Examination of the Respiratory system

* Topographical divisions of the chest
  - Front: Supraclavicular, Infraclavicular, Supramammary, Inframammary, Supraaxillary, & 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, Gargoilism & 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-cardial 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 4th intercostals spaces, in or just lateral to mid clavicular line in up to 2 yr of age. After that, it is located in the 5th 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-communicating 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 (tympanatie), over a big space with tense enclosing wall e.g pneumothorax, 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 discontinuous 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.
RESPIRATORY SYSTEM EXAMINATION IN PEDIATRICS

by dr_suraj_d on Oct 11, 2012

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COMPLETE EXAMINATION OF RESPIRATORY SYSTEM IN PEDIATRICS. IT HAS BEEN SUMMARIZED FROM ALL WELL KNOWN 32 BOOKS UNDER GUIDANCE OF ONE OF THE BEST PEDIATRIC DOCTORS AND PROFESSORS. ...

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- 1. Examination of Respiratory System By Suraj Rameshwar Dhankikar Under Guidance of DR. SUNIL MHASKE (PROF & HEAD IN PAEDIATRICS DEPARTMENT) DR. KOTHARI (ASSISTANT PROFESSOR) AND RESIDENTS WITH IMENSE HELP AND SUPPORT OF

- 2. Introduction: Respiratory examination is the most important part of the examination in any pt. as other vital organs, because respi system can affect other sys as. Neonates Apgar score Ballard Maturational Assessment. The respiratory pathology is one of the most often pathology in childhood. You can live without food for a week, without water for a day, but you cannot live without air for more than a few minutes. Most people take breathing for granted. For thousands of people who suffer from breathing problems, each breath is an accomplishment.

- 3. Main Functions of Respiratory System in Children: vBreathing and gas exchange function Defence function vMetabolic function vDeposited function Filtrated function vEndocrine function

- 4. Development of Respiratory system in Children: It is a complex of structures that function under neural and hormonal control. At birth the respiratory system is relatively small, but after the first breath the lungs grow rapidly. The shape of the chest changes gradually from a relatively round configuration to flattened in the anteroposterior diameter in adulthood. Changes take place in the air passages that increase respiratory surface area. For example, during the first year the alveoli in the terminal units rapidly increase in number. In addition, the early globular alveoli develop septa causing them to become more lobular. They continue to increase steadily until, at the age of 12 years, there are approximately nine times as many as were present at birth. In later stages of growth the structures lengthen and enlarge. The bifurcation of the trachea lies the third thoracic vertebra in the infant opposite the fourth vertebra in the adult. These anatomic changes are differences in the angle of access to the trachea at various ages must be considered when the infant or child is to be positioned for purposes of resuscitation and airway clearance.

- 5. Physiologico-Anatomical peculiarities of the Respiratory System in Children: Thus, there are some physiologico-anatomical peculiarities of the respiratory system in children. The peculiarities of the NOSE: The nose consists particular by of cartilage, The nasal meatuses are narrow, There is no inferior nasal meatus (until 4 years), Undeveloped submucosal membrane (until 8-9 years). The peculiarities of sinuses in children: The maxillary sinus is usually present at birth, The frontal sinuses begin to develop in early infancy, The ethmoid and sphenoid sinuses develop later in childhood. The peculiarities of the pharynx at the neonate: The pharynx is relatively small and narrow, The auditory tubes are small, wide, straight, and horizontal. The peculiarities of the larynx at the neonate: The larynx is funnel-shaped (in the adult it is relatively round), It is relatively long, The cricoid cartilage descends from the level of the fourth cervical vertebra in the infant to that of the sixth in the adult. The fissure of glottis is narrow and its muscles fatigue soon, Vocal ligaments and mucous membrane are very tender and well blood-supplied, Vocal ligament are relatively short.

