بسم الله الرحمن الرحيم

جامعة ديالى
كلية الطب

فرع طب الأطفال
ا.د.مهدي همفي الزهيري

Examination of the Respiratory system

*** Topographical divisions of the chest**

- Front: Supraclavicular, Infraclavicular, Supramammary, Inframammary, Supraaaxillary, & Intraaxillary areas.
- Back: Suprascapular, Scapular, Interscapular, & Infrascapular areas.

* Inspection

■ Form of the chest

- Cylindrical shape of chest at birth gradually grows to antero-posteriorly flat.
- Deformities of chest may be due to:
  - Rickets (Rickety rosary: a necklace of beads formed at costo-condral junction which must be differentiated from scorbutic beading where it is round & smooth in rickets & sharp in scurvy due to sublaxation of costo-condral junction, Harrison's sulcus.)
  - Obstructive airway diseases & recurrent chest infections (Pigeon chest, Barrel chest, Harrison's sulcus: sulcus around the chest wall at site of diaphragmatic attachment)
  - Diseases of spine as Rickets, TB, Morquios disease, Polydystrophic dwarfism, Gargoylism & Trauma, Kyphosis: forward bending, Scoliosis: lateral bending
  - Bulging on one side with fullness of intercostals spaces may be seen in pleural effusion, pneumothorax & emphysema.
  - Localized depression may be seen collapse or fibrosis(rare) of lung.
  - Pre-cordial bulging may be seen in CHD

■ Movement of the chest

- Observe the Rate & Rhythm of respiration.
- Respiration is usually irregularly-irregular in infants & young children. Newborns may normally have transient apnea.
- Rapid respiration may be seen after exertion, playing, crying or fever or hysteria(rare).
- Tachypnea ± dyspnea at rest usually indicates respiratory or CVS diseases.
- Look for dyspnea (flaring of ala nasi & retraction in suprasternal notch, intercostal spaces & subcostal region). It is always associated with tachypnea. Ask about feeding history of dyspneic child
- Note the extent & symmetry of respiratory movement & any abnormal movement or pulsation. Diminished or no movement (& expansion) is seen in pleural effusion, pneumothorax, consolidation & collapse. Symmetry of movement & expansion is lost when lesion is on one side. Normal chest expansion in adult: 5-12 cm.
- In newborn, when dyspneic, always see the abdomen. In diaphragmatic hernia, there is scaphoid abdomen instead of normal protuberance.

* Palpation

- Palpate any pain site for tenderness (Fibrositis, Myalgia, Trauma, Dry pleurisy or fracture of ribs).
- Look for swelling & whether it is expansile & has any relation with respiration (Empyema: may expand with respiration, Boil or abscess (cold abscess may be seen in TB of spine).
- Locate the position of trachea & apex beat. Normally, the apex beat may be palpable in the 4^{th} intercostals spaces, in or just lateral to mid clavicular line in up to 2 yr of age. After that, it is located in the 5^{th} space , in or just medial to mid clavicular line.

◦ Displacement of apex beat or trachea can be due to Pulmonary, Cardiac, or Skeletal abnormality which leads to mediastinal shift (in cardiac conditions, only the position of apex beat changes). Trachea or apex beat or both may be pushed to opposite side (pleural effusion, pneumothorax) & pulled towards same side (collapse, fibrosis). Consolidation does not cause any shifting. In scoliosis, mediastinum is shifted towards concave side.
  ◦ Assess the extent & symmetry of expansion of chest (by hands & see the movement of thumb or tape measure at the level of nipple). Some times, it can be assessed in crying child when he takes deep breath.
  ◦ Assess the Vocal fremitus (VF) by applying the palm or ulnar border of hand while the child says 44 or 77 or cries (with comparison of both side of chest). VF ↑(over consolidation or a cavity underlying the surface with patent bronchus) & ↓ (pleural effusion, non-communicting pneumothorax, collapse & bronchus obstruction).

