

Prediction and Management of Difficult Airway

Essay

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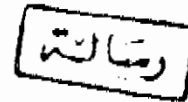
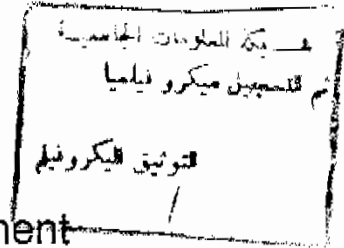
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Introduction

Introduction

Over the last three decades anesthesia-related mortality has probably declined but airway catastrophes continued to be well represented in all large series of anesthesia deaths. Perhaps this is not surprising since airway management is central to the practice of anesthesia, but it would indeed be pleasing to report that some new development had reduced the number (Wright and Major, 1992).

Tracheal intubation is a common procedure usually accomplished easily, but if the attempt proves unexpectedly difficult, the patient may be seriously at risk (McIntyre, 1987).

In any patient, the greater the degree of "difficulty" in maintaining airway patency, the greater the risk of brain damage or death thus it is always presumed that the anesthesiologist attempting to maintain airway patency is a fully trained one (Benumof, 1991).

The incidence of difficult intubation in anesthesia practice at teaching hospitals is estimated to be between 2% and 4%. No data exist about the incidence of difficult

intubation in the intensive care unit (Schwartz and Wiener-Kronish, 1991).

The incidence of failed intubation in parturients is estimated to be as frequent as 1 in 500 ; that of mortality is unknown (Davies et al., 1989).

Recently there has been increasing interest in the preoperative recognition of the patient who will be difficult to intubate with routine methods, and in the management of events that can be associated with a difficult intubation.

This essay discusses the normal anatomy of the upper airway as well as the abnormal anatomy presenting in various syndromes associated with difficult airway management. Prediction of the difficult airway as well the different protocols recommended for its management are also discussed.

Chapter 1

*Anatomy of Normal Upper Airway and
Anatomical Factors in Difficult Direct
Laryngoscopy*

Anatomy of Normal Upper Airway and Anatomical Factors in Difficult Direct Laryngoscopy

A- Upper Airway Anatomy

The Mouth

The mouth is anatomically divided into the vestibule and the mouth cavity. The vestibule is the area between the gums and teeth inside, the lips and cheeks outside. The mouth cavity is bounded by the alveolar arch and teeth in front, the hard and soft palate above, the anterior two-thirds of the tongue and the reflection of its mucosa forward onto the mandible below, and the oropharyngeal isthmus behind (fig. 1).

The tongue is a muscular organ with a large blood supply and is attached to the hyoid bone, styloid process and the back of the mandible. The mucous membrane covering the dorsal surface is thickened posteriorly forming three folds. In the midline the tongue is attached to the epiglottis by the glossoepiglottic fold, laterally the mucous membrane combines with the pharyngeal mucous membrane to form the pharyngoepiglottic folds. Between these three folds are two similar depressions

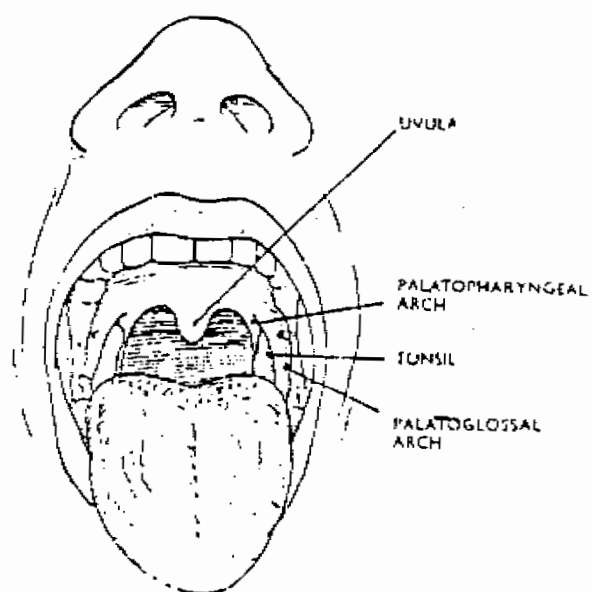


Fig. 1: View of open mouth with tongue depressed.
(Quoted from Ellis and Feldman, 1983).

