INTRODUCTION

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.

Hypoxia and ischemia lead to neuronal death. With severe insults the neurons die of necrosis, which leads to inflammation and extensive damage to other neurons in the area; after less severe insults, neurons may be damaged so they cannot function properly and die of a regulated cell death process called apoptosis, which does not injure adjacent neurons.

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.

Until and unless the deleterious effects of mild hypothermia can be reduced, or the brain can be cooled without reducing systemic temperature below 35°C, clinical evidence does not support induction of intra-operative mild hypothermia for neurosurgical procedures.

With more extensive arteriovenous malformations, hypothermia and high-dose barbiturates have been recommended for brain protection. Induced hypotension may also be required to reduce lesion size and blood flow.