neurological results for the patient. Further evaluation of this technique in larger series of patients is needed to confirm these benefits.

References


Editorial comment

Which is more appropriate as a cerebral protection method — unilateral or bilateral perfusion?

I read the article by Panos et al. [1] with great interest. They describe their experience with the unilateral cerebral perfusion through the right axillary artery (RAxA). In a series comprising 25 patients with acute type-A aortic dissection, the authors performed the RAxA cannulation for both cardiopulmonary bypass and antegrade cerebral perfusion under moderate hypothermia. The average duration of cerebral perfusion was just under 40 min. The authors achieved commendable results both in terms of mortality and neurological deficits based on which, they emphasize that unilateral cerebral perfusion through the RAxA provides adequate cerebral protection to allow safe distal aortic arch repair.

Selection of an appropriate cerebral protection method is a key issue in aortic arch surgery. Although the choice is mostly determined by surgeons’ preference and experience, an important consideration is the duration of cerebral protection expected to be required. Recent research indicates that deep hypothermic circulatory arrest (DHCA) with or without retrograde cerebral perfusion (RCP) is limited in its ability to protect the brain for more than 30 min. Thus, it may be appropriate for procedures requiring brain protection for 30 min or less whereas antegrade selective cerebral perfusion (SCP) is desirable for longer durations. Thus in most cases requiring extensive arch repair like total arch replacement (TAR), antegrade SCP is usually the cerebral protection method of choice.

The history of unilateral cerebral perfusion can be traced back to 1986 when Frist et al. [4] first reported IA or LCCA perfusion. After that, Baribeau et al. [5] in 1998 and Tasdemir et al. [6] in 2002 reported RAxA perfusion and right brachial artery perfusion, respectively. Based on our previous experimental study, a perfusion flow of 10 ml/kg/min at a perfusion pressure of 40 mmHg seems to be adequate for bilateral perfusion. However, we are still unsure as to what should be considered an adequate flow in case of unilateral perfusion through the RAxA. How do we know that the 12 ml/kg/min flow used in this study at a temperature of 25—27°C flow was adequate? Another important question is: what is the safe duration of circulatory arrest for this technique with regard to cerebral, spinal cord and visceral perfusion?

Possible hypoperfusion of the left cerebral hemisphere is a major concern with unilateral perfusion. There are a number of techniques to assess whether cerebral circulation in the left hemisphere is adequate or not. They are: (1) preoperative angiography or MRI of intra and extracranial arteries, (2) carotid occlusion test using cerebral balloon catheter to determine the adequacy of collateral blood flow, (3) intraoperative transcranial Doppler sonography to assess the blood velocity in the left middle cerebral...
artery and (4) Intraoperative assessment by the amount of back-bleeding through the LCCA and LSA. However, the preoperative assessments are impractical in emergency situations like acute type-A aortic dissection. Intraoperative Doppler study of the middle cerebral artery gives little idea about the perfusion of the vertebrobasilar region while monitoring of back flow through the LCCA and LSA is only a subjective assessment. Occlusion of right vertebral artery or dominant left vertebral artery effectively means an inadequate left posterior circulation which can give rise to vertebrobasilar insufficiency. A non-patent circle of Willis, particularly the lack of posterior communicating artery which is found in 2—3% patients can give rise to watershed infarct in deep white matter [7].

In my opinion, the RAxA perfusion should be contraindicated in patients in whom the artery is involved in the dissection process. Another relative contraindication may be obesity which makes the exposure of the RAxA difficult. I also think that it is better to attach a side-graft to the RAxA for the cannulation to avoid the cannulation-related complications.

Unilateral cerebral perfusion through the RAxA can be effective in selected patients who receive HAR requiring rather short period of cerebral protection, and may not be suitable for patients with compromise of intra and extracranial arterial circulation—a condition that is difficult to figure out intraoperatively. As we await further evaluation of the technique in larger case volume, it is perhaps too early and premature to routinely recommend it for patients receiving TAR that require longer periods of cerebral protection.

References


Teruhisa Kazui
First Department of Surgery,
Hamamatsu University School of Medicine,
1-20-1, Handayama, Hamamatsu 431-3192, Japan

Tel.: +81 53 435 2276; fax: +81 53 435 2272
E-mail address: tkazui@hama-med.ac.jp
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