- Clinical anatomy of thoracic cage and cavity-1
- Dr. Rehan
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At the end of this session, the student should be able to:

- Discuss briefly anatomical changes in thorax with ageing.
- Describe needle and tube thoracostomy.
- Identify indication of thoracotomy and structures encountered in performing it.
- Briefly describe the anatomy for intercostal nerve block. Mention its possible complications.
- Identify clinical application of diaphragm and pleural reflections.
- Classify the congenital anomalies encountered in the ribs and diaphragm.

- Anatomical changes with age
- Rib cage becomes more rigid and inelastic.
- Due to calcification and ossification.
- Kyphosis: also termed as stooped appearance.
- Increase in the sagittal contour of thoracic spine.
- Normal curve is about 20 to 40 degree.
- Occurs due to degeneration of intervertebral disc.

- Anatomical changes with age
- Disuse atrophy of thoracic and abdominal muscles.
- Leads to poor respiratory movements.
- Degeneration of elastic tissue in lungs and bronchi leads to altered movement in expiration.

- Needle thoracostomy
- Indications:
- Tension pneumothorax
- Drain fluid/pus from pleural cavity.
- To collect sample from pleural fluid.
- Two approaches of thoracostomy

✓ Anterior

✓ Lateral

- Needle thoracostomy
- Anterior approach: patient lie in supine position
- Identify sternal angle
- Identify 2nd rib and insert needle in 2nd intercostal space in mid clavicular line.
- Lateral approach
- Mid axillary line is used.
- Needle thoracostomy

- Skin, superficial fascia, serratus anterior muscle, external intercostal, internal intercostal, innermost intercostal, endothoracic fascia and parietal pleura.
- The needle should always pass through upper border of 3rd rib to avoid damage to intercostal nerve and vessels in sub costal groove which lies at superior part of intercostal space.

- Tube thoracostomy
- Preferred site is fourth and fifth intercostal space.
- Anterior axillary line.
- Incision should be given at superior border of rib to avoid neurovascular damage.

- Surgical access to chest
- Thoracotomy

- ✓ Indication: penetrating chest injuries with intrathoracic hemorrhage.
- ✓ Incision in 4th intercostal space from lateral margin of sternum to anterior axillary line.
- ✓ Line of the incision in intercostal space should be close to the upper border of rib.
- ✓ Right or left side depends on the site of injury

- Surgical access to chest
- ✓ Structures to be avoided for damage in thoracotomy:
- ❑ Internal thoracic artery
- ❑ Intercostal vessels and nerves
- Medial sternotomy
- ✓ Used to access heart, coronary arteries and valves.

- Intercostal nerve block

- 7^{th} to 11^{th} intercostal nerve supply skin and parietal peritoneum covering outer and inner surface of abdominal wall
- Indications

✓ Repair of injuries of thoracic and abdominal wall.

✓ Relief of pain in rib fractures

- Complications
- Pneumothorax occurs if needle penetrates parietal pleura
- Hemorrhage caused by puncture of intercostal blood vessels

- Intercostal nerve block
- Procedure: to produce analgesia of anterior and lateral thoracic wall and abdominal wall
- Perform rib counting from 2 to 12.
- Select the superior part intercostal space.

- Needle should direct towards the lower border of rib
- The tip should come close to subcostal groove to infiltrate anesthetic agent around nerve.
- To produce analgesia, nerve should be blocked before lateral cutaneous branch
- Diaphragm
- Paralysis of single dome of diaphragm by sectioning of phrenic nerve.
- Performed sometimes in treatment of chronic tuberculosis.
- this will give rest to the lower lobe of the lung.
- Penetrating injuries:

✓ Stab or bullet wound

✓ In any penetrating injury below the level of nipples, diaphragmatic injury is suspected

- Pleural reflection
- Cervical dome of pleura and apex of lungs most commonly damaged during:

- ✓ Stab wound in root of neck.
- ✓ By anesthetist needle during nerve block of lower trunk of brachial plexus.
- Lower reflection of pleura may damage during nephrectomy.
- Congenital anomalies of ribs
- Cervical rib:
- Arises from the anterior tubercle of transverse process of 7^{th} cervical vertebrae
- Cause compression of subclavian artery
- Compression of subclavian vein
- Compression of T1 nerve as it passes above first rib.
- Cervical rib
- On Plain AP radiograph demonstrate small horn like structure
- Congenital anomaly of diaphragm
- Congenital hernia
- Due to incomplete fusion of septum tranversum, dorsal mesentery and pleuroperitoneal membrane.

- Three common sites
✓ Pleuroperitoneal canal
✓ Opening between xiphoid and costal origin of diaphragm
✓ Esophageal hiatus

- Summary
- Anatomical changes with age
- Thoracostomy and its sub types
- Surgical access to chest
- Intercostal nerve block
- Cervical rib
- Congenital anomaly of diaphragm.

- References

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