RESPIRATORY SYSTEM (PEDIATRIC)

LUNG DEVELOPMENT

(1).Pre-natal lung development :-

The lung bud arises as a pouch from the primitive foregut at 22-26 days gestation.

The bronchial tree develops between 5 and 16 wks gestation by continuous budding and branching of the airways . airways branching ends at 16 wks . further growth occurs by an increase in diameter and length but not by increase in air ways number .

Insults to lung before 16 wks gestation decrease both air ways number and subsequent

alveolar growth and number and the insult after 16 wks affect only alveolar number and growth.

(2).post-natal lung development :---

Approximately 60 million primitive alveoli exist at birth ,the lung grows most rapidly in alveolar number during the 1st 2 years . the growth rates decrease thereafter ,until the adult number of approximately 375 million alveoli is reached at age 8-12 yrs .

Common pathologic features of pulmonary :-

1. underlying pathologic process : Most lung diseases in children are classified as
   1. .Obstruction (airway narrowing ) may be caused by intraluminal secretion , edema or inflammation , hyper trophy or contraction of the bronchial smooth muscles or extrinsic compression
   2. Restriction (impaired lung expansion) may be caused by decrease lung compliance ., atelactasis or pneumothorax causing lung collapse ,neuromuscular diseases and disorder of chest wall .

(2). Pathophysiology :

(a) .hypoxemia (deficient oxygenation of blood ) most commonly caused

by ventilation – perfusion abnormalities but may be the result of intra cardiac or intra pulmonary shunt or hypoventilation .

1. .hyper capnia (excess carbon dioxide in the blood ) caused commonly

by hypoventilation due to upper air way obstruction , neuromuscular weakness or CNS depression

(3) Pathogenic factors :

(a) The small airway of the child result in high airway resistance

and put the child at great risk for develop of obstructive lung

diseases .boys are affected more than and more severely than

girls in part because the peripheral airway in boys younger

than 5 yrs are smaller than those in girls .

(b) the young child lack specific immunity

( c) in children most pulmonary diseases has a single cause,

whereas in adult ,pulmonary diseases is apt to be multi

factorial in etiology .

CONGENITAL MALFORMATION

The following discussion is focused on those congenital malformation that do not cause symptoms until after the neonatal period or that have late complications .

LARYNGOMALACIA AND TRACHEOMALACIA (congenital strider )

Strider persisting or appearing after the first few days of life usually result from disturbance to the larynx .

The most common of these are laryngomalacia and tracheomalacia due to flabbinees of the epiglottis and subglottic and weakness of the airway walls leading to collapse and sometime air way obstruction with inspiration .

Clinical features :

Noisy respiration sound usually associated with inspiration are relatively common during the neonatal period and the first years of life ,strider may present at birth or may appear at two months ,male affected more than female ,symptom can be intermittent and are worse when affected infant lie on the back .

Some infant develop dyspnea and inspiratory retraction in the supraclavicular ,intercostals and subcostal spaces .

The strider typically is loudest when the child is feeding or quietly relaxing or in neck flexion position ,and the strider diminished during sleeping or when the child is crying

The strider usually resolves by the age 2 months but may recur with respiratory infection until about three years of age .

Diagnosis :-

Is diagnosed by fibroptic bronchoscopy or direct laryngoscopy .

Therapy :-

Is usually not needed ,parent should be reassured and provide slow careful feeding ,sometime need small nipple .

Rarely tracheostomy is required when the strider occur in failure to thrive or with life threatening apnea or obstruction .

SUBGOTTIC STENOSIS

Is a common problem that may be congenital or iatrogenic ,aggressive management of premature infant with intubation and mechanical ventilation may produce residual damage to the larynx .

Infant with down syndrome appear to have a small larynx and more susceptible or sub glottic stenosis .

Subglottic stenosis will produce strider and evidence of obstruction will be present on expiration and inspiration with increasing degrees of respiratory effort ,the strider will worsen .Viral infection may increase strider .

Definitive diagnoses requires endoscopic evaluation .

Treatment may necessitate tracheostomy ,however milder congenital cases improve with age as the larynx grows .

VASCULAR RINGS

Congenital anomalies of the aortic arch or its branches can create a ring around the airway that compromises respiration .

Clinical features :

If the vascular ring produce compression of trachea and esophagus symptoms are frequently present at infancy , chronic strider and wheezing is exacerbated by crying , feeding and flexion of the neck .

Extension of the neck tends to relieves the noisy respiration .

Vomiting is frequent

Diagnosis :

X-ray examination of the barium filled esophagus , arteriography , two

dimensional ECHO , MRI ,CT or angiography .

Bronchoscopy may be used to assess air way narrowing .

THE CONDITION NOT IMPROVE WITH AGE

Treatment with surgical correction of the defect .

