Chapter 15

Neurologic Complications in the Cardiac Surgery Patient

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ABSTRACT

This chapter per the authors discusses the spectrum of complications that occur in the postoperative cardiac surgery patients. It evaluates the mechanistic role of cardiopulmonary bypass and the various cardiac surgical procedures in the development of cerebral injury. Furthermore, it evaluates the role of different intraoperative monitoring in early detection of cerebral injury in these patients. Finally, it provides evidence based practice guidelines for hemodynamic management as well as treatment of complications that are diagnosed in the cardiac surgical intensive care unit.

INTRODUCTION

Neurologic injuries have always been an important complication of cardiac operations. In a prospective study of patients undergoing open-heart operations published in 1970, 43% of patients were reported to suffer cerebral injury during operation with 15% of patients suffering permanent damage. (Tufo, Ostfeld, & Shekelle, 1970) In 1996, the rate of stroke in a multicenter study of patients undergoing elective coronary artery bypass (CABG) operations was reported as 3.1% and the rate of neurocognitive dysfunction reported as 3%. (Roach, Kanchuger, & Mora-Mangano, 1996) Perioperative neurologic injury as a consequence of cardiac operations have also been associated with increased mortality, increased morbidity, and decreased long-term survival. (Roach et al., 1996; Tarakji, 2011)

Fortunately, contemporary studies indicate that the rate of stroke after CABG operations may be decreasing despite a cardiac surgical patient population with a greater risk profile for neurologic complications. (Tarakji, 2011)
Major advances in understanding the causes of stroke and encephalopathy among cardiac surgical patients together with improvements in the anesthetic care and surgical techniques employed in the care of cardiac surgical patients to minimize the risk of neurologic complications may explain the progress that has been achieved over time.

**Types of Perioperative Neurological Injury**

Neurological complications of cardiac operations have generally been broadly classified as injuries as a consequence of stroke and injuries that are manifested by neurocognitive dysfunction or global encephalopathy without direct evidence of ischemic neurologic injury. (Roach et al., 1996) Stroke is caused by thromboembolism, cerebral hypoperfusion, or hemorrhage that may occur at any time in the perioperative period and produces ischemic neurologic injury associated with radiologic findings of cerebral infarction or hemorrhage. The precise etiology of neurocognitive dysfunction or encephalopathy has not been established, but is likely multifactorial. Subclinical ischemia, stroke, thromboembolism, or cerebral hypoperfusion may also be etiologic mechanisms that contribute to the development of perioperative neurocognitive dysfunction or global encephalopathy.
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