- 6. The peculiarities of the trachea: The length of the trachea is relatively larger (about 4 cm in the adult 7 cm) and wide, It is composed of 15-17 cartilage rings (the amount does not increase), The
bifurcation of the trachea lies opposite the third thoracic vertebra in infant and descends to a position opposite the fourth vertebra in the adult, Mucus membrane is soft, well blood supplied, but sometime dry, It can v collapse easily. The peculiarities of the bronchi: in young children the bronchi are relatively wide, the right bronchus is a straight continuation of the trachea, the muscle and elastic fibres are undeveloped, the lobules are segmental bronchus are v narrow. The peculiarities of the lung: size of alveoli is smaller than in adult, quantity of alveoli is relatively less than adult.

- 7. Human Respiratory System
- 8. The upper respiratory tract includes The nose pharynx adenoids tonsils epiglottis larynx, and trachea. The lower respiratory tract the bronchi, Bronchioles alveolar ducts and alveoli
- 9. vSurface Markings The surface markings of the v The surface markings of the lungs and pleura— anterior lungs and pleura—posterior view. view.
- 10. Surface markings of the lobes of the lung: (a) anterior, (b) posterior, (c) right lateral and (d) left lateral. (UL, upper lobe; ML, middle lobe; LL, lower lobe).
- 11. How exactly the pt may come to vyou: vBreathlessness vHaemoptysis vNasal discharge vChest pain vFever vCyanosis vCough vSputum vCatarrh vRespiration Rate or Rhythm disorders Non-specific complaints.
- 12. Environment
- 13. Nebulizers, drugs near the bed or vInhalers? vAre there any medications around? Special food, vincluding sugar-free (DM). vMobility-assisting devices. Hospital vequipment. Oxygen – if so, check at the wall how much, and by what method is it being administered (e.g mask, nasal vspecs)
- 14. The basic steps of the Clinical vExamination vHistory taking vInspection vPalpation vPercussion Auscultation
- 15. History taking
- 16. How exactly the pt may come to vyou: vBreathlessness vHaemoptysis vNasal discharge vChest pain vFever vCyanosis vCough vSputum vCatarrh vRespiration Rate or Rhythm disorders Non-specific complaints.
- 17. History of the present illness & vAnalysis of Chest Symptoms vOrigin vDuration vProgress vAggravating factors vRelieving factors Any treatment taken
- 18. vPast History Attack or disease similar to the present one: e.g. - Asthma. - vRecurrent pneumonia Allergic disorders: eczema, vurticaria, angioedema and hay fever. Admission in any hospital before vand why? vChest injuries and operations. Other Surgical vProcedures. Coma , convulsions….may predispose to aspiration lung vabscess vCardiac diseases and history of Rheumatic fever. Any high valtitude visits It is important to identify any exercise or sleep vrelated symptoms vDiabetes Mellitus Hypertension. Cough may result vfrom ACE inhibitors T.B and history of admission to a chest hospital for treatment of T.B. medicines, duration of the treatment and the vadherence to it. Previous radiological examination: comparison with the current radiograph
- 19. Family and Social History vSimilar condition in the family. vHistory of T.B. History of vallergy as eczema and hay fever. vHistory of DM Any smoker in close contact with the child? (R/O passive smoking)
- 21. Before Examination Remove your vassets if any. Always ensure that your hands have been washed properly till the elbow and dried prior to the examination of any vpatient. Introduce yourself to pt/family, Make a good rapport vexplain what going to do. Position of pt for Best examination method by age: vNeonates, very young infants: on examining vtable vUp to preschool: lying / sitting on mothers lap vAdolescent: without family presence.
- 22. General appearance vExpose area as needed (ALWAYS PARENTS SHOULD UNDRESS THE CHILD). vDress, hygiene. vIf the child is under 2, then ask the parents to help. vIf the child is a bit
older, then they are probably able to take their own clothes off. Obviously, with older and adolescent children, you have to take a more focussed approach, and be more wary of privacy. v Draping - the chest should be fully exposed. Exposure time should be minimized v vExamine from the Rt side of the pt. Posture, body positions, vbody shape. vSkin colors. vAny unusual behavior. Parent-child interaction, reaction to someone new entering the room (child vabuse). vFat/skinny vRashes, scars? Ask if tenderness anywhere, before start touching them.