HEMANGIOMA

A number of mass lesion affect the larynx ,but the most common is hemangioma ,that usually found in the subglottic space .

Infant with strider should be examined head to toe for cotaneous hemangioma because

The presence of such lesion greatly increase the likelihood that the strider due to subglottic hemangioma .

The airway obstruction usually worsen with cry and may produce pulmonary hypertension .

The diagnosis depend on endoscopy and may be by AP x-ray of the larynx .

Treatments are controversial ,may need trachiostomy , others laser therapy or steroid.

As with cutaneous hemangioma ,spontaneous regression is the rule ,but may need years .

PULMONARY SEQUESRATION

A cyst like mass of non-functioning lung tissue which lack normal communications with tracheo –bronchial tree .sometime develops at the embryo .

Most often within the lower lobe , the non functioning part is nourished by systemic arteries .

Clinical features :

Infection can result if a fistula develop between the sequestration .

Children usually present with history of recurrent persistent progressive pulmonary sepsis or lung abscess .

Diagnosis of lung sequestration :

* + 1. . x-ray usually shows the sequestration as area of density with displacement of the bronchovascular marking .
    2. Contrast bronchography shows sequestration as area fail to fill outlined by bronchi that are filled
    3. Arteriography will delineate the anomalous artery supply from the aorta .

The treatment is surgical removal of the sequestration

FOREIGN BODY ASPIRATION

The majority of patient are less than 4 yrs and most of death

also occur in this age .

Younger children most commonly aspirate foods ,toys .

Clinical features :

A high number of children who aspirate foreign bodies will present with either a clear –cut history of choking or physical or x-ray evidence of foreign body ,however a small percentage of patients with foreign body aspirate will have negative history because un observed or unrecognized events .

Physical finding consistent with acute foreign body aspirate include unilateral absence of breath sound ,localized wheeze ,strider or bloody sputum .

X-ray may reveal the presence of radiopaque , when aspiration suspected ,expiratory films should be requested .

Because the right main bronchus is a more direct continuation of the trachea than the left main bronchus ,foreign bodies tend to enter the right lung more .

Some foreign bodies especially nuts ro seeds may migrate from place to place in the air way and even lodge in the larynx on coughing totally occluding the air way .

Foreign bodies also may lodge in the esophagus and compress the trachea producing respiratory symptoms .

Diagnosis :-

The majority of foreign bodies are small and quickly coughed out ,but many may remain in the lung for long period before diagnosis and may come to medical attention because of symptoms of fever ,cough sputum production or chest pain .

Patient with persistent with wheeze unresponsive to bronchodilators therapy, persistent atelactasis ,recurrent or persistent pneumonia or persistent cough without other explanation should be suspected foreign body aspiration .

If there is good evidence in history ,physical examination or by film for bronchial foreign body ,the patient should undergo rigid bronchoscopy .

Flexible bronchoscopy may be very useful diagnosis when presentation is not straight forward .

Prevention :-

The best approach to foreign body aspirate is to educate parents .

Infant should not have food that must be easily broken into small pieces .

Toys should be free of small parts that may be aspirate .

INDICATORS OF SERIOUS LUNG DISEASES

1. Persistent fever
2. ongoing limitation of activity .
3. failure to grow .
4. clubbing of fingers .
5. signs and symptoms of persistent distress (tachypnoea ,use of accessory muscles, hypoxaemia , grunting , cyanosis )
6. refractory chest x-ray infiltrate
7. persistent pulmonary functions abnormalities
8. family history of lung diseases

FEASTURES SUGGESTIVE OF SEVERE RESPIRATORY DISRESS

1. inability to feed or drink and vomiting every thing .

2 .convulsion .

3 abnormal sleepiness .

4 . strider in a calm child .

5 . severe malnutrition .

INFECTIONS OF RESPIRATORY TRACT

The peak incidence of respiratory infections in general is during the months of December to February .

The attack rate is higher among the children than the adult and especially severe on those under 3 yrs and more than one affected among the family.

The causal agents are a wide variety of viruses and bacteria , usually start with viral infection followed by secondary bacterial invasion .A wide range of clinical pattern from the trivial to the fatal can produce by many viruses , each of which may produce essentially similar clinical illness ,

Classification of acute respiratory diseases is difficult because the isolation of the viruses is slow and requiring laboratory facilities which are not universally available .

On anther hand an anatomical classification can not provide a satisfactory basis because a single virus can affect the respiratory mucous membrane which is continuous from the nose to the alveoli .

Further more some of the viruses do not confined to respiratory tract alone ,but also may invade the GIT ,mesenteric lymph nodes and CNS .

There are 3 main groups of viruses that affect the respiratory tract .

