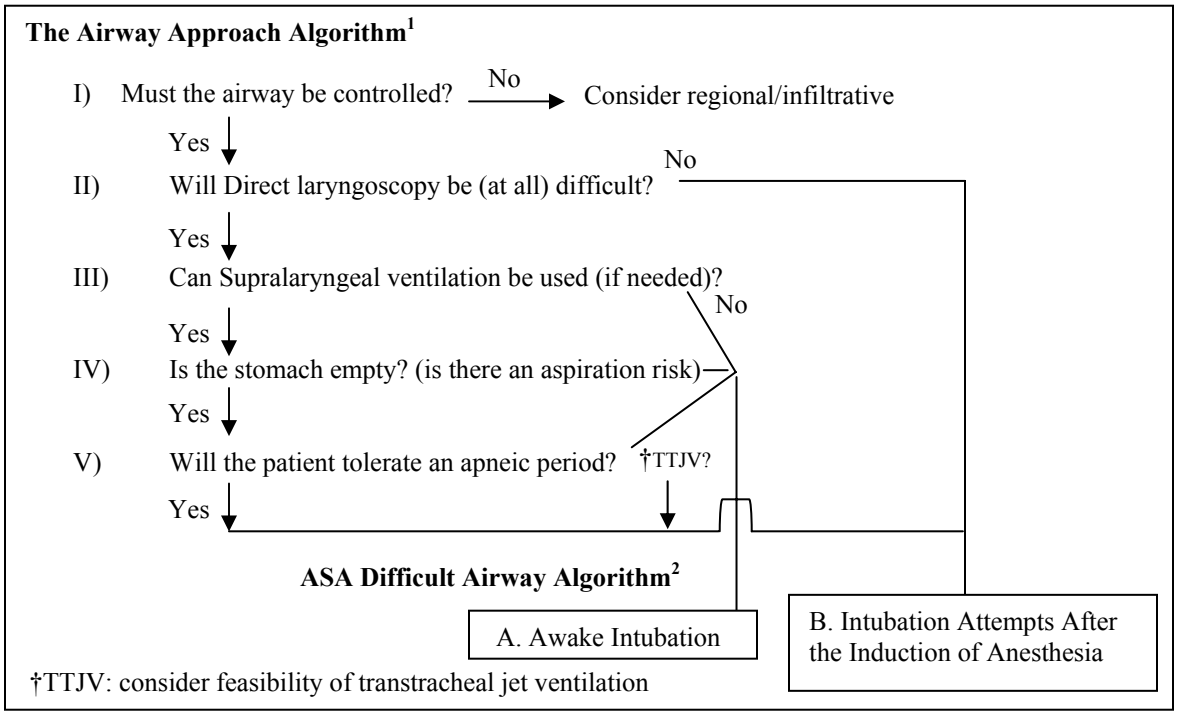
Awake intubation made easy!

William H. Rosenblatt, M.D. **New Haven, Conneticut**

By far the hardest part of performing an awake intubation should be the decision to do it! Once that decision is made the mechanics of securing the airway should be routine – familiar to you and comfortable for the patient. First we will review a strategy for deciding on awake intubation, and then I will describe my own technique of patient preparation.

One note of clarification: this is not a refresher course on flexible fiberoptic aided intubation. Once the decision is made to pursue awake intubation and the patient is prepared, the "tool" to be used can be variable (e.g., FOB, SGA, DL, optical stylet, minimally invasive). Second, though sedation may be an important part of an "awake" technique, this refresher course will concentrate on non-sedation techniques, such as might be used with a critical airway patient.

Figure 1 describes a decision tree approach to the preoperative assessment of the patient airway: the Airway Approach Algorithm (AAA).[1] The AAA is an amalgamation of the salient issues of total airway assessment.



