LETTERS TO THE EDITOR

Pulsatile perfusion during cardiopulmonary bypass

To the Editor:

I read with interest the article by Kawahara and associates from Saitama, Japan, titled "Induced Pulsatile Perfusion During Cardiopulmonary Bypass Does Not Improve Brain Oxygenation" (*J Thorac Cardiovasc Surg* 1999;118:361-6). The article should be retitled "Balloon Pump-Induced Pulsatile Perfusion During Cardiopulmonary Bypass Does Not Alter Brain Oxygenation" because, as applied in this study, there were no substantial effects of the balloon pump on any of the measured parameters.

Perhaps this is because the balloon did not augment the pulse pressure significantly enough (24 ± 8 mm Hg) during cardiopulmonary bypass. Had the pulse pressure been 40 mm Hg or more, positive readings might have occurred. No hemodynamic blood pressure tracings accompanied the article.

One clear measurement of intra-aortic balloon pump efficacy during cardiopulmonary bypass is the simple measurement of urinary output during successful pulsatile augmentation. Many^{1,2} studies have shown that when pulsatile flow is successfully applied, the urinary output usually doubles. Was this the case in this study?

Rather than suggest that the lack of improvement in brain oxygenation was a result of the negative (or no) effect of pulsatile perfusion, perhaps the authors should reexamine the basic application of the balloon pump in the cardiopulmonary bypass setting for the creation of pulsatile flow to determine whether it was really applied effectively in their study.

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2. Haubert SM, Parodi EN, Bregman D. Clinical experience with a new pulsatile cardiac assist device. *J Extracorp Circ* 1977;9:22.

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Reply to the Editor:

We appreciate the interest and comments of Dr Bregman. We agree that pulsatility offers advantages over nonpulsatility to reduce requirements for postoperative inotropic support and intra-aortic balloon counterpulsation (IABP), as reported by Bregman and colleagues.¹ Furthermore, Murkin and associates² reported that the duration of cardiopulmonary bypass (CPB), age, and use of nonpulsatile perfusion correlated significantly with adverse outcome. However, it still remains

controversial whether pulsatility offers advantages over nonpulsatility for brain protection.³

The pulse pressure used in our study (24 ± 8 mm Hg) was determined to obtain the physiologic dP/dt value. Since we did not examine the pulse pressure as recommended by Bregman (>40 mm Hg), further study with higher pulse pressure is required to evaluate the effect of high-pressure IABP on cerebral circulation.

Since the hemofiltration system was connected to the CPB circuit to increase hemoglobin concentration during CPB in most cases in our institutes, exact urinary output could not be examined during CPB. However, we also have the impression that pulsatile perfusion has a beneficial effect on renal blood flow.

Cook, Orszulak, and Daly⁴ reported that pulsatility generated by IABP, with a pulse pressure of approximately 30 mm Hg, had no significant effect on cerebral perfusion. Lodge and associates⁵ also could not show any benefits of pulsatile perfusion on regional or global cerebral blood flow. Their pulse pressure was 36 ± 6 mm Hg. In contrast, several reports¹ including the study by Dr Bregman showed benefits of pulsatile perfusion. At present, it is not clear which type of pulsatile wave form has positive effects on cerebral circulation and improves the outcome of patients. We admit that another type of pulse wave might be effective to alter brain oxygenation.

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