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Patient Safety

The Effectiveness of Cricoid Pressure for Occluding the Esophageal Entrance in Anesthetized and Paralyzed Patients: An Experimental and Observational Glidescope Study

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Abstract

BACKGROUND: In the last 2 decades, the effectiveness of cricoid pressure (CP) in occluding the esophageal entrance has been questioned. Recent magnetic resonance imaging studies yielded conflicting conclusions. We used real-time visual and mechanical means to assess the patency of the esophageal entrance with and without CP in anesthetized and paralyzed adult patients.

METHODS: One hundred seven, nonobese ASA physical status I and II patients were recruited for the study. A cricoid force of 30 N

was used. This force was standardized by using a weighing scale before application of CP in each patient. After oxygen administration, anesthetic induction, neuromuscular blockade, and establishment of manual ventilation with $FIO_2 = 1.0$, the view of the glottis and esophageal entrance was visualized, and video recordings were obtained by using a Glidescope video laryngoscope. Attempts to insert 2 gastric tubes (GTs), size 12 and 20 F, into the esophagus were made by a "blinded" operator without and with CP, the timing of which was randomized. A successful insertion of a GT in the presence of CP was considered evidence of a patent esophageal entrance (ineffective CP), whereas an unsuccessful insertion of a GT was considered evidence of an occluded esophageal entrance (effective CP). After the attempts to insert the GTs were completed, tracheal intubation was performed while CP was applied. The position of the esophageal entrance in relation to the glottis (midline versus lateral) was assessed from the video recordings, with and without CP.

RESULTS: We stopped the study when 79 patients (41 men and 38 women) qualified for and completed the study (2-sided Clopper-Pearson confidence interval (CI) 95% to 100%, $n = 72$). Advancement of either size GT into the esophagus could not be accomplished during CP in any patient but was easily done in all subjects when CP was not applied. This occurred whether the esophageal entrance was in a midline position or in a left or right lateral position relative to the glottis. Esophageal patency was visually observed in the absence of CP, whereas occlusion of the esophageal entrance was observed during CP in all patients. Without CP, the esophageal entrance was in a left lateral position in relation to the glottis in 57% ([95 % CI, 45%–68%)] of patients, at midline in 32% (CI, 22%–43%), and in a right lateral position in 11% (CI, 5%–21%). The position did not change with CP.

CONCLUSIONS: The current study provides additional visual and mechanical evidence supporting a success rate of at least 95% by using a cricoid force of 30 N to occlude the esophageal entrance in anesthetized and paralyzed normal adult patients. The efficacy of the maneuver was independent of the position of the esophageal entrance relative to the glottis, whether midline or lateral.

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