Exposure to Anesthetic Gases and Health Problems in Dental Workers

The purpose of this brief communication is to call to the attention of readers of Anesthesiology an article published in the July issue of the Journal of the American Dental Association. In that issue, Cohen et al. report their findings resulting from a large mail survey of dental workers concerning the possible occurrence of occupational disease related to chronic exposure to anesthetic gases. This survey, supported by grants from both the National Institute of Occupational Safety and Health and the American Dental Association, represents a most thorough effort to answer a question of concern to all who are subject to such anesthetic exposure. Compared with previous surveys of operating room personnel, there are two major improvements inherent in the present survey of dental workers: 1) the control and the exposed groups were essentially identical in terms of occupational profiles except for the differences in anesthetic exposures; 2) because many dentists use nitrous oxide as the only inhalational anesthetic, the effects of this anesthetic alone could be evaluated separate from the effects of the potent volatile compounds in combination with nitrous oxide.

To an initial 138,278 mailings, 107,771 dentists responded. From these respondents, two groups of approximately 15,000 each were randomly selected and identified as either users or non-users of inhalational anesthetics. These in turn supplied the names of their chairside assistants, who were then surveyed separately. By this means predominantly male (dentists) or female (assistants) control and exposed groups were created. In the exposed groups two subgroups were created, consisting of those lightly exposed (1-8 hr/wk) and those heavily exposed (more than 8 hr/wk). Respondents were asked to report health-related events during the preceding ten years. The overall response rates of the final groups of approximately 30,000 dentists and 30,000 assistants were 75.6 and 70 per cent, respectively; these rates were similar for the anesthetic users and the non-users.

The results can be summarized as follows. Spontaneous abortion rates were significantly higher for both wives of exposed dentists and exposed female assistants (1.5-2.3-fold). The frequency of cancer was not related to anesthetic exposure in either dentists or their assistants. However, health abnormalities clustered under the headings of liver, kidney or neurologic disease were significantly increased in both groups that were heavily exposed to anesthetic gases. In the case of neurologic disease the increase (1.9-2.8-fold) was accounted for by nonspecific complaints of numbness, tingling and muscle weakness rather than specific neurologic diseases. It should be noted that in the lightly exposed groups the increased incidence of these disease states approached but did not always achieve statistical significance. When the effects of nitrous oxide alone were evaluated separately, the results were essentially unchanged. Congenital abnormalities were also found to be significantly more frequent in the children of the female assistants, but here an apparent statistical anomaly was encountered, in that this was only true for the lightly exposed group.
This study, like all such surveys, suffers from the potential errors inherent in the methodology, including possible responder bias, inaccurate recall, and the possible impact of the unknown results in non-responders. Still, the results are largely consistent with those reported from other surveys,²⁻⁴ and support the general conclusion that anesthetic contamination is a potential health hazard for exposed workers. This conclusion is particularly strengthened by the apparent dose–response relationship which was observed for spontaneous abortion, as well as for kidney, liver and neurologic diseases. Considering that there was a nearly perfectly matched control group, the evidence cannot be easily refuted or ignored. Assuming, then, that the reported differences are real, it must be concluded that either chronic exposure to anesthetic gases is harmful per se or for unexplainable reasons there are inherent biological differences between those individuals who use and those who do not use anesthetic gases.

References