

output. In fact, the advantage of being able to maintain a normal Pa_{CO_2} in the face of large tidal volumes, as well as the benefits of improved humidity² and heat retention, have caused us to favor this method. No doubt controlled studies concerned with the effect of this technique on cardiac output are needed.

In our study, both collision broadening and nitrous oxide effects were compensated for in calibrating the capnograph. Severinghaus⁵ has shown that nitrogen also has collision broadening effects similar to, but not quite as large as, those of nitrous oxide. Our capnograph was calibrated using 5 per cent CO_2 in nitrogen, which should make the error from collision broadening less than the inherent errors of the capnograph reading or the blood-gas analysis. The capnograph was zeroed against the gases in the fresh-gas inflow line to eliminate the effects of nitrous oxide. We apologize for omitting this from our Methods section.

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PEEP for the Morbidly Obese

To the Editor:—The recent article of Salem *et al.*¹ was of interest to me because I have been providing anesthesia to many morbidly obese patients for gastric bypass operations. It has been my experience that the application of PEEP during the operation greatly improves the arterial blood-gas values of these patients.

In an attempt to explain the discrepancy between the results reported by Salem *et al.* and my own experience, I examined the anesthetic records of 34 morbidly obese patients undergoing either gastric or jejunoileal bypass procedures for the treatment of morbid obesity. These patients were all anesthetized using a balanced technique, *i.e.*, narcotic and relaxant drugs and nitrous oxide-oxygen. The inspired oxygen concentration was maintained at 30–35 per cent. When a Pa_{O_2} value of less than 100 torr was encountered, PEEP was applied, usually 10–15 cm H_2O . The application of 10 cm PEEP resulted in an improvement in arterial oxygenation of 20–25 per cent. PEEP was most frequently needed by patients undergoing gastric bypass procedures that involved prolonged high abdominal retraction. PEEP was used only once in a patient undergoing jejunoileal bypass, which does not necessitate such profound retraction.

The difference in our experiences may be due to

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two factors: first, evidently the surgical procedure Salem *et al.* studied was the intestinal bypass variety, not involving such marked retraction on the diaphragm; second, the myocardial depression from enflurane (the anesthetic they used), when combined with PEEP, caused considerable decreases in cardiac output, which would offset any improvement in alveolar ventilation. We have both used large tidal volumes.

In summary, I believe that PEEP is extremely valuable in the anesthetic management of the morbidly obese patient, especially when using a balanced technique in situations in which nitrous oxide concentration and surgical retraction are both high.

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