To View or Not To View? Standard Geometry Video Laryngoscopes and Screen Visualization

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We all love video laryngoscopy with standard geometry, the most popular format since it also permits direct vision. But what is the best way to use a standard geometry video laryngoscope: screen viewing, direct visualization, or some hybrid of both? Two interesting articles in this issue of *Annals* show substantial variation in such practice, with some operators relying foremost upon direct vision whereas the primary focus of others is the screen.[1,2] Some intubators frequently alternate their gaze between screen and patient, and others rarely shift their view. Which is the best? Is there a style of visualization that might optimize first-attempt success? In this editorial, I will argue why I believe that standard geometry video laryngoscopes should be the default choice for most emergency department intubations, how evidence suggests that the screen should be best used in terms of priority and frequency, and how future research can further clarify and enhance these nuances of laryngoscopy style.

What does the evidence already tell us about video laryngoscopy? No randomized trial has definitively established the video technique as superior or inferior to traditional direct laryngoscopy. Many such trials are limited by their exclusion of patients with anticipated difficulty—representing 30% of intubations or more.[3-7] Robust observational studies, however, which include patients with difficult airways, have noted higher success with video laryngoscopy.[8-12] A large meta-analysis of randomized trials showed that video laryngoscopy was associated with fewer failed intubations and less airway trauma.[7] A challenge to all of this research is that video laryngoscope screen visualization patterns—when and how to view the mouth and monitor screen— are not standardized in clinical practice or randomized trials.[1,2,13,14]

When should emergency physicians preferentially reach for a traditional direct laryngoscope rather than a video device? Short answer—almost never. The choice of a non-video laryngoscope for the first-attempt rather than a standard geometry video laryngoscope, will almost certainly result in some avoidable first-attempt failures. Peri-intubation complications increase when more than one attempt is required.[15,16] Direct laryngoscopes should only be used when a video laryngoscope is not available or not functional—and a video laryngoscope should always be available, barring a mass casualty event that consumes all blades.

But don't I need to maintain direct laryngoscopy skills? Absolutely. Intubating using direct laryngoscopy (ie, using direct vision alone) should be performed frequently and remains a core skill of emergency medicine because of the ubiquity of body fluids and equipment failure. Direct laryngoscopy, fortunately, can be performed with some standard geometry video laryngoscopes—the intubator simply looks in the mouth and does not look at the screen—provided the laryngoscope light is bright enough, and the curve of the blade is not excessive.

What about hyperangulated video laryngoscopes? These devices should not be considered routine, as they add steps and challenges to tube delivery and, more importantly, preclude direct laryngoscopy as either a first choice or for rescue in the event of camera soiling.[17-19] The excessive blade curvature is useful when an adequate laryngeal view cannot be obtained with a standard geometry laryngoscope. Furthermore, observational data report first-attempt success >95% for some settings that exclusively use standard geometry video laryngoscopes, but no higher than 93% for settings that predominately use hyperangulated blades.[20-23]

How should we use the screen for a standard geometry video laryngoscope? Dean[1] and Donoghue[2] provide rich data but do not outline a single optimal approach; rather, they show that a broad range of screen usage patterns achieved mostly similar success. Does this mean an intubator can use any technique they want? No—certainly, the intubators in their data sets used direct vision more frequently when the intubation was easier, and the screen

more frequently when the intubation was more difficult. The screen must not be used haphazardly and should be considered a valuable tool with specific best practices—which vary by intubator's experience. I recommend the following screen visualization framework for novice, proficient, and expert intubators, respectively, while noting that all intubation devices should be initially inserted into the mouth under direct vision to avoid iatrogenic injury to oropharyngeal structures. These recommendations should apply to both pediatric and adult intubations, as the data from Dean[1] and Donoghue[2] are consistent with adult data, and children >2 years old are not significantly anatomically different from adults.[13,24]

Novices (eg, inexperienced resident physicians, medical students) more quickly achieve higher success when using a video laryngoscope but, less intuitively, novices also have better eventual success with *direct laryngoscopy* when they *learn intubation using a standard geometry video laryngoscope while viewing the screen*, compared to a non-video direct laryngoscope.[25-31] The reasons for this are threefold. First, they can receive detailed real-time feedback as opposed to general advice. Second, the magnified view of the airway shows anatomic detail not visible by direct vision. Third, the intubator gains detailed knowledge of how the laryngeal view is altered with manipulations of blade position, angle, or force on specific anatomic structures. This suggests an optimal path for novice intubators: use a standard geometry video laryngoscope *while viewing the screen* until proficiency is attained.

