IS THERE A ROLE FOR DIRECT LARYNGOSCOPY

NIKHIL JAGAN
PULMONARY AND CRITICAL CARE
CREIGHTON UNIVERSITY

I HAVE NO DISCLOSURES

I AM NOT A GLIDESCOPE REP
OBJECTIVES

Seeing is believing – Why is video laryngoscopy better

Seeing is believing – Not always

Status in training programs

My take
High-stakes maneuver, performed uneventfully thousands of times daily throughout the world.

In the U.S., elective (routine) intubation is almost exclusively the domain of anesthesiologists,

They become masters of the technique through thousands of iterations throughout training and their careers.

The vast majority take place in the operating theater, a relatively controlled, stable setting.

Lifesaving skill essential to the practice of emergency medicine, and critical care
INVENTION OF DIRECT LARYNGOSCOPY BLADES BY MILLER AND MACINTOSH IN THE 1940’S

VIDEO LARYNGOSCOPY IN THE LATE 1990’S
Today multiple video laryngoscopes provide excellent, albeit indirect, views of the larynx without the need for aligning the laryngeal axis with the clinician’s line of sight.

- Striking ease of achieving laryngeal visualization and proliferation of video laryngoscopy devices
- This led to the extension of video laryngoscopy to use outside the operating room and to patients without a difficult airway
THE DARK SIDE

• In the emergency department, intensive care unit and wards
• Difficult and dangerous when performed in rapidly deteriorating patients who are obese, combative, hypoxemic, hypotensive, with preexisting cardiopulmonary disease (or all of the above)
• As the difficulty of intubation and the severity of illness increase, the margin for error shrinks, and the risks to the patient rise exponentially
• Outside the O.R., intubation is rarely “routine”
One eye-witness weighs more than ten hearsays — Seeing is believing all the world over.  
(Plautus)

Rigid devices that allow indirect laryngoscopy

Visualization of the vocal cords and related airway structures without a direct line of sight
VIDEO-LARYNGOSCOPY/GLIDESCOPE®

- Compared to direct laryngoscopy, it is associated with improved glottic visualization, particularly in patients with potential or simulated difficult airways

- Improves the first-attempt success rate during urgent endotracheal intubation performed by pulmonary and critical care medicine fellows

Griesdale, Donald EG, et al. 
Silverberg, Michael J., et al. 

RCT IN 2005

- 200 patients 
- Intubation by direct laryngoscopy using a Macintosh size 3 blade (DL, n=100) or intubation using the GlideScope® (GS, n=100) 
- Prior to intubation all patients were given a Cormack and Lehane (C&L) grade by a separate anaesthetist using a Macintosh size 3 blade. 
- Different anaesthetist 
- Larynx was inspected and given a laryngoscopy score 
- Time to intubation was measured

Sun et al. 
British Journal of Anaesthesia, March 2005
RESULT

In most patients, the GlideScope® provided a laryngoscopic view equal to or better than that of direct laryngoscopy, but it took an additional 16 s (average) for tracheal intubation.

HOW ABOUT CHILDREN?

- The laryngoscopic view in 203 children was scored using both the Macintosh laryngoscope and the GlideScope® using Cormack and Lehane (C&L) grades.
- They compared C&L grades for the two views in the same patient, and also the time to intubate for each group.
- In children, the GlideScope® provided a laryngoscopic view equal to or better than that of direct laryngoscopy but required a longer time for intubation.

Kim, J-T., et al.  
British journal of anaesthesia 101.4 (2008)
EMERGENCY DEPARTMENT

- The C-MAC was associated with a greater proportion of successful intubations and a greater proportion of Cormack-Lehane grade I or II views compared with a direct laryngoscope.


AN ANALYSIS OF 2,004 GLIDESCOPE INTUBATIONS, COMPLICATIONS, AND FAILURES FROM TWO INSTITUTIONS

- Overall success for Glidescope intubation was 97% (1,944 of 2,004)
- As a primary technique, success was 98% (1,712 of 1,755)
- Success in patients with predictors of difficult direct laryngoscopy was 96% (1,377 of 1,428)
- Success for Glidescope intubation after failed direct laryngoscopy was 94% (224 of 239).

• Strongest predictor of Glidescope failure was altered neck anatomy with presence of a surgical scar, radiation changes, or mass

• This data demonstrate a high success rate of Glidescope intubation in both primary airway management and rescue-failed direct laryngoscopy

• However, Glidescope intubation is not always successful and certain predictors of failure can be identified

DIFFICULT AIRWAY ALGORITHM

1. Assess the likelihood and clinical impact of basic management problems:
   - Difficulty with patient cooperation or consent
   - Difficult mask ventilation
   - Difficult supraglottic airway placement
   - Difficult laryngoscopy
   - Difficult intubation
   - Difficult surgical airway access

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:
   - Awake intubation vs. intubation after induction of general anesthesia
   - Non-invasive technique vs. invasive techniques for the initial approach to intubation
   - Video-assisted laryngoscopy as an initial approach to intubation
   - Preservation vs. ablation of spontaneous ventilation