- 24. jugular venous pulse-indicates right heartfailure

- 25. Inspection

- 26. Inspection of Respiratory System vconsists of following steps Face vInspection vNose Inspection vThroat Inspection vNeck Inspection vHand Inspection Thorax Inspection

  - Nares Patancy,v27. Nose Discharge,v Nasal Polyps (CF)v Snotty / RedvSeptum, Nasal Flaring. Sinus tenderness.vMucous Membranes,

  - 28. Throat Breath vodor. vLips: Color, Fissures and Dryness. vTongue. vTeeth: vGums: color, hypertrophy (Phenytoin) Throat: Using a torch, look at the back of the throat for vsigns of infection Tonsils: size, signs vof inflammation. Tonsillitis may cause white pus to exude from the vtonsils Infections in the larynx and below will generally not have any throat signs. Some textbooks even advise not to look in the throat in croup – as the presence of the tongue depressor can exaggerate the condition.

  - v29. Inspection involves primarily observation of respiratory vmovements. Respirations are illuated vfor v(1) rate (number per minute), (2) rhythm (regular, irregular vor periodic), v(3) depth (deep or shallow), (4) quality ( vautomatic, difficult, or labored). The doctor also notes the breath sounds based on inspection without any aid, such as noisy, grunting, or snoring.

  - v30. Inspection or observation involves observing the respiratory rate which vshould be in a ratio of 1:2 inspiration : expiration . Normal Respiratory rates in children Age Group Respiratory rate (breaths/min) . 0 - 6 months 30 - 60 . 6 months – 1 year 30 - 50 . 1 - 3 years 24 - 40 . 3 - 5 years 22 - 34 .5 – 12 years 14 - 25 . > 12 years 12 - 20

  - 31. vAbnormal Breathing Pattern Disorders of the respiratory rate: v Tachypnea is the increase of the respiratory rate. v Bradypnea is the decrease of the respiratory rate. v Dyspnea is the distress during breathing. v vApnea is the cessation of breathing. Disorders of the respiratory depth: v Hyperpnea is an increased depth. v Hypoventilation is a decreased depth and irregular rhythm. v vHyperventilation is an increased rate and depth. Pursed-lip breathing - seen in COPD (used to increase end vexpiratory pressure) Accessory muscle use (scalene muscles) Intercostal respiration v(reatsmatory obstruction). Type of respiration [respiratory pattern is abdominal <6yrs].

  - v32. Pathological Respiration Seesaw (paradoxic) respirations: the chest falls on inspiration and rises on expiration. It is usually vobserved in respiratory failure. Kussmauls breathing is hyperventilation, gasping and laboured respiration, usually seen in diabetic coma or other states of vrespiratory acidosis: Another type of breathing is Cheyne -Stokes respiration, which is alternating breathing in high frequency and low frequency from brain stem injury

  - 33. Inspection of Anterior vchest wall vAsk the patient to lie supine. Stand at the feet vof patient. Inspect the shape of the chest (ratio of antero- vposterior and transverse diameters). Inspect the symmetry of the patient’s chest on both vsides with comparison. Any bulging (empyema and pleural effusion) and vretraction (collapse of lung) Shoulders inspection – dropping of shoulder on pathological side (fibrosis). Trachea Inspect for tracheal position “Traillé’s sign”.

  - 34. Inspect the chest wall and skin for swelling, scars, sinuses,v skin eruption or engorged veins.— surgery –e.g. Meconium vileus in CF Harrison’s Sulcus – two symmetrical sulci, horizontal, at the lower margin of the anterior thorax, at the attachment of the diaphragm. A sign of prolonged respiratory distress (asthma ) in children. . Also present in Rickets where there is insufficient calcium
to allow for bone mineralisation, and the soft ribs are distorted by the pull of the Thickening of the costochondral junction (rachitic diaphragm. rosary) Inspect patient’s chest for retraction of lower intercostal spaces. Stand again to the right of patient and look tangentially for apical and epigastric pulsation.

