

Anesthesiology
50:174, 1979

PEEP and Grossly Obese Anesthetized Patients

To the Editor:—Salem *et al.* have recently reported that discontinuance of 10–12 cm H₂O PEEP from high-tidal-volume controlled ventilation in grossly obese anesthetized patients caused a decrease in A-aP_{O₂}.¹ The abrupt (2 min) initial decrease in A-aP_{O₂} from 365 to 350 torr was probably due to an increase in cardiac output following the removal of PEEP. The slower (5–30 min) subsequent decrease in A-aP_{O₂} from 350 to 325 torr was probably due to the reversal of the PEEP-induced “redistribution of pulmonary blood flow to nonventilated regions, thus augmenting intrapulmonary shunt flow and venous admixture.”¹ There are quantitative data to support this contention.* Salem *et al.* concluded “the use of PEEP superimposed on high tidal volumes does not have any salutary effect on Pa_{O₂} during the intraoperative management of grossly obese patients.” We believe that their data do not warrant this conclusion.

First, Salem *et al.* imply by their conclusion that all levels of PEEP are ineffective in all obese patients undergoing surgical procedures. Surely with different age groups, position changes, presence of pulmonary disease, etc., the use of PEEP might be efficacious. Also, only one level of PEEP was used and, therefore, responses to lower or higher levels of PEEP were not determined. Kirby *et al.* have shown that high levels of PEEP are sometimes necessary to effect clinically significant decreases in intrapulmonary shunting.²

* Moyce PR, Benumof JL, Wahrenbrock EA: Positive end expiratory pressure (PEEP) and hypoxic pulmonary vasoconstriction (abstract). American Society of Anesthesiologists Annual Meeting, 1977, pp 231–232.

Anesthesiology
50:174–175, 1979

In reply:—Dr. Koehler states that contrary to the findings of our recently published report,¹ her experience has been that the application of PEEP is valuable in the anesthetic management of the morbidly obese. Her patients were anesthetized using a balanced technique while maintaining an inspired oxygen concentration (F_IO₂) of 30 to 35 per cent. The use of an F_IO₂ of 0.3 to 0.35 seems inadvisable and may be dangerous to the grossly obese patient. Vaughan and Wise² have demonstrated that: 1) oxygen, 40 per cent, did not uniformly produce adequate oxygenation for intra-abdominal operations in otherwise healthy obese patients; 2) placement of a subdiaphragmatic pack resulted in a consistent decrease in Pa_{O₂} in each patient to less than 65 torr even though F_IO₂ was 0.41; 3)

Additionally, the magnitudes of the changes in both cardiac output and intrapulmonary shunt flow due to PEEP, the balance between the two variables being a determinant of systemic arterial oxygenation, were not determined the study of Salem *et al.* Although their patients received 2,000–3,000 ml dextrose, 5 per cent, in lactated Ringer's solution intravenously during the operation, the adequacy of this intravascular volume replacement was not determined particularly with respect to the application of PEEP. It would be of interest to know what happened to the A-aP_{O₂} when PEEP was first applied. Using the mean data given for A-aP_{O₂}, the calculated difference in total shunt fraction comparing control conditions with values 30 min after removal of PEEP is small (approximately 2–3 per cent of total cardiac output) and, therefore, is of questionable clinical significance.

RICHARD E. BERRYHILL, M.D.
JONATHAN L. BENUMOF, M.D.
Anesthesia Research Laboratory
University of California, San Diego
School of Medicine
La Jolla, California 92093

REFERENCES

1. Salem MR, Dalal FY, Zygmunt MP, et al: Does PEEP improve intraoperative arterial oxygenation in grossly obese patients? *ANESTHESIOLOGY* 48:280–281, 1978
2. Kirby RR, Downs JB, Civetta JM, et al: High level position end expiratory pressure (PEEP) in acute respiratory insufficiency. *Chest* 67:156–163, 1975

(Accepted for publication August 24, 1978.)

77 per cent of these patients had Pa_{O₂} values of less than 80 torr at F_IO₂ 0.4. On the other hand, with the use of high F_IO₂ and high tidal volumes, Pa_{O₂} values were well above 100 torr in all patients intraoperatively.¹

Dr. Koehler does not provide any evidence derived from a prospective study, but rather a simple observation that when a Pa_{O₂} value below 100 torr was encountered, the application of PEEP resulted in improvement in arterial oxygenation. We do not think that the difference between her observations and our findings could be attributed to either the surgical procedure or the myocardial depression resulting from the combined effect of enflurane and PEEP. We have not observed any increase in arterial oxygenation dur-