SUMMARY

The intracranial compartment has a fixed volume. Increases in the volume of the brain, the blood, or the cerebral spinal fluid can lead to an increase in intracranial pressure; this may compromise blood flow or cause the brain to herniate.

Both intravenous and volatile anesthetic agents reduce brain metabolism. It is the balance of this effect with blood flow, because of flow metabolism coupling, that determines the extent of the increase or decrease in cerebral blood flow with a particular anesthetic agent.

Electrophysiologic and cerebral oxygenation/metabolism monitors are used perioperatively to assess cerebral function and pharmacologic interventions and to detect cerebral ischemia. Image-guided neurosurgical procedures are used for diagnosis, three-dimensional localization, and resection of intracranial lesions.

The administration of anesthesia to neurosurgical patients requires an understanding of the basic principles of neurophysiology and the effects of anesthetic agents on intracranial dynamics.

Neuroanesthetic management of patients with supratentorial disease maximizes therapeutic modalities that reduce intracranial pressure. Because of the relatively confined space within the posterior fossa, the challenge of infratentorial surgery is to prevent further neurologic damage from surgical position and exploration.

The anesthetic goals for intracranial aneurysm surgery are to avoid aneurysm rupture, maintain cerebral perfusion pressure and transmural aneurysm pressure, and provide a “slack” brain.

Severe intracranial hypertension can precipitate reflex arterial hypertension and bradycardia (Cushing's triad). A reduction in systemic blood pressure in these patients can further aggravate cerebral ischemia by reducing cerebral perfusion pressure.