- 35. Inspection of posterior chest wall1) Stand behind the patient in a midline position. 2) The patient should be sitting with the posterior thorax exposed. 3) Inspect the cervical, thoracic and upper Kyphosis - lumbar spine for deformity. curvature of the spine - anterio- Scoliosis - curvature of posteri thorax - lateral 4) Inspect for scars.
- 36. Chest wall Pectus carinatum Pectus excavatum
- 37. Palpation
- 38. NECK-Tracheal examination a) Stand in front of the patient. b) Ask the patient to sit up with the head straight. index finger in horizontal position in the pouch between the medial end of sternomastoid and the lateral aspect of trachea with comparison. Check the cricosternal distances. This is the distance between the cricoid cartilage and the suprasternal notch. Tracheal descent: place the tip of the index finger on the thyroid cartilage and observe its descent. Tracheal Tug? – This is where the trachea is pulled posteriorly and superiorly during inspiration, and results from recruitment of accessory muscles in vlaboured breathing Lymph nodes – examine the lymph nodes of the neck in the same way as in an adult.
- 39. Palpation of Anterior Chest wall 1) Stand in front of the patient. 2) Ask the patient to lie supine. 3) Palpate upper lung zone to confirm the movement by placing the palms in the infracavicular fossa and the two thumbs in the midline at the level of suprasternal notch. Let the patient inspire deeply and let your thumbs follow chest movement. 4) Palpate middle lung zone by putting the palm in the middle part with tips of thumbs in the midline. Let the patient inspire deeply and let your thumbs follow chest movement. 5) Palpate lower lung zone by putting the palm in the lower part with tips of thumbs in the midline. Let the patient inspire deeply and let your thumbs to follow chest movement.
- 40. Palpation of Anterior Chest wall6) Palpate for palpable Rhonchi, pleural rub or chest wall tenderness by putting the palm on various areas of chest wall.
- 41. Palpation of posterior chest wall 1) Stand behind the patient in a midline position. 2) The patient should be sitting with the posterior thorax exposed. and, if cooperative, should take several deep breaths. 3) Assess extent and symmetry of lower thoracic expansion by a) Place your thumbs at the level of the 10th ribs with your fingers loosely grasping the rib cage and gently slide them medially. b) Ask the patient to inhale deeply and observe whether your thumbs move apart symmetrically. 4) With palms of hands, assess symmetry of fremitus throughout lung fields.
- 42. Palpation. Heart – feel the location of the apex beat, character, checking for displacement Assess for costovertebral tenderness
- 43. The doctor also palpates for vocal fremitus, the conduction of voice sounds through the respiratory tract. With the palmar surfaces of each hand on the chest, the doctor asks the child to repeat words such as "ninety-nine", "one, two, three," "eee- eee" etc. The child should speak the words with a voice of uninform intensity. Vibrations are felt as the hands move symmetrically on either side of the sternum and vertebral column. In general vocal fremitus is the most intense in the regions of the thorax where the trachea and bronchi are the closest to the surface, is least prominent at the base of the lungs. Crepitation is felt as a coarse, cracking sensation as the hand presses over the affected area. It is the result of the escape of air from the lungs into the subcutaneous tissues from an injury or surgical intervention. Both pleural friction rubs and crepitation can usually be heard as well as felt. Tactile fremitus - the patient says ninety-nine, whilst physician sense with ulnar aspect of hand for changes in sound conduction.
- 44. TVF Increased TVF Consolidation Decreased TVF Cavitation Thick chest wallv Pleuralv Collapse with patent mainveffusion Pleural fibrosis bronchusv Pneumothoraxv Emphysemav Collapsev
- 45. Percussion
- 46. Percussion Technique Place left hand on chest wall, palm downwards with fingers separated v2nd phalanx over area of intercostal space Right middle finger strikes the 2nd phalanx vproducing hammer effect Entire movement comes from wrist
47. Percussion of the Anterior chest wall1 - Stand to the right of the patient. 2 - Ask the patient to lie supine. 3 - Use light percussion. 4 - Krönig’s isthmus: Percuss both areas right and left from dullness to resonance (start from the neck) with comparison. 5 - Percuss both clavicles directly (over medial third) 6 - Percuss the infraclavicular regions. 7 - Percuss both parasternal lines right and left, from the second space to the sixth space with comparison. 8 - Spare bare area to be percussed late with special areas percussion. 9 - Percuss both midclavicular lines right and left, from the second space to the sixth space with comparison. 10 - Comment on dullness found.