4. Develop primary and alternative strategies:

   **AWAKE INTUBATION**
   - Airways approached by noninvasive intubation
     - Invasive Airway Access
       - Success
       - Cancel
       - Consider feasibility of other options
     - Invasive airway access

   **FACE MASK VENTILATION ADEQUATE**
   - Nonemergency Pathway
     - Ventilation adequate, intubation unsuccessful
     - Alternative approaches to intubation
   - Successful intubation
   - Fail after multiple attempts
   - Invasive airway access

   **INTUBATION AFTER INDUCTION OF GENERAL ANESTHESIA**
   - Initial intubation attempts successful
     - From this point considering: consider
       - Calling for help
       - Returning to spontaneous ventilation
       - Awakening the patient
     - Invasive Airway Access

   **FACE MASK VENTILATION NOT ADEQUATE**
   - Emergency Pathway
     - Ventilation not adequate, intubation unsuccessful
     - Call for help
   - Emergency noninvasive airway ventilation

   **SGA ADEQUATE**
   - SGA Not adequate or not feasible
   - Invasive airway access
   - Consider feasibility of other options
   - Awake, patient
   - Emergency noninvasive airway ventilation
META-ANALYSES OF RCTS COMPARING VIDEO-ASSISTED LARYNGOSCOPY WITH DIRECT LARYNGOSCOPY

In patients with predicted or simulated difficult airways

• Improved laryngeal views, a higher frequency of successful intubations, and a higher frequency of first attempt intubations with video-assisted laryngoscopy
• No differences in time to intubation, airway trauma, lip/gum trauma, dental trauma, or sore throat were reported

• One RCT comparing the use of video-assisted laryngoscopy with Macintosh-assisted intubation reported no significant differences in the degree of cervical spine deviation (Category A3-E evidence).
• Despite a high success rate, intubation with the GlideScope is likely to be more challenging in patients with high Cormack and Lehane grade during direct laryngoscopy, high upper lip bite test score, or short sternothyroid distance.


• Glottic visualization with video is superior to direct laryngoscopy in controlled operating room studies

• However, glottic exposure with video laryngoscopy has not been evaluated in the emergency department (ED) setting, where blood, secretions, poor patient positioning, and physiologic derangement can complicate laryngoscopy
• Video laryngoscopy affords more grade I and II views than direct laryngoscopy and improves glottic exposure in most patients with poor direct glottic visualization.

• In a small proportion of cases, glottic exposure is worse with video than direct laryngoscopy.


• Electronic databases, conference abstracts, and article references, trials in humans comparing Glidescope® video-laryngoscopy to direct laryngoscopy regarding the glottic view, successful first-attempt intubation, and time to intubation

• There was no difference between the Glidescope® and the direct laryngoscope regarding successful first-attempt intubation or time to intubation, although there was significant heterogeneity in both of these outcomes

• In the two studies examining nonexperts, successful first-attempt intubation and time to intubation were improved using the Glidescope®. These benefits were not seen with experts

• Compared to direct laryngoscopy, Glidescope® video-laryngoscopy is associated with improved glottic visualization, particularly in patients with potential or simulated difficult airways


• VLs are easy to use and build upon basic DL techniques, although some training and adjustments in technique are needed.

• Furthermore, unlike DL, video laryngoscopes provide the supervisor and trainee with an identical view of the glottis, allowing for improved teaching and troubleshooting.
“Everything we hear is an opinion, not a fact. Everything we see is a perspective, not the truth.”

- Marcus Aurelius
SEEING IS BELIEVING, BUT THAT DOES NOT MEAN IT’S TRUE

- Five randomized controlled trials with 1,301 patients were included
- Despite better glottic visualization with VL use of VL did not result in a significant increase in the first-attempt success rate
- In addition, time to intubation, difficult intubation, mortality, and most other complications were similar between the VL and DL groups
- The VL technique did not increase the first-attempt success rate during EI in ICU patients compared with DL. These findings do not support routine use of VL in ICU patients

• All the outcomes except mortality have high heterogeneity
• The meta-analysis demonstrated the superiority of VL vs DL regarding glottic visualization and incidence of esophageal intubation. **So why did VL not improve the outcomes of successful intubation on the first attempt?**

• Time to intubation, difficult intubation, and mortality rate are related to the experience of the intubators
• **None of the studies in the meta-analysis provided the exact definitions of the intubators’ competence in VL and DL, and even experience with DL does not ensure skill with VL.**
THE FOLLOWING CONCEPTS ARE IMPORTANT REGARDLESS OF THE LARYNGOSCOPY TECHNIQUE EMPLOYED:

• The critical step in laryngoscopy is to locate the epiglottis

• The clinician must be prepared for unanticipated difficulty

RCT IN FRANCE BETWEEN MAY 2015 AND JAN 2016

• 371 adults requiring intubation while being treated at 7 ICUs

• To determine whether video laryngoscopy increases the frequency of successful first-pass orotracheal intubation compared with direct laryngoscopy in ICU patients

