Nitrous Oxide and Intraoperative Tension Pneumocephalus

To the Editor.—Artru’s conclusion that nitrous oxide plays a direct role in the development of tension pneumocephalus intraoperatively seems most reasonable. In fact, several other factors may combine to make this a much more common complication than has been realized previously.

The transphenoidal approach to the pituitary gland generally is performed with the patient maintained in a slightly head-up position. A lumbar subarachnoid catheter or needle frequently is inserted, through which 2–3 ml air may be injected intraoperatively to confirm, fluoroscopically, complete extirpation of the tumor. We also have used this system as a convenient means to measure lumbar subarachnoid pressure (LSAP). Following injection of 3 ml air to a patient anesthetized with nitrous oxide, LSAP was noted to increase from 5–15 mmHg over a seven-minute period. Nitrous oxide was discontinued and the pressure returned to baseline levels. Approximately 15 minutes later, nitrous oxide again was introduced to the system and again the pressure promptly increased, although no more air had been injected. We assumed that the initial infusion of air increased the pressure by the well-recognized nitrous oxide/nitrogen displacement mechanism. A larger gas pocket thus was created. With discontinuation of nitrous oxide, this gas was then absorbed, creating negative pressure which then sucked more air through the surgical wound. The phenomenon probably was aggravated by the upright position as fluid could not be used to flood the field. Reintroduction of nitrous oxide some minutes later thus caused further pressure increases.

It has become our practice to eliminate nitrous oxide from the anesthetic regimen some 10–15 minutes prior to the anticipated injection of air and not to introduce it again for the duration of the procedure. It may well be that routine use of nitrous oxide in any neurosurgical procedure should be more completely examined.

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Reference


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