PERIOPERATIVE SURGICAL EMPHYSEMA

Essay

Submitted for Partial Fulfillment of Master Degree in Anesthesia

By

Sherif Ibrahim El-Gohary Mahmoud
M.B.,B.Ch,
Faculty of Medicine
Ain Shams University

Supervised by

Prof. Dr. Sherif Wadie Nashed
Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Ahmed Ali Fawaz
Assistant Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Mayar Hassan El-Sersi
Lecturer of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2012

النُفــاخ الجراحــى المحيـط بالجراحـــة

رساله

توطئة للحصول علي درجة الماجستير في التخدير

مقدمة من

الطبيب / شريف ابراهيم الجوهري
بكالوريس الطب و الجراحة العامة
كليه الطب- جامعة عين شمس

تحت إشراف

أ.د/ شريف وديع ناشد
أستاذ التخدير و الرعاية المركزة
كليه الطب جامعة عين شمس

د/ أحمد علي فواز
أستاذ مساعد التخدير و الرعاية المركزة
كليه الطب جامعة عين شمس

د/ مايار حسن السرسي
مدرس التخدير و الرعاية المركزة
كليه الطب جامعة عين شمس

كليـة الطـب
جامعة عين شمس
2011

INTRODUCTION

The Ultimate Goals of preoperative medical assessment of patients undergoing anesthetic care are to reduce the morbidity of surgery, to increase the quality of perioperative care, and to return the patient to desirable functionality as quickly as possible. Traditionally, these goals have been facilitated by a preoperative meeting between the patient and the anesthesiologist ***(Egbert et al., 1963).***

Surgical emphysema describes the presence of gas in subcutaneous tissue. It has several known causes, among them anerobic infections, traumatic disruption of mucosal surfaces and alveolar rupture. Diagnosis is characterized by the presence of crepitation on palpation over the affected area and radiographic evidence of gas in the subcutaneous tissues. The pathogenesis relates to the tracking of gas along fascial planes into the subcutaneous space of the neck, chest or extremities. Therapy of surgical emphysema itself is generally supportive and involves the treatment of the underlying condition as surgical emphysema is usually self-limited and benign. However the appearance of surgical emphysema often warrants a search for more serious underlying pathology such as pneumothorax, pneumomediastinum, or tracheobronchial or esophageal disruption ***(Beck et al., 2002).***

AIM OF THE WORK

This study review current literature related to surgical emphysema. It discusses a framework for preoperative evaluation and conditions related to surgical emphysema that can be affected by anesthesia as well as surgery. It focuses on preoperative anesthetic management of patients with surgical emphysema using updated guidelines & recommendations.

ANATOMY OF UPPER AIRWAY

The upper airway consists of passages extending from the interior nares down to the larynx and including the larynx.

The Nose:

The nose divided anatomically into the external nose and nasal cavity.

The external nose:

Is formed by an upper framework of bone, series of cartilage in the lower part, and a small zone of fibrofatty tissues forms the lateral margin of the nostril. The cartilage of the nasal septum comprises the central support of this framework.

The nasal cavity:

It's subdivided by the nasal septum into two separate compartments, which open to the exterior by the nares and into the nasopharynx by the posterior nasal apertures.

Immediately within the nares is the vestibule, which is a small dilatation lined in its lower part by stiff, straight hair.

The Septum is frequently deviated from the midline, so that one nasal cavity is greater in size than the other. If nasal polypi are present, they may cause obstruction and difficulty with instrumentation. Each side of the nose if formed of a roof, floor, medical and lateral wall.

-The Roof:

At first slopes upward backward to form the bridge of the nose (nasal and frontal bones) then has a horizontal part (cribriform plate of ethmoid), and finally a downward slopping segment (The body of the sphenoid)

-The floor:

Concave from side to side and from backward.

It's formed by the palatine process of the maxilla and the horizontal plate of palatine bone.

-The medial wall:

Is the nasal septum, formed by the septal cartilage perpendicular plate of ethmoid and the vomer.

