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ADEQUACY OF VENTILATION DURING GENERAL ANESTHESIA IN SPONTANEOUSLY BREATHING ANESTHETIZED PATIENTS USING A CUFFED OROPHARYNGEAL AIRWAY OR LARYNGEAL MASK AIRWAY

Thesis

Submitted in Partial Fullfilment for the Master Degree in Anesthesiology

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INTRODUCTION

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The cuffed oropharyngeal airway (COPA) is a new airway device which is being introduced into clinical practice. It is an oral airway with a cuff to seal the pharynx and lift the tongue. It can also be connected directly to anesthesia breathing circuit. It is similar to laryngeal mask airway (LMA), in that it is designed for the use in spontaneously breathing patient and enable anesthetists to avoid tracheal intubation. The advantage of COPA, LMA may be that placement is easier to learn, less traumatic and less stimulating ***(Nakata et al.,1998).***

During general anesthesia, end tidal carbon dioxide partial pressure is used widely as an indicator of arterial carbon dioxide partial pressure and hence adequacy of ventilation ***(Hicks et al.,1993)***.

REVIEW

OF

LITERATURE

REVIEW OF LITERATURE

The major responsibility of the anesthesiologist towards the patients is the provision of adequate respiration. The most vital element in providing functional respiration is the airway. So, no anesthetic is safe unless diligent efforts are devoted to maintaining an intact functional airway.

Functional anatomy of the airway

The air passages starting from the nose and ending at the bronchioles are vital to the delivery of respiratory gas to and from the alveoli. During anesthesia, the anesthesiologist uses these air passages to deliver the anesthetic gases to the alveoli while, at the same time, maintaining vital respiratory gas transport. To accomplish proper airway management, the anesthesiologists often gain access to the airways by means of an endotracheal tube or other devices that are directly introducted into the patient's upper or lower air passages.

For the purpose of description, the airway is divided into the upper airway, which extends from the nose to the glottis, and the lower airway, which includes the trachea, the bronchi, and the subdivisions of the bronchi. The airways also serve other important functions such as olfaction, deglutition, and phonation ***(Reznik, 1990)***.

Nose (Fig. 1):

The airway functionally begins at the nares and the mouth where air first enters the body. During exercise or respiratory distress, mouth breathing occurs to facilitate decreased airway resistance and increased airflow.

The nose serves two functions: respiratory and olfactory. In the adult human, the two nasal fossae extend 10 to 14cm from the nostrils to the nasopharynx. The two fossae are divided mainly by a midline quadrilateral cartilaginous septum together with the two extreme medial portions of the lateral cartilages. Each fossa is convoluted and provides approximately $60cm^2$ surface area per side for warming and humidifying the inspired air. The nasal fossa is bounded laterally by inferior, middle, and superior turbinate bones (conchae), which divide the fossa into scroll-like spaces called the inferior, middle, and superior meatuses. The inferior turbinate usually limits the size of the nasotracheal tube that can be passed through the nose. The vascular mucous membrane overlying the turbinates can be damaged easily, leading to profuse hemorrhage ***(Roberts and Pino, 1994)***.

The olfactory portion of the nasal fossa consists of the middle and upper septum and the superior turbinate bone; the respiratory portion consists of the rest of the nasal fossa. The respiratory mucous membrane consists of ciliated columnar cells and the goblet cells. The olfactory mucous membrane contains the nonciliated supporting cells and the olfactory cells. The olfactory cells have specialized hairlike processes, called the olfactory hair, innervated by the olfactory nerve. The nonolfactory sensory nerve supply to the nasal mucosa is derived from the first two divisions of the trigeminal nerve. The parasympathetic autonomic nerves reach the mucosa from the facial nerve after relay through the sphenopalatine ganglion, and sympatheitc fibers are derived from the plexus surrounding the internal carotid artery via the vidian nerve ***(Linton, 1984)***.

A series of complex autonomic reflexes controls the blood supply to the nasal mucosa and allows it to shrink and swell quickly. Reflex arcs also connect this area with other parts of the body.

