Management of Difficult Airways: Which Is the Safest Approach after Reviewing Virtual Laryngo-tracheo-bronchoscopy Imaging?

To the Editor:

Agarwal *et al.*[1] highlighted the usefulness of three-dimensional reconstruction of computed tomography imaging for the safe management of patients with upper airways stenosis. The authors well described the reasons for performing such advanced imaging and we agree that preoperative work-up of such patients may greatly benefit by the innovative information provided by virtual laryngo-tracheo-bronchoscopy. Yet, virtual laryngo-tracheo-bronchoscopy has great potentialities also in patients with obstructive lesions and can help in planning a safer anesthesiological approach. In fact, it is paramount to consider the risk of airway trauma and consequent bleeding in these patients with expected difficult airways. Therefore, the importance of smooth and uneventful placement of the endotracheal tube cannot be overemphasized.

According to the findings of the virtual laryngo-tracheo-bronchoscopy imaging, the authors decided the appropriate size of the endotracheal tube, which is entirely reasonable; however, it is less clear what they mean by *"proper anesthetic induction"* and more importantly, which strategy they implemented for positioning the 5.5-cm reinforced endotracheal tube.

The usefulness of a combined two-operator laryngo-bronchoscopic approach for the safe management of such cases has already been reported. Both conventional[2,3] and video-laryngoscopes[4] have been used in such scenarios to facilitate the introduction of the rigid[2] or the flexible bronchoscope,[3,4] therefore optimizing the operator view and decreasing the risk of bleeding. Interestingly, a manikin study showed that the combined use of Airtraq® (Prodol Meditec S.A., Vizcaya, Spain) and fiber-optic bronchoscope significantly reduced the time for intubation in difficult laryngoscopy scenarios when compared with the Airtraq® alone.[5] It would therefore be useful if the authors could share their technical approach in the management of the airways of such cases.

Competing Interests

The authors declare no competing interests.

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In Reply:

We would like to thank Dr. Sanfilippo *et al.* for their thoughtful comments regarding our recent article in Anesthesiology.[1] We do agree that our phrase, "proper anesthetic induction" does not give a clear sense of what occurred during induction and intubation. However, because of word-count limits, we were unable to elaborate further. More importantly, we wanted to focus on the usefulness of a novel imaging modality, virtual laryngo-tracheo-bronchoscopy, in the management of complex airway scenarios.

We agree that a combined laryngo-bronchoscopic approach can help in managing complex airways. However, there are two important considerations. First, the approach requires two trained operators, who may not always be readily available. Second, this combined approach is more useful in patients with upper airway pathologies; our patient had a lower airway pathology.

On the basis of the computed tomography measurements, we had estimated that a size 5.5 endotracheal tube could be placed across the tracheal stenosis and that there was relatively low risk for dynamic airway collapse. Therefore, awake fiber-optic intubation was deemed unnecessary. However, to ensure that we did not end up in a "cannot ventilate-cannot intubate" situation, we planned to do an inhalational induction with sevoflurane while maintaining spontaneous ventilation. Intubation using a videolaryngoscope was unremarkable, with the tube passing easily through the stenosed segment.

Competing Interests

The authors declare no competing interests.

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Duration of Hypotension (Still) Matters

To the Editor:

In a retrospective analysis of 16,263 records of adult patients undergoing noncardiac anesthesia, Dr. Kertai *et al.* provide evidence suggesting that the duration of "triple low" states, as originally defined,[1] does not appear to be independently associated with adverse long-term patient outcome following adult noncardiac surgery.[2] These seemingly differing findings might conceivably, yet erroneously, be interpreted as there not potentially being any benefit to bringing patients out of protracted "triple low" states such as by elevating their mean arterial pressure (MAP). While these findings may point at a conceptual weakness in the definition of "triple low," by virtue of considering any MAP <75 mmHg, regardless of the severity of hypotension, they should not be interpreted as ruling out the possibility of extended periods of hypotension being independently associated with adverse outcome. This assertion is supported by the recent observation in now over 100,000 patient records from different health systems of an *independent* association of *hypotensive exposures*, certain combinations of severity, and duration of MAP accumulated below various hypotensive thresholds, with adverse 30-day survival following adult noncardiac surgery, independent of patient comorbidity.[3,4,*] Specifically, it was observed that in somewhat of an analogy to diving charts, less time was required to be accumulated at a lower MAP (a greater depth) to incur the same relative increase in risk for adverse outcome. Accordingly, 20 min spent at an MAP of 74 mmHg would be expected to have much less of an adverse impact than, let us say, 20 min spent at an MAP of 60 mmHg. Yet, for the purpose of the determination of the duration of "triple low," these would be treated equally. While "triple low" as currently defined may thus very well fail to adequately capture the extent of the underlying physiologic abnormality and its impact on patient outcome, these latest findings should not be construed as suggesting that duration of MAP accumulated below 75 mmHg does not matter ("triple low" or not): inadequate blood pressure represents quite likely (one of) the principal, potentially modifiable risk factor(s) we are being urged to keep looking out for to identify and address as anesthesiologists.

Having said this, the authors actually did find an association between duration of "triple low" and adverse outcome, which only disappeared after adjustment for procedural risk.[2] To the reader, this begs the question to what extent "triple low" might have perhaps accounted for at least some (potentially modifiable fraction) of this procedural risk. Accordingly, it might be interesting to explore what the procedural risk might have been *after adjustment for the duration of "triple low."* In our quest to better understand and, hopefully, reduce procedural risk, we must be very careful not to inadvertently adjust for what we are trying to better understand: when, let us say, studying the effect of global warming (man-made or not) on the water level of the oceans one would obviously have to (risk-) adjust for the effect of tidal changes. However, had this been done by Johannes Kepler (recognizing that these were well-known to maritime cultures since antiquity), the effect of the moon's and sun's gravity on ocean waters would have remained obscured. Unless we are absolutely certain that known procedural risk is not in any way attributable to physiologic abnormalities such as "triple low" or, for that matter, hypotensive exposures, we need to be very careful adjusting for such risk while trying to better understand it without risking to obscure the identification of potentially modifiable contributing factors that may allow it to be reduced.

Competing Interests

The author declares no competing interests.

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