-The lateral wall:

It has a bony framework made up to the nasal aspect of the ethmoid labyrinth above, the nasal surface of the maxilla below and in front, and the perpendicular plate of the palatine bone. This is supplemented by the three turbinate bones, each arching over a meatus. The major nasal air passage lies beneath the inferior turbinate. Occasionally, the posterior end of the inferior turbinate may be hypertrophied and may offer resistance to the passage of the nasal tube ***(Ellis and Feldman, 2002).***

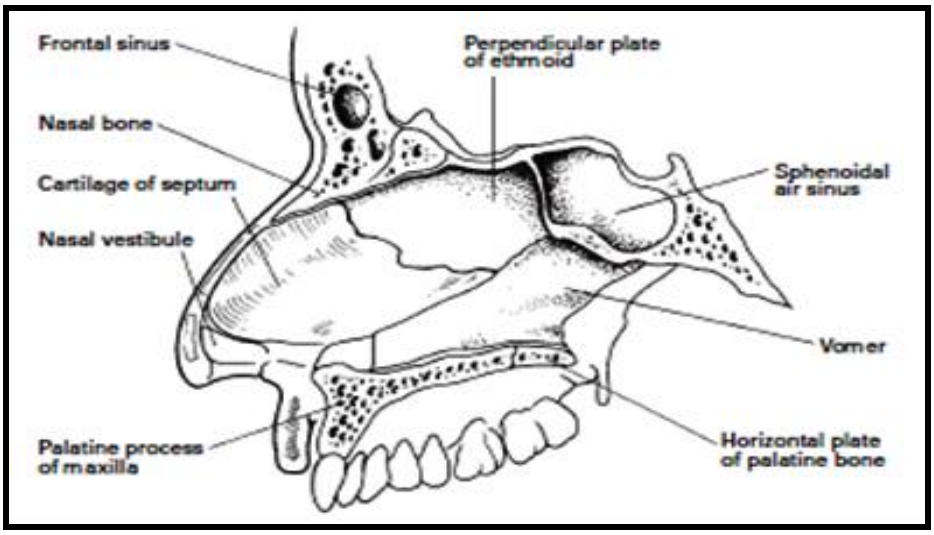

Fig. (1): Asagittal section showing nasal septum

(Ellis and Feldman, 2002)

Blood supply of the nose:

Blood supply to the nose is by both internal and external carotid arteries. The anterior and posterior ethmoidal arteries are branches of the ophthalmic artery, which in turn is a branch of the internal carotid artery, and supply the superior part of the nose. Branches from the external carotid artery, chiefly the maxillary artery, supply the remainder of the nose. Little's area (Kiesselbach's plexus) is an area where several vessels anastomose on the anterior septum. It is a frequent site of epistaxis.

Venous drainage of the nose is to the ophthalmic and facial veins and the pterygoid and pharyngeal plexuses. Venous drainage is, therefore, both intracranial and extracranial ***(Rajagopal and Paul, 2005).***

The Mouth:

The mouth is made up of 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 reflection of its mucosa forward into the mandible below, and the oropharyngeal isthmus behind ***(Ellis and Feldman, 2002).***

