Lower tidal volumes through ProSeal laryngeal mask airway as compared to endotracheal tube?

Sir,

In a randomized controlled trial, Kannan et al. compared the “ventilatory parameters and airway dynamics needed to maintain normocarbia” between ProSeal laryngeal mask airway (PLMA) versus endotracheal tube (ETT).1 It was concluded that PLMA maintained normocarbia at “lower tidal volumes” and peak pressures without increasing the airway resistance, as compared to ETT. This apparently greater efficacy of PLMA needs closer scrutiny and may indeed be contrary to the quoted finding.

The tidal volume/minute ventilation requirement is expected to depend on apparatus dead space. The dead space of a size 3 PLMA is different from a size of 7.5 mm ETT. It is 39.6 ml for PLMA and 30.8 ml for ETT when calculated using Enghoff’s modification of Bohr’s equation by substituting the mean ETCO₂ values reported by the authors (ETT: 37 mmHg; PLMA: 35 mmHg) and assuming similar PaCO₂ of 40 mmHg. This finding of almost 9 ml higher dead space of the PLMA was also corroborated by us, by measuring the apparatus dead space in vitro using saline (approximately 21 ml and 13 ml for PLMA and ETT, respectively). For the ETT, we measured it only until the expected level at glottis, aiming to negate the effect of anatomical dead space. Thus, the use of PLMA entails a higher apparatus dead space. This would result in dilution of the recorded ETCO₂ when initiating ventilation with same tidal volume. If further tidal volumes will be titrated using ETCO₂ as done by the authors, an apparently lower tidal volume requirement will be seen progressively. On the contrary had PaCO₂ been monitored by the authors, the results could show raised PaCO₂ following the decreased volumes through PLMA. Thus, it is perhaps inaccurate to suggest a decreased tidal volume requirement through PLMA.

Second, the in vivo airway resistance was found to be same through both devices by the authors. This is contradictory to clinical perception regarding the devices as well as the earlier finding of Berry et al. who noted significantly lower resistance through the PLMA (almost 50% lesser).2 Despite citing this particular article, Kannan et al. have made no comparison or give a probable explanation for this surprising and contradictory finding.1

If it is accepted that the resistance is indeed similar with both these devices, the finding of raised peak airway pressure with ETT is then a likely consequence of the raised tidal volume itself. Since Kannan et al. did not measure the plateau airway pressures, relative contribution by resistive, and elastic components on peak airway pressure cannot be commented upon.1

Finally, what is worrisome is the method used for sample size calculation by the authors. No previous dataset/value that is required for the calculation is mentioned. How was it calculated with only a presumed clinical difference?

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Conflicts of interest
There are no conflicts of interest.
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