

THORACIC SURGERY

INTRODUCTION:-

Thoracic surgery focuses primarily on the organs that support the delicate consequence of events that move air to blood and blood to tissues.

The cardio-respiratory system functions to ensure that those events occur dependably. the margins of errors being extremely small. The analysis and management

of surgical problems involving the chest and its contents whether relating to congenital anomalies, tumors, trauma or infection.

Air pass through upper air way , trachea , and the bronchi to reach the alveoli , the

alveolar membrane must allow efficient diffusion of oxygen and carbon dioxide .

Blood with sufficient oxygen carrying capacity (RBC) must circulate through the

alveolar capillaries in adequate volumes and at proper speed to take up O₂ and discharge CO₂.

THE early history of thoracic surgery was limited to the management of trauma and

was closely related to the history of weaponry.

The development of elective thoracic surgery closely followed the history of air way

management particularly the TRACHEAL intubation and MECHANICAL ventilation..

ANATOMY OF THORAX AND PLEURA:-

Thoracic diseases often can be localized by physical examination to underlying anatomy

because the bony parts of the thorax are palpable and cardiac and breath sounds are transmitted through the chest wall.

Chest wall is conical in shape tapering sharply in the upper chest.

The lung apices rise well above the clavicle anteriorly and scapula posteriorly, the diaphragm rises as high as the level of the nipple, and the upper part of abdomen including the liver, spleen, stomach, distal pancreas and kidneys is overlapped by 6-10 anterior ribs and the lower four posterior ribs, these easily overlooked facts can lead to serious errors in patient management regarding penetrating trauma..

The framework of the thoracic cage composed of sternum, 12 pairs of ribs, 12 thoracic vertebrae. The thoracic inlet has a rigid structural ring formed by the sternal manubrium, the short semicircular first rib and the vertebral column as a result of its articulation with the manubrium and the attachment of the costoclavicular ligament, the clavicle helps to protect the subclavian vessels and brachial plexus which traverse the thoracic inlet.

the same rigidity that provides protection from trauma leaves little room for pathologic swelling, enlarging masses, or age related postural adjustment.

The cartilage of the first six ribs have separate articulation with the sternum (true ribs) the cartilage of the seventh through the tenth ribs fused to form the costal margin before attaching to the lower margin of the sternum

Since there is significant flexibility of the chest wall in children, serious trauma can be transmitted to intra thoracic structures with little injury to the body framework.

Although this flexibility decreases with age surprising damage can occur occasionally in the chest of adults without evidence of skeletal injury.

The pectoralis major and minor muscles are the principle muscles of the anterior thorax. The lower margin of pectoralis fold forms the anterior axillary fold.

Auscultation of the chest in the axilla often allows best determination of the breath sounds. The latissimus dorsi and teres major muscles form the posterior axillary fold.

the sternal angle is easily palpated and allows quick identification of second rib which articulates with the sternum at this angle.

In upright person this plane pass between 4th to 5th thoracic vertebra, tracheal bifurcation and the arch is higher to this plane.

The pleura is a serous membrane of flat mesothelial cells overlying a thin layer of connective tissue, it is of two types that cover the lung referred as visceral pleura and it is continuous over the pulmonary hilus and the mediastinum with the parietal pleura which enclose the interior of the chest cavity.

The pleural space contains few amount of fluid which is a continuous process of secretion and absorption, it decreases the friction between the two surfaces, the pleural space is in negative pressure, when any injury that disturbs this closed sac air may enter leading to (pneumothorax).

There is no communication between the pleural cavities, but the anteromedial borders of the two pleural sacs come nearly into apposition behind the sternum.

Parietal pleura is sensitive to stretching (pain) while visceral pleura is insensitive to pain.

The structures occupying the intercostal space include three layers of muscles, intercostal neurovascular bundle which is located deep to the external and internal muscles and these structures protected by the lower border of the ribs so during any procedure avoiding this area to avoid injury to these structures.

There is significant overlap of neural supply to each interspace and complete anaesthesia in an interspace will not occur unless the intercostal nerve above and below the space are anaesthetized.

To minimize the risk of lacerating intercostal artery thoracocentesis needle should be passed across of the top of the lower rib of selected space.

A musculofibrous floor of the thorax provided by the diaphragm. peripheral muscular portion of the diaphragm arise from the lower six ribs and costal cartilages, from lumbar vertebrae and from lumbosacral arches and xiphisternum.