• Among patients in the ICU requiring intubation, video laryngoscopy compared with direct laryngoscopy did not improve first-pass orotracheal intubation rates and was associated with higher rates of severe life-threatening complications


• The median time to successful intubation was 3 minutes for both video laryngoscopy and direct laryngoscopy

• In post hoc analysis, video laryngoscopy was associated with severe life-threatening complications

Of potential concern was the suggestion that the incidence of severe life-threatening complications, such as severe hypoxemia and cardiac arrest, was higher in patients undergoing video laryngoscopy (9.5% vs 2.8%; P = .01)

- This study illustrates the fundamental problem with video laryngoscopy: it generates excellent views of the larynx but may not facilitate tracheal intubation
- The use of video laryngoscopy can lead to the creation of blind spots, both visual and cognitive. Because the lens of the laryngoscope is located at the tip of the device, the pharynx and hypopharynx are not visualized during video laryngoscopy
- This phenomenon has been linked to higher rates of pharyngeal soft tissue injury and longer intubation times in patients undergoing video laryngoscopy as compared with direct laryngoscopy
The view during video laryngoscopy can also create a cognitive blind spot: laryngoscopists may fail to abort a laryngoscopy attempt in a timely manner because they have such a clear view of the larynx.

- The eventual goal in airway management is to be able to pass the tube through the cords to ventilate the lungs and having a good view of the glottis greatly facilitates this goal.
- It is helpful to think of “laryngoscopy” and “intubation” as two separate steps in airway management, wherein difficulty could be encountered at the level of either step.
- Although satisfactory view of the glottis may sometimes not be achieved with direct laryngoscopy, intubation does not take very long if a reasonable view is achieved.
WHAT IS THE STATUS IN TEACHING PROGRAMS NOW

• A 19-question survey was e‐mailed to program directors of pulmonary/critical care and internal medicine critical care fellowship training programs
• A completed survey was returned by 36% of invited program directors
• Sixty-nine percent of respondents reported a change in their approach to intubation training over the prior 3 years, with 56% of changes attributed to the adoption of a video laryngoscope

• A video laryngoscope is available for clinical use in 89% of the responding programs
• The video scope is used as the primary device in 16% and is never used in 9%
• The video laryngoscope is only used for difficult intubations or after failure of direct laryngoscopy (32%) or the primary device is determined by the preference of the operator (32%)
• The majority of internal medicine critical care program directors recently responded to an e-mail survey reported that they have changed their approach to teaching endotracheal intubation, driven largely by the adoption of video laryngoscopy for upper airway visualization

• Using a VL as the primary device improved intubation success and decreased complications compared with a DL when PCCM fellows were the primary operators
• These data suggest that the VL should be used as the primary device when urgent intubations are performed by less experienced operators

Aziz, Michael F., et al.
The Journal of the American Society of Anesthesiologists 114.1 (2011)
A RANDOMIZED, PARALLEL-GROUP, PRAGMATIC TRIAL

- Video compared with direct laryngoscopy in 150 adults undergoing endotracheal intubation by Pulmonary and Critical Care Medicine fellows
- In critically ill adults undergoing endotracheal intubation, video laryngoscopy improves glottic visualization but does not appear to increase procedural success or decrease complications


- The Macintosh laryngoscope group (n = 19) had an intubation success rate of 47.4% with a mean intubation time of 69.0 seconds
- The video-assisted group (n = 21) demonstrated a significantly higher success rate of 100% and a decreased mean intubation time of 23.1 seconds
- Novice physicians with little to no prior intubation experience showed significantly higher intubation success with lower intubation times using a video-assisted laryngoscope in a difficult airway manikin simulator.

WHAT USING THE VL ONLY DOES TO LEARNERS

• The aim of this study was to assess the success rate of the GlideScope video laryngoscope (GVL) and direct laryngoscope (DL) over ten years in two academic emergency departments.
• Analyzed changes in first-pass success (FPS) rate by device and operator training level
• FPS rates of GVL have slightly increased but DL's FPS rate has significantly decreased during the last ten years.


• Considering the above survey results and the underlying trends, are future critical care fellows really going to get enough experience in direct and video laryngoscopy to achieve genuine proficiency in both?
• If this is considered an important goal, an "always try with DL first" approach might be needed during fellowship, followed by video laryngoscopy for failures
MY TAKE

Airway training should be comprehensive. Physicians should be comfortable in assessing the airway before endotracheal intubation, providing preoxygenation, including proper bag ventilation technique, working knowledge of the pharmacology of various medications used to facilitate endotracheal intubation (sedatives, muscle relaxants, etc.) and have a plan in regards to alternative ventilation techniques (such as laryngeal mask airway), surgical airway, and situations in which to seek help.
The importance of learning direct laryngoscopy in preparation for situations where a video laryngoscopy may not be available mirrors bygone arguments for continuing training in landmark central line insertion techniques to prepare for situations where ultrasound is not available.