48. To evaluate the densities of the underlying organs. Resonance is heard over all the lobes of the lungs that are not adjacent to other organs. Liver Dullness is heard beginning at the fifth intercostal space in the right midclavicular line. Percussing downward to the end of the liver, a flat sound is heard because the liver no longer overlies the air-filled lung. Cardiac dullness is felt over the left sternal border from the second to the fifth interspace medially to the midclavicular line. Below the fifth interspace on the left side, tympany results from the air-filled stomach. Deviations from these expected sounds are always recorded and reported. In comparative percussion the chest, the anterior lung is percussed from apex to base, usually with the child in the supine or sitting position. Each side of the chest is percussed in sequence in order to compare the sounds.

49. In topographic percussion the margin of the lung is assessed from the side of resonance sound. The upper margin of the lung (the location of the apex of the lung) is determined by percussions from the clavicle to the neck. The apex of each lung rises about 2 to 4 cm above the inner third of the clavicles in front of the body. At the back we examine the location of the apex of the lung by percussions from the scapula axis to the seventh cervical vertebra. Normally, the upper border of the lung is in the seventh cervical vertebra at the back.

50. Upper border of the liver - Use vpercussion. - Start in the right midclavicular line from second vspace down to the first dullness. - Decide the upper border of the liver. Feel for the liver. If the liver is lower than expected, it may be displaced by hyper expanded lungs. Normal liver position: v Age 0-6 months – 1-2 fingers below rib cage v Age 6-24 months – 0-1 finger below rib cage v Age 2+ - usually not palpable (but remember, palpable liver is often still normal)

51. Percussion of the lateral chest wall1 - Stand to the right of the patient. 2 - Ask the patient to lie supine and raise his hands above his head. 3 - Use light percussion. 4 - Percuss both anterior axillary lines right and left, from the fourth space to the eighth space with comparison. 5 - Percuss both middle axillary lines right and left, from the fourth space to the eighth space with comparison. 6 - Percuss both posterior axillary lines right and left, from the fourth space to the eighth space with comparison. 7 - Comment on dullness found.

52. Percussion of the posterior chest wall1 - Stand to the right of the patient. 2 - Ask the patient to sit and his hands folded across the anterior chest wall. 3 - Use heavy percussion. 4 - Percuss suprascapular area with comparison. 5 - Percuss both scapulae directly. 6 - Percuss interscapular area on the right and left sides with comparison. 7 - Percuss both infrascapular areas to the 10th space comparing right and left sides. 8 - Comment on dullness found.

53. Tidal percussion1 - Stand to the right of the patient. 2 - Ask the patient to sit. 3 - After percussing the back using heavy percussion if any infrascapular dullness was found, fix the left hand over it and ask the patient to take a deep breath and hold it then percuss again. 4 - Comment on whether it changed to be resonant or not and explain.


55. Auscultation

56. Technique of Auscultation1 Patient relaxes and breathes normally with mouth open, auscultate lungs, apices and middle and lower lung fields posteriorly, laterally and anteriorly. v Alternate and compare both sides at each site. Listen at least one complete respiratory cycle at each site. Listen to quiet respiration. If sounds are inaudible, then ask him take vdeep breaths. First vdescribe the breath sounds and then the adventitious sounds. Same technique as adult – just make sure you compare sides and listen to all lobes, including under the axilla and to the apices above the vclavicle. Note
intensity of breath sounds and compare with opposite vside. vAssess length of inspiration and expiration. Listen for a pause between inspiration, expiration and the quality of pitch of vsound compare intensity of breath sounds between upper and lower chest in upright vposition. Compare intensity of breath sounds from dependent to top lung in decubitus vposition. Note the presence or absence of adventitious sounds.

