Pneumocephalus after Nitrous oxide

Nitrous oxide, pneumocephalus, and air embolism The solubility of nitrous oxide (N2O) is ≈ 34 [1] times that of nitrogen. When N2O comes out of solution in an airtight space it can increase the pressure which may convert pneumocephalus to "tension pneumocephalus." It may also aggravate air embolism. Thus caution must be used especially in the sitting position where significant postoperative pneumocephalus and air embolism are common. The risk of tension pneumocephalus may be reduced by filling the cavity with fluid in conjunction with turning off N2O about 10 minutes prior to completion of dural closure.

Is nitrous oxide use appropriate in neurosurgical and neurologically at-risk patients?

Nitrous oxide has been used as a component of general anesthesia for over 160 years and has contributed to countless apparently uneventful anesthetics in neurologically at-risk patients. Avoidance of nitrous oxide in specific circumstances, such as pre-existing pneumocephalus, during acute venous air embolism, and in patients with disorders of folate metabolism, is warranted. However, various controversies exist regarding the use of this drug in the general neurosurgical population. Specifically, some suggest a possible association between nitrous oxide and the postoperative development of tension pneumocephalus despite lack of data to support this notion. Additionally, data describing alterations of cerebral hemodynamics and metabolism and exacerbation of ischemic neurologic injury by nitrous oxide are inconsistent. Recent data derived from humans having cerebral aneurysm clipping failed to show any long-term adverse effect from the use of nitrous oxide on gross neurologic or cognitive function.

Except in a few specific circumstances, there exists no conclusive evidence to support the dogmatic avoidance of nitrous oxide in neurosurgical patients [2].

1)
Raggio JF, Fleischer AS, Sung YF, et al. Expanding Pneumocephalus due to Nitrous Oxide Anesthesia: Case Report. Neurosurgery. 1979; 4:261–263
2)
Pasternak JJ, Lanier WL. Is nitrous oxide use appropriate in neurosurgical and neurologically at-risk patients? Curr Opin Anaesthesiol. 2010 Oct;23(5):544-50. doi: 10.1097/ACO.0b013e32833e1520. Review. PubMed PMID: 20689409.