

Pre-procedure Evaluation – Predicting the Difficult Airway

It is an absolute necessity that airway problems are discovered before sedation is initiated. This requires that a certified practitioner who is knowledgeable perform a complete evaluation of the airway. A simple medical history and physical exam will often alert you to potential problems with intubation and airway management.

Medical History

Operations in and around the airway can produce distortion by either changing or removing normal anatomical landmarks. Recent surgery, trauma, tumor, and infection often produce edema or hematoma formation. These not only distort the landmarks but can cause airway obstruction. Nasal fractures often deviate the septum, causing a problem with nasal intubation. Past surgery or irradiation of the neck create scar tissue. This limits the range of motion of the larynx, fixing it in position. It can also limit the range of motion of the head and neck. Anything that alters anatomy or limits motion of the larynx or neck makes difficult intubation more likely.

Physical Signs

Short muscular neck – The larynx on these patients is often higher in the neck, opposite the fourth cervical vertebrae and higher. This makes it harder for the laryngoscope to push the tongue and epiglottis forward. Downward pressure on the vallecula often folds the epiglottis down, hiding the cords. This makes curved blades more difficult to use in these patients. The patient's teeth can be an added disadvantage because teeth limit your ability to maneuver the blade

Receding Chin – Patients with receding chins have hypoplastic or poorly developed mandibles. Again, there is less room to displace the tongue and epiglottis forward. Identify these patients by measuring the distance from the inside of the mandible to the hyoid bone with your fingertips. This distance is normally at least three fingers breadths in the adult (Fig. 1). Less than three is an indication patients extend their necks. A distance from the lower border of the mandible to the thyroid notch of less than 6 cm alerts you to potential problems.



Fig. 1 Measuring the distance from the mentum of the chin to the hyoid bone – 3 fingers breadth in the adult.

Patients with receding chins and those with short necks have a so-called “anterior larynx.” Their larynx isn’t more anterior in their neck when seen in profile. But when you try to view their larynx with the laryngoscope, the entire structure lies anterior to your field of view (Fig. 2). Since the larynx is higher in the neck, there is less room to displace the other structures forward to clear the path to the larynx. The larynx can be very hard to see. Sometimes you only see the arytenoids. At other times you can see no landmarks at all

Overbite – The presence of an overbite (the protrusion of the incisor teeth due to relative overgrowth of the premaxilla) hampers intubation. There is less room to maneuver your blade. The upper teeth simply gets in the way. In these patients it is especially important to lift the mandible and extend the head as much as possible. This prevents using the teeth as a fulcrum.

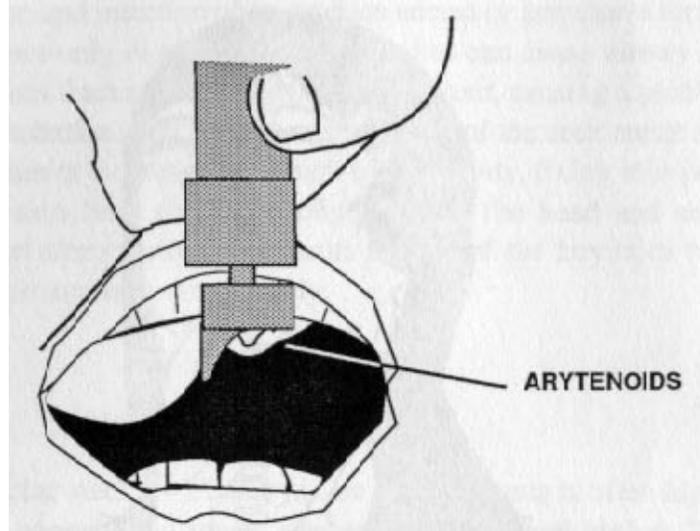


Fig 2. The view seen with an anterior larynx. Here you can see the arytenoids. Often you see no landmarks.

Limited Mobility of the Mandible – Opening the mouth requires two movements: opening the hinge joint on a vertical axis and then sliding the angle of the jaw forward. Check both since arthritis, scar tissue, and spasm of the masseter muscle can impair either movement. First check the patient's ability to open the mouth widely (Fig. 3). Normally adults can open the mouth at least three cm or about three fingers breadths. When a patient can't open that broadly, it impairs your ability to maneuver and to see. You may not be able to insert your blade at all. Second, check the ability to displace the mandible. Have the patient push his lower jaw forward to place his lower teeth in front of his upper teeth (Fig 4). If he ior she can't, you might not be able to pull the mandible forward far enough to see the larynx. Patients with temporomandibular joint arthritis frequently lose the forward glide of their jaw before they lose their ability to open their mouths.

