Second, in this study, the endoscopy at the isthmus of the fauces showed that the narrowed oral airway space abruptly and significantly dilated during oscillatory movements of the soft palate and the tongue base (pharyngeal fasciculation) after succinylcholine administration. Thus, the FMV improvement after succinylcholine administration is contributed to reopening of the pharyngeal airway by the pharyngeal muscle contraction. However, other than the soft tissue airway at the pharynx, the laryngeal aperture is another important site that may significantly affect gas flow of the upper airway.[2,5] It has been shown that the vocal cord closure is a primary source of difficult or impossible FMV during anesthesia induction with sufentanil.[7,8] After anesthesia induction, it is also possible for the epiglottis to overlie and obstruct the laryngeal aperture or to seal against the posterior pharyngeal wall, especially when the patients are placed in a neutral head and mandible position without any airway intervention.[5] Because the authors did not observe changes of both position of the epiglottis in the pharynx and configuration of the laryngeal aperture during succinylcholine-induced upper airway muscle fasciculation, contribution of these factors to the FMV improvement by succinylcholine cannot be excluded.

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Ventilation before Paralysis

To the Editor:

I read with great interest the article by Ikeda *et al.*[1] and the accompanying editorial.[2] Surprisingly, the editorial did not refer to the recently published findings of a prospectively assessed algorithm for difficult airway management involving 12,225 facemask ventilations (FMV).[3] Patients with indications for awake fiberoptic intubation were excluded. In contrary to traditional teaching, the algorithm required that patients with greater than or equal to three risk factors for difficult airway management receive succinylcholine right after induction of anesthesia without previous assessment of quality of FMV. In patients with less than three risk factors, quality of FMV was assessed before administration of a muscle relaxant. Patients with grade I or II difficulty of FMV received a nondepolarizing muscle relaxant; patients with grade III or IV difficulty of FMV received succinylcholine.

Most relevant in this context, in no case of difficult FMV was any attempt undertaken to awaken the patient. In 56 of the 90 patients (62%) with FMV difficulty grade III, quality of FMV improved by one grade after the administration of succinylcholine. In none of the 12,003 patients with FMV difficulty grade I and II did the quality of FMV worsen after administration of the nondepolarizing muscle relaxant. This confirms previous findings showing that in patients with unimpaired[4] or with a mix of unimpaired and moderately difficult FMV,[5] quality of FMV either remained unchanged or improved after the administration of a muscle relaxant, but never worsened. All 12,225 patients who were routinely paralyzed, irrespective of the quality of FMV, could ultimately be orotracheally intubated using various airway devices. In another study, of 37 patients with impossible FMV, all but one were successfully intubated.[6] The 97% intubation success rate after impossible FMV is likely to have been due to the early administration of the muscle relaxant in all but one of the 37 patients.[7] It is questionable that endotracheal intubation could have been that successfully performed in the absence of muscle relaxation, or that these patients could have safely been awoken.

The editorialists mistakenly interpret the findings by Ikeda *et al.*[1] as showing a superior effect of succinylcholine over nondepolarizing muscle relaxants on the quality of FMV. However, as the investigators studied patients with successful FMV before administration of any muscle relaxant, the data can only be interpreted as showing that administration of muscle relaxants does not worsen preexisting effective FMV. As this had been a nonrandomized study, baseline values for nasal and oral ventilatory volumes had differed between patients receiving rocuronium or succinylcholine, and less than optimal statistical testing had been applied (use of paired Student *t* test for comparison of data from three successive observation points), the data do not necessarily support the conclusion of different effects of succinylcholine and nondepolarizing muscle relaxants on the quality of FMV.

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Furthermore, I strongly disagree with the editorialists' opinion that administration of succinylcholine instead of a nondepolarizing agent reliably preserves the option to "wake the patient up" if needed. After the administration of succinylcholine 1 mg/kg, it took as long as 10.5[8] and 11.2 min[9] for the recovery of the first train-of-four twitch (T_1) to 10%, and as long as 8.5 min from tracheal intubation to the return of spontaneous respiration.[9] These findings reemphasize that after succinylcholine-induced apnea, "achievement of functional recovery before significant desaturation is not a realistic possibility".[10]

It is a potentially dangerous misconception to consider the administration of a muscle relaxant to be the Rubicon. Rather, the Rubicon is the administration of a hypnotic at a dose that abolishes spontaneous respiration. The chances of successfully restoring adequate spontaneous respiration before severe hypoxemia develops in the presence of difficult or impossible FMV in an anesthetized, apneic patient whose is prone to airway collapse because of reduced pharyngeal muscle tone are very small. Thus, once we have crossed that Rubicon, our goal must not be to "consider preserving a way back over the bridge" (*i.e.*, awaken the patient), but to provide as quickly as possible optimal conditions not only for FMV but also for endotracheal intubation or insertion of a supraglottic airway device. If patients with obvious indications for primary awake fiberoptic intubation are excluded, early relaxation will not worsen the quality of FMV,[3,5] often improves it,[3,5] and provides superior intubating conditions. These are no longer the 1960s or 1970s when effective airway devices were rare or nonexistent and "preserving a way back over the bridge" was clearly a safety issue. Today, fiberscopes, video laryngoscopes, and numerous supraglottic airway devices are readily available. It has become an extremely rare event that effective oxygenation and securing the airway cannot be achieved by any of these devices in the fully relaxed patient. However, for obvious reasons similar effectiveness of these devices cannot be expected in nonparalyzed patients. Even the sternest proponents of the "no muscle relaxant before effective FMV" rule do not mostly hesitate to administer a muscle relaxant when hypoxemia develops during failed FMV,[11] and they do not hesitate at all to administer a muscle relaxant during rapid sequence induction. If ensuring effective FMV before injection of the muscle relaxant were that essential for patient safety, awake fiberoptic endotracheal intubation would have to be performed in all patients undergoing rapid sequence induction.

Considerable reservations about the rationale and safety of the practice of having to demonstrate effective FMV before administering muscle relaxants have previously been voiced.[12,13] Numerous findings[3–7] support the view that in airway management muscle relaxants are much more often the solution than the problem[14]; that the earliest possible administration of the muscle relaxant may well be the most effective tactic in routine clinical practice; and that the practice of insisting on effective FMV before administering a muscle relaxant should be abandoned.[12–14] I know of numerous academic and nonacademic anesthesia departments who have completely done so, including our own department at a tertiary university referral center with 110 anesthesiologists. Personally, I have done so some 25 yr ago.

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