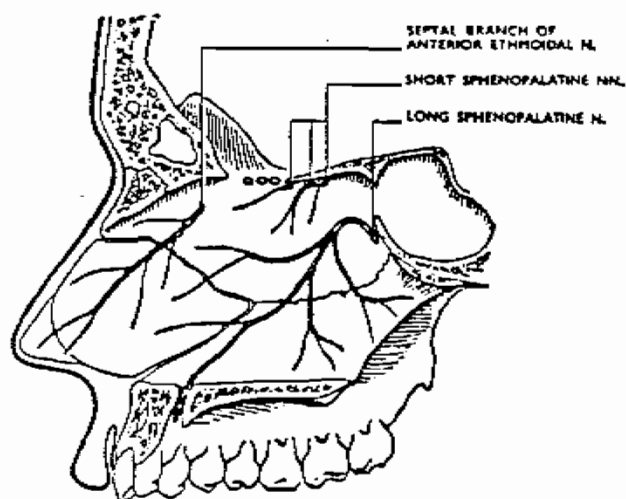
called the valleculae .

The tip of the soft palate, the uvula, hangs freely in the midline and is important landmark during intubation . Occasionally, the uvula becomes very swollen and can cause difficulty with nasal or oral intubation .

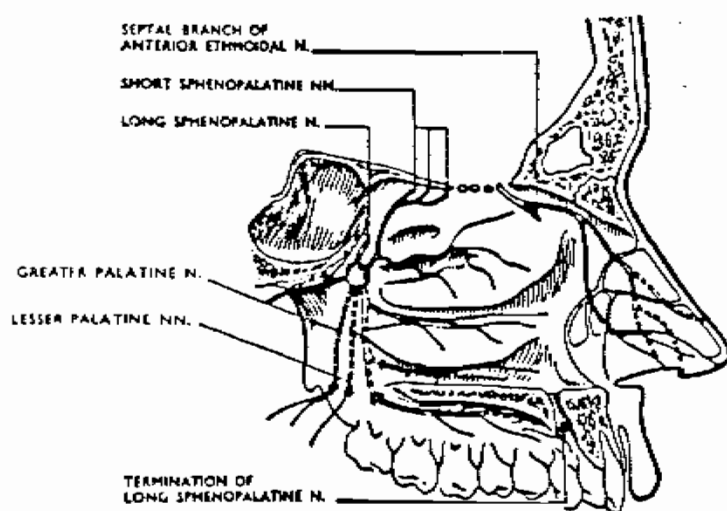
The mouth cavity communicates with the oropharynx through the oropharyngeal isthmus . There are two structures of importance in this area, the tonsils and the tip of the epiglottis . The tonsils are lymphoid tissue and are embedded between two folds of mucous membrane, palatoglossal arch (anterior pillar) and palatopharyngeal arch (posterior pillar) . The tonsils rarely cause difficulty with intubation unless they are considerably enlarged .

The Nose

The nose is anatomically divided into the external nose and the nasal cavity; the external nose is formed by a framework of nasal bones in the upper part and nasal cartilages in the lower part . The external nares tend to be oval and their shape is used as a guide in selecting an appropriately sized nasotracheal tube . The nasal cavity is subdivided by the nasal septum into two separate compartments which open to the exterior by the



(A)



(B)

Fig. 2: A- Nerve supply to the medial wall of nasal cavity.
 B- Nerve supply to the lateral wall of nasal cavity.
 (Quoted from Ellis and Feldman, 1983).

walls are mainly derived from the constrictor muscles and fibrous tissue covered by a layer of mucous membrane .

The constrictor muscles are attached above around the base of the skull and below in a wide fan-like manner to the mandible, hyoid bone and the larynx . Their nerve supply is mainly derived from the vagal and glossopharyngeal nerves .

Anatomically, the pharynx is subdivided into three main parts : The oropharynx which lies behind the oral cavity , the nasopharynx which lies behind the nasal cavity and the laryngopharynx which lies behind the larynx and contains the inlet of the larynx and pyriform fossa on each side of it, through which run the right and left superior laryngeal nerves (Last, 1984) .

