

Tube thoracostomy

Tube thoracostomy or **chest tube** or **intercostal drain(ICD)**, is a flexible hollow plastic tube that is inserted through the chest wall into the pleural cavity and .connected to bedside drain container called underwater seal drainage system

:Types of chest tube: tow basic types of chest tubes, these are

.A. chest tube with trocar

.B. chest tube without trocar

The differences between these types are the presence of the trocar, the

:advantages of the trocar are

.it gives the plastic malleable chest tube the rigidity, for better handling .1

.its sharp tip facilitate the penetration of the tube into the chest wall .2

it allows the proper positioning of the chest tube after inserting into the pleural .3

cavity like upward anterior position in apical chest and downward and posterior

.position in case of basal chest tube

:Indications

:generally, for **drainage of the pleural cavity** which may include the following

.pneumothorax .1

.pleural effusion or hydrothorax alone or as hydro-pneumothorax .2

.empyema or pyothorax, alone or as pyo-pneumothorax .3

.hemothorax alone or as hemo-pneumothorax .4

.chylothorax, and chylopneumothorax .5

thoracic operations: usually two chest tubes are inserted an apical anterior one .6

to drain air and lower posterior to drain any kind of fluid collections, some time

single chest tube is inserted for surgeries on mediastinum, esophagus and in

.pneumonectomy

post-operative: (after development of late collection of "reactionary fluid or .7

blood in case of secondary bleeding" or due to infection of the residual pleural

.space)

.malignant effusion, for pleural drainage and to do chemical pleurodesis .8

:Contraindications

refractory coagulopathy, should correct the condition first then do it to reduce .1

.the risk of intractable bleeding

lack of co-operation, by the patient, it is relative contraindication may be .2

.managed be doing chest tube under general anesthesia

diaphragmatic hernia, because the high risk of abdominal visceral injury, which .3

.can be avoided by calling a safe and expert surgeon

congenital lobar emphysema, CLE by itself is not an indication for tube .4

thoracostomy, in addition there is risk of rupturing the emphysematous lobe and

creation of big broncho-pleural fistula with massive air leak, also it can be avoided by

.expert surgeon

surgical emphysema without pneumothorax, it is not an indication for chest tube, it may be indicated if the patient has respiratory embarrassment with high suspicion of very minimal not visible radiologically pneumothorax

:Technique

sterilization of the safety area and the skin that surround it at appropriate distance .1

local anesthetic drug is infiltrated at the site of incision, usually 2% Lidocaine. (It can be done under local or general anesthesia (particularly in children and uncooperative patients) .2

small incision is made in the safety area at the appropriate intercostal space and parallel to alignment of the rib direction, and the dissection deepen from the skin .3
.incision down to the intercostal muscles or even to open the parietal pleura

inserting the chest tube through the incision at the upper boarder of the rib .4 below to avoid any injury to the neurovascular bundle which run in the costal grove along the lower border of each rib, then the chest tube is connected to the tube .extension of the underwater seal drainage container

chest tube is fixed to the skin with stitch (usually silk thread), and another stitch .5 is used to form a **burse-string suture** around the tube its role is to close the .thoracostomy incision after removal of the chest tube

:Sites

The **safe zone** or the **safety triangle** consist of the **lateral boarder of pectoralis major muscle** (the anterior axillary fold), the **anterior boarder of latissimus dorsi** (the posterior axillary fold), and the **5th or the 6th rib** which can be localized by counting the ribs from the sternal angle that marks the 2nd rib and sometimes roughly at the **level of nipple** in male which marks the level of the 5th rib. From that site the chest tube after insertion within the pleural cavity can be directed upward and anterior (apical location), for drainage of air or directed downward and .posterior (basal location), for drainage of fluid collections

:Layers traversed during chest tube insertion

.skin .1

.subcutaneous fat .2

.serratus anterior .3

.endothoracic fascia .4

.intercostal muscles .5

.parietal pleura .6

.pleural space .7

:Indications for removal of chest tube

.clinical: patient looks well, with good air entry bilaterally .1

mechanical: the tube is stop functioning, not draining air or fluid (provided it is .2
.not blocked)

.radiological: the lung is fully expanded on chest X-ray .3

:Complications

:minor .1

- .severe pain at site of insertion
- .cough (due to rapid drainage of the fluid)
- .subcutaneous hematoma or seroma
- .anxiety
- .shortness of breath

:major .2

- .a. hemorrhage (injury to intercostal artery)
- .b. hemoptysis (pulmonary injury)
 - .c. infection (at or around the site of insertion)
- d. re-expansion pulmonary edema: resulting from rapid decompression of massive pleural effusion or pneumothorax, causing rapid increase in pulmonary blood flow and transudation of fluid into the pulmonary alveoli with severe shortness of breathing and precipitation of pulmonary edema. It needs urgent management with clamping of the tube, giving oxygen, steroid and diuretics
- e. Other serious injuries may include liver, spleen and diaphragm by very low insertion site of the tube, injury to the aorta and heart