

EDITORIAL

NITROUS OXIDE—TIME TO SAY GOODBYE!

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Nitrous Oxide, our old companion is in use since long. Its two properties analgesia and reduction in MAC of inhalational agent make it a powerful tool in anaesthetic practice. Importance of nitrous oxide can be judged from the fact that sizable percentage of anaesthetists will cancel the elective list if nitrous oxide is not available!

Widespread and prolonged use of nitrous oxide has brought into focus certain side effects. There is almost consensus that chances of postoperative nausea and vomiting are increased with intraoperative use of nitrous oxide.

Nitrous oxide has been blamed for increased pulmonary artery pressure, pulmonary hypertension leading to right heart failure in some cases. Increase in volume and pressure in closed spaces including intracuff pressure of cuff endotracheal tubes is long known to anaesthetist.

Nitrous oxide has been implicated in few cases of postoperative blindness which resolved spontaneously. The tag of increased incidence of spontaneous abortion and teratogenic effect remained unresolved issue so far. Nobody paid much attention to all these side effect because advantages of nitrous oxide outweigh its disadvantages.

There is a major safety concern in use of nitrous oxide.¹ There are occasional reports of administration of hypoxic gas mixture to the patient leading to hypoxic brain damage and some occasions leading to death. Reports are few and far apart but they make big heading in modern day press.

This was all good when anaesthesia was important contributor to overall surgical mortality. Occasional reports of hypoxic mixture.¹⁻³ administration and death in few cases were ignored on ground of acceptable mortality. At that time (1960) anaesthesia was fourth in causes of direct maternal death in confidential enquiry into maternal and child health.⁴ Now anaesthesia is among uncommon causes in recent reports. General mortality in anaesthesia in ASA I and II cases is in the tune of 1:250000. This exactly is number of cases which

one can maximally perform in his/her anaesthetic carrier (more than 13 cases per day for carrier span of 50 years without having any break!). So there is no margin of error as far young and fit patients are concerned.

Nitrous oxide has been the cause of death in six cases between 2004–2006 in Germany, Austria, and Switzerland. There is tendency toward underreporting of less severe cases and in developing countries even death due to nitrous oxide remain unreported in some occasions.⁵ The problem is much more widespread than that normally reported in the press.

Two main reasons for use of nitrous oxide—analgesia and reduction MAC of inhalational agent—can conveniently be achieved by alternate means. Wide range of analgesic drugs are available, concepts of balanced and multimodal analgesia has broaden our analgesic options.

Reduction in MAC can be achieved by above mentioned analgesic options and/or use of wide range of benzodiazepines. Do we require reduction in MAC with new inhalational agents is another question? It was in era of halothane when reduction in MAC was safety concern. Halothane is gradually fading away from the scene and new inhalational agents are much less arrhythmogenic.

Disaster involving nitrous oxide usually occurs in scenario of repair of existing gas system or instalment of new gas system. Filling of wrong gas, cross connection, disconnection and failure of oxygen-nitrous proportion device can happen in routine daily life.^{1,6}

Keeping in view safety achieved by present day anaesthesia practice, nitrous oxide is major safety hazard and its use in operating theatres should be discontinued.⁷

Possible contenders to replace nitrous oxide are many, two are most promising, Medical Standard Air and Entonox. Advantages and disadvantages of each are beyond the scope of this article.

REFERENCES

1. Ishikawa S, Nakazawa K, Makita K. Hypoxic gas flow caused by malfunction of the proportioning system of

- anesthesia machines. *Anesthesia and Analgesia* 2002;94:1672.
2. Bonsu AK, Stead AL. Accidental cross-connection of oxygen and nitrous oxide in an anaesthetic machine. *Anaesthesia* 1983;38:767-9.
 3. Caplan RA, Vistica MF, Posner KL, Cheney FW. Adverse anaesthetic outcomes arising from gas delivery equipment: a closed claims analysis. *Anesthesiology* 1997;87:741-8.
 4. Cheney FW, Posner KL, Lorri LA, Caplan RA, Domino KB. Trends in anesthesia-related death and brain damage: a closed claims analysis. *Anesthesiology* 2006;105:1081-6.
 5. Biboulet P, Aubas P, Dubourdieu J, Rubenovitch J, Capdevila X, d'Athis F. Fatal and non-fatal cardiac arrests related to anesthesia. *Canadian Journal of Anaesthesia* 2001;48: 326-32.
 6. Fielden JM. Anaesthetic machines and anti-hypoxia devices. Interim solution is to remove nitrous oxide cylinders and pipelines and cap their connections. *British Medical Journal* 2002;324:169-70.
 7. Lagasse RS. To see or not to see. Editorial. *Anesthesiology* 2006;105:1071-3.
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