( 1) . Myxo viruses include the influenza A and B , respiratory syncytial

virus and para influenza virus .

(2 ) . the adenoviruses contain a large number of different types ,some

endemic or others epidemic .

( 3) . the picorna viruses are two types ,entero virus such as coxcacke ,

ECHO virus and rhinoviruses of many serological types .

There is no doubt that RSV is the commonest virus and most severe one ,causing infection of the infant and young children and can cause death in absence of bacterial infection .

UPPER RESPIRATORY TRACT INFECTIONS

The vast majority of cases including these in which tonsillitis is present are due to the virus and few cases of tonsillitis and pharyngitis are due to bacteria of Beta –hemolytic streptococci .

Clinical features :

Upper respiratory infections vary widely in their clinical features

Depend on :---

(1 ) . the area of maximum involvement

( 2 ) . the age of the patient .

( 3) . the causative agent .

Rhinitis with nasal obstruction and mucopurelent discharge may seriously interfere with feeding in the infant whereas a similar common cold in toddler may result only in a mild malaise and low grade fever and nasal discharge .

In most cases however the pharynx shows acute hyperaemia and some edema ,may with cervical adenitis that present with brisk fever ,irritability and anorexia .

When the cause adenovirus type 3 ,conjunctivitis and posterior cervical lymphodenitis are often present .

The direct inspection of the throat is important because the young child rarely complained of sore throat .

When the larynx affected can cause strider

When trachea affected the symptoms ,harsh cough ,sometime with retrosternal

pain ,often worsen during night .

In other cases the prominent complain are abdominal pain and vomiting due to mesenteric lymph nodes , so the different diagnosis from appendicitis may be difficult , but the viral infection are associated with high fever and flushed hot skin and often absence of rigidity and muscle tenderness .

In few cases headache and neck stiffness may arouse the suspicion of meningitis

IT IS WISER TO PERFORM A LUMBER PUNCTURE THAN TO RISK LEAVING A PYOGENIC MENINGITIS INADEQUATELY TREATED

If the tonsils affected they are grossly hyperemic and swollen with yellow to white

Exudates may appear in crypts with enlarged tender lymph nodes .

TREATMENT OF UPPER RESPIRATORY INFECTIONS

1. The room of the patient should be airy with temp. around 18-20 centigrade .
2. good intake of fluid and glucose in form sweetened drinks must be encouraged
3. diet should be light and palatable and the intake of calories is un important in a short illness.
4. tepid sponging is indicated if the rectal temp. rises above 39 c .
5. pain and high temp. ca relieved by paracetamol .
6. nasal obstruction may be temporarily relieved by the use in each nostril before each reed of 2 drops of normal saline .
7. throat swab should be always be taken for culture when the pharynx is inflamed and when the hemolytic streptococcus are isolated antibiotic should be given such as benzyl penicillin 5oo,ooo unites I .m. twice daily

for 3 days and followed by oral penicillin 250 four times daily for a further four days .

CROUP

The most common syndrome of infectious upper obstruction is croup or acute infectious laryngo tracheobronchitis .

Croup is of viral etiology para-influenza type 1 ,2 viruses are the most common .

CLINICAL FEATYRES :-

The typical attack begin in a child between 6 mon .-3 yrs.

Having symptoms of upper respiratory infections (common cold ) and lasts less than five days .

A brassy cough ,inspiratory strider and respiratory distress may develop slowly or acutely . signs of upper air way obstruction such as labored breathing and marked supra sternal ,inter costal and sub costal retractions are evident on examination .

Associated lower air way diseases accompanied by wheeze and productive cough may present ,although the majority of such children are not seriously ill.

The air way may becomes more severe .

The subglotic space is the major site of obstructive which is caused by edema resulting fro the viral inflammation .

Indication of admission to hospital :-

1 . suspected epiglottitis .

2 . progressive strider .

3 . severe distress at rest .

4 . hypoxeamia .

5 . restlessness with pallor or cyanosis .

6 . decrease sensorium .

7 . high fever .

8 . respiratory distress .

Trearment of croup

1. keep the child quite as possible and the best calm method for a child with croup is to sit in mother lap .
2. racemic epinephrine inhaler may reduce the edema temporarily producing marked clinical improvement ,but the edema and obstruction soon return and the disease run its course over several days .

In severe case epinephrine may be repeated every 20 min .

3 . cool mist adminsterd by tent or face mask may help to prevent drying of the

Secretion around larynx

4 . sedation should be avoided .

5 . systemic administered corticosteroid is beneficial in treating croup ,but

Generally is reserved for ill patient .

