an embolus or utilize other intraluminal clot–retrieval devices with and without anticoagulation.

Data in their report reconfirm what has been noted in the past by different authors. First, the outcome of any intervention for acute intracranial thrombus depends very much on the degree of collateral blood flow. If there is sufficient collateral flow, then a penumbra exists in which there is sufficient residual flow to preserve parenchyma and retard irreversible neurological injury. Therefore, it is possible to review an angiogram and quickly assess the potential for preservation via collateral blood flow. Reversibility can also be determined using other techniques such as perfusion computed tomography (CT), which reportedly helps to indicate patients who might benefit from interventional thrombolysis. The degree of collateral flow or its absence is the same rationale for why a patient who has ipsilateral carotid artery occlusion and simultaneous intracranial thrombus is likely to fare quite poorly due to an absence of collateral blood flow through the lenticulostriate arteries along the M1 segment and anterior choroidal artery, both of which are end arterial systems with minimal access to collateral perfusion. It has also been reported that thrombus from the heart is more susceptible to embolectomy given that it is easier to milk it out of the arterial tree compared with a carotid atherosclerotic plaque or debris, which is harder and tends to shatter and fragment, subsequently embolizing distally up the MCA tree.

Although it is not mentioned in the text, perioperative anesthesia management is important. Specifically, it may be valuable to administer thiopental or etomidate to help provide some degree of cerebral protection while awaiting reperfusion. Likewise, there may be some cytoprotective benefits of propofol anesthesia. It is important to maintain the patient’s blood pressure at normal or even slightly elevated levels to try to enhance or at least preserve residual collateral blood flow. Perioperative anticoagulation is not necessary and, in fact, its use may be detrimental by theoretically increasing postoperative hyperperfusion and hemorrhage syndromes, a significant complication that has been reported with interventional embolectomy.

References

Response: We truly appreciate Dr. Meyer’s comments regarding our paper. We completely agree with him in that the degree of collateral blood flow influences the outcome of acute intracranial ischemia. It is very difficult to assess whether there is sufficient residual blood flow and how long ischemic penumbra can be tolerated. The therapeutic time window varies among individuals, depending on the development of collateral circulation. Therefore, tailor-made treatment should be considered in patients with MCA occlusion. Although both perfusion CT and magnetic resonance imaging have been recently advanced, angiography would still be an important tool to estimate collateral blood flow. After obtaining information about collateral blood flow based on angiography studies, we use follow-up CT after angiography or fibrinolysis as the final indicator of...
whether to perform open embolectomy. The absence of a low-density area in the affected MCA territory on follow-up CT indicates the presence of collateral blood flow supplying the ischemic area and therefore the possibility of saving this area with open embolectomy.

As stated by Dr. Meyer, a patient with internal carotid artery occlusion does not usually have a favorable outcome because there is poor collateral blood flow of lenticulostriate arteries and the anterior choroidal artery. However, blood distribution of these arteries also varies with individuals. In some patients, the collateral blood flow through the perforating arteries from the posterior communicating and/or posterior cerebral arteries feeds the territory of the anterior choroidal artery. The coronal radiation is also supplied by lenticulostriate and/or cortical arteries. Therefore, neurological deficits can be improved in some but not all patients with internal carotid artery occlusion by performing interventions such as open embolectomy.

With regard to perioperative anesthetic management, neuroprotective agents (thiopental with or without propofol) were used in our study. Based on our experience, postoperative hyperperfusion has not been encountered.

We hope that open embolectomy will become a treatment option in patients with acute MCA occlusion.

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