The clinician must apply his or her own experience and judgment while moving through the AAA – there are no absolute answer.Additionally, it should be recognized that the role of the AAA is to help guide entrance into the American Society of Anesthesiologist's Difficult Airway Algorithm (ASA-DAA).[2]

The following discussion will examine the five questions of the AAA, and how, after preoperative assessment, it guides the clinician into the ASA-DAA.[1]

I. Is airway management required? Factors including the patient's disease and opinion, consultation with other healthcare givers, and the anesthesiologist's own opinion weigh heavily on this question. It is this author's opinion that the assessment by the clinician who assumes responsibility for airway management procedures, far outweighs other opinions. In some cases, avoidance of airway manipulation can be achieved through the use of regional anesthesia. When a decision is made to proceed with a regional anesthetic, or when no regional or general anesthesia is deemed necessary, it is helpful to consider a full evaluation of the patient's airway should conversion to a general anesthetic be required.

II. Will direct laryngoscopy be (at all) difficult? Though there is a multitude of ways to secure an airway, the vast majority of clinicians recognized direct laryngoscopy to be a standard of care.[2] Until this standard is redefined, the ease of direct laryngoscopy and intubation must be evaluated in all patients about to undergo interventions that may affect the airway. Many authors have attempted to delineate the factors that describe the difficult patient airway. **Table 1** lists the most prominent techniques in use today. Also included in this table are the results of sensitivity and specificity testing of these indices. It should be carefully noted that these standard methods of evaluation have been shown to have low and variable sensitivity and marginal specificity when used to predict the ease of laryngoscopy in terms of the Cormack and Lehane's view.[3-7]

Table 1: Commonly cited physical exam indices of laryngoscopy

Physical exam index	Sensitivity	Specificity
Interincisor gap	0.26	0.94
Thyromental distance	0.65	0.81
Chin protrusion	0.29	0.85
Atlanto-occipital extension		
Oropharyngeal grade	0.4- 0.67	0.52-0.84

Evaluation of the airway for the purpose of definitively identifying the difficult to intubate patient remains an enigma. As investigators search for new predictive exams, it is appearing that the nemesis of each test is simply related to other anatomic findings: though the indexes tend to treat each finding in isolation (this is still true of multivariate indexes) they are really interdependent.[8] If the clinician is satisfied that direct laryngoscopy will be straightforward (the answer to question I is "no"), then he or she may proceed as clinically appropriate (e.g. routine induction and intubation or LMA if there is no aspiration risk, rapid sequence induction, etc). This is equivalent to the root point of the ASA-DAA box "B" (figure 1).[2] If the answer to question II is "yes", than the AAA proceeds to question III.

III Might supralaryngeal devices be used (if needed)? Recent studies have given some surprising information by highlighting an expanded range of patients who might present problems (minor or significant) with facemask ventilation.[9-10] Langeron et al., investigated the incidences of difficult mask ventilation and delineated factors that described these patients. The study heightens our awareness that there are a significant number of patient situations where we should be suspicious of a problem. (**Table 2**).

Table 2: Clinical factors predictive of difficulty with mask ventilation[10]

Age greater than 55
Body mass index >26
History of snoring
Edentulous
Facial hair

Other prominent supralaryngeal devices include the Laryngeal Mask Airway (LMA) and the Combitube. Both devices are now considered to serve in both elective and rescue arenas.[11] Though there is a large body of anecdotal and series reports, only one study has investigated the LMA in "Cannot intubate/cannot ventilate" situations. Parmet, et al., were able to rescue 16 of 17 "cannot intubate/cannot ventilate" patients.[11] The one patient who could not be rescued was found to have intratracheal blood clots, believed secondary to attempts at transtracheal jet ventilation. The Combitube has been shown to have a 97% to 99% success rate in prehospital airway rescue when patients could not be intubated.[12-13] Factors which preclude the use of the Combitube and LMA include small oral aperture, oropharyngeal, pharyngeal or hypopharyngeal mass, and an aspiration risk (though the Combitube and possibly the new Proseal-LMA offer some protection in this regard[14]). Esophageal pathology, including caustic ingestion, contradicts use of the Combitube. New SGAs (e.g., the Laryngeal Tube) have also been successfully used in the can not intubate/can not ventilate situation. As this, and other new SGAs gain popularity, it is likely that they will supplement the SGA armamentarium.