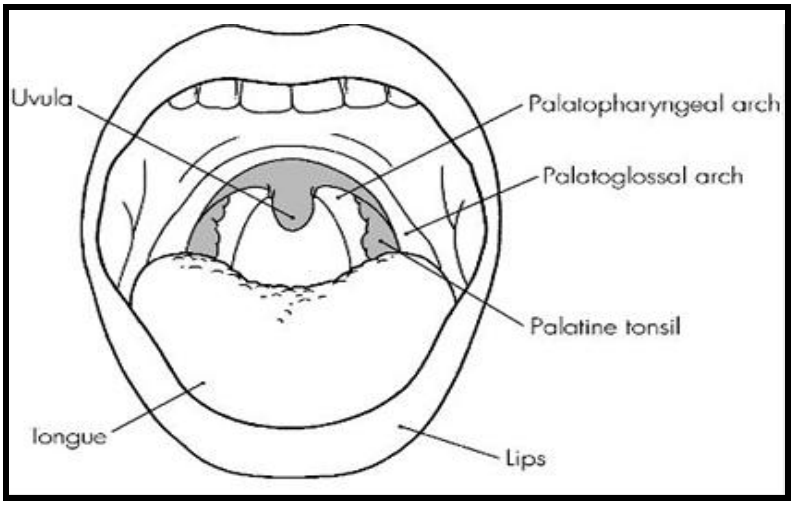

Fig. (2): Anterior view of the mouth
(***Ellis and Feldman, 2002)***

The palate:

Hard palate: it is made of the palatine process of the maxilla and the horizontal plates of the palatine bones. The mucous membrane covering is closely connected to the underlying periosteum (mucoperiosteum).

Soft palate: the soft palate hangs like a curtain suspended from the posterior edge of the hard palate. It's free end bears the uvula centrally and blends on either side with pharyngeal wall. Muscles of the soft palate are five in number ***(Ellis and Feldman, 2002).***

- ***Tensor palate*:** its action is to tighten and flatten the soft palate, pulls upon the cartilage of Eustachian tube and opens it.
- ***Levator palate:*** its contraction pulls the palate upwards and backwards and the nasopharynx is shut off from the oropharynx.
- ***Palatoglossus:*** Its action is sphincteric at the oropharyngeal isthmus; it raises the tongue and narrows the transverse diameter of the isthmus.
- ***Platopharyngeus:*** It is an elevator of the larynx and pharynx, it arches the relaxed palate, making it more concave on its oral surface.
- ***Musculus uvulae:*** Injury to the cranial root of the accessory nerve, which supplies this muscle via vagus nerve, results in the uvula becoming drawn across and upwards towards the opposite side

(Last, 1992).

The pharynx:

The pharynx is a wide muscular tub, which forms the common upper pathway of the respiratory and alimentary tracts. Anteriorly it is in free communication with the nasal cavity, the

mouth, and the larynx. Divided into 3 parts, naso, oro, and laryngeopharynx. Posteriorily, it rests against the cervical vertebrae and the paravertebral fascia. It extends from the base of the skull down to the sixth cervical vertebra, where it becomes continuous with the oesophagus. Anatomically the pharynx is subdivided into three main parts; *the nasopharynx*, *the oropharynx*, and *the laryngeopharynx* ***(Ellis and Feldman, 2002).***

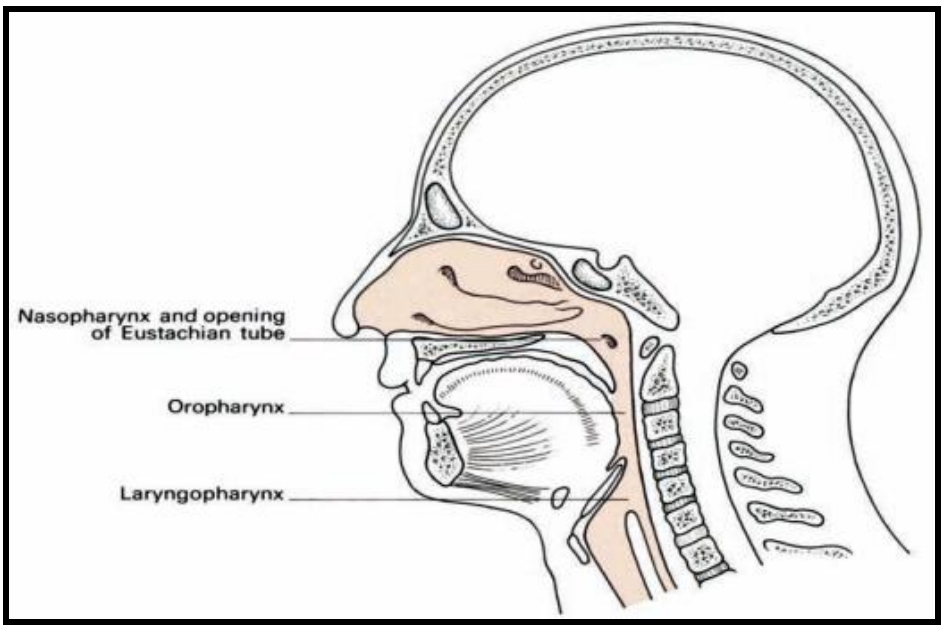

Fig. (3): Asagittal section through the head and neck to show the subdivisions of the pharynx ***(Ellis & Feldman, 2002).***

