

## *Anesthetic-induced Abortion?*

SPONTANEOUS LOSS of the conceptus before the twentieth week of pregnancy is a common event. The incidence varies, and numerous factors are known to be involved. Spontaneous abortion is generally commoner in white than in black Americans, and both races have higher incidences with increasing maternal age.<sup>1</sup> The mean incidence of spontaneous abortion in North America, based on personal interview, appears to be about 15 per cent.<sup>2,3</sup> About a third of these are associated with a chromosomal abnormality in the conceptus.<sup>4</sup> These chromosomal anomalies are usually sporadic events, and their etiology is largely unknown. Some, however, are related to increased maternal age.

There are a number of other known causes of spontaneous abortion, including local factors in the pelvic area and systemic infections and toxins.<sup>5</sup> Very few chemicals are known to predispose to termination of pregnancy, and it is of particular interest to be alerted to anesthetics as possible predisposing agents. In a paper in this issue, Cohen, Belville, and Brown have shown a relationship between employment in the operating room and a significant increase in the incidence of spontaneous abortion. The authors are careful to point out that correlation is no proof of causation, but they have tried to examine other possible factors common to both control and exposed groups. Of particular interest is the fact that the increase in spontaneous abortion is much more significant among anesthesiologists and their controls than among operating room nurses and their controls.

In a companion paper, Whitcher, Cohen and Trudell have measured the level of exposure to anesthetic agents in operating room staff. The increase in halothane concentration during the working day is striking. As one might expect, the levels reached are much higher for anesthesiologists than for the nursing staff. This is precisely the same direction of increase as occurred in the incidence of spontaneous abortion.

The authors are the first to point out that

more work needs to be done, but a potential problem has been identified and also an available solution. However, these findings are potentially more far-reaching than operating room staff, and raise the question of exposure to volatile agents during pregnancy.

In an extension of the studies on operating room staff, it would be most informative to have detailed study of the abortuses. Is there any difference between the incidences of chromosomal anomalies or even physical disorders in the exposed and control groups? This is important in elucidating the facts behind the finding that abortion tended to occur earlier in the exposed than the unexposed women.

Does this danger extend to women exposed acutely, that is, at surgery, during the early weeks of pregnancy? What are the possible effects of other volatile agents, spray paints, hairsprays, and air fresheners, when widely used? This is especially important for those heavily exposed, such as hairdressers.

From a public health point of view it is vital to extend the preliminary studies of Cohen, Belville and Brown on the possibility that anesthetics produce congenital defects. They found no such evidence but, as they have indicated, a much larger study is needed. Agents causing abortion do not necessarily cause anomalies. Judging by animal experiments, some agents are embryotoxic but not teratogenic.<sup>6</sup> However, no amount of animal experimentation can define teratogenicity in man. The human is the final experimental animal, and indications of possible harmful agents must be continually sought. In view of the warning note raised here, those responsible for studying the data from the Collaborative Perinatal Project should pay serious attention to exposure to volatile agents as teratogenic.<sup>7</sup>

DR. D. H. CARR  
*Professor of Anatomy  
Faculty of Medicine  
McMaster University  
Hamilton, Ontario  
Canada*

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## Neonatology

**OXYGENATION AND CONGENITAL DIAPHRAGMATIC HERNIA** Infants born with a congenital diaphragmatic hernia through the foramen of Bochdalek are often in respiratory distress, with cyanosis in both air and oxygen. Institution of artificial ventilation may reduce  $P_{CO_2}$  to normal but does not produce marked improvement of oxygenation. The possible sources of right-to-left shunt in these cases are: 1) intrapulmonary, *i.e.*, perfusion in non- or poorly ventilated areas due to compromise of expansion by abdominal contents within the chest cavity; 2) through the foramen ovale; 3) through a patent ductus arteriosus. The sources of the hypoxemia in ten neonates born with diaphragmatic hernia through the foramen of Bochdalek were investigated. The infants' ages at time of study ranged from 6 to 76 hours. Arterial blood samples were obtained from the *right* radial artery and the descending aorta (catheter inserted via the umbilical vein) while the infants were breathing high concentrations of oxygen spontaneously or were being ventilated mechanically. Inspired  $O_2$  was  $71 \pm 4$  per cent (mean  $\pm$  SD), while  $Pa_{O_2}$  of blood from the *right* radial artery was  $56 \pm 7$  mm Hg higher than that in a sample from the descending aorta.  $P_{CO_2}$  of blood from the descending aorta was  $4 \pm 1$  mm Hg higher and pH was correspondingly lower. All differences were significant. Three of the ten infants died. Paired samples were obtained from three infants after operation; two of these three died. In the survivor, the radial artery-aorta  $P_{O_2}$  difference decreased postoperatively, then increased again transiently. There was no significant difference between mean values in blood from the radial artery and aorta in infants who survived and those who died. The radial artery-aorta  $P_{O_2}$  difference was not affected by spontaneous or mechanical ventilation. (Murdock, A. I., Burrington, J. B., and Swyer, P. R.: *Alveolar to Arterial Oxygen Tension Difference and Venous Admixture in Newly Born Infants with Congenital Diaphragmatic Herniation Through the Foramen of Bochdalek*, *Biol. Neonat.* 17: 161-172, 1971.) EDITOR'S COMMENT: A worthwhile contribution to the management of practical problems associated with acute respiratory failure in the neonate. It emphasizes the importance of sampling site in the assessment of oxygenation: the *right* radial arterial  $P_{O_2}$  defines what happens in the lung, while the *left* may show the added effect of an anatomic right-to-left shunt when flow across the patent ductus arteriosus is reversed. It is unfortunate that a number of interesting problems are not discussed in the paper. We certainly would like to know the cause of the balanced pressures across the patent ductus arteriosus: is it the "space occupying" lesion within the thorax that elevates pulmonary arterial pressure? How does one explain the lack of change in the radial artery-aorta  $P_{O_2}$  difference when these infants are ventilated with increased airway pressure? What was the cause of death? If right-sided pressures are higher than left, can a patent foramen ovale also contribute to postoperative hypoxemia? All these questions and many more underscore the importance of appreciating hemodynamic function when treating respiratory failure.