If the clinician's assessment leads him or her to a significant suspicion that supraglottic ventilation may be difficult, then we must consider where one's assessment stands in relation to the ASA-DAA. We have already decided that this patient may be a difficult laryngoscopy (the preoperative equivalent of "cannot intubate"), and now we have

determined that a possible "cannot ventilate" scenario might occur. Within the ASA-DAA we have reached the definition of the emergency pathway. Because we never want to place our patient into danger, and because, as a preoperative tool the AAA gives us the luxury of choice, "box A" (awake intubation) is chosen (figure 1).[2] If it is judged that supraglottic ventilation will be possible, we proceed to the next AAA question. Recognizing that the decision regarding supraglottic ventilation adequacy may be a difficult one, question V will later address the problem of error.

IV Is there an aspiration risk? This is a difficult topic to discuss. Currently, opinions vary greatly as to what patient conditions define a risk. Research regarding gastric emptying times and the development of new propulsive and acidity reducing pharmaceutical agents have changed the meaning of "aspiration risk." When making this decision, each clinician must weigh-in in light of their personal experiences as well as currently available evidenced-based information. If there is an aspiration risk then the we have reached a potential scenario of "can not intubate" and "should not ventilate." In this case, an impasse is reached in the ASA-DAA. Once intubation has failed, the ASA-DAA branches to mask ventilation. Because mask ventilation is contraindicated in the current assessment, we have once again found ourselves in the emergency pathway, and so, will preoperatively choose "box A" (awake intubation) (figure 1).[2] If there is no aspiration risk we can proceed to the final question of the AAA.

V) Will the patient tolerate an apneic period? If our assessment of the patient regarding difficulty of intubation is correct, but our assessment of ventilation is erroneous, the patient will suffer an apneic period after the induction of anesthesia. The duration of this apnea will be dependent upon many factors including a variety of patient health issues, and co-administered drugs. Similarly, the time to critical oxygen desaturation will vary with these same factors as well as the adequacy of preoxygenation (a discussion of each of these factors is beyond the scope of the current lecture[16]). Should it be determined that the patient would not tolerate a misjudgment in question III, "box A" (awake intubation) is chosen.[2] If the patient should be able to tolerate a duration of apnea which will allow the resumption of spontaneous ventilation, or provide the clinician enough time to institute alternative rescue means, routine induction is undertaken ("box B") (figure 1).[2] The experienced clinician may consider an advanced exception in the "failure in judgment" decision branch (question V, answer "No"). As can be seen in Figure 1, a footnote on the "awake intubation" branch indicates that the clinician may "consider the feasibility of transtracheal jet ventilation." TTJV can rapidly correct hypoxemia when used correctly and in a timely fashion. Location (e.g., operating room vs radiology suite), available equipment (e.g., high pressure oxygen source and Sanuders valve, vs angiocatheter and ambu bag), patient habitus (e.g., accessible cricothyroid membrane vs. the patient with morbid obesity), and the physician's experience will dictate the practicality of preparing to use TTJV if apnea or airway obstruction occurs and results in oxyhemoglobin desaturation.

Summary of the decision making

Airway evaluation should be aimed at developing a plan which considers all aspects of the patient's airway, and not only issues regarding direct laryngoscopy. Every time we are asked to manage an airway, or to use pharmaceuticals or procedures that might compromise the patient's ability to maintain a patent and competent airway, we must consider alternatives. The ubiquitous use of the Laryngeal Mask Airway and similar devices, provide new possibilities in the approach to the airway. By asking the correct questions, all information regarding management of the airway is delineated. The "cannot intubate" or the "cannot intubate-cannot ventilate" condition may still arise, but even in this situation, the clinician should be better prepared, having concisely gathered the critical information. In the oft-time confusing world of new ventilation devices and reflux reducing medications, the AAA steers the clinician into the appropriate starting point of the ASA-DAA.