-The nasopharynx:

Lie behind the nasal cavity and above the soft palate. It communicates with the oropharynx through the pharyngeal isthmus. The nasopharyngeal tonsil (adenoids) lies on the roof and the posterior wall of the nasopharynx, when attempting to pass a

nasotracheal tube the adenoids may prevent passage, become dislodged, obstruct the lumen of the tube, or cause sever bleeding. So adenoids hypertrophy is a relative contraindication to nasal intubation ***(Ellis and Feldman, 2002)***

-The oropharynx:

The mouth cavity leads to the oropharynx through the oropharyngeal isthmus. The oropharynx extends from the soft palate to the tip of the epiglottis. Its most important features are the tonsils.

-The laryngeopharynx:

It extends from tip of the epiglottis to the lower border of the cricoid at the level of C6. Its anterior aspect faces first the laryngeal inlet. The larynx bulges back into the center of the laryngopharynx, leaving recesses on either side termed the pyriform fossa, through which runs the right and left superior laryngeal nerves, local solutions applied to the surface of the pyriform fossa will produce anaesthesia of the larynx above the vocal folds which is useful to for laryngoscopy and bronchoscopy ***(Ellis and Feldman, 2002)***..

Nerve Supply:

The pharyngeal plexus supplies sensory, motor and autonomic nerves. Sensory fibres pass principally in the glossopharyngeal nerve which also carries taste sensation from the posterior third of the tongue. Motor supply arises mainly from the vagus nerve ***(Aitkenhead et al., 2003).***

Anaesthesia of oro-and nasopharynx is best obtained by means of topically applied solution of local anaesthesia (e.g. 10ml of 1 or 2% lignocaine). These solutions may be sprayed on the posterior and lateral wall of the pharynx. Alternatively, good anaesthesia can be obtained by gargling with lignocaine viscous (2% lignocaine viscous) ***(Ellis and Feldman, 2002).***

When a patient is anaesthetized in the supine position, the airway may become obstructed as a result of relaxation of the jaw muscles and falling of the tongue to obstruct the oropharynx (***Nandi et al., 1991).***

The Larynx:

The larynx is the continuation of the airway from the laryngopharynx to the trachea. The cavity of the larynx extends from its inlet to the lower border of cricoid cartilage. In men its length is 45 mm, and its anteroposterior diameter 35 mm; in females these measures are 35, And 25mm respectively (***Aitkenhead et al., 2003).***

The skeleton of the larynx is formed of catilages, ligament and muscles.

The laryngeal cartilages:

The principles are thyroid, cricoid and the paired arytenoid, together with the epiglottis, in addition, to the small corniculate and

cuneiform cartilages. The thyroid cartilage: is shield like cartilage, consists of two laminae which meet in the midline inferiorly, leaving the thyroid notch between them above. The epiglottis: is like a leaf attached at its lower tapering end to the back of the thyroid cartilage by means of the thyro-epiglottic ligament. The corniculate cartilage: is a flake of cartilage within the margin of the ary-epiglotic fold ***(Ellis and Feldman, 2002).***