- 57. Anterior Auscultation
- 58. v Auscultation involves using the stethoscope to evaluate breath and voice sounds. Breath sounds are best heard if the child inspires deeply. The child can be encouraged to "take a big breath" by following a demonstration of "breathing in through the nose and out vthrough the mouth." In the lungs breath sounds are classified as vesicular or vbronchovesicular. Vescicular breath sounds are normally heard over the entire surface of the lungs, with the exception of the upper intrascapular area and the area beneath the manubrium. Inspiration is louder, longer, and higher-pitched than expiration. Sometimes the expiratory phase seems nearly absent in vcomparison to the long inspiratory phase. Bronchovesicular breath sounds are normally heard over the manubrium and in the upper intrascapular regions where there are bifurcations of large airways. Inspiration is louder and higher in pitch than that heard is vvesicular breathing. Puerile breath sounds are one of normal types of breathing in children from 6 month. Puerile breath sounds have shot inspiration and louder, a hollow expiratory phase.
- 59. Bronchial breath sounds found over the trachea near the suprasternal notch. They are almost the reverse of vesicular sounds; the inspiratory phase is short and the expiratory phase is longer, louder vand of higher pitch. Absent or diminished breath sounds are always an abnormal vfinding warranting investigation. Fluid, air, or solid masses in the pleural space all interfere with the conduction of breath sounds (pneumonia, pneumo-, hydro-, haemothorax, tumor of lung or mediastinal, emphysema of lungs, atelectasis, airways obstruction, a forcing body in the vbronchus). Diminished breath sounds in certain segments of the lung can alert the doctor to pulmonary areas that may benefit from postural drainage and percussion. Increased breath sounds following pulmonary therapy indicate improved passage of air through the respiratory tract.
- 60. Auscultation of the posterior chest wall 1) Stand to the right of the patient. 2) Ask the patient to sit and his hands folded across the anterior chest wall 3) Auscultate both scapular lines right & left, from the apex to the tenth space with comparison. 4) Ask the patient to say ‘99’ and auscultate both scapular lines right & left, from the apex to the tenth space.
- 61. Posterior Auscultation
- 62. Voice sounds are also part of auscultation of the lungs. Normally voice sounds or vocal resonance is heard, but the syllables are indistinct. They are elicited in the same manner as vocal fremitus, except that the doctor listens with the vsstethoscope. vRarely done in children. Consolidation of the lung tissue produces three types of abnormal voice sounds – v Whisperes Pectoriloquy, v Bronchophony and v Egophony.
- 63. Breathing Patterns
- 64. Abnormal findings; Recession: as paediatric patients have a more compliant chest wall (that is, it is not as rigid as an adults) any increased negative pressures generated in the thorax will result in intercostal, sub-costal or sternal recession. Greater recession = greater respiratory distress. But be careful, as children will tire from an increased effort of breathing much faster than adults, and as they do, these recessions will vdecrease. Stridor: is usually more pronounced in inspiration but may also occur during expiration. It indicates an upper airway obstruction. Always consider the possibility of an inhaled foreign vbody if you can hear stridor. Wheeze: Indicates lower airway narrowing and us usually more pronounced during expiration. Increased wheeze does not mean increased respiratory distress., wheeze will subside as the patient vbecomes exhausted. Grunting: a grunting child is a bad thing. It is an attempt to keep the distal airways open by generating a grunted positive end-expiratory pressure. It is a sign of severe respiratory distress. Grunting may also be seen in vchildren with raised intercrainial pressure. Use of accessory muscles: the child may begin using the sternomastoid muscle to assist with breathing. In infants this may lead to bobbing of the head. Looks cute, but isn’t. Gaspv: a gasping child is really really bad. vGet help.. Crackles or rales are similar to rhonchi except they are only heard during inspiration. It is the result of alveoli popping open from increased
v65. Rales result from the passage of air through fluid or moisture. They are more pronounced when the child takes a deep breath. Even though the sound may seem continuous, it is actually composed of several discrete sounds, each originating from the rupture of a small bubble. The type of rales is determined by the size of the passageway and the type of exudate the air passes through. They are roughly divided into three categories: fine, medium, and coarse. Fine rales (sometimes called crepitant rales) can be simulated by rubbing a few strands of hair between the thumb and index finger close to the ear or by slowly separating the thumb and index finger after they have been moistened with saliva. The result is a series of fine crackling sounds. Fine rales are most prominent at the end of inspiration and are not cleared by coughing. They occur in the smallest passageways, the alveoli and bronchioles. Medium rales are not as delicate as fine rales and can be simulated by listening to the “fizz” from recently opened carbonated drinks or by rolling a dry cigar between the fingers. They are prominent earlier during inspiration and occur in the larger passages of the bronchioles and small bronchi. Coarse rales are relatively loud, coarse, bubbling, gurgling sounds that occur in the large airways of the trachea, bronchi, and smaller bronchi. Often they clear partially during coughing.

