

Incidence of known Possible Occupational Hazards to Anaesthesiologists – A Retrospective Survey among Anaesthesiologists in Malaysia*

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Introduction

OVER THE last 10 years the problem of operating theatre pollution with its consequences on Anaesthesiologists and other working personnel has emerged to the forefront. Retrospective surveys and studies have pointed the finger at the operating theatre environment as the possible causative factor for certain common clinical conditions amongst anaesthesiologists and their families. Exactly how these conditions are brought about is often not fully elucidated. Circumstantial evidence and animal experimental studies have generally supported these suspicions and have led to preventive methods being advocated. To-date no definite proof is available partly because controlled human studies would be unethical and difficult.

Various claims have been made to show that Anaesthesiologists are more prone to the following conditions because of theatre pollutions (Murrin K.R., 1975).

1. Headaches, irritability, malaise, insomnia, lethargy, depression (Yanagida et al. 1974; Vaisman, 1967).
2. Spontaneous abortion (female anaesthesiologists and/or wives of anaesthesiologists), Askrog and Harvald, 1970.
3. Liver damage (A.S.A. 1974).
4. Renal damage (A.S.A., 1974).

5. Malignancies of lymphoid and reticulo-endothelial tissues (A.S.A. 1974).
6. Higher incidence of female children (Askrog, 1970).
7. Drug addiction.
8. Suicidal tendencies (Bruce et al, 1974).
9. Coronary arterial disease (Bruce et al, 1968).

Methods and Materials

All qualified anaesthesiologists in West Malaysia (36 with postgraduate Fellowships in Anaesthesiology (see Table 1) were interviewed, personally, by the author and their answers to a questionnaire were recorded. There were 3 females (1 unmarried) and 33 males (1 unmarried). The answers were analysed and are shown under Results.

Table 1

General Data on Anaesthesiologists interviewed

Total number of Anaesthesiologists interviewed	36
Sex:	3 females, 33 males.
Marital status:	34 married, 2 unmarried (1 female, 1 male)
Ages:	38.8 years (average), 28-52 years (range).
Number of years in anaesthetic practice:	10.9 yrs (average) 5-23 yrs (range)

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Results

The answers to the questionnaire are summarized in Tables 2 and 3 and the various incidences are expressed as percentages. No statistical significance can be derived from the results because of the paucity of numbers, numerous uncontrolled possible influencing factors and the absence of a "control" group.

Table 2
Previous medical history of 36 Anaesthesiologists interviewed

	No.	% incidence
Headaches	26	72.2%
Irritability	25	69.4%
Insomnia	20	55.5%
Spinal problems ("backaches", 3; Prolapsed disc, 1; Cervical/dorsal spondylosis, 2)	6	16.6%
Depression	4	11.1%
Angina/cardiac ischaemia	3	8.3%
Peptic ulcer	3	8.3%
Jaundice	0	
Others (Pulmonary lobar collapse, 2; Right direct inguinal hernia, 1; Retinal tear, 1; Involuntary infertility, 1; Gastritis/pancreatitis, 1).	6	

The high incidences reported on headaches (72.2%), irritability (69.4%) and insomnia (55.5%) were related to usage of inhalational agents (usually halothane), long lists, towards the end of the day or when the anaesthesiologist had been working regularly for 2-3 months without going on leave. All anaesthesiologists who admitted to headaches, irritability, insomnia, felt that when they used the high-flow, spontaneous respiration technique (N₂O/O₂/Halothane, Magill circuit) more, the chances of going home irritable with a headache and developing insomnia were greater.

Table 3 (obstetric history) revealed an incidence of 15.8% spontaneous abortions out of 82 pregnancies (2 married female anaesthesiologists and 32 wives of anaesthesiologists) after commencement of anaesthetic practice. The 13 spontaneous abortions occurred only among the wives of anaesthesiologists in 79 pregnancies (16.5%). There was no incidence of spontaneous abortions in pregnancies before commencement of anaesthetic practice. The 2 married female anaesthesiologists had no pregnancies before and a total of 3 pregnancies after commencing anaesthetic practice without any incidence of spontaneous abortions. Sex of children revealed an incidence of 42.8% females before, compared to 52.2% females after commencement of anaesthetic practice.