* Percussion

  ◦ The blow should not be very heavy & not more than 1-2 strokes in one site (to decrease discomfort to the child)
  ◦ See the intensity & quality of resonance over the normal lung tissue (Resonant: low pitched, clear sound), over a big hollow viscus e.g stomach (tympanatic), over a big space with tense enclosing wall e.g pneumotharax, emphysema (hyperresonant)
  ◦ Resonance ↓ (dull in consolidation or massive collapse or thick pleura & stony dull in pleural effusion).

*Auscultation

  ◦ Infants & young children have to be examined in whatever position they feel comfortable.
  ◦ Crying may be beneficial because it may be the only way to make a child take deep breath. It can be used to assess vocal fremitus or vocal resonance.
  ◦ Child should breath with his mouth open, regularly & deeply.

■ **Character of breath sound :** Normally it is vesicular (heard typically in axillary & infrascapular region), or harsh vesicular or to a less extent bronchovesicular.
Typical bronchial breathing can be heard over trachea but bronchial character is to some extent imparted to breath sound heard over 2nd intercostal space & interscapular region.
  ◦ Breath sounds may be reduced in intensity (collapse, thick pleura, pneumothorax, & pleural effusion in which rarely there is bronchial breathing with whispering pectoriloquy (WP) above the fluid level), or breath sounds altered in character (bronchial breathing sound in consolidation or rarely above level of pleural effusion with WP, or harsh breathing with increased expiratory phase in obstructive lung diseases e.g in asthma or bronchiolitis.)

■ **Character of Vocal Resonance (VR)**
  ◦ Normal VR appears to be produced just at the chest piece of stethoscope.
  ◦ VR ↑ (in Consolidation as bronchophony: if VR heard nearer than chest piece or at the ear piece of the stethoscope, or whispering pectoriloquy (WP): VR further increased & words appears to be spoken directly into observer ear(WP can not be heard in young children as they can not be made to whisper & WP may be heard when a cavity communicating with a bronchus or above the level of pleural effusion).
  Some times, a voice of nasal character is heard (aegophony) & is seen over the level of pleural effusion or in some cases of consolidation.
  ◦ VR ↓ (in pneumothorax, pleural effusion, thickened pleura & emphysema).

■ Adventitious sounds

- ◦ It can be not pathological (rubbing of stethoscope to the skin, observers hand or clothes, or rubbing of tow tubes of stethoscope, or patients muscle due to shivering.
  Broken rib may produce sound resembles course crepitations.
- ◦ Rhonchi are prolonged, uninterrupted sounds, arising in bronchi & are due to partial obstruction of their lumen because of swelling of mucosa, viscid secretions or constriction of bronchial smooth muscles. There are high & low pitch rhonchi. Generalized rhonchi are found in asthma & bronchiolitis. Localized rhonchi are seen in foreign body inhalation.
- ◦ Crepitations are discontinous crackling or bubbling sounds, produced in alveoli (fine high pitch crepitations, seen in early stage of pneumonia when there is exudates in the alveoli, pulmonary edema & fibrosing alveolitis), or produced in bronchi or cavity (coarse variable pitch crepitations, seen in bronchitis, bronchopneumonia, bronchiolitis, asthma, bronchiactasis, resolving consolidation & cavity).
  They may be heard at any time in respiratory cycle, but course crepitation are most commonly heard from the beginning while fine crepitation at the peak of inspiration.
- ◦ Crepitation in children are most commonly confused with the sound produced in throat, when air passes through secretions there. These throat sounds are generalized & changes or completely disappear when child coughs or changes position or throat suction is done. If one places the stethoscope near the child's mouth, these sounds being produced in throat can be heard.
- ◦ Pleural rub or friction sound is characteristic of dry pleurisy & is produced by the rubbing together of inflamed pleural layers. It has a creaking or rubbing character & can be differentiated from course crepitations by the features that it occurs in corresponding phase of inspiration & expiration. Secondly, it does not change with coughing & may increase with tenderness, if we press the stethoscope over the area.
- ◦ Examination of respiratory system is never complete unless the throat is examined because it is the door way of respiratory system. If not done with general examination, do it at the end.

.