Technique of awake intubation

Awake intubation (AI) is one of the most important tools of the airway manager. If you are going to manage airways, you must be good at AI (one day you'll need it)! And if you have not performed an awake intubation in years, you probably are not doing enough of them (Don't confuse being good with being lucky.) After speaking to thousands of anesthesiologists and nurse anesthetists, I have come to two conclusions: The typical anesthesia practitioner 1) is insecure about his or her technique and 2) confuse airway anesthesia with AI technique. The sentinel grounds for these conclusions are deduced from the single question I have been asked almost every time I speak about airway management (no matter what the lecture topic): "Dr. Rosenblatt, what local anesthetic do you

use?" This question exposes the misconception most clinicians have about AI: that AI is about producing a "numb" airway. In fact the topical anesthetic(s) chosen matter little. AI involves a systematic approach to patient preparation – once this is appreciated, and a consistent technique developed, AI can become as easy as routine airway management.

AI has 6 distinct elements – in my technique, each element is essential, and rarely do I diverge

Element	Underlying concept/action
Explanation*	Patients understand safety
Desiccation	Dry the airway
Dilatation	Prepare (through) the nose
Topicalization	Obtund reflexes
Sedation	Maintain patient airway control
Procrastination	AI can not be rushed

*substituting the word "Account" those who like pneumonics can recall "ADD a TSP" (Benjamin Sherman, MD)

Explanation: All patients presenting to the operating room for surgery have some degree of anxiety. Though we may be comfortable in the OR, it is a foreign environment for most others, and surgery is most often a daunting prospect. Patients want the safest experience possible. If you have determined (via the AAA or your own method) that AI is warranted, you have erred on the side of safety – and the patient will understand this. A clear explanation to the patient is usually all that is required to gain cooperation. Explaining that they will feel or remember very little and that they will have some sedation is all that is needed. My typical explanation is always some variant of the following:

> "My job is to make sure that you are breathing during surgery. Your anatomy differs (a lot / a little) from normal, and I have to make sure I can find your breathing pathway. What I am going to do is to make your throat numb, just like the dentist does (except I will not use needles unless absolutely necessary). I will then be looking in your mouth in order to find your breathing pathway. After I make sure you are comfortable and feeling none of this, I will put the breathing tube in."

Desiccation: To desiccate is to "dry." Before you begin to manipulate the airway below the nasopharynx it must be dry: 1) saliva is a protective barrier – it will protect the mucosa from your topical agents. 2) saliva dilutes your topical local anesthetic, and decreases it's effectiveness. 3) manipulation of the airway produces more secretions – these secretions are an airway stimulant, causing more cough, laryngospasm, etc. 4) I'm likely to use an indirect optical device which will be neutralized by secretions. I don't exclude patients who have had airway radiation and are already complaining of "dry mouth." My concern is that any remaining functional salivary tissue will counteract my efforts. My favorite desiccant is glycopyrolate (0.2 to 0.4 mg). Atropine, clonidine and scopolamine are also effective. Whatever agent you use, it must be given time to be effective -- at least 15 minutes. I will often give the agent in the nursing intake area as soon as the patient has changed clothes. If there is no IV in place, I do not hesitate to use an IM injection. This assures that the agent will have time to be effective. If, by the time the patient reaches the holding area, they are not complaining of "cotton mouth" I consider giving another 0.2mg.

