

three cases, and continuously with a radial artery catheter in one case. In fact, in addition to these four cases, we have administered epinephrine epidurally to another ten preeclamptic patients to date, in varying doses and concentrations (from 1:400,000 to 1:200,000, up to about 25 ml, with either lidocaine-bupivacaine mixtures or lidocaine alone) for both labor analgesia and cesarian section. There was continuous fetal heart rate monitoring in each case. Maternal blood pressure was measured every 1 min with an Accutorr automatic blood pressure device. There has not been a single case of maternal hypertension, nor poor fetal outcome, nor fetal distress that could be attributed to the anesthetic. Even if, in these patients, there is a reduction in umbilical flow, it seems not to matter, implying a significant margin of safety in uterine and intervillous blood flow.

Epinephrine has no significant effects on intervillous blood flow when given epidurally during normal pregnancies.^{4,5} Perhaps there is vasodilation of human uteroplacental arteries when exposed to beta adrenergic stimuli,⁶ which is the probable effect of the epidurally administered epinephrine.^{3,7} Thus, we do not believe that epidurally administered epinephrine is harmful in preeclampsia. We still feel that meticulous technique is necessary to avoid accidental intravenous injection of large amounts of epinephrine.

PAUL J. HELLER, M.D.
Assistant Professor of Anesthesiology

CAREN GOODMAN, M.D.
Fellow in Anesthesiology

*Department of Anesthesiology
Yale University School of Medicine
333 Cedar Street
New Haven, Connecticut 06510*

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Isflurane-induced Failure of the Bentley-10 Oxygenator

To the Editor:—For many years, we have administered isoflurane *via* vaporizer into the oxygen line during cardiopulmonary bypass to control blood pressure. Recently, we experienced two failures of the Bentley-10[®] oxygenator during bypass necessitating brief termination of cardiopulmonary bypass and replacement of the oxygenator. The failures were identical in that the attachment of the oxygen inlet separated from the upper portion of the oxygenator housing. The plastic appeared cracked and fragmented as if hammered. In each episode, the patient was hypothermic and the time off bypass was under 3 min. Neither patient suffered injury.

In examining each incident, we found that the isoflurane vaporizer had recently been refilled. On our pump, the vaporizer was located such that liquid isoflurane, if spilled during refilling, might fall upon the oxygenator. We applied 0.25 ml of liquid isoflurane to the top of a new Bentley oxygenator. Seconds later, cracking ap-

peared. Application of an additional 0.75 ml resulted in fracturing of the oxygenator similar to that seen during our cases (figs. 1, 2). Application of liquid isoflurane to a William Harvey[®] oxygenator and a DIDEKO[®] cardiomy reservoir produced similar results. All are constructed of polycarbonate plastic.

We were not able to produce any damage using enflurane in volumes up to 10 ml. Halothane softened and distorted the plastic surface, but did not induce cracking. Since most pump oxygenators and other reservoirs are constructed of the same material (polycarbonate), it is likely that they would be adversely affected by isoflurane.

Subsequent to our discovery, we found this problem had been previously reported.*† Because of the limited

* Health Devices 14, 133-134, 1985.

† Health Devices Alerts, No. 1985-11, p 3, March 15, 1985.

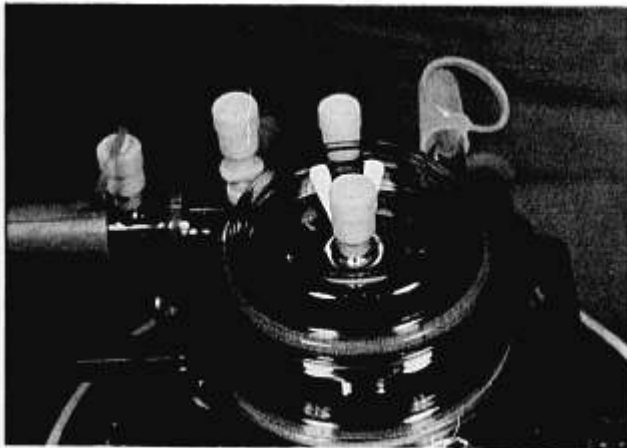


FIG. 1. Top of Bentley-10 Oxygenator.

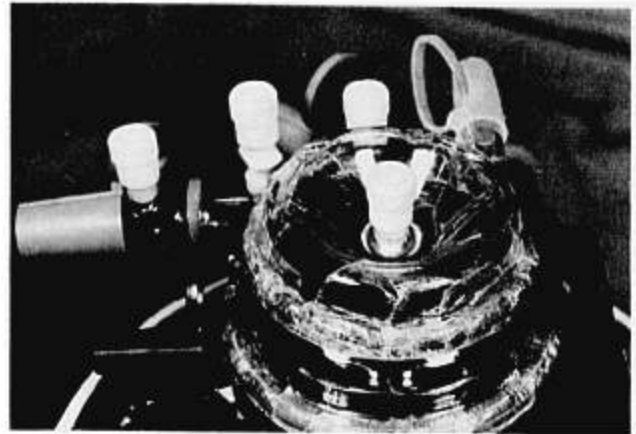


FIG. 2. Same Bentley-10 Oxygenator as in figure 1 after 1 ml of isoflurane has been dropped on it.

distribution of this publication and the absence of any warning by the manufacturer, we believe that a more widespread alarm should be sounded.

We have since changed the location of our pump vaporizer and prohibited its filling while the pump is set up. We strongly recommend that those using isoflurane and halothane take steps to insure that the liquid form of these agents does not come into contact with materials made of polycarbonate.

In summary, polycarbonate plastic reacts adversely to liquid isoflurane by cracking and fragmenting. Since cardiac bypass equipment utilizes polycarbonate plastic for some items (especially the oxygenator), there is danger in

exposing such devices to liquid isoflurane. Liquid halothane can effect the plastic to a lesser degree, causing softening, while liquid enflurane has no effect.

DAVID E. MALTRY, M.D.
Assistant Professor

G. W. N. EGGERS, JR., M.D.
Professor and Chairman

*Department of Anesthesiology
University of Missouri—Columbia
3N15 Health Sciences Center
Columbia, Missouri 65212*

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Near Catastrophic Oxygenator Failure

To the Editor:—We wish to point out that spillage of liquid anesthetic agents can dissolve the plastic structure of membrane oxygenators, leading to potentially catastrophic interruption of cardiopulmonary bypass (CPB).

During a recent cardiac surgical procedure at Temple University Hospital, while the patient was on CPB, the perfusionist started to fill the Fluotec Mark 2 vaporizer in the CPB system with isoflurane. A few drops were spilled onto the Shiley M-2000 membrane oxygenator mounted directly below the vaporizer. Seconds afterward, blood was pouring out of the arterial outlet port onto the floor. The arterial outlet port had almost broken off of the main frame of the oxygenator. A large crack extended

the length of the oxygenator (fig. 1). The heart-lung machine was immediately turned off and the arterial line clamped.

Fortunately, the patient's core temperature was 34° C and the heart rate was still 90. Mean arterial pressure (MAP) fell to 20 mmHg for approximately 1.5 min. The perfusionists were able to manually squeeze the blood in the venous reservoir back into the patient. After this transfusion of 0.5 liters of blood, the MAP rose to 50 mmHg. Resuscitation consisting of crystalloid, one unit of packed red blood cells, and dopamine and neosynephrine infusions kept the MAP at 60–70 mmHg for 15 min while the perfusionists changed the oxygenator.