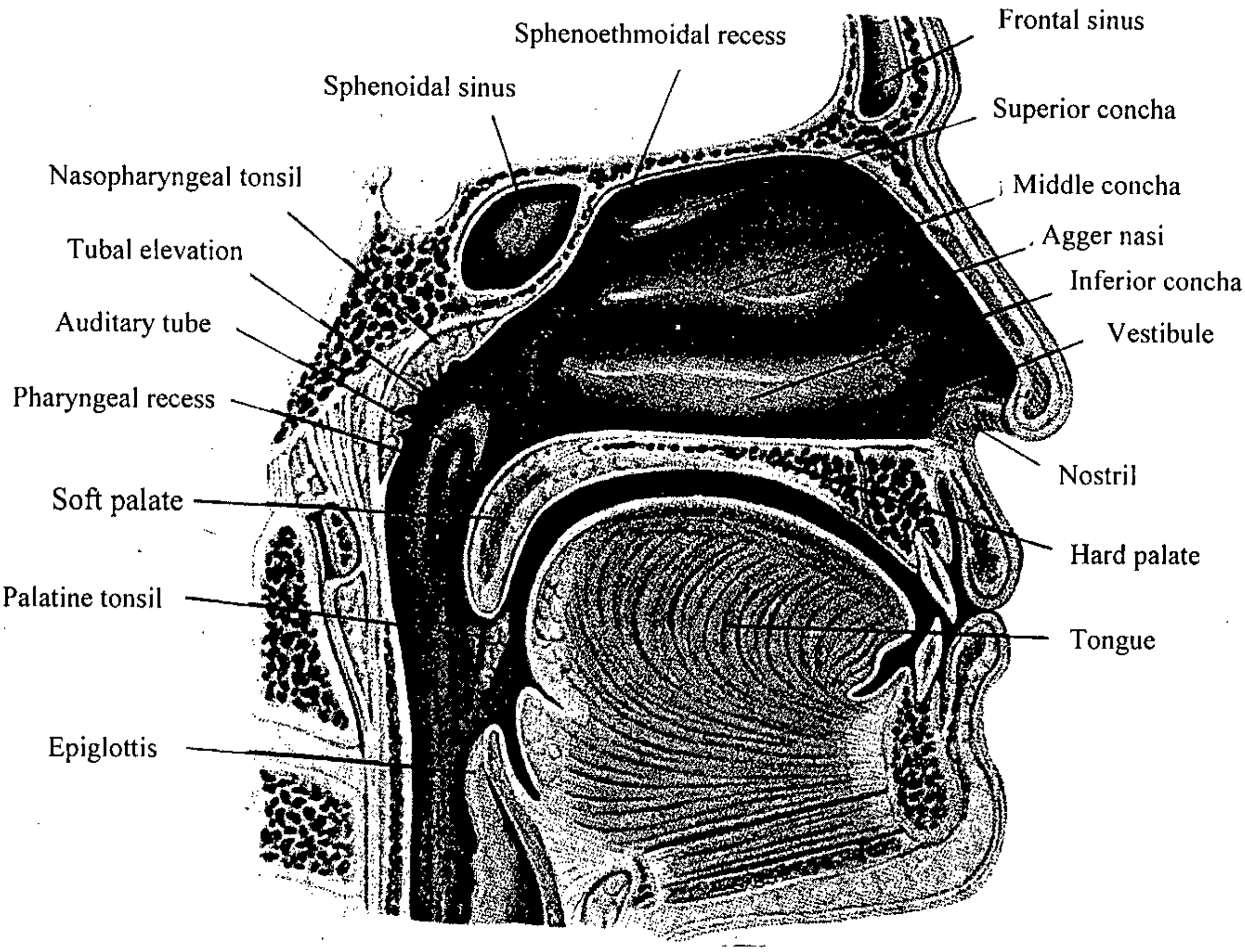

Fig. (1): Latteral view of the nasal cavity

Pharynx (Fig. 2):

The pharyngeal airway extends from the posterior aspect of the nose down to the cricoid cartilage, where the passage continues as the esophagus. An upper area, the nasopharynx. Lies posterior to the termination of the turbinates and nasal septum and extends to the soft palate. The eustachian tubes open into the lateral walls of the nasopharynx. The oropharynx starts below the soft palate and extends to the hyoid bone. In the lateral walls of the oropharynx are situated the tonsillar pillars of the fauces. The anterior pillar contains the glossopharyngeus muscle and the posterior pillar, the palatoglossus muscle. The hypopharynx lies behind the larynx and is also called the laryngopharynx. The pharynx is surrounded by two layers of muscles, an external and an internal. The stylopharyngeus, the salpingopharyngeus, and the palatopharyngeus form the internal layer. They elevate the pharynx during deglutition. The superior, middle, and inferior constrictors form the external layer, and they advance the food into the esophagus ***(Raberts, 1983)***.

The constrictors are innervated by filaments arising out of the pharyngeal plexus (formed by motor and sensory branches from the vagus and the glossopharyngeal nerves). The inferior constrictor is additionally innervated by branches from recurrent laryngeal and external laryngeal nerves. The internal layer is innervated by the glossopharyngeal nerve.