

CORRESPONDENCE

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Heart Rate and Blood Pressure Response to Laryngoscopy: The Influence of Laryngoscopic Technique

To the Editor:—Laryngoscopy and tracheal intubation are techniques that can result in significant hemodynamic changes and a high rate of dysrhythmias. We have examined the effect of laryngoscopic technique on blood pressure and heart rate response following direct laryngoscopy and endotracheal intubation. After receiving approval of the institutional review board and informed consent, 45 ASA physical status I patients ages 18–55 were randomly assigned to one of three groups: Group A—laryngoscopy performed with the Miller No. 2 blade with the tip placed in the vallecula; Group B—laryngoscopy performed with the Miller No. 2 blade used to lift the tip of the epiglottis; and Group C—laryngoscopy performed with the MacIntosh No. 3 blade placed in the vallecula. There were no differences in age, weight, height, and sex between groups. All patients received diazepam 0.125 mg/kg PO and glycopyrrolate 1.0 mg PO 1 h before induction and *d*-tubocurarine 3 mg, thiopental 4 mg/kg, and succinylcholine 2 mg/kg iv for the induction of anesthesia. Laryngoscopy was performed following the loss of the lid reflex and loss of the thenar eminence twitch as tested by stimulation of the ulnar nerve at the wrist. Tracheal intubation was performed 30 s later and the endotracheal tube cuff was inflated to 25 mmHg pres-

sure. All laryngoscopies were performed by the same anesthesiology resident in his third year of anesthesiology training. The blood pressure and heart rate were measured preinduction, before laryngoscopy, following 30 s of direct laryngoscopy, and 30 s, 3.5 min, and 5 min after intubation. There were no differences when heart rate and blood pressure were compared between groups at a given time by a three-way analysis of variance. Sinus tachycardia was the only dysrhythmia we detected, and we failed to observe ST-segment changes on lead II electrocardiogram that might have suggested myocardial ischemia. The use of iv and intratracheal lidocaine, the administration of iv nitroprusside and fentanyl, and limitation of the duration of laryngoscopy appear more important than the choice of laryngoscope blade in blunting the pressor response to direct laryngoscopy.

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Fine Tuning the Priming Principle

To the Editor:—Dr. Miller, in his thoughtful Editorial “The Priming Principle”¹ suggests that the determination of the optimal time interval between the “priming” and “intubating” doses of nondepolarizing muscle relaxants (MR) and the range of these doses will require further investigation. I agree with Dr. Miller but would like to add that these parameters should be adapted to the requirements of the individual patient. It can be expected that, everything else being equal, increasing the size of the priming and intubating doses but leaving the time interval (6 min) between them unchanged will accelerate the development of neuromuscular (NM) block. Increasing the priming dose, however, also will increase the in-

cidence and severity of discomfort for unanesthetized patients, and the larger the intubating dose, the longer the duration of its NM effect. Furthermore, with the exception of vecuronium, the likelihood of histamine release and the incidence and severity of circulatory side effects will also be greater with increasing doses.

Since the development of the maximal NM effect of marginally effective doses of nondepolarizing MR takes 6–8 min,^{2,3} decreasing the time interval between the administration of the priming and intubating doses to less than 6 min is unlikely to offer any advantages. Changing the size of priming and intubating doses, however, may be advantageous. If, for psychologic reasons, it is impor-

tant that the patient should feel no discomfort before induction of anesthesia, a smaller priming dose should be employed. In this case, however, to be able to intubate rapidly, the size of the intubating dose must be increased substantially. Thus, for example, the onset of muscular relaxation (2.1 ± 0.2 [SEM] min [$n = 21$]) and the clinical duration of the intubating dose (39.1 ± 1.6 min) were longer after the administration of a 0.01 mg/kg priming and 0.07 mg/kg intubating dose of vecuronium than when the priming and intubating doses of vecuronium were 0.015 and 0.05 mg/kg (onset time 1.6 ± 0.2 min [$n = 11$]; clinical duration 19.0 ± 1.4 min). Studies in progress indicate that with a 0.01 mg/kg priming dose of vecuronium an intubating dose of 0.1 mg/kg is necessary to be able to intubate within 60–90 s.

Our present practice is to use, in most patients, 0.015 mg/kg priming and 0.06 mg/kg intubating doses of vecuronium, administered 6 min apart. This priming dose seldom causes unpleasant symptoms. The priming dose is decreased to 0.01 mg/kg when it is essential to avoid the possibility of unpleasant sensations. With the 0.01 mg/kg priming dose the intubating dose is increased to 0.07–0.10 mg/kg. The lower intubating dose is used when prolongation of the intubation time by 20–30 s is not an important consideration, and muscular relaxation is required for a relatively short period. For long surgical procedures, where the duration of action of the initial dose is unimportant, the larger intubating dose may be used. For “crash intubation,” 0.015 mg/kg priming and 0.10–0.12 mg/kg intubating doses are employed. In ambulatory patients, where rapid recovery of NM function is desirable, 0.015 mg/kg priming and 0.05 mg/kg intubating doses of vecuronium are recommended.

In our experience, increasing the priming dose of vecuronium to 0.02 mg/kg does not offer enough advantages to compensate for the increased incidence and severity of discomfort experienced by conscious patients.

The priming principle is also applicable to atracurium

and other nondepolarizing MR.^{4,5} These agents, however, are less suitable than vecuronium for facilitation of “crash intubation.” The reason for this is that the doses of these compounds required for this purpose could cause histamine release and circulatory side effects. Furthermore, with the exception of atracurium, the duration of action of the necessary doses of other nondepolarizing MR would exceed the requirements of most surgical procedures.

In closing, I would like to emphasize that no set rules can be formulated for the facilitation of rapid tracheal intubation with the administration of nondepolarizing MR in divided doses. The application of this technique will require clinical judgment and the priming and intubating doses of the MR used have to be selected to satisfy the requirements of each case.

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The Priming Principle and the Open Eye–Full Stomach

To the Editor:—Schwarz *et al.*¹ imply that priming offers the solution to the long-standing problem of the open eye–full stomach. Although Dr. Miller's editorial² stressed caution in the clinical application of priming, we feel fur-

ther warning is justified, since our experience with priming sequences of nondepolarizing relaxants differs significantly from that of Schwarz *et al.*

We recently reported a randomized double-blind comparison of priming sequences of atracurium and vecuronium with succinylcholine.³ Succinylcholine produced uniformly excellent intubating conditions in 60 s with no bucking. All patients were intubated successfully with the

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