Proficient intubators should routinely use a standard geometry video laryngoscope to maintain and improve their critical direct laryngoscopy skills. This is preferable to a non-video laryngoscope for 2 reasons. First, direct laryngoscopy remains an important rescue technique *for all levels of airway difficulty*—an intubator should be comfortable intubating using direct vision alone, even on very difficult airways. Second, experienced intubators cannot predict, even under ideal conditions, which intubations will actually be difficult—more than >50% of difficult intubations are unanticipated.[32] Thus, proficient intubators should perform direct laryngoscopy using a standard geometry video laryngoscope as much as possible—even when difficulty is anticipated. Should the intubation prove challenging, the clinician can then view the screen as needed. No attempt should fail without viewing the screen. How long one should wait before switching gaze to the screen will vary with intubator experience and clinical circumstances. Consistent with prior adult evidence,[13] the data from Dean[1] and Donoghue[2] support the efficacy of direct visualization first with a standard geometry video laryngoscope, ie, similar success is achieved regardless of screen viewing, likely because the intubator switches gaze as needed for difficult intubations.

Although expert intubators have more license to use the device and screen viewing pattern that they are most comfortable with, the best available evidence suggests the superiority of a standard geometry video laryngoscope.[7-12]

Are there optimal screen visualization techniques or markers that will optimize first-attempt success with this framework in mind? It is hard to say. While Dean et al examined specific screen visualization patterns, including percent of time viewing the screen and gaze switches, we do not know if these are the best markers. Even if an optimal proportion of screen viewing time or the number of gaze switches existed, it would be difficult and impractical to use this information effectively. Consider an intubator prolonging their view of the mouth or the screen solely to achieve the *best* proportion of the two or targeting the *best* number of gaze switches even when their experience suggests otherwise.

Instead, the intubator should use the screen (if necessary) to accomplish defined goals during intubation. For example, the intubator uses direct vision to incrementally advance the blade down the tongue to find the epiglottis, position the blade properly in the vallecula, and obtain the best possible laryngeal view. If an adequate view is not possible, the intubator looks at the screen to optimize blade position within the vallecula and engage the midline vallecular fold, and might also elevate the head or perform external laryngeal manipulation.[33-34] The intubator then passes the tube or bougie, viewing the screen if passage is challenging. In all cases, tracheal tube placement should be initially confirmed by looking at the screen to ensure that the tube passes between the vocal cords rather than waiting for waveform capnography, which should be a routine but secondary confirmation measure. This goal-oriented method may result in multiple gaze switches for routine intubations but does not dictate the number.

Two important caveats. First, individuals, departments, and systems should not blindly follow this framework and assume that it will automatically be optimal; rather, they should track the methods used and the associated first-attempt success and peri-intubation complications. If the first-attempt success is <95% or complications are higher than the established benchmarks, additional protocolized changes should be made to improve the efficacy and/or safety.[22,35,36] Second, departments following the framework above should carefully select their video laryngoscope; the lighting in some devices is less bright and thus less optimal for direct visualization (eg, McGrath

MAC, Glidescope Titanium MAC reusable), and some Macintosh-shaped laryngoscopes have excessive curvature that complicates direct laryngoscopy and tube passage (eg, McGrath MAC).[37-38]

Future research can take many directions. First, we should determine the most successful global approaches to intubation with the fewest complications, both on the first-attempt and overall. A global approach is how an individual, department, or system routinely performs intubation, and something every department should seek to make more uniform.[22,35] What is done to prepare for intubation? What is the default laryngoscope? What is done after the first-attempt fails? How is the screen visualized? Comparisons of individual devices will be less valuable than comparisons of global approaches.[39,40] Second, examining outlier systems that have achieved high success with few complications and attempting to replicate these outcomes at other institutions—either by duplicating the approach or iteratively refining key techniques—will reveal which features of high-performing systems are essential and which are not. These first 2 approaches could be accomplished with quality improvement, registry data, or randomized cluster trials. Third, we should identify the most predictive measures of screen visualization, if they exist. This search may, however, prove fruitless. It may be more useful to learn *why* and *for whom* an intubator viewed the screen rather than measuring exactly how it was viewed. These studies will need consistent terminology—I suggest direct vision and screen viewing (as opposed to direct and video laryngoscopy). In contrast with the approach of Dean[1] and Donoghue,[2] I believe that the term "direct laryngoscopy," if used at all, should be reserved for intubations performed *solely* by direct vision rather than by a threshold percentage of screen visualization. This is only fair since the lack of a screen defines traditional direct laryngoscopy, and the presence of the screen defines video laryngoscopy. An iota of screen viewing necessarily classifies an intubation technique as something *other than* direct laryngoscopy.

In conclusion, Dean[1] and Donoghue[2] highlight that both the chosen device and the screen visualization technique matter—while optimal metrics for the latter remain unknown. However, the routine use of a standard geometry video laryngoscope is best supported by current evidence and expert opinion and allows maintenance of direct laryngoscopy skills while optimizing patient safety.

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