

MOTHERISK UPDATE

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Occupational exposure to inhaled anesthetic *Is it a concern for pregnant women?*

abstract

QUESTION Two of my pregnant patients are exposed to inhaled anesthetic on the job. One is an anesthetist, and the other is a veterinarian. They have both expressed concern about this exposure. How should I advise them?

ANSWER Occupational exposure to waste anesthetic gas is not associated with increased risk of major malformations. Risk of spontaneous abortion might be slightly increased, however. This risk can be reduced, if not eliminated, by good gas scavenging systems.

résumé

QUESTION Deux de mes patientes enceintes sont exposées à l'inhalation d'anesthésiques au travail. L'une est anesthésiste et l'autre est vétérinaire. Elles ont toutes deux exprimé des préoccupations concernant cette exposition. Quel conseil devrais-je leur prodiguer?

RÉPONSE L'exposition professionnelle aux anesthésiques résiduels n'est pas associée à une hausse du facteur de risque de malformations majeures. Le risque d'avortement spontané est par contre un peu plus élevé. Ce risque peut être toutefois réduit au moyen de bons systèmes de récupération des gaz.

Currently, 854 anesthetists practice in Ontario; 25% of them are women, and 46% of those are of childbearing age, according to the Ontario Physician Human Resources Data Centre at McMaster University in Hamilton, Ont. The College of Veterinarians of Ontario indicates there are 2745 practising veterinarians in the province; approximately 45% of them are women.¹ Although there are numerous studies in the medical literature on the effects of occupational exposure to waste anesthetic gas (WAG) on the reproductive system, to date there have been no prospective controlled studies.

There are more data on the effects of exposure to WAG on pregnant women working in operating rooms than on those working in the veterinary field. Most existing evidence does not associate occupational exposure to WAG with increased risk of congenital malformations.²⁻¹¹

Association with spontaneous abortion

A recent meta-analysis showed, however, that occupational exposure to WAG is associated with increased risk of spontaneous abortion (relative risk 1.48, 95% confidence interval 1.4 to 1.58).¹² This meta-analysis included 19 studies of various designs with anesthetists, operating-room physicians and nurses, dental assistants, operating-room workers, hospital workers, health workers, and veterinarians and veterinary assistants as subjects. Most of the studies included in the meta-analysis were conducted before WAG

scavenging had become a legal requirement, and none of the studies attempted to establish a relationship between amount of exposure and magnitude of risk of spontaneous abortion. The most important limitation is that all the studies were retrospective.

Veterinary work

In the veterinary field, Johnson et al¹³ have shown that even though the odds ratio (OR) for spontaneous abortion after exposure to WAG among female veterinarians and female veterinary assistants was greater than 1.0 when adjusted for use of diagnostic x-ray machines, it did not reach statistical significance. Schenker et al¹⁴ demonstrated that rates of spontaneous abortion and low birth weight infants were statistically similar among female veterinarians and lawyers.

Do you have questions about the safety of drugs, chemicals, radiation, or infections in women who are pregnant or breastfeeding? We invite you to submit them to the Motherisk Program by fax at (416) 813-7562; they will be addressed in future Motherisk Updates. Published Motherisk Updates are available on the College of Family Physicians of Canada website (www.cfpc.ca). Some articles are published in *The Motherisk Newsletter* and Motherisk website (www.motherisk.org) also.

Motherisk questions are prepared by the **Motherisk Team** at the Hospital for Sick Children in Toronto. **Miss Shuhaiber** is a counselor and graduate student and **Dr Koren** is Director of the Motherisk Team.

It is a misconception that concentrations of WAG are much greater in veterinary facilities than in human operating rooms. Ward and Byland¹⁵ measured WAG levels of 2 parts per million (ppm) in veterinary facilities and 10 ppm in human hospitals. Even though average room size in veterinary practice is smaller, operating times are short, and doors of veterinary surgery rooms are normally left open to allow technicians to work concurrently in other rooms.¹⁵ In addition, veterinary staff spend only a small portion of their working time performing surgeries.¹⁵ Despite all these factors, the level of WAG in veterinary facilities depends primarily on the presence of gas scavenging systems, good anesthetic practices, and periodic examination and maintenance of anesthetic machines.

Nitrous oxide

Most of the studies did not differentiate between the various inhaled anesthetics because subjects were anesthetists, operating room staff, or hospital staff who were exposed to mixtures of gases. A few studies examined the association between occupational exposure to nitrous oxide and spontaneous abortion among dental assistants and midwives.

Studies on dental staff's exposure to WAG had conflicting results. Cohen et al¹⁶ showed an increased risk of spontaneous abortion among dental assistants exposed to nitrous oxide (*P*value not reported). Heidam,¹⁷ on the other hand, showed no increased risk for dental assistants either practising in private clinics or working in dental school services (OR 0.4). Last, Rowland et al¹⁸ demonstrated increased risk of spontaneous abortion among dental assistants exposed to nitrous oxide for 3 or more hours weekly in places without scavenging systems.

A study of Swedish midwives exposed to nitrous oxide in more than 50% of deliveries showed no increased risk of spontaneous abortion (OR 0.95). The effect of WAG scavenging was excluded because many midwives were unsure about whether such equipment had been present in the delivery rooms.¹⁹

These findings clearly indicate that the question of whether occupational exposure to nitrous oxide increases risk of spontaneous abortion is complicated. The answer depends on the field in which nitrous oxide is being used because this dictates duration of exposure and anesthetic techniques used.

Conclusion

Pregnant patients should aim to minimize their exposure to WAG by always using scavenging systems, by periodically testing anesthetic machines for gas leaks, and by not emptying or filling vaporizers. We also recommend good anesthetic techniques including use of cuffed endotracheal tubes whenever feasible, avoiding use of anesthetic chambers or masks (veterinary staff), and maintaining connections between animals and anesthetic machines such that animals breathe pure oxygen for a few minutes once vaporizers are switched off (veterinary staff). Monitoring WAG is possible through air sampling, dosimeter badges, and portable infrared analyzers, but monitoring is costly and, therefore, not routinely practised.

Currently, the Motherisk Program at The Hospital for Sick Children, in collaboration with the Ontario Veterinary Medical Association and the Ontario Association of Veterinary Technicians, is conducting the first prospective study of occupational exposures of veterinary staff during pregnancy; inhaled anesthetics are one of the exposures. If you have

patients who work in veterinarians' offices and would like to enrol them in our study, call or direct your patients to call Samar Shuhaiber at (416) 813-6780. ❖

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