CHAPTER 18
Neuroanesthesia

Richard A. Jaffe, M.D., Ph.D.
Professor of Anesthesiology and Neurosurgery
Department of Anesthesia
Stanford University School of Medicine

Neuroanesthesiologists, indeed all anesthesiologists, owe a debt of gratitude to a medical student named Harvey William Cushing. In 1894, Cushing, a student at Massachusetts General Hospital, challenged fellow student Ernest Amory Codman to see who could achieve the best control over the administration of ether during surgery.[1] The most significant outcome of this competition was the development of the anesthesia record as an important tool in the management of the anesthetized patient.

It is possible that Cushing was motivated to improve the practice of anesthesia by his first experience administering ether as a medical student. Unfortunately, during the induction of anesthesia his patient died. Years later, Cushing (by then a distinguished neurosurgeon) admitted that he had never forgotten that experience in spite of being assured that such events were common and certainly not the fault of the anesthetist.

As a neurosurgeon, Cushing was quick to emphasize the importance of the anesthetist, stating, "Anesthetization by an expert is absolutely essential. There are trials enough for the surgeon in these cases without the added anxiety in regard to narcosis."[2] To that end he employed Dr. S. Griffith Davis as his full-time neuroanesthetist, later stating, "It is entirely due to [Davis'] skill that in over three hundred cranial operations there has been a complete absence of the calamities usually assigned to anesthesia."[2] While much of the practice of neurosurgery would still be familiar to Cushing today, he would recognize little of the modern practice of neuroanesthesia, except the anesthesia record.

The current practice of anesthesia for neurosurgical procedures continues to evolve as it benefits from advances in our understanding of neurophysiology, pharmacology and the pathophysiologic (molecular) processes that underlie the nervous system's response to injury and ischemia. With continuing advances in neuroprotective and neuromonitoring techniques we are increasingly able to target anesthetic-related interventions to specific patient needs. Indeed, much of the "art" of neuroanesthesia has been replaced by evidence-based practice guidance. As Michael Todd said in his Forward in the 4th edition of *Anesthesia and Neurosurgery*, "A large part of what we do in neurosurgical anesthesia isn't particularly difficult. The young resident … can quickly be taught a few basic rules about how to anesthetize a patient with a brain tumor, an intracranial aneurysm or a cervical spine injury. Unfortunately, while this may result in the safe care of most patients, it qualifies the individual only as a minimally skilled technician. The rest of neuroanesthesia is 'the hard part' and is what distinguishes the technician from the physician and consultant."[3]

The interdependence of surgeon and anesthesiologist is nowhere more evident than it is in the operative management of the neurosurgical patient. The perceptive neurosurgeon realizes that the successful outcome of complex neurosurgical procedures is a true team effort. While the perceptive neuroanesthesiologist understands that, although necessary, it is not sufficient to be technically proficient. It is the "rest of neuroanesthesia" that is both the challenge and the reward.

It is ironic that the brain, the most important organ system and principle target of anesthetic action, is still the least understood and most difficult to monitor. In that irony lays opportunity. As a student contemplating a career in neuroanesthesia you can anticipate clinical challenges and practice or research opportunities limited only by your own enthusiasm and desire to learn.

References:

1. Bingham, WF. The early history of neurosurgical anesthesia. *J Neurosurg.* 1973;39(5):568-84.
2. Cushing, H. Some principles of cerebral surgery. *JAMA*.1909;LII(3):184-195.
3. Todd, MM. Cottrell JE, Smith DS, ed. *Anesthesia and Neurosurgery*, 4th ed. St. Louis, MO: Mosby; 2001: Forward.