Regarding scavenging or venting systems, 9 out of the 36 (25%) interviewed have started some improvised wall suction system on the expiratory port recently (1-2 years).

Since the number is so small (2 married female anaesthesiologists) compared to the number of wives of anaesthesiologists (32) it is not possible to draw any significance between the two groups. But taking the groups as a whole, the incidence of spontaneous abortions (13 out of 82 pregnancies after starting anaesthesia and 0 out of 14 before anaesthesia) makes interesting reading.

Discussion

The Anaesthesiologist is subjected to long hours of work, frequently without adequate meals and periods of rest; the tension and stress of work in an operating theatre, coupled with the possible effects of theatre air pollution by anaesthetic agents, poor ventilation and being away from daylight for long periods can obviously lead to hazards to health. Radiation exposure can also occur from radiological procedures conducted on patients undergoing general anaesthesia.

Administration of inhalational general anaesthesia, as practised over the years, allows for the patient's expiratory gases to be vented into the atmosphere of the operating theatre room. This

Table 3

Obstetric history (2 married female Anaesthesiologists, 32 wives of Anaesthesiologists)

	No. of Pregnancies	Spontaneous Abortions	Congenital Abnormalities	Live Births	Males	Sex Females
Pre-anaesthetic practice	14	0	0	14	8 (57.1%)	6 (42.8%)
Post-anaesthetic practice	82	13 (15.8%)	0	69 (84.1%)	33 (47.8%)	36 (52.2%)

leads to pollution which depends on the efficiency of theatre ventilation, the composition and concentration of the inspired gases, the minute volume vented and the duration of anaesthesia. The greatest pollution is around the expiratory valves. Average levels of contamination have been quoted as 15 parts per million (0.0015%) for halothane and 170 p.p.m. for nitrous oxide (Pfaffli et al., 1972). Operating theatre personnel, in poorly ventilated rooms, accumulate inhalational drugs in their tissues and slowly release them (Gostomzyk et al., 1973); this phenomenon can also occur in recovery room areas (Yanagida et al, 1974; Pfaffli et al, 1972). Repeated exposure to halothane can lead to induction of liver microsomal enzyme systems which eventually leads to bromide ion accumulation. Bromide ions are eventually slowly excreted via the skin and kidneys and, when an accumulation occurs, thought processes can be impaired. Herein lies an obvious danger whereby a tired, overworked anaesthesiologist, with cerebration slowed down due to chronic exposure to a polluted environment, might make mistakes in management of cases.

Generally speaking, notwithstanding the small numbers involved, Malaysian Anaesthesiologists exhibit incidences of morbidities associated with theatre work (see Tables 2 and 3) comparable with those reported amongst groups in other countries.

The incidence of 6 anaesthesiologists (16.6%) reporting spinal problems (see Table 2) raises an interesting problem not generally mentioned or discussed in other investigations. 5 of these 6 are in Private Anaesthetic Practice. Thus, out of 13 "Private Anaesthetists," 5 (38.5%) have complained of "spinal problems." Possibly in private practice the anaesthesiologist is more involved in carrying patients (in smaller private surgical and/or obstetric clinics, besides helping to transport patients to and from the operating table, the anaesthesiologist often helps in carrying the patient back to the ward bed following anaesthesia). One anaesthesiologist developed a Right Direct Inguinal Hernia after 5 years of Private Practice Anaesthesia and 1 Anaesthesiologist in Private Practice developed a Retinal Tear. Both these cases raise the possibility that the sudden jerks and strains involved in carrying patients might have been incriminating factors (sudden rises in intra-abdominal and intraocular pressures, respectively). There were no incidences of jaundice and drug addiction. One Anaesthesiologist developed malaise, lethargy and right hypochondral discomfort/pain whenever halothane was used; the use of halothane has subsequently been limited. The query is whether an abnormal reaction to inhalation of traces of halothane is the cause.

