Double Trouble ... Less Often

To the Editor:
Thanks to Kheterpal et al.1 for their study on the incidence of concurrent difficult laryngoscopy and difficult mask ventilation. In their database series of 177,000 cases, both airway maneuvers were difficult in 0.4% of patients.

This rate is alarmingly high. Even worse, it may be an underestimate because the study excluded patients who were predicted to be difficult and offered alternative techniques. Inevitably, the definitions used are important when interpreting these results.

First, mask ventilation was assessed using the Han scale: grades 3 or 4 were defined as “difficult.” Han et al.2 defined grade 3 as mask ventilation, which was “inadequate, unstable, or requiring two operators,” and grade 4 as “impossible.” These two grades cover a broad range of clinical significance. The need for a second operator is mild inconvenience compared with the potential crisis of a flat-line capnograph.

Second, two methods were used to assess laryngoscopy: the Cormack and Lehane grade and the number of attempts. Grades 3 and 4, or four attempts, constituted “difficulty.” Again, this definition spans a wide range of significance. An epiglottis-only view with easy bougie-guided intubation is far less serious than a grade 4 view or three failed attempts.

Furthermore, the Cormack and Lehane scale describes an objective endpoint—the best view at laryngoscopy. However, there is a marked variation between operators in both knowledge of that scale and reproducibility of grading.3,4 Observer variation is likely to be even greater with the Han scale, which is subjective and operator dependent.5

Next, the authors note that data on dose and timing of muscle relaxation were unavailable, but assert that this does not influence the Han grading of mask ventilation. That claim is questionable.

Finally, it is striking that the list of risk factors identified does not include a history of difficult intubation or mask ventilation. When it is available, clinicians routinely draw on that history to predict difficulty and plan anesthetic technique. It seems likely that such good clinical practice was used in the authors’ institutions and thus excluded cases from their cohort.

Perhaps a further implication of this study is the persistence need for a uniform and objective method to assess mask ventilation and describe it to future clinicians. A better anesthetic history could help to plan a safer future anesthetic.

Competing Interests
The author declares no competing interests.

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Difficult Face-mask Ventilation and Difficult Laryngoscopy

To the Editor:
Our thanks are due to Kheterpal et al.1 for another valuable addition to our understanding of airway management during anesthesia. Their work suggests that provided we exclude the patients with obvious abnormalities, we will find that the incidence of the combination of difficult mask ventilation (DMV) and difficult laryngoscopy (DL) is infrequent but not rare (0.4%), and the outcome is good when standard methods are applied.

As well as incidence and outcome, Dr. Kheterpal et al. addressed the prediction of DMV plus DL and presented odds ratios6 to describe their findings. They used a group (class I, 0 to 3 risk factors) with few risk factors as a reference, but we should note that cases of DMV plus DL occurred (107 patients) in this group. The odds ratio for the group of patients with the most risk factors (class V, 7 to 11) was 18.4, which sounds high, but I suspect that the positive predictive value gives most of us a clearer idea of the clinical significance. The positive predictive value for DMV plus DL of class V abnormalities was only 3.31%, which means that 96.69% of predictions were wrong and the patients did not present difficulty. The conclusion must

* It is hard to know how best to combine the significance of associated conditions, which are usually described with odds ratios, and test results, which are often described with likelihood ratios (the ratio of true positives to false positives). For interest’s sake I considered the combination of items in class V as a test, calculated the likelihood ratio, and got a result of 8.9 (a value above 10 indicates clinical usefulness), which just restates the authors’ findings and confirms that practitioners cannot be expected to predict the problem cases with accuracy.

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be that practitioners must expect to encounter such cases in low-risk patients and cannot be expected to predict the diffic-
tult cases with any accuracy.

What practitioners **should** be expected to do is to manage combined DMV and DL when it arises, so I am glad to see that this study tends to support the view that successful oxygenation, ventilation, and intubation are facilitated when the laryngeal “sphincter” is relaxed by neuromuscular blockade. Richardson and Litman have mentioned a “traditional anesthetic induction sequence taught on day 1 of residency,” which advises anesthesiologists to check that face-mask ventilation is possible before giving a relaxant drug. I believe that Kheterpal et al.’s report adds to the evidence pointing to the illogicality of this advice, which is actually of fairly recent and obscure origin.3

**Competing Interests**
The author declares no competing interests.

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**In Reply:**

We thank Drs. Nielsen and Calder for their interest in our study1 and their thoughtful correspondence.

Regarding Dr. Nielsen’s commentary, we agree that the incidence of difficult mask ventilation combined with difficult laryngoscopy may seem high at 4 in 1,000 patients. However, the absence of any existing data in this area reveals exactly why studies such as this must be performed: to separate intuition from reality. This is the first time this combined outcome has been examined in a large general surgical population across multiple centers. The reproducibility of the finding is demon-
strated in the article itself by a range of incidence across the four centers: 0.28 to 0.65%. As a result, the stated overall incidence of 0.40% is likely a true finding as little work has preceded this current study and none exists to contradict it.

Second, despite Dr. Nielsen’s assertions, we believe that the definitions of difficulty encountered during bag-mask ventilation are clinically significant and do indicate a real clinical challenge. The grade 3 “unstable, inadequate, requiring two operators” is a significant variation from normal airway experience and likely indicates more than simple inconvenience. Many care settings lack a second skilled airway operator, and the need for a second operator represents a concerning situation, not an inconvenience. We concur that the Han scale may suffer from observer variation and have no data to counter this assertion. However, compared with many mask ventilation scales that include only “easy,” “difficult,” or “impossible,” we are reassured as its features are less prone to difficulty in interpretation due to the use of objective endpoints—use of an airway adjunct or use of two providers to ventilate. In addition, it offers discrimination between the wide range of conditions that could be considered “not easy” yet “possible.” Once again, the data presented in the article do reveal some level of reliability as only a two-fold variation in difficult mask ventilation incidence across centers, from 1.5 to 3.2%, was observed. This variation in clinical phenomenon is certainly within the range of reliable observation and consistent with other clinical outcomes. We do agree with Dr. Nielsen that when encountered in isolation, grade 3 mask ventilation poses limited clinical challenge. However, the essence and lesson of our article is to draw attention to the combination of this airway finding with difficulty encountered during direct laryngoscopy. Again, the use of generally acceptable criteria for difficulty encountered during direct laryngoscopy consistent with American Society of Anesthesiologists guidelines is reasonable. When encountered in the presence of easy or adequate bag-mask ventilation, the clinical impact may be limited, but the occurrence of unstable bag-mask ventilation in combination with the lack of a glottic view at direct laryngoscopy should be of interest to airway management practitioners. Although many of the patients meeting the primary outcome were rescued using a bougie introducer, it behooves us to not dismiss the use of a epiglottis-only view with bougie as “easy.” In all likelihood, Dr. Nielsen’s skills as a laryngoscopist make this an easy situation for him, but if the bougie landed in the esophagus and mask ventilation was inadequate, many providers would be appropriately concerned.

The use of previous difficult mask ventilation or laryngoscopy as a candidate predictor is an insightful recommendation. We agree that the skilled provider uses previous airway experience to guide future decision making. However, the absence of these data for most patients in this dataset precluded usage of it. More importantly, many care settings lack access to previous anesthetic records from other facilities, reducing the value of a model dependent on historical data. Many patients with a known difficult intubation were diverted to awake fiber-optic intubation, and these patients were excluded from...