Cerebral and Renal Blood Flow Autoregulation

To the Editor:

I was delighted to see our work cited in the recent editorial, “Intraoperative hypotension and patient outcome: Does one size fit all?”. Unfortunately, the authors made unsupported claims about the differences between renal and cerebral blood flow autoregulation. Indeed, the editorial's conclusion that cerebral blood flow is determined by cerebral perfusion pressure and independent of changes in cardiac output is confirmed by our laboratory studies in nonhuman primates. In our laboratory model, cardiopulmonary bypass flow was varied by adjusting pump output, whereas arterial blood pressure was independently manipulated by administration of intrathecal lidocaine. Furthermore, this finding that cerebral perfusion is dependent on mean arterial pressure and not dependent on cardiac output is strongly supported by the clinical data in cardiac surgery patients.

In stark contrast, the editorial claim that, “the kidney can be hypoperfused at normal mean arterial pressure if cardiac output is compromised,” is not supported by the cited reference. In that study's piglet model, renal blood flow decreased during hemorrhagic hypotension. Although cardiac output was not measured at all, one would presume that the hemorrhage resulted in both decreased cardiac output and decreased arterial blood pressure. That decrease in renal blood flow may have been a consequence of hypotension, low cardiac output, or both. Whether or not changes in cardiac output, independent of arterial blood pressure, alter renal blood flow remains largely an open question.

Competing Interests

The author declares no competing interests.

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References


In Reply:

We thank Dr. Schwartz et al. for his contribution to the understanding of cerebral blood flow during cardiopulmonary bypass. We are pleased that our citation is in agreement with his own published results. We disagree, however, on the interpretation of our previous study on renal blood flow. Although it is true that cardiac output was not measured in the referenced article, our position that "the kidney can be hypoperfused at normal mean arterial pressure if cardiac output is compromised" is supported by the citation in question.

In that study, piglets with a baseline mean arterial pressure between 50 and 60 mmHg underwent continuous slow hemorrhage over 3 to 4 h to demise. Cerebral blood flow was trended as a percentage of baseline using continuous laser-Doppler red cell flux monitoring with probes surgically placed against the cerebral cortex through a