Retrograde cerebral perfusion still remains a valuable adjunct for hypothermic circulatory arrest

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Continuous retrograde cerebral perfusion circuit.

Central Message

RCP has the beneficial effect of eliminating air and debris in the arterial circulation of the brain and should be used as an adjunct for even a short period of HCA.

See Article page 1339.

In this issue of the *Journal*, Tian and colleagues¹ report the results of a meta-analysis comparing straight hypothermic circulatory arrest (HCA) versus HCA with retrograde cerebral perfusion (RCP).¹ As Tian and colleagues¹ describe, there are several limitations, such as heterogeneous patient population, insufficient patient information, and selection bias of modality. They conclude that the addition of RCP during aortic arch surgery does provide better outcomes than seen with HCA alone. I myself do not have the expertise of this particular statistical method; however, I do agree with their conclusions.

In recent years, many surgeons have chosen antegrade cerebral perfusion (ACP) for brain protection during intricate aortic arch repair. Many readers of the *Journal* would think that there is little to choose between HCA alone and HCA with RCP. A significant number of surgeons still use HCA alone, however, especially in cases in which a short circulatory arrest time is expected. HCA has been used as a standard procedure in aortic arch replacement since Griep and colleagues² reported excellent results in 1975. Elefteriades and colleagues at Yale^{3,4} persistently advocate straight HCA for operations involving the aortic arch, and they have used no adjunctive strategy for brain protection.

Ueda and coworkers⁵ reported RCP to be a useful adjunct for HCA during aortic arch surgery in 1990. RCP flow was regulated to maintain a pressure of less than 20 mm Hg in the internal jugular vein. HCA with RCP is simple and requires no additional extracorporeal circuits such as those used for ACP. The beneficial effects of RCP may be its ability to sustain brain hypothermia during HCA and its removal of embolic material and air from the arterial circulation of the brain. Generally, RCP should not exceed 60 minutes, because it is nonphysiologic perfusion. Long RCP duration has been reported to be associated with increased incidence of stroke, as well as with transient neurological dysfunction.⁶

All cardiovascular surgeons recognize that HCA, with or without RCP, is completely nonphysiologic and that ACP is

closer to physiologic than is RCP. ACP, however, is still nonphysiologic. Straight HCA may be used reasonably for hemiarch repair with open distal anastomosis during the short duration of HCA.⁷ When resuming cardiopulmonary bypass after HCA, there are crucial points for the prevention of brain complications. First, meticulous procedures are required to prevent stroke caused by debris and air in the arterial circulation of the brain. RCP has the beneficial effect of eliminating air and debris in the arteries of the brain and should be used as an adjunct to HCA. Second, hyperperfusion after HCA should be avoided, because hyperperfusion may cause brain edema and deleterious complications.

As Tian and colleagues reveal,¹ there are beneficial effects with RCP for even a short period of HCA. In particular, RCP still remains a valuable adjunct for cerebral protection in patients with acute aortic dissection or atherosclerotic cervical branches.⁶ Both ACP and RCP have advantages and drawbacks; surgeons should therefore select the most appropriate modality according to their respective characteristics.

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