



Article Appraisal

Article: The Bougie and First-Pass Success in the Emergency Department, Driver et al, Annals of Emerg Med 2017
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Background and Study Objective(s):

The bougie is commonly advocated as a rescue device after a failed initial intubation attempt. Data from the National Emergency Airway Registry indicate that bougies are only used during 3.5% of ED intubations, with a first-pass success of 85%.

The authors of this study practice at a centre with a high rate of bougie assisted intubations, and noted a lack of previous research on how the bougie performs as a primary ED intubation device, rather than as a difficult airway backup. The purpose of this study was to determine whether bougie use was associated with increased first-pass success in ED intubations.

Study Design:

A retrospective observational study was carried out of ED intubations performed at an urban, level 1 trauma center (~100,000 annual ED visits) in Hennepin County, Minnesota during 2013. Participants were selected using the electronic medical record based on the presence of an intubation procedure note, a professional fee for intubation, or ventilator settings.

Motion-activated video recording was the primary method of data collection. A structured review of resuscitation room videos was conducted for eligible patients. Three trained investigators independently reviewed all videos. Video reviewers were reportedly aware of the general nature of the study, but blinded to specific study aims. They adjusted for neuromuscular blockade, use of VL, abnormal airway anatomy, and patient positioning. Inclusion criteria were adults >17 years of age, and intubation using a Macintosh laryngoscope blade. Exclusion criteria included patients with missing videos, those intubated before arrival to the ED, and cases in which a bougie was used with a hyperangulated video laryngoscope blade such as the GlideScope (which can make it difficult to pass the bougie).

Pre-intubation characteristics captured included obesity, cervical immobilization, the presence of abnormal airway anatomy, and body fluids visible from the mouth. Intubation characteristics captured included the device used,

whether the video screen was viewed by in the intubating physician if a video device was used, intubation route, duration of each intubation attempt, bougie use, the level of training of the intubating physician, whether the sniffing position was achieved or the head was lifted off the bed during the intubation attempt, presence of hypoxia (O2 sats <90%), and oesophageal intubation during the intubation attempts.

The primary outcome was first-pass success, which was defined as successful tracheal intubation with a single laryngoscope blade insertion, confirmed by waveform capnography.

Primary Data Analysis:

Baseline and intubation characteristics were compared between bougie and non-bougie cases. Several multivariate logistic regressions were fit in an effort to determine whether bougie use was independently associated with first-pass success. Possible known confounder that were controlled for in these models included neuromuscular blockade, video laryngoscopy use, abnormal airway anatomy, and whether the patient was placed in the sniffing position or the head was lifted off the bed during intubation. A sensitivity analysis, using both “best case” and “worse case” scenarios was performed for cases with no video record.

Results:

676 adult ED intubations during the study period, with videos available for 593 (88%). Of these, 543 (92%) had a first attempt with a Macintosh blade, and of these, a bougie was used for the first attempt in 435 (80% of cases). First pass intubation success was 95% (95%CI: 93%-97%) with a bougie vs 86% (95% CI: 79%-93%) without a bougie. This represented a difference of 9% with a 95%CI of 2%-16%; a statistically significant finding. Median intubation attempt duration was 40 seconds with a bougie, vs 27 seconds without a bougie (a median difference of 14 seconds). Hypoxemia data was incomplete, with missing data in 181 participants. On a series of multi-variable analyses, bougie use remained associated with increased first-pass intubation success. A sensitivity analysis of 70 patients with missing video data suggested bougie use would remain associated with significantly increased first-pass success regardless of the findings in this cohort with missing data.

Validity of Results:

The consensus among Journal Club attendees was that this study addressed a focused issue with an appropriately recruited cohort given the significant limitations of the study design. It was noted that efforts were made to mitigate the limitations of retrospective analysis: rigorous video review technique and repeated examination by multiple viewers, and reviewers were blinded to the specific aims of the study. Moreover, efforts were made to control for confounders through multivariate modelling.

It was pointed out that despite the efforts of the authors, potentially important data was missing including pre-intubation assessments (such as Mallampati, mouth opening, and thyromental distance) that could have influenced first-pass success, reason for initial bougie non-use in a centre that uses bougie a great deal, missing videos in 70 eligible participants (although sensitivity analyses were reassuring), complications related to direct airway trauma, and of particular significance, hypoxemia (as 21% of participants were missing this data because the videos failed to capture the monitor).

Moreover, Table 1 suggest that characteristics between Bougie vs No Bougie groups were different, particularly in the CMAC screen viewed, suggesting that perhaps difficult airways are more likely to be associated with bougie use. It was pointed out that the entire findings could explained by an increased first-pass success associated with video laryngoscopy given the increased CMAC screen viewing in the bougie group, although countering that was the fact that CMAC usage was identical in the Bougie and No Bougie groups.

Generalizability of Results:

Journal Club attendees made note of the fact that this was a single centre US study where 80% of RSI intubations were done with a bougie on first attempt. This is substantially different than our setting, and raises issues regarding generalizability since it stands to reason that comfort and expertise with this approach would be higher in such a location. It seems that physicians who performed the intubations in this study are likely much more experienced

with the bougie than without, a situation that could exaggerate the effectiveness of bougie use. It is arguable that first pass success is highest with the device you are most experienced with.

The Bottom Line:

This study showed that in a single centre with significant bougie experience, bougie-use was associated with increased first-pass intubation success. However, definite causal conclusions cannot be drawn from this owing to the limitations in study design, and the potential for confounding. While the results of this study do not necessarily support the conclusion that bougie use will lead to higher first-pass success rate in suboptimal airway conditions, it does seem clear that in experienced hands bougie use can be highly effective. Journal Club attendees felt that two important “take home messages” from this study were: (1) local physicians may wish to gain more experience with bougies on easy airways, as doing so would likely be helpful when the device is truly needed (particularly as both knowing a bougie is in the trachea, and threading an ET tube over a bougie can sometimes be challenging), and (2) rather than viewing a bougie as a rescue device for a failed airway, an approach where a bougie was more immediately available, preferably placed on the patient’s chest, for the first intubation attempt might facilitate it’s immediate application when an poor view is encountered or difficult anatomy is unexpectedly encountered.