The Larynx

The larynx is a box like structure anterior to the bodies of the 4th , 5th and 6th cervical vertebrae . The upper border boundary is somewhat higher (between C3 and C4) in infants . It has also greater inclination in infants, so backward pressure on the neck brings the larynx into view , facilitating intubation (fig. 3) .

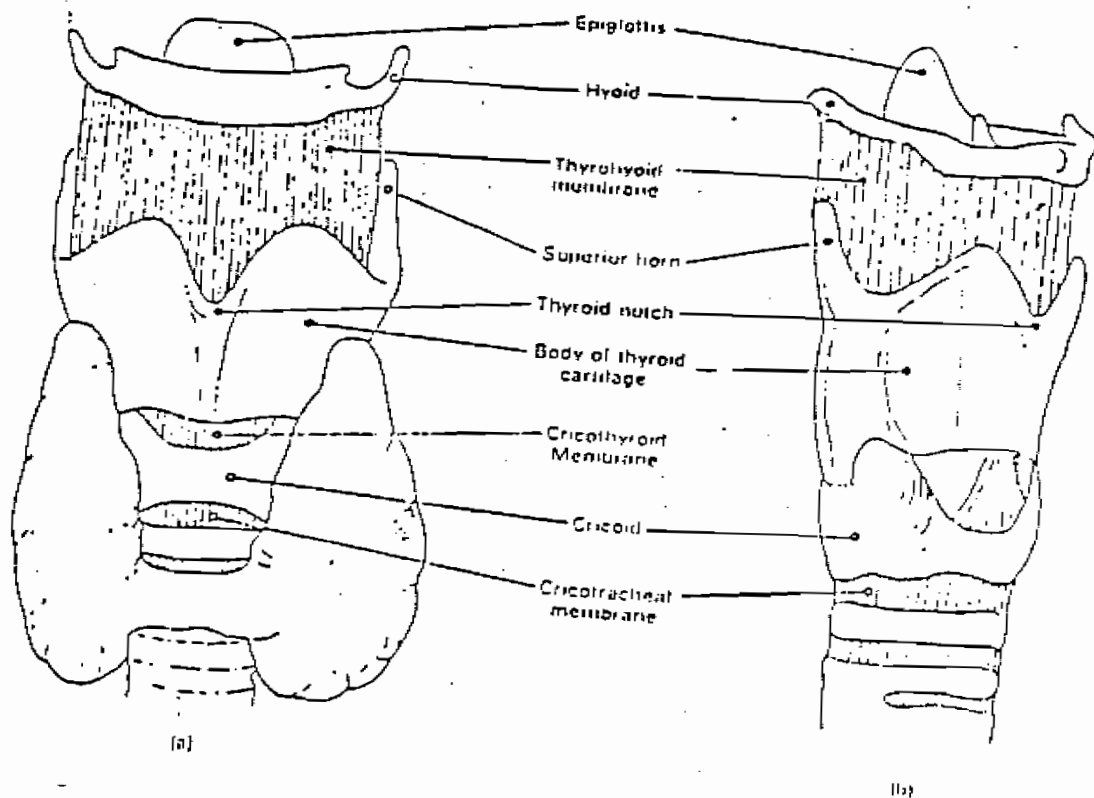


Fig. 3: (a) Anterior and (b) lateral views of larynx.
 (Quoted from Ellis and Feldman. 1983).

Its primary function is to guard the entrance to the respiratory tract . Structurally, the larynx is composed of nine articulating cartilages, three of which are paired (arytenoid, corniculate, and cuneiform cartilages) and three of which are unpaired (thyroid, cricoid and epiglottic cartilages) .

The major skeleton of the larynx is formed anteriorly by the thyroid cartilage, and the posterior wall consists of the arytenoid and cricoid cartilages. The two laminae of the thyroid cartilage meet in the midline forming the thyroid notch . The upper border of this fusion projects forward as the laryngeal prominence, identifying the position of the larynx.

The cricoid cartilage is a complete ring with its broad aspect posteriorly. In children less than 10 years old, the narrowest part of the larynx is usually at the cricoid cartilage and consequently determines the size of the tracheal tube. Naturally, edema of the mucosal surface of the larynx can reduce the airway diameter considerably.

The arytenoid cartilages are pyramidal in shape. They articulate with the cricoid cartilage forming synovial joints. These may become involved in the general process of rheumatoid arthritis, which could cause hoarseness and