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Should the Dominant or Nondominant Hand Be Used for Applying Cricoid Pressure?

To the Editor:

In their excellent review, Salem *et al.*[1] suggest that the dominant hand should be used to apply cricoid pressure (CP) because even though either hand can achieve adequate CP, the applied force may become inadequate if it needs to be sustained with the nondominant hand.[2] I suggest that if there is any possibility that the person applying CP may be asked to perform a task that can be done with one hand (*e.g.*, upper lip retraction, removal of stylet), the CP should be applied with the nondominant hand. I have noticed that if one ever asks that person to do something, they reflexively tend to use their dominant hand and thus may prematurely release CP, putting the patient at increased risk of aspiration. Ideally the person applying CP should not be asked to do anything else. However, sometimes one is in the situation where additional trained personnel are not available. Most airways are secured quickly enough that fatigue of the nondominant hand does not become an issue.

Competing Interests

The author declares no competing interests.

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Cricoid Pressure: Effective Measure or Ritual?

To the Editor:

I read with great interest the review on cricoid pressure (CP) by Salem *et al.*[1] The authors assure the reader that they have "used discretion in deciding which articles to finally include, favoring peer-reviewed articles from highly ranked journals written in English." However, a couple of key references are missing, and a couple of publications require additional commenting to place the findings in the proper clinical perspective.

Although the authors cite those recent guidelines that indicate the common use of CP, they fail to cite those guidelines recently published by various national and international professional societies that no longer recommend routine application of CP. These include the 2010 Scandinavian Clinical Practice Guidelines on General Anesthesia for Emergency Situations,[2] the 2015 Guideline on Airway Management released by the Board of the German Society of Anesthesiology and Intensive Care Medicine,[3] and the 2015 European Resuscitation Council Guidelines for Resuscitation.[4] Obviously, these guidelines reflect the doubt of the respective professional societies that the benefits of this technique outweigh its disadvantages. This may have considerable medicolegal implications, because a physician would no longer be blamed *per se* for not having applied CP. Based on findings of nonrandomized controlled trials, a recent Cochrane review concluded that CP may not be necessary to safely perform rapid sequence induction.[5]

The authors interpret recently published findings of an *in vitro* investigation of a tactile, single-use cricoid cartilage compression device[6] as showing that by, "careful titration of the force, the operator can be assured that the cricoid force is between 30 and 35 N." However, the actual findings do not support this generalized statement. During 114 attempts, the target force of 30 N was achieved in only 15 attempts (13%), and a range of forces of 25 to 35 N was achieved in only 35 attempts (31%). These less-than-optimal results occurred despite highly controlled experimental conditions (*i.e.*, application of cricoid force on a CP training simulator by practitioners familiar with both device and simulator). It is predictable that the results will be even less favorable when CP is applied under less controlled conditions in humans with highly variable neck anatomy.

At first glance, the authors' recommendation for training of personnel performing CP seems reasonable. However, because such training would have to be provided for countless healthcare providers every 2 weeks to 3 months (the duration of retention of training-acquired respective skills), such a recommendation is entirely unrealistic. It would be interesting to know whether members of the authors' departments are this often regularly retrained in the application of CP.

Why does the CP literature continue to focus so closely on the cricoid force to be applied rather than on

its postulated clinical benefit? After all, the recommended forces are derived from investigations in infant and adult cadavers performed in the 1970s and 1980s and from theoretical considerations. Thus, defining correct performance of CP as correct application of recommended forces is incomprehensible. In addition, it is unrealistic to expect that a given force will make the cricoid cartilage (a rigid tubular structure) reliably compress the esophagus (a semimobile, nonrigid tubular structure of varying thickness) against the vertebral body (a rigid structure with a curved surface) in the presence of large variations in neck anatomy and, at times, in intraluminal esophageal pressures (induced by regurgitation and vomiting). Depending on the underlying condition, in the individual patient the recommended forces will be adequate, too low, or unnecessarily high regarding occlusion of the upper esophageal lumen. The combination of variations in underlying conditions and the repeatedly documented incorrect application of CP by most anesthesiologists make the efficacy of this technique even more questionable.

The emphasis on CP as a reliable measure in reducing the risk of gastric regurgitation carries the risk of becoming complacent about the many other factors that are verifiably associated with regurgitation and pulmonary aspiration. A liberal indication for preoperative insertion of a nasogastric tube in case of suspicion of a "full" stomach (with or without removal of the tube before induction of anesthesia), aggressive pharmacologic prophylaxis aimed at reducing gastric volume and acidity, optimal patient positioning before induction of anesthesia, and rapid induction of a deep level of anesthesia and muscle relaxation to decrease the risk of coughing, straining and retching, and routine tracheal extubation in the lateral position in patients considered at risk for pulmonary aspiration are likely far more effective in preventing pulmonary aspiration than CP.

The criteria of the Airway Device Evaluation Project Team (ADEPT) of the Difficult Airway Society consider level 3b trial evidence (*i.e.*, single case-control or historical-control study) published in peer-reviewed scientific literature a *sine qua non* criterion for equipment evaluation.[7] As recently pointed out,[8] if CP were considered a new airway device, it would not be considered for further evaluation because level 3b trial evidence for its efficacy does not exist.

By today's standards, CP cannot be considered an evidence-based practice. By applying CP, we may well be endangering more lives by causing airway problems than we are saving lives in the hope of preventing pulmonary aspiration. In the absence of a documented beneficial effect on outcome, CP appears to be more a ritual than an effective measure.

Competing Interests

The author declares no competing interests.

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In Reply:

We thank Dr. Roth for his thoughtful comments about our article.[1] He makes the important observation that when assistants are asked to perform an additional duty, they tend to reflexively use their dominant hand. Therefore, he suggests that cricoid pressure (CP) should be applied with the nondominant hand, if there is any possibility that the assistant applying CP will be asked to perform an additional task. We agree with Dr. Roth's suggestion. Perhaps trainees should practice performing the CP maneuver using either hand so they can easily switch back and forth depending on the circumstances.

The letter by Dr. Priebe, beginning with the title and extending to the final paragraph, is an attempt to undermine the credibility of our review and to completely discredit the CP technique. We feel that Dr. Priebe's arguments are lacking in merit and are unfair because they are not objective and because they ignore the considerable experimental evidence on behalf of CP that was described in our review. To support his position, Dr. Priebe levels a series of criticisms of our review, which we will address.

Dr. Priebe claims that we only cite recent guidelines that indicate the common use of CP but fail to mention those