Decreased Incidence of Postoperative Stroke Following Off-Pump Coronary Artery Bypass

We read with great interest the recent study by van der Linden et al. “Postoperative Stroke in Cardiac Surgery Is Related to the Location and Extent of Atherosclerotic Disease in the Ascending Aorta” (1). The investigators demonstrate the importance of routine use of epiaortic ultrasound to dictate modifications of surgical technique during cardiac surgery in an attempt to decrease postoperative stroke. One such modification mentioned is performing coronary artery bypass grafting (CABG) without cardiopulmonary bypass (CPB). However, they state that “not all surgeons are comfortable” with the techniques of off-pump coronary artery bypass (OPCAB), and it appears that all 921 of their own patients underwent conventional CABG with CPB. In recent years technical advances in coronary artery exposure and stabilization have resulted in a remarkable resurgence of interest in OPCAB (2), and have ultimately led to the development of revascularization of all coronary territories on the beating heart, including those located in “topographically” difficult areas, including the lateral and inferior walls of the heart (3). Currently, our group and others perform 96% of CABG without CPB.

Postoperative stroke associated with cardiac surgery is thought to be associated with ischemic hypoperfusion and/or cerebral embolization. A decreased incidence of perioperative stroke has been demonstrated if mean arterial pressure (MAP) is kept above 80 mm Hg (4). Likewise, it has also been shown that a direct correlation exists between aortic atherosclerotic load and the amount of cerebral embolization, likely a result of the “jet” of perfusate through the aortic cannula scouring the atherosclerotic aortic lumen (5). This has been corroborated in the current study by van der Linden et al (1), who conclude that it is possible that postoperative stroke results mainly from cerebral embolization of atheromatous debris and not from calcified material. Therefore, with OPCAB, avoidance of embolic potential associated with aortic cannulation and decannulation, and the generation of microgaseous and microparticulate emboli from the pump circuitry, significantly decreases cerebral embolic load and improves outcomes.

Furthermore, maintenance of more normal aortic hemodynamics with OPCAB and maintaining a MAP > 80 mm Hg would be expected to decrease further the incidence of cerebral atheroemboli as well as ischemic hypoperfusion. This has been substantiated in a study (6) showing significantly less or no cerebral emboli as measured by transcranial Doppler in OPCAB patients in comparison to those undergoing conventional CABG with CPB. In our own experience with 269 octogenarians who underwent CABG with the use of CPB or OPCAB techniques, we reported a significantly lower incidence of stroke (0%, 0 of 97) in the OPCAB group compared with an incidence of 9.3% (16 of 172) in the conventional CABG group (7).

Until recently, in the vast majority of patients requiring surgical coronary revascularization, performance of CABG implied the use of CPB. Both the introduction and the progressive refinement of myocardial stabilizer technology have greatly facilitated the development of OPCAB. It is currently estimated that approximately 20% of the 600,000 CABG procedures performed annually in the U.S. are done using OPCAB techniques; this number is predicted to grow substantially over the next decade (8). The study by van der Linden et al. (1) is extremely relevant in identifying the location and extent of atherosclerotic disease in the ascending aorta as a risk factor for postoperative stroke following cardiac surgery. However, we believe that their 3.5% incidence of stroke by using epiaortic ultrasound may be further reduced in high-risk patients by using OPCAB techniques. Independent of the cost, complexity and the high degree of technical support associated with CPB, there has been steadily mounting evidence of some degree of end-organ dysfunction associated with its usage (9). For a majority of patients, this manifests in clinically undetectable sequelae, but for a significant minority, the neurologic results are devastating. Therefore, we recommend the routine use of OPCAB techniques in all high-risk patients, especially those with atherosclerotic disease of the ascending aorta.

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REFERENCES