

Title: CHANGE IN VOLUME OF INTRAOCULAR AIR AND SF₆ DURING N₂O ANESTHESIA.
Authors: G. Wolf, M.D., C. Capuano, B.S., J. Hartung, Ph.D.
Affiliation: Department of Anesthesiology, State University of New York, Downstate Medical Center, Brooklyn, New York 11203.

Introduction. Air or sulfur hexafluoride (SF₆) is injected into the anterior chamber of the eye during cataract extraction, cornea graft surgery, and repair of retinal tears.¹ It is common practice to achieve anesthesia with nitrous oxide (N₂O) during such procedures. Since N₂O is known to increase intraocular pressure after air² and SF₆ gas injections, we compared the effect of ventilation with 66% N₂O in oxygen (N₂O:O₂), air, and oxygen (O₂) on anterior chamber air and SF₆ bubble volume in cats.

Methods. Cats were induced with intraperitoneal pentobarbital and acepromazine maleate. They received additional pentobarbital intravenously as necessary, were paralyzed with pancuronium, and were ventilated with either 100% O₂, air or N₂O:O₂.

A forelimb vein was cannulated and 5% dextrose in normal saline administered. Femoral artery cutdown and cannulation allowed continuous blood pressure monitoring and intermittent blood gas determinations. Femoral vein cutdown and cannulation provided continuous venous pressure observation. Ventilation was adjusted to maintain end-tidal carbon dioxide concentration from 3-5%, as determined by infra-red gas analysis, and normal PaCO₂.

After 30 minutes of ventilatory stabilization, from 0.1-0.5 ml of either air, or SF₆, was injected into the anterior chamber using a 27 gauge needle inserted adjacent to the limbus. After 180 minutes, anterior chamber gas was similarly aspirated for determination of volume change. Changes were compared across all groups by one-way analysis (p < 0.05, F test).

Results. Aspiration of anterior chamber gas 180 minutes after injection showed a greater than two-fold increase in original bubble volume for air, and a greater than three-fold increase in original bubble volume for SF₆ during N₂O:O₂ ventilation. In contrast, SF₆ bubble volume increased 35% during O₂ ventilation and 50% during air ventilation. When the initial injection was air, bubble volume decreased -13% during O₂ ventilation and increased 7.5% during air ventilation. (See Table 1).

Table 1
% of initial volume
after 3 hours ventilation

Anterior chamber gas	SF ₆	N	Air	N
O ₂	35 ± 3	8	-13 ± 3	10
Ventilation				
Air	50 ± 6	6	7.5 ± 3	8
N ₂ O:O ₂	242 ± 22	9	114 ± 7	6

Discussion. Differences between groups are explained by solubility coefficient differences between gases, and by partial pressure differences between anterior chamber bubble and blood. Our results indicate that N₂O is contraindicated when gas is injected into the closed eye.

References.

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