v66. Rhonchi are bubbly sounds similar to blowing bubbles through a straw into a sundae. They are heard on expiration and inspiration. It is the result of viscous fluid in the airways such as exudate. Rhonchi are continuous, since sound being forced past an obstruction. Sibilant Rhonchi are high pitched, musical, wheezing, or squeezing in character. The wheezing quality is often more pronounced in forced expiration. Sibilant rhonchi are produced in the smaller bronchi and vbronchioles. Sonorous Rhonchi are low pitched and often snoring or moaning in character. They are produced in the large passages of the trachea and bronchi. Like coarse rales, they can be partly cleared by coughing.

67. Common Conditional Findings of Respiratory Exam in children Chest Movement Percussion Auscultation InfoConditionBronchitis Hyper-resonant Fine crackles +/- Viral infection – RSV Laboured breathing +/- wheeze Usually under 18 months Hyperinflation +/- old More severe in younger Recession +/- babies, ex prem, family of smokers Tachypnoea, poor feeding, irritating cough Apnoea in small babies Treatment is supportive Increased incidence of wheezing episodes in the next 10 yearsPneumonia Dull Crackles Reduced on affected side Increased vocal Rapid, shallow breathing +/- fremitusAsthma Hyperresonant Wheeze Reduced, but hyperinflated +/- Harrison’s sulcus if prolongedCF +/- Hyperresonant Inspiratory Clubbing Hyperinflation +/- crepitations Nasal polyps Expiratory wheeze

68. Interpretation of findings Pleural effusion reduced tactile vocal +/- Consolidation increased tactile vocal +/- fremitus reduced chest expansion +/- stony dull +/- reduced expansion +/- ronchi +/- reduced air entry +/- dull percussion +/- nov bronchial breathing +/- added sounds +/- reduced vocal resonance +/- coarse creptsv +/- increased vocal resonance +/- whispeing +/- pectoriloquy

69. Interpretation of findings Pneumothorax deviated trachea +/- Collapse reduced +/- deviated trachea +/- tactile vocal +/- reduced tactile vocal +/- vocal fremitus +/- hyper-resonance +/- fremitus +/- reduced air entry +/- dull percussion +/- reduced vocal +/- reduced air entry +/- crepsv +/- resonance

70. Air Flow and Blood Flow & Control of breathing Medulla oblongata +/- v +/- Rhymthic breathing Pons +/- Apneustic center +/- Prolongs inhalation +/- Pneumotaxic center +/- v +/- Curtails inhalation +/- v +/- H+ concentration CO2 +/- levels +/- most critical Chemoreceptors +/- CSF +/- Aortic bodies +/- Carotid bodies

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