All muscle fibers converge into central tendon. of the three major openings of diaphragm the aortic hiatus located posteriorly and aorta, azygos vein and thoracic duct pass. The esophagus hiatus carry esophagus and vagus nerves

Endoscopic procedures :-

Endoscopy is procedure used to visualized the internal organs through natural or artificial orifices.

ESOPHAGOSCOPY:-the first esophagoscopy procedure is done in 1868by Kassmaul using 13 mm metallic tube ,fiber optic esophagoscopy interduced in 1958.the indication are both diagnostic and therapeutic indication:-

- 1-Dysphagia &Odenophagia.
- 2-reflux esophagitis .
- 3-truama.
- 4-Tumor staging &screening .
- 5-Upper GIT bleeding.
- 6-Removal of foreign body in the esophagus.
- 7-Follow-up of previously found polyp,tumor or ulcer.

The flexible esophagoscopy (OGD)can be done under local anesthesia at the O.P department,left lateral position with the head flexed,bite block is placed in the mouth to protect the scope from the teeth.

During insertion of the OGD there are 4normal endo luminal landmarks:-

A-upper esophageal sphincter or crico-pharyngeal opening(15cm).

B-aortic arch indentation at the left antero-lateral wall.

C-left arium indentation is wave like pulsation anteriorly.

D-lower esophageal sphincter which is seen by ask the atient to do valsalva maneuver.

Rigid esophagoscopy is rarely used reserved now for three main condition these are trauma,F.Bremoval and food impaction removal ,placement of tubes and stents.

ENDOSCOPIC ACCESSORIES:- are tools used with the procedures to get maximum information :-

- 1-Brushing for cytological examination.
- 2-Biopsy for histopathological examination.
- 3-Endoscopic U/S.
- 4-LASER THERAPY ,CRYOTHERAPY.

BRONCHOSCOPY:-

An endoscopic procedure which provides direct access to the tracheo-bronchial tree, and play essential role in diagnosis and treatment of chest conditions.

Two types of bronchoscopy are available (flexible and rigid), the procedure can be used for diagnostic and therapeutic purposes or both at the same section.

DIAGNOSTIC INDICATIONS:-

Persistent cough, Hemoptysis, localized lung lesion, Abnormal chest radiography, suspected tumor of the lung, follow-up of chest disease.

THERAPEUTIC INDICATIONS:-

Removal of foreign bodies of tracheo-bronchial tree, post operative atelectasis, transbronchial drainage of lung abscess, brachytherapy, placement of endotracheal tubes, opening of narrowed tracheal stenosis and localized management of tumor with phototherapy, laser therapy or cryotherapy.

RIGID BRONCHOSCOPY

Done less frequently than flexible type, it is a metal tube of different size introduced under GA, need ventilator and muscle relaxant. It is more valuable in removal of FB, secretions and control of bleeding but still needs GA. It is disadvantages that also poor visualization of distal bronchi, inability to instrumentation and vision at the same time with ventilation.

FLEXIBLE BRONCHOSCOPY

COMPOSED OF fiber optic bundles which provides both illumination and visualization pathways.

Small channel with diameter 1-3mm traverses the fiber optic scope through which instrument or suction can be used.

Most of diagnostic procedures are done using this flexible type, it needs only topical anesthesia (awake patient) at O.P room which equipped by monitor for reading BP, PR, Pulse oxymeter.

Trans-nasal approach in awake patient commonly used viewing nasal and upper air way passages then pass through the vocal cords, tracheal

searching for luminal irregularity carina should be sharp bifurcation ,any fullness of carina should alert adenopathy or mass.

Systematic examination of the tracheo-bronchial tree to segmental or subsegmental bronchioles and taking specimens like wash, lavage,brush, biopsy..

CONTRA-INDICATION

NO ABSOLUTE CONTRA-INDICATIONS FOR BRONCHOSCOPY ONLY RELATIVE CONDITIOND LIKE:-

- 1-Bleeding disorders.
- 2- Patient on ventilator.
- 3-Sever tracheal obstruction .
- 4-Bronchial asthma.
- 5-Certain infections e.g. active TB ,HIV.

COMPLICATIONS

Bronchoscopy in general considered as safe procedure ,most complications are preventable :-

A-anesthetic complications :due to medications can result in respiratory depression,hypotension and syncopal attacks.

B-technical difficulties can cause trauma and bleeding.

C-biopsy related complication :pneumothorax and bleeding.

OTHER TYPES OF THORACIC ENDOSCOPES

MEDIASTINOSCOPY

THORACOSCOPY

