The Heart Surgery Forum®

EDITORIAL

Dr. Ricci

Neurocognitive Decline Following Coronary Artery Bypass Grafting

(#2001-1111 … May 7, 2001)

In an article that recently appeared in the New England Journal of Medicine, Newman et al. [Newman 2001] reported the results of a study which involved the assessment of neurocognitive function after coronary artery bypass surgery. Not surprisingly, this landmark investigation has finally provided the medical community with important information regarding an essential aspect of the treatment of coronary artery disease, namely the neurobehavioral sequelae associated with coronary artery bypass grafting (CABG). In their study, the authors evaluated prospectively the occurrence and severity of neurocognitive decline in 261 patients who underwent conventional coronary artery bypass grafting (CABG) with cardiopulmonary bypass (CPB) [Newman 2001]. This investigation, along with many others which appeared in the literature in recent years, emphasizes that the interest for this important and controversial aspect of cardiac surgery is undoubtedly increasing.

Although many of the detrimental effects of extracorporeal circulation on the central nervous system have been known for decades, some investigators have questioned their true clinical significance, as many of the clinical and pathological sequelae of CPB on the brain were felt to be transient and largely reversible. In addition, the vast majority of surgeons has been traditionally gratified with the results of conventional CABG operations using CPB, which have been shown to be consistently associated with overall favorable perioperative as well as long-term outcomes.

Address correspondence and reprint requests to: Tomas A. Salerno, MD, Professor of Surgery, Chief, Division of Cardiothoracic Surgery, University of Miami/Jackson Memorial Hospital, 1611 NW 12 Avenue, East Tower 3072, (R-114), Miami, FL 33136, Phone: (305) 585-5271, Fax: (305) 547-2185

It was not until recently that, as a result of the wide popularization of beating heart CABG, the interest of many investigators has shifted toward this new approach to coronary surgery, in an attempt to objectively disclose the real advantages and disadvantages of avoiding CPB during CABG operations. In this regard, several studies have recently suggested that beating heart CABG may have a beneficial role with regard to the deterioration of neurocognitive function observed after CABG. Murkin et al. [Murkin 1999] recently reported the results of 35 patients who underwent beating heart CABG as compared to 33 patients who received conventional CABG on CPB. In their study, patients undergoing beating heart CABG were noted to have an incidence of cognitive dysfunction substantially lower than that of conventional CABG patients, both at 5 days and 3 months from the operation. Although less convincingly and with some variability, the results of other investigations, such as those conducted by Diegler [Diegler 2000] and Manspeizer [Manspeizer 2000] paralleled those of Murkin and asociates. Despite the small number of patients involved, the studies seem to suggest that beating heart CABG may have a role in preventing, or at least reducing, the perioperative neurocognitive decline experienced by patients undergoing coronary revascularization.

While the controversy on whether avoiding CPB during CABG will result in a lower incidence of cognitive decline for the long term has yet to be resolved, the investigation conducted by Newman et al. [Newman 2001] remains unique. In fact, it conclusively demonstrates that conventional CABG performed on CPB is indeed associated with a substantial risk of protracted neurobehavioral decline, the magnitude of which is significantly greater than that observed in the age-matched general population. Contrary to what was hypothesized, in the vast majority of patients such decline does not appear to be either transient or reversible, since as many as 42% of the patients still displayed significant neurobehavioral deficits at five years from the operation.

While these findings should be interpreted with caution, and do not necessarily demonstrate the superiority of beating heart CABG over conventional CABG, they unequivocally suggest that the previously believed "harmless" role of conventional CABG with CPB in respect to neurocognitive function needs to be reexamined, and that avoiding CPB may have a role in preventing these debilitating sequelae.

REFERENCES

1. Newman MF, Kirchner JL, Phillips-Bute B, et al. Longitudinal assessment of neurocognitive function aftery coronary artery bypass surgery. NEJM 344: 395-402, 2001.
2. Murkin JM, Boyd DA, Ganapathy S, et al. Beating heart surgery: why expect less central nervous system morbidity? Ann Thorac Surg 68: 1498-501, 1999.
3. Diegeler A, Hirsch R, Shneider F., et al. Neuromonitoring and neurocognitive outcome in off-pump versus conventional coronary bypass operation. Ann Thorac Surg 69: 1162-1166, 2000.
4. Manspeizer H, Heyer EJ, Lee K, et al. NFMT performance after CABG: CPB versus OPCAB. Ann Thorac Surg 70: 1788, 2000.

Marco Ricci, MD, PhD, Tomas A. Salerno, MD

Division of Cardiothoracic Surgery, University of Miami, Jackson Memorial Hospital, Miami, FL