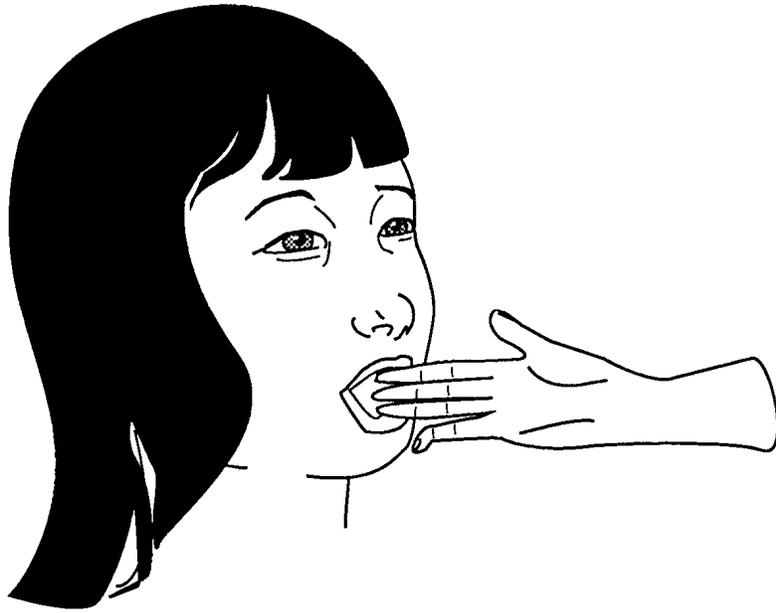


Fig. 3. Can the patient open his or her mouth wide enough for 3 fingers?



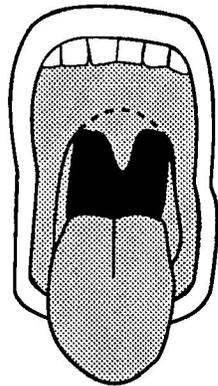
Fig. 4. Have the patients place their lower teeth outside their upper teeth to check for the ability of their jaw to glide forward.

Oral Cavity – There are a number of things to check here. First, look at the condition of the teeth. Notice teeth that are loose, chipped, or missing before you start. Look at the relative size of the tongue in relation to the rest of the mouth. Young children have relatively large tongues. Sometimes, patients with oral tumors or trauma have swollen or enlarged tongue. High arched palates with narrow mouths make passage of the tube difficult because the blade itself takes up so much room.

Finally, have the erect patient open his mouth as widely as possible and look at the posterior pharynx. You can use Mallampati's signs and classification to identify patients at risk for difficult intubation (Fig. 5). Visibility of intraoral structures correlates with ease of viewing with laryngoscope. Patients in categories I and II are low risk. Patients in category III and IV are at high risk for problems.

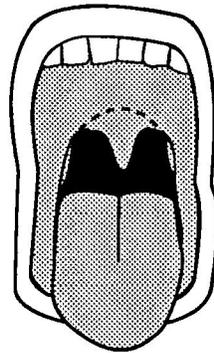
Flexion and extension of the Neck – Have the patient touch his chin to his chest (normal 45 degrees) and to both shoulders in turn (normal 40 degrees). Then have the patient extend his head back as far as possible years of age. Limited range of motion impairs your ability to bring the axes into alignment.

External larynx – Look at the trachea and the external laryngeal structures. Are they midline in the neck or deviated to one side? Tumor, trauma, hematoma, and scar tissue can deviate the trachea. Movement of the larynx from the midline makes identification of landmarks and alignment of axes more difficult. Place your hand over the larynx and gently move it from side to side. A larynx fixed to the midline by tumor or scar is often hard to lift with the laryngoscope. It looks anterior and is often very hard to see (Fig. 6).



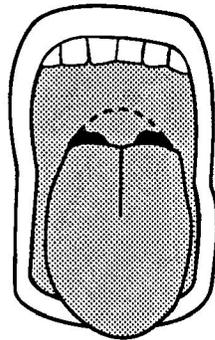
**Class I: soft palate, uvula,
fauces, pillars visible**

No difficulty



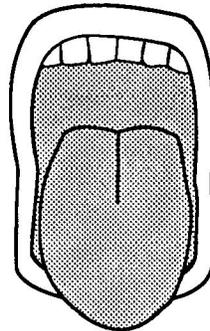
**Class II: soft palate, uvula,
fauces visible**

No difficulty



**Class III: soft palate, base
of uvula visible**

Moderate difficulty



**Class IV: hard palate
only visible**

Severe difficulty



Fig. 5 Mallampati Signs as indicators of difficulty of intubation. (Adapted from Mallampati and Samssoon and Young)

Vocal cords – Indirect exam of the vocal cords entails listening to the voice. The presence of hoarseness can mean edema, tumor, paralysis, or arthritis. All of the above imply and need for a smaller than average endotracheal tube.



Fig. 6 Gently move the larynx from side to side to check for masses and immobility.

Summary of Airway Evaluation

1. Medical History
2. Physical signs
 - a. Short muscular neck
 - b. Receding chin
 - c. Overbite
 - d. Limited mobility of the mandible
 - e. Oral cavity – Malocclusion signs
 - f. Flexion and extension of the neck
 - g. External larynx