

ticle size claimed by the manufacturer is 73.5 per cent below 0.4 microns in diameter.

By plugging the normal air intake of the PV3, and directing a carrier gas through the normal oxygen input nipple of the PV3 it is practical to use the nebulizer with the respirator shut off to supply a dense mist to a tracheostomy mask, face tent or similar equipment thus eliminating the need for a separate unit for use during periods when the patient is disconnected from the respirator.

Although the large volume of liquid required to fill the nebulizer chamber precludes the use of anything but bulk liquids, the amplifier includes a tuning mechanism making it possible to unplug the main crystal and substitute a different crystal which could in the future be used for intermittent nebulization of medications.

The conversion was done to our specifications by the Emerson Company in cooperation with the Macrosonics Corp.

## CASE REPORT

### An Unusual Cause of Hypoxia Under Anesthesia

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In most instances, the cause of hypoxia occurring during anesthesia can be determined. The following case illustrates an unusual cause of hypoxia, which could be explained with certainty only in retrospect.

#### CASE REPORT

The patient was a 58 year old white man who had a squamous cell carcinoma of the carina. His only symptom was hemoptysis, and he was essentially healthy except for mild hypertension. Chest roentgenogram was normal. It was planned to resect the carina on total cardiopulmonary bypass.

Premedication consisting of droperidol 10 mg. (Inapsine-McNeil) intramuscularly was given one hour preoperatively. Anesthesia was induced and maintained with an intravenous infusion of droperidol and fentanyl (Sublimaze citrate-McNeil) supplemented with nitrous

oxide and oxygen in a 1:1 proportion. The patient was intubated and placed in the lateral position. Blood gas analysis one hour after induction of anesthesia showed the following results:  $P_{O_2}$  155 mm. of mercury,  $P_{CO_2}$  24.5 mm. of mercury, pH 7.6. The course of anesthesia was entirely uneventful until the chest was opened and the lesion palpated at which time it became obvious from the color of the blood that the patient had become suddenly and severely hypoxic. Blood gas analysis at the time showed:  $P_{O_2}$  19 mm. of mercury,  $P_{CO_2}$  41 mm. of mercury, pH 7.39. Nitrous oxide was discontinued immediately and on 100 per cent oxygen, the blood gas analysis showed:  $P_{O_2}$  35 mm. of mercury,  $P_{CO_2}$  39 mm. of mercury, pH 7.45. The right lung, which was exposed could be seen to be well aerated, and there did not appear to be any interference with its blood supply. The endotracheal tube could be seen to be correctly placed, and perfectly patent. It was felt that in the left main stem bronchus was probably obstructed. Immediate bronchoscopy not being feasible, it was decided to place the patient on cardiopulmonary

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bypass as quickly as possible. When the carina and main stem bronchi were examined, there was no apparent obstruction on the left side. The carina was resected and gross inspection of the left main stem bronchus as well as instrumentation failed to reveal any bronchial obstruction. The bronchi and trachea were anastomosed.

At the conclusion of cardiopulmonary bypass, but before the arterial and venous lines were removed and with the patient receiving 100 per cent oxygen, blood gas analysis was carried out at 12 and 25 minutes with the following values:  $P_{O_2}$  147 mm. of mercury,  $P_{CO_2}$  24 mm. of mercury, pH 7.57, and  $P_{O_2}$  108 mm. of mercury,  $P_{CO_2}$  25.5 mm. of mercury, pH 7.54, respectively. It was decided that satisfactory oxygenation could be maintained, and the operation was concluded uneventfully. Elective tracheostomy was performed. At the completion of surgery, with the patient still receiving 100 per cent oxygen, blood gas analysis showed:  $P_{O_2}$  190 mm. of mercury,  $P_{CO_2}$  42 mm. of mercury, pH 7.42.

In the immediate postoperative period, the patient's level of consciousness was low. We believed this to be consistent with the period of hypoxia which had occurred before cardiopulmonary bypass. On mechanical ventilation using 100 per cent oxygen, blood gas values initially were:  $P_{O_2}$  83 mm. of mercury,  $P_{CO_2}$  43 mm. of mercury, pH 7.46. But one and a

half hours later their values were:  $P_{O_2}$  275 mm. of mercury,  $P_{CO_2}$  35 mm. of mercury, pH 7.54. Breath sounds were fairly good on both sides of the chest despite the fact that the chest film showed almost complete opacity on the left side. By the next morning, the patient's level of consciousness had returned to normal. On 40 per cent oxygen, his blood gases were:  $P_{O_2}$  54 mm. of mercury,  $P_{CO_2}$  29 mm. of mercury, pH 7.44. Approximately 15 hours postoperatively, the patient suddenly coughed a piece of tissue  $1 \times 0.8$  cm. which on histological examination was found to be a poorly differentiated squamous cell carcinoma. Chest roentgenogram 15 minutes later indicated dramatic improvement in aeration of the left lung. Blood gas analysis at this time yielded the following values:  $P_{O_2}$  70 mm. of mercury,  $P_{CO_2}$  30 mm. of mercury, pH 7.49.

#### CONCLUSION

In retrospect, a portion of the tumor must have become detached during the course of surgery and fallen into the left main stem bronchus, causing obstruction and leading to the severe hypoxia which occurred before the institution of cardiopulmonary bypass. The position of this foreign body must have changed at some time, since during the period following cardiopulmonary bypass and in the immediate postoperative period, oxygenation was fairly satisfactory.

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**OCULOCARDIAC REFLEX** The effect of anesthesia upon the oculocardiac reflex was studied in pediatric strabismus surgery in subjects from 1.5 to 13 years of age. Findings include: (1) intravenous administration of 0.2 mg. of atropine 5 minutes prior to surgery could prevent the oculocardiac reflex in all cases, although intramuscular preanesthetic dosage was not effective; (2) retrobulbar injection of 2 ml. of 2 per cent procaine, lidocaine or mepivacaine inhibited the reflex in 14 of 21 cases; (3) increasing the depth of anesthesia with halothane from 0.3 to 3 per cent seemed to be effective in suppressing the reflex to some extent; (4) a transient positive pressure of over 15 cm. of water, applied intratracheally or vigorous artificial ventilation considerably suppressed the reflex, the effect being more prominent under higher pressure. (Kudo, Y.: *Electrocardiographic Studies on the Oculocardiac Reflex (Japanese)*, *Jap. J. Anesthesia* 14: 851, 1965.)