Based on available literature of other work and on the revelations of this retrospective survey, the following recommendations are put forth:

Recommendations:

1. Anaesthesiologists should have adequate and regular periods for meals and rest during work. Possibly, at the end of not more than every 2-month period vacation leave, should be taken. This recommendation should lessen irritability, headaches, lethargy, etc. and make the anaesthesiologist less prone to mental fatigue, resulting in maximum patient-safety. Less prolonged exposure to inhalational agents in the theatre air might also lessen the obstetric problems (Spence, 1973).
2. Operating theatre ventilation should be efficient. Current-day recommendations are that operating rooms should be air-conditioned with non-recirculating systems capable of providing minimal total air-exchange rates of at least 10 times per hour (Witcher et al, 1971).
3. Scavenging systems are recommended in operating theatres because it has been conclusively shown that operating theatre personnel are exposed to inadvertent trace concentrations of anaesthetic agents (Witcher et al 1971; Linde and Bruce, 1969); the theoretical potential hazards of this pollution justify the aim to reduce such contamination as much as possible. High-flow anaesthetic systems, e.g. the spontaneous respiration technique using N_2O/O_2 /Halothane, can lead to more pollution of the theatre air compared to the lower-flow techniques. Wall-suction equipment can be used but has its disadvantages (might be required intermittently for patient-care; maximum wall suction pressure might be transferred directly to the patient's lungs depending on the arrangement of the system). The ideal is a closed system venting of all gases to the outside through the use of appropriately designed scavenging equipment. Scavenging systems can vary from simple designs (Price and McKeever, 1970; Corbett, 1969) to more sophisticated units (Yeakel 1970; Marrese, 1969). All systems have common objectives: attachment to the expiratory valve of anaesthetic machines, protection of patient from positive and negative pressure swings.

Activated charcoal in canisters, close to the expiratory ports of anaesthetic circuits, is also recommended (Murrin, 1975); this is not effective regarding nitrous oxide but effectively absorbs halothane.

In Malaysia, certain areas where ventilation in operating theatres might not be efficient, the high flow anaesthetic techniques should be avoided whenever possible.

4. Dosimeters should be carried by anaesthesiologists who are frequently exposed to radiation from radiological procedures on patients under anaesthesia (Jenkins, 1973).
5. The carrying of patients who come for anaesthesia and surgery should be a combined team effort: the surgical team must join the anaesthesiologist with the aid of other operating theatre personnel in this necessary task. Quite often, in Malaysia (as in many other countries), at the end of the operative procedure the anaesthesiologist is abandoned by the surgical team and is left with the nursing staff to transport the patient off the table. Chivalry can lead to backaches! It is important for the anaesthesiologist to take charge and protect the patient's head and neck, in particular, as he or she is being transported while in the throes of residual anaesthesia. This care requires the anaesthesiologist's expertise in upper airway care, etc. The basic manual effort for carrying and transporting patients does not require the expertise of an anaesthesiologist. Team work is the essence of operating theatre work and the transportation of patients within this area should come under the ambit of essential team work.

Summary

Qualified anaesthesiologists (numbering 36) in West Malaysia were personally interviewed to ascertain any incidences of claimed hazards to anaesthesiologists.

High incidences of headaches (72.2%), irritability (69.4%) and insomnia (55.5%) were recorded. Out of 82 pregnancies (after commencing anaesthetic practice) 13 ended in spontaneous abortion (15.8%) compared to 0 incidence of spontaneous abortion out of 14 pregnancies (before commencing anaesthesia) in 2 female anaesthesiologists and 32 wives of anaesthesiologists. 6 anaesthesiologists (16.6%) developed "spinal problems".

Recommendations attempting to lessen the hazards are listed.

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