Commentary: “Pumphead,” Revisited

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Central Message: Neurocognitive decline can occur after cardiac surgery and further study is needed. But it should not deter most patients who can gain major benefits from cardiovascular operations.

Central Picture Legend: Michael E. Jessen, M.D.

In 2003, Bruce Stutz, an accomplished science and environment writer, published an article in Scientific American titled “Pumphead” (1). In it, he provided a balanced review of the evidence available at that time on the topic of neurocognitive decline (NCD) that can occur after cardiac surgery. Mr. Stutz wrote from some personal experience, having undergone a mitral valve repair operation about 1 year prior, and having noted some changes in his own emotions, thinking, and processing for a period of time after surgery. One focus in his article was on factors associated with the “pump” itself, as off-pump coronary surgery was increasing and randomized trials that would include assessment of neurocognitive function were enrolling.

So what have we learned over the subsequent 20 years? In this issue of the Journal, Stanley and Sellke supply a state-of-the-art review of the topic, documenting and analyzing the available literature on the prevalence, pathologic mechanisms, and potential treatment strategies of this important surgical complication (2). NCD is inconsistently defined making comparisons amongst studies challenging, but measurable NCD may occur in 40-50% of patients early after cardiac surgery, and may persist long-term in 2.5% or more. While multiple causes are
implicated, microembolism, cerebral hypoperfusion, and systemic inflammation have garnered the most attention. A variety of risk factors have emerged including higher burdens of atherosclerosis, prior stroke, diabetes, advanced age and baseline cognitive impairment. Unfortunately, most risk factors cannot be altered prior to surgery.

The authors also carefully review the existing evidence on treatments and prevention of NCD. Intraoperative interventions designed to maintain specific arterial blood pressure goals, rewarm more slowly from hypothermia, and avoid aortic manipulation seem to have merit, and strategies that avoid prolonged intubation and postoperative acute kidney injury are likely effective. Notably, off–pump surgery does not reliably reduce the incidence of NCD (as noted in results of the ROOBY trial (3) that was enrolling in 2003), so “pumphead” may not be an accurate characterization of this significant complication.

And what about Bruce Stutz? How has he fared since his surgery and his analysis? I spoke with him via zoom from his home in Brooklyn. Mr. Stutz remains highly productive in his career and his life. He has served as an editor of Audubon magazine and editor-in-chief of Natural History magazine, and has lectured at the graduate school at NYU. He has published over 200 articles on the environment and many facets of science, his work having appeared in the New York Times Magazine, Discover, OnEarth, Conde Nast Traveler, and others. He speaks fondly of his family, including his children and grandchildren. Next year he plans to spend an extended period of time in the Iberian Peninsula studying and reporting on an emerging environmental catastrophe. Importantly, he has remained free of any symptoms of heart failure and enjoys a fully active lifestyle.

There is more work to be done to expand our understanding of NCD and to work towards reducing the disabilities that it can cause. But we must also remember that major cardiovascular
operations also carry the ability to profoundly impact the lives of patients in so many positive ways.

References:


