Current Preoperative Airway Assessment

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If it were only this easy!!
The Goal of all Preoperative Airway Assessments
“From little Acorns Mighty Oaks Do Grow”
Why we continually revisit the art and science of airway assessment

- Difficult laryngoscopy / intubation 1.5% to 13% (Various)
- The incidence of 24-h postoperative death: 8.8 per 10,000. (95’-97’) (869,483 pt. cohort.) Anesth Feb 05’
- Anesthesia mortality rates have fallen from two deaths per 10,000 in the 1980s to 1 per 200,000 today.

-Money Magazine, 10/06/09

We are what we repeatedly do. Excellence, then, is not an act, but a habit.

-Aristotle
Potentially Difficult Airways
Objectives

1. Review and understand modern airway assessment techniques.
2. Review basic statistical terms used to assess the strength of data.
3. Define and discuss the use of the Upper Lip Bite Test (ULBT).
4. Understand modern evidence-based implementation of current airway assessment tools.
Modern Preoperative Airway Assessment tools

- Modified Mallampati (MMT)
- Inter-incisor distance (IIC)
- Sternomental distance (SMD)
- Thyromental distance (TMD)

**Upper Lip Bite Test (ULBT)**
Modified Mallampati

Upright, maximal jaw opening, tongue protrusion without phonation

1. Fauces, pillars, soft palate and uvula visualized
2. Fauces, soft palate, uvula
3. Soft palate, base of uvula
4. Soft palate not visible

34,523 pt. meta-analysis. “Used alone, the MMP test has limited accuracy for predicting the difficult airway and thus is not useful as a single screening test. (Anesth Analg 2006;102:1867-78)
Interincisor distance (IID)

- Less than or equal to 4.5 cm is considered a potentially difficult intubation.

- Generally greater than 2.5 to 3 fingerbreadths (depending on observers' fingers)

- **There is some variation among studies.**
## Thyromental and Sternomental Distance

**TMD**

1. Upright
2. Full neck extension
3. Distance from upper border of thyroid cartilage (laryngeal prominence), to the boney point of the mentum.
4. Distance < 6.5cm may be difficult

**SMD**

1. Supine with neck fully extended
2. Measure from sternum to boney point of mentum.
3. <12.5cm is potentially a difficult intubation

**Some inter-study variation**
Cormack & Lehane Grades

Class I: the vocal cords are visible
Class II: the vocal cords are only partly visible
Class III: only the epiglottis is seen
Class IV: the epiglottis cannot be seen.

Cormack & Lehane grade 3 and 4 are considered Difficult Intubation in the ULBT studies reviewed. **Some inter-study variation.**
Statistical Terms

- **Specificity**: The percentage of correctly predicted easy laryngoscopies as a proportion of all laryngoscopies that were truly easy.

- **Sensitivity**: The percentage of correctly predicted difficult laryngoscopies as a proportion of all laryngoscopies that were truly difficult.

- **Positive Predictive Value (PPV)**: The percentage of correctly predicted difficult laryngoscopies as a proportion of all predicted difficult laryngoscopies.

- **Negative Predictive Value (NPV)**: The percentage of correctly predicted easy laryngoscopies as a proportion of all predicted easy laryngoscopies.

- **Accuracy**: The proportion of correctly predicted easy or difficult laryngoscopies as a proportion of all laryngoscopies.

- **True Positive**: A difficult laryngoscopy that had been predicted to be difficult.

- **False Positive**: An easy laryngoscopy that had been predicted to be difficult.

- **True Negative**: An easy laryngoscopy that had been predicted to be easy.

- **False Negative**: A difficult laryngoscopy that has been predicted to be easy.
Inter-rater Reliability

- Trained raters agree with the "official" or "known" assessment tool.

- Trained raters agree with each other.

“A Mallampati 4, is a Mallampati 4, is a Mallampati 4”
A Comparison of the Upper Lip Bite Test (a Simple New Technique) with Modified Mallampati Classification in Predicting Difficulty in Endotracheal Intubation: A Prospective Blinded Study

- 300 adult patients
- Modified Mallampati Vs. ULBT
- Inclusion Criteria: (>15 yrs)
- Exclusion Criteria: (<16 yrs), endentulous, unable to open mouth, laryngeal mass, limitation of cervical movement.

Findings
1. ULBT significantly higher specificity and accuracy (P < 0.001)
2. Sensitivity, Positive/Negative Predictive Value, no significant difference

Conclusion
“ULBT is an acceptable option for predicting difficult intubation as a simple, single test.”
Upper Lip Bite Test

- **Class 1:**
  Lower incisors can bite upper lip above vermillion line.

- **Class 2:**
  Lower incisors can bite upper lip below vermillion line.