Dilatation: This is primarily an ellipsis for saying "prepare the nose" which is done in all cases unless medically contraindicated, regardless of my intent to intubate via the mouth or nose. A vasoconstrictor is used to decongest the nasal mucosa. This widens the space and reduces the risk of bleeding during manipulation. Oxymetazoline (Afrin, Gensol) is the most effective and long acting agent. Why prepare the nose in all cases? 1) During preparation of the nose much of the effect occurs in areas of the oropharynx by both cross innervation, and passive leak of local anesthetic. Nasal preparation can be started before desiccation has been effective. 2) In the case where oral intubation is unexpectedly difficult, the nose is prepared for manipulation – too many times I have seen the plan changed from oral to nasal intubation, and the nose is not prepared. This leads to an ill-fated "rush job."

Topicalization: Except for cases of retrograde intubation, where a cricothyroid puncture is part of the procedure, I have not used invasive airway blocks for more than 7 years. Though I have no objection to "needle" blocks, I have not found them necessary. Additionally, I use the same topical anesthetic technique in call cases: I don't discriminate based on my intent to intubate by a nasal or oral route, or depending on which instrument I plan to use.

There are also topical blocks that I do not employ. Again, its not because I object to them – I just use the techniques which work best in my routine.

I divide the airway into three areas, and use directed blocks for each: Nasal passage/nasopharynx, base of tongue/posterior oropharyngeal wall, hypopharynx/larynx-trachea. Note, that should the patient begin coughing during the topical administration, he or she should be assured that the "local anesthetic is getting to the right place."

> *Nasal passage/nasopharynx*: This area is innervated by the anterior ethmoid nerve (anterior 1/3) and nasopalantine nerve. I take cotton swabs soaked with local anesthetic (4% lidocaine solution or 5% lidocaine ointment) and advance them slowly into the nasal passage, first up towards the cribiform plate, and then directly posterior until the bony feel of the sphenoid bone is encountered. Progress is incremental, and I "push to pain," that is, I advance the swab only until the patient winces or otherwise exhibits discomfort. This may take up to 5 minutes to accomplish. I will often start this procedure in the nursing intake area. It is complete by the time the patient reaches the holding area.
>
> Base of tongue/posterior oropharyngeal wall: These are the only two areas in the mouth and pharynx that concern me. I don't concern myself with the oral cavity – my dentist regularly performs an aggressive oral exam which I readily accept unless he accidentally stimulates my gag reflex. The glossopharyngeal nerve is responsible for the gag. We can access the glossopharyngeal where it travels in the base of the palatoglossal arch – that arch of tissue which travels from the uvula to the base of the tongue. A new set of lidocaine soaked swabs are inserted along the tongue until they contact the base of the arch. Some patients will respond to this with a retch. This is a good indication that you are in the correct position. A slight backing off will resolve the gag. A few moments later the swab can generally be readvanced. The patient can close their mouth on the swabs and hold them in position for 5 minutes.
>
> *Hypopharynx/larynx-trachea*: Many years ago at an ASA annual meeting I learned an old pulmonologist's trick from a young anesthesiologist: a 10 cc syringe fitted with a large plastic angiocatheter is filled with lidocaine (2%). The patient extends the tongue maximally, and the anesthesiologist takes an unfolded gauze, wraps the tip of the tongue and does not allow the patient to retract. After the patient is assured that there is no needle, the catheter is inserted over the tongue until the distal tip is at the oral-pharyngeal juncture. Slowly lidocaine is "dripped" on to the tongue base. The procedure may take up to 1-2 minutes, and all 10 cc of lidocaine need not be used: At first the patient will cough. Once the coughing subsides, yet you can hear the gurgling of the lidocaine deep in the airway, you can let go of the tongue. Holding the tongue in this manner prevents the patient from swallowing the lidocaine, and encourages its aspiration.

Sedation: Any number of sedative agents can be used: bezodiazpines, opiods, droperidol, haldo, benedryl, dexmedetomideine. There are three general rules I follow: 1) judicious titration – do not give significant boluses of the drugs. 2) Avoid polypharmacy – stay with one or two agents. 3) Have reversal agents available.

