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Beach Chair Position: Is It Really Feasible in Laparoscopic Procedures?

To the Editor:—In the November 2007 issue of *ANESTHESIOLOGY*, Valenza *et al.*¹ described how they used the application of positive end-expiratory pressure and the beach chair position to counteract the respiratory derangements in morbidly obese patients undergoing laparoscopic gastric surgery. The authors state that although both the beach chair position and the addition of positive end-expiratory pressure each similarly improved lung volumes, oxygenation, and respiratory mechanics at baseline, it was only the combination of both positive end-expiratory pressure and the beach chair position that improved oxygenation during pneumoperitoneum. Because it is often the practice of surgeons to ask their anesthesiology colleagues to place the patients in some degree of Trendelenburg to “facilitate” the exposure during laparoscopic surgeries, we are forced to question how feasible it would be to use the beach chair position in any laparoscopic procedure, let alone in morbidly obese patients. Moreover, in certain types of laparoscopic surgeries (prostatectomies, and some gynecologic surgeries), extreme Trendelenburg is requested, thus making the use of beach chair position even more impractical. A number of variables contribute to the respiratory derangements in all anesthetized patients; notable among them are the general anesthetic, paralytics, pneumoperitoneum, and positioning. The authors describe performing

recruitment maneuvers (three consecutive inspiratory holds of 5 s at 45 cm H₂O airway pressure) in both positions, with and without pneumoperitoneum, to improve respiratory derangements. Although it is not always possible to consistently maintain improved oxygenation for a prolonged period of time after performing the recruitment maneuvers, it is quite more practical to perform these maneuvers as opposed to attempting to use the beach chair position when performing laparoscopic procedures.

Jagtar Singh Heir, D.O.,* Vijaya Gottumukkala, M.B.B.S.
*University of Texas MD Anderson Cancer Center, Houston, Texas.
jsheir@mdanderson.org

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In Reply:—Drs. Singh Heir and Gottumukkala are right: If a surgeon asks for an “extreme Trendelenburg” position, one cannot use the head-up position as a strategy to counteract hypoxemia, unless in an emergency!

The negative effects of the Trendelenburg position have been investigated by others.¹⁻³ Any conclusion taken from our data on the Trendelenburg position is merely speculative, provided we set out to investigate the beach chair position and positive end-expiratory pressure (PEEP).⁴ Nevertheless, our data allow some speculations on the aspect brought up by Drs. Singh Heir and Gottumukkala in their letter.

In a sedated and paralyzed patient, pleural pressures displace the relaxed diaphragm downward, hence increasing end-expiratory lung volume, while intraabdominal pressure (IAP) acts as a counter pressure on the diaphragm. When the bowels are allowed to slide under gravity in the head-up position, bladder pressure increases, as we have shown (from 17.87 ± 5.45 to 23.92 ± 4.35 cm H₂O; $P < 0.01$). The increase of bladder pressure in head-up position may thus correspond to a reduction of pressure pushing the diaphragm upward. When we estimated pleural pressure as $P_{pl} = (PEEP + PEEP_i) \times Ew/(E_l + E_w)^5$ in the supine and beach chair positions with and without PEEP, and considered changes of IAP due to the beach chair position (ΔIAP) to obtain an indicative “push-down pressure” ($P_{pl} + \Delta IAP$), we found that this was positively correlated with end-expiratory lung volume ($R^2 = 0.857$, $P < 0.001$, $m = 0.67$, multiple linear regression analysis). We did not measure IAP changes occurring in the extreme Trendelenburg position. How-

ever, we would anticipate that an increase in the forces shifting the diaphragm upward would ensue following the same physical rule. In this condition, PEEP (hence Ppl) may be used as a counterpressure that opposes diaphragm upward shift, thus preserving lung volume.

Recruitment maneuvers proposed by Drs. Singh Heir and Gottumukkala to improve oxygenation have been discussed in our article.⁴ They are possibly even more important in the extreme Trendelenburg position than in the supine position to open up the lung. However, their effects are short-lived,⁶ whereas PEEP is known to maintain lung units open, once recruited.

Franco Valenza, M.D.,* Luciano Gattinoni, M.D., F.R.C.P.
*Fondazione Policlinico Ospedale Maggiore, Mangiagalli e Regina Elena-IRCCS, Milano, Italy. franco.valenza@unimi.it

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