- **Class 3:**
  Lower incisors cannot bite the upper lip.
ULBT

- Class 1
- Class 2
- Class 3
Poor Visualization During Direct Laryngoscopy and High Upper Lip Bite Score Are Predictors of Difficult Intubation with the GlideScope Videolaryngoscopy

- 400 patients.
- 2 Experienced Anesthesia Residents with at least 30 GlideScope Intubations
- First attempt DL with MAC Blade and obtain Lehane & Cormack Grade
- Second GlideScope Videolaryngoscopy obtain Lehane & Cormack Grade, then attempt intubation
- First Attempt 342, Second Attempt 48, Third Attempt 9, Failed intubation 1

**Conclusions:** High ULBT score (3), High Lehane & Cormack grade (3,4), short sternothyroid distance. May result in “challenging” videolaryngoscopy.

- **Recent significant palatopharyngeal injury has been reported with the use of GlideScope Videolaryngoscopy.**
  - Choo MK, Yeo VS, See JJ. Another Complication associated with videolaryngoscopy. Can J Anaesth 2007;54:322-4
Current ULBT Studies

- Khan HZ, Et al. The Diagnostic Value of the Upper Lip Bite Test combined with Sternomental Distance, Thyromental Distance, and Interincisor Distance for Prediction of Easy Laryngoscopy and Intubation: A Prospective Study. Anesth Analg 2009;109:822-4. **Conclusion:** Specificity and Accuracy of ULBT is significantly higher than other single tests. However, ULBT combined with the other tests “could” more reliably predict easy laryngoscopy or intubation.


- Bhat RR, Mishra SK, Badhe A. Comparison of Upper Lip Bite Test and Modified Mallampati Classification in Predicting Difficult Intubation. The Interne Journal of Anesthesiology. 2007; Volume 13 (1). **Conclusion:** A combination of Upper Lip Bite Test and Modified Mallampati Test in parallel is more sensitive, specific and has a higher discriminative power which is clinically relevant than Modified Mallampati Test or ULBT alone. Upper Lip Bite Test and Modified Mallampati Test alone, in parallel and series are good predictors of possible easy intubation rather than difficult intubation.


- Khan HZ, et al. The Diagnostic Value of the Upper Lip Bite Test combined with Sternomental Distance, Thyromental Distance, and Interincisor Distance for Prediction of Easy Laryngoscopy and Intubation: A Prospective Study. Anesth Analg 2009;109:822-4. **Conclusion:** Specificity and Accuracy of ULBT is significantly higher than other single tests. However, ULBT combined with the other tests “could” more reliably predict easy laryngoscopy or intubation.

- Khan HZ, et al. Easy Endotracheal Intubation of a Patient Suffering from Both Cushing’s and Nelson’s Syndromes Predicted by the Upper Lip Bite Test Despite a Mallampati Class 4 Airway. Anesth Analg 2007;105:786-7 **Conclusion:** Achieved L&C Grade 1 and all went well with case. However, letter backlash for lack of best practice application for the patient as patient was induced and direct laryngoscopy rather than a safer awake induction.
Current ULBT Studies


- Tremblay MH, et al. Poor Visualization During Direct Laryngoscopy and High Upper Lip Bite Score Are Predictors of Difficult Intubation with the GlideScope Videolaryngoscopy. Anesth Analg 2008;106:1495-1500. **Conclusion:** Despite GlideScope high success rate, increased ULBT, sternothyroid distance or Lehane / Cormack score is likely to be more "challenging" with GlideScope. (Eg.) Attempts: 400 pt.'s, 342 1st attempt, 48 2nd attempt, 9 3rd attempt, 1 failure to intubate. Study also cited other studies with significant palatopharyngeal injury from Videolaryngoscopy.

- Salimi A, Farzanegan B, Rastegarpour A, Kolahi AA. Comparison of the upper lip bite test with measurement of thyromental distance for prediction of difficult intubations. Acta Anaesthesiologica Taiwanica. 46(2):61-5, 2008 Jun. **Conclusion:** The findings suggest that the sensitivity of the ULBT and TMD for predicting difficult intubations may not be significantly different, but the specificity of the ULBT is significantly higher. The positive predictive value of the ULBT was significantly higher than that of TMD, signifying that a positive ULBT is more predictive of a difficult airway than is a positive TMD.
Current Literature Findings

- Modern Efficacious Airway assessments include: MMP, ULBT, TMD, SMD, IID.

- ULBT is as good or better than any single bedside airway assessment tool for predicting easy intubation.

- ULBT appears to be statistically best at predicting easy intubation or laryngoscopy as a single test.

- Using a combination of airway assessment tools appears to be the best method for predicting easy and difficult intubation / laryngoscopy.

- There is still no preoperative airway assessment which reliably (statistically) predicts difficult intubation.

~Anesthesia practice is as much art as science~

Personal Conjecture: “the formation or expression of an opinion or theory without sufficient evidence for proof.”

- dictionary.com
Want to be involved in a study?

- We are looking for CRNAs who want to participate in a prospective clinical study involving the use of the ULBT for preoperative airway assessment.

- Easy data collection, I will collaborate with the IRB paperwork. (exempt study with no patient identifiers).

- If you provide general anesthesia services as a part of your practice and would like to be involved or have any questions, please contact me at: scottrigdon@hotmail.com
In Addition to ORANA
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“Champions of Research and Development”
The Quality of a person's life is in direct proportion to their commitment to excellence, regardless of their chosen field or endeavor.

- Vince Lombardi