Procrastination: AI is undertaken when the clinician has decided that it is necessary for the wellbeing of the patient. As such, the above procedures should be executed in a controlled pace and composed environment. "Procrastination" is a tongue-in-cheek way of saying, do not hurry to get into the operating room." The OR is a highly pressured environment, and it is difficult to allow generous time for antisialogouges and topical anesthetics to reach their therapeutic effect. Of course, the demands of modern medicine hardly allow such luxury – but we can achieve this goal by starting our procedures early: Oxemetazoline is applied and glycopyrolate is injected in the admitting area (IM if an IV is not yet available). Topical anesthetics are begun in the holding area and continued with the patient's stretcher outside the operating room. The patient does not enter the OR until there is some objective evidence that a block is being achieved (e.g., the patient tolerates an oral airway.)

REFERENCES

1. Rosenblatt, WH. The Airway Approach Algorithm. Journal of Clinical Anesthesia [in press] 2004
2. Practice Guidelines for Management of the Difficult Airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology 2003 May 98 1269-1277.
3. Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anaesthesia 1984 Nov 39 (11):1105-11.
4. el-Ganzouri AR, McCarthy RJ, Tuman KJ, Tanck EN, Ivankovich AD. Preoperative airway assessment: predictive value of a multivariate risk index. Anesth Analg 1996 Jun 82 (6):1197-204.
5. Oates JD, Macleod AD, Oates PD, Pearsall FJ, Howie JC, Murray GD. Comparison of two methods for predicting difficult intubation. Br J Anaesth 1991 Oct 66 (3):305-9.
6. Yamamoto K, Tsubokawa T, Shibata K, Ohmura S, Nitta S, Kobayashi T. Predicting difficult intubation with indirect laryngoscopy. Anesthesiology 1997 Feb 86 (2):316-21.
7. Savva D. Prediction of difficult tracheal intubation. Br J Anaesth 1994 Aug 73 (2):149-53.
8. Rosenblatt WH. Airway management, Critical Surgical Illness: Preoperative Assessment and Planning (supplement) Critical Care Medicine (in Press)
9. Kheterpal S, Han R, Tremper KK, et al. Incidence and predictors of difficult and impossible mask ventilation. Anesthesiology 2006; 105:885–91
10. Langeron O, Masso E, Huraux C, Guggiari M, Bianchi A, Coriat P, Riou B. Prediction of difficult mask ventilation. Anesthesiology 2000 May 92 (5):1229-36.
11. Parmet JL, Colonna-Romano P, Horrow JC, Miller F, Gonzales J, Rosenberg H. The laryngeal mask airway reliably provides rescue ventilation in cases of unanticipated difficult tracheal intubation along with difficult mask ventilation. Anesth Analg 1998 Sep 87 (3):661-5.
12. Blostein PA, Koestner AJ, Hoak S. Failed rapid sequence intubation in trauma patients: esophageal tracheal combitube is a useful adjunct. J Trauma 1998 Mar 44 (3):534-7.
13. Davis DP, Ochs M, Hoyt DB, Vilke GM, Dunford JV (2001) The use of the combitube as a salvage rescue device for paramedic rapid sequence intubation. Academic Emergency Medicine (Abstract 234) 8:500
14. Brimacombe J, Keller C, Fullekrug B, Agro F, Rosenblatt W, Dierdorf SF, Garcia De Lucas E, Capdevilla X, Brimacombe N. A multicenter study comparing the Proseal and Classic laryngeal mask airway in anesthetized, nonparalyzed patients. Anesthesiology 2002 Feb 96(2):289-95.
15. Brimacombe JR, Berry A: The incidence of aspiration associated with the laryngeal mask airway: a meta-analysis of published literature. J Clin Anesth 1995 Jun 7 (4):297-305.
16. Farmery AD. Roe PG. A model to describe the rate of oxyhaemoglobin desaturation during apnoea. British Journal of Anaesthesia, 1996; 76:284-291