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# Grading Scale for Mask Ventilation

*To the Editor:*—One of the most important aspects of airway management is the ability to mask ventilate a patient. Although there are methods to assess the probability of the difficulty of intubation and grading the view during laryngoscopy, there is, to our knowledge, no recognized scale to grade mask ventilation.[1–4]

Langeron *et al.*[5] investigated factors predictive of difficult mask ventilation. They found that the incident of difficult mask ventilation was 5% of all cases and was associated with five criteria: age older than 55 yr, body mass index greater than 26 kg/m$^2$, lack of teeth, presence of a beard, or history of snoring. In this study, they rated mask ventilation as difficult when the clinician considered it "clinically relevant and could have led to potential problems if mask ventilation had to be maintained for a longer time."[5] They rated mask ventilation as impossible "when it completely failed and an alternative technique of ventilation was required in emergency conditions."[5] This study did not define a grading scale other than "difficult" and "impossible."[5] In an accompanying editorial, Adnet[6] did recommend that a grading scale be developed. The American Society of Anesthesiologists Guidelines for Management of the Difficult Airway defines difficult facemask ventilation as the situation in which "it is not possible for the anesthesiologist to provide adequate face mask ventilation due to one or more of the following problems: inadequate mask seal, excessive gas leak, or excessive resistance to ingress or egress of gas."[7] The guidelines also describes the signs of an inadequate facemask ventilation, but again, there is no proposed grading system for the ability to facemask ventilate.[7]

During the development of a perioperative information system, we found it useful to devise a grading system similar to that used for grading the view during laryngoscopy. Initially, we chose grades 0–4, defined in table 1. There was also a means by which practitioners could type in a text description of mask ventilation. The incidence of each grade of ease or difficulty with mask ventilation is described in table 1. Institutional review board approval was received for this electronic chart review process. After approximately 3 weeks, we compiled the results of documentation using the selections chosen (table 1). On review of these data, we revised the definitions of the grading as described in table 2, removing the modifiers of "easy" and "difficult" before grades 1 and 2. After another 3 weeks, these data were again compiled with the results in table 2. The second version of the grading system resulted in similar percentages for both grade 3 and grade 4, a reduction in grade 1, and an increase in grade 2 classifications. We also noted a substantial decrease in the number of comments going from 1.4% to 0.3% of cases. We believed that the reduction in comments implied that the second method of defining the grades of mask ventilation was easier to select for the practitioners, although it may have been because individuals were more used to the system, in general. As with the grading of airway evaluation and view of laryngoscopy, grading the ability to mask ventilate is subjective and practitioner dependent. It is interesting to note that Langeron *et al.*[5] reported one case of impossible to ventilate out of the 1,502 patients, whereas we noted three in 2,621 cases. This close agreement in the incidence of being unable to ventilate was probably because being unable to ventilate a patient is a more objective (and memorable) event. We did not find as close an agreement in patients who were defined as "difficult mask ventilation" (grade 3). Langeron *et al.*[5] found this in 5% of their patients, whereas we noted an incidence of 1.3%. This may be because

**Table 1. Initial Mask Ventilation Classification and Description**

| Classification | Description/Definition | No. of Selections | % of Cases |
|---|---|---|---|
| Grade 0 | Did not attempt | 272 | 17.7 |
| Grade 1 | Easy mask | 1,079 | 70.0 |
| Grade 2 | Difficult mask requiring an oral airway or other adjuvant | 128 | 8.3 |
| Grade 3 | Very difficult mask ventilation requiring two practitioners | 22 | 1.4 |
| Grade 4 | Unable to mask ventilate | 2 | 0.1 |
| Comments | | 22 | 1.4 |
| Total | | 1,533 | |

**Table 2. Final Mask Ventilation Classification and Description**

| Classification | Description/Definition | No. of Selections | % of Cases |
|---|---|---|---|
| Grade 0 | Ventilation by mask not attempted | 449 | 24.2 |
| Grade 1 | Ventilated by mask | 1,010 | 54.4 |
| Grade 2 | Ventilated by mask with oral airway or other adjuvant | 366 | 20.0 |
| Grade 3 | Difficult mask ventilation (inadequate, unstable, or requiring two practitioners) | 22 | 1.2 |
| Grade 4 | Unable to mask ventilate | 1 | 0.05 |
| Comments | | 6 | 0.3 |
| Total | | 1,854 | |

Langeron *et al.* had a broader definition of difficult mask ventilation. Ultimately, the most important grades to document are the more difficult ones, grades 3 and 4, because those would most likely affect the plan for future anesthetics. We have continued with the classifications and descriptions presented in table 2 and have found this information useful for planning future anesthetics, especially for patients in whom intubation was difficult.

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## References

1. Mallampati SR, Gatt SP, Gugino LD, Desai SP, Waraksa B, Dubravka F, Liu P: A clinical sign to predict difficult tracheal intubation: A prospective study. Can J Anaesth 1985; 32:429–34
2. Frerk CM: Predicting difficult intubation. Anaesthesia 1991; 46:1005–8
3. Tse JC, Rimm EB, Hussain A: Predicting difficult endotracheal intubation in surgical patients scheduled for general anesthesia: A prospective blind study. Anesth Analg 1995; 81:254–8
4. Cormack RS, Lehane J: Difficult tracheal intubation in obstetrics. Anesthesia 1984; 39:1005–111
5. Langeron O, Masso E, Huraux C, Guggiari M, Bianchi A, Coriat P, Riou B: Prediction of difficult mask ventilation. ANESTHESIOLOGY 2000; 92:1229–36
6. Adnet F: Difficult mask ventilation. ANESTHESIOLOGY 2000; 92:1217–8
7. Caplan RA, Benumof JL, Berry FA, Blitt CD, Bode RH, Cheney FW, Connis RT, Guidry OR, Ovassapian A: Practice Guidelines for Management of the Difficult Airway: A report by the ASA Task Force on Management of the Difficult Airway. ANESTHESIOLOGY 1993; 78:597–602

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