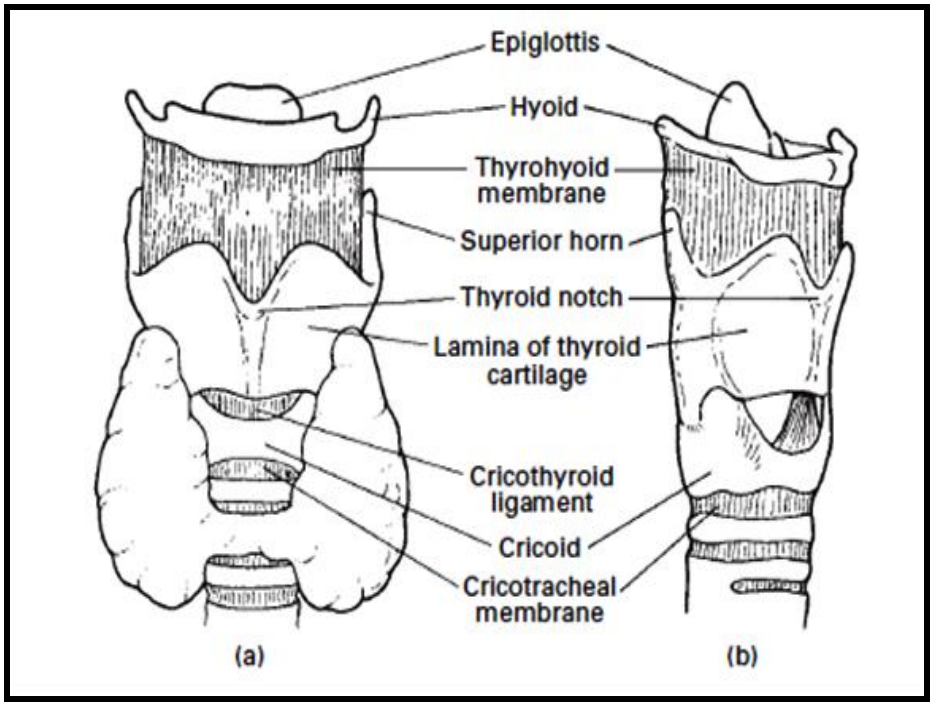

Fig. (4): External view of the larynx: (a) anterior aspect; (b) anterolateral aspect ***(Wiliams, 1995).***

The laryngeal ligaments:

The laryngeal ligaments can be divided into the extrinsic and the intrinsic ligaments.

1- Extrinsic ligaments:

- Sternothyroid
- Thyrohyoid
- Inferior constrictor

2- Intrinsic ligaments:

- Posterior crico-arytenoid
- Lateral crico-arytenoid
- Interarytenoid (unpaired)
- Thyro-arytenoid
- Vocalis
- Cricothyroid.

(Andreas, 2001).

The muscles of the larynx:

-The extrinsic muscles:

These are muscles, which attach the larynx to the surrounding. They are two muscles.

1- The sternohyoid muscle, which is supplied by ansahypoglossi nerve.

2- The thyrohyoid muscle which is supplied by C1 through hypoglossal nerve. It elevates the larynx.

-The intrinsic muscles:

They are the posterior and lateral cricoarytenoids, the interarytenoid, the aryepiglottic, the thyro-epiglottic, the vocalis and the circothyroid muscles.

Action of the intrinsic muscles:

- Abductors of the fold: posterior cricoarytenoid.
- Adductors of the folds: lateral cricoarytenoid, interarytenoid.
- Sphincters to the vestibule: Aryepiglottic, thyroepiglottic
- Regulation of the fold tension: cricothyroids (tensor); thyroarytenoids (relaxors); and vocalis (fine adjustment).

(Ellis and Feldman, 2002).

Nerve supply of the Larynx:

a. Superior laryngeal nerve (internal division) supplies the epiglottis, base of the tongue, supraglottic mucous, thyroepiglottic joint, and cricothyroid joint.

b. Superior laryngeal nerve (external division) gives sensory supply to anterior subglottic mucosa and motor to cricothyroid muscle (adductor, tensor).

c. Recurrent laryngeal nerve gives sensory innervation to the subglottic mucosa and muscle spindles, and motor innervation to thyroarytenoid, lateral cricoarytenoid, interarytenoids and posterior cricoarytenoid.

(Rajagopal and Paul, 2005).