If the patient is very young ( less than 4 months ) or if symptoms continued

for more than one week ,the patient should undergo care full laryngoscopy,

because there is increased possibility that another lesion may present such as

subglottic or hemangioma .

sudden worsening ( fever ,respiratory distress , increased ) this suggests

complicating bacterial tracheitis

6 . Intravenous fluid may be needed in severely distressed child .

EPIGLOTTITIS

Another syndrome o upper air way obstruction typically occur in older children ( 2-7) yrs and the causative agent H . INFLUENZA type b .

CLINICAL FEAT URES

Epiglottitis is characterized by sudden onset with high fever ,respiratory distress ,fulminant progression ,severe dysphagia and muffled voice .

The patient prefer erect position to breath easily with drooling due to dysphagia .

Epiglottitis is true pediatric emergency because the inflamed airway suddenly

May become totally obstructed leading to death ,

Examination of the pharynx should be avoided .

DIFFERNTIAL DIAGNOSIS OF EPIGLOTTITIS

1 . severe croup .

2 . becterial tracheitis .

3 . foreign body aspiration .

4 . Retropharyngeal and peritonsillar abscess .

DIAGNOSIS :-

1 . High suspicion from clinical picture

2. Confirmation depend on direct observation of the inflamed and

swollen supraglottic structures and redness of enlarged epiglottis

of course examination done at operation room to place nasotracheal

or perform tracheostomy .

3 . Isolation of H. influenza room the surface of epiglottis or from

Blood culture .

4 . X-ray of lateral neck give us thumb sign of swollen epiglottis .

X-ray in croup give us steeple sign due to narrowed subglottic space. .

TREATMENT :-

1 .Admission to the respiratory care unit .

2 . nasotracheal intubations with closed observation to prevent

Extubation.

3 .tracheostomy .

4 oxygen

5 .antibiotics like ceftriaxone 50 – 75 mg /kg x 2 suitable for

H influenzas hould be given and continued for 7-10 days .

Or ampicillin +sulbactam combination should be given

Parentrally if H influenza sensitive .

6 . Intravenous fluid may be needed during hospitalization .

7 . the epiglottitis resolve after a few days of antibiotics and the

Patient can be weaned from the tracheostomy .

PNEUMONIA

Pneumonia is an inflammation of the lung parenchyma ( the lower portion of respiratory tract consisting of the respiratory bronchiole ,alveolar ducts ,alveolar sacs and alveoli ) are is associated with consolidation of the alveolar space .

TYPES OF PNEUMONIA

1 . Infectious pneumonia .

2 . hydrocarbon pneumonia .

3 . aspiration pneumonia .

4 . radiation pneumonia .

5 . lipoid pneumonia .

( pneumonitis is a general term for lung inflammation that may or may not

be associated with consolidation ) .

INFECTIOUS PNEUMONIA

1 VIRAL PNEUMONIA .

A virus is the most common cause of pneumonia in children and the RSV is the most common virus ,others include para influenza .adenovirus ,influenza virus .

Clinical features :-

The picture start with several days of rhinitis and cough followed by fever and more profound respiratory symptoms such as dyspnea and intercostals

retraction .

Diagnosis :-

1 . laboratory finding include predominance of lymphocyte on

complete blood picture and diffuse bilateral infiltration on CXR .

2 . Specific diagnosis can be done by rapid test for viral Ag and by

culturing nasopharyngeal specimens .

Treatment :-

Usually supportive by antipyretic .

Oxygen and fluid sometime needed .

Specific treatment :-

Ribavirin effective for RSV and influenza in sever pneumonia .

Amantidine for influenza type A .

2 . BACTERIAL PNEUMONIA

The common bacterial cause in children older than three months include pneumococ pneumonia and streptococcus group A flowed by ataph .aureas and H influenza .

Clinical features :-

( 1 ) .The clinical features in older children ( about 6 yrs and older)

Is fairly classic present first with mild upper respiratory tract symptoms followed by abrupt onset of fever , tachypnea , chest pain and shacking chills .

Physical examination often reveals lateralization chest signs such as decrease breath sound and crepitation on the affected side .

( 2) . younger children < 6 yrs , may present with non specific manifestation including fever ,malaise ,gastrointestinal complaints , restlessness, apprehension and chills .

Respiratory signs may be minimal and include tachypnea cough grunting respiration .

Signs of pneumonia also may be subtle in young infant with absence of crepitation and rhonchi .

I n older children th finding on examination may consist of decrease or tubular breath sound .dullness to percusion and egophony in localized region .

Sometime the clinical pictures of pneumonia differ according to causative M. O .

H influenza ytpe b pneumonia often associated with bacteremia , meningitis and other sites of infections ( arthritis , pleural effusion ,cellulites ).

Staph. Aureas if present in infant ( 70 % of staph .pneumonia in infant present in first year ) ,associated with acute ill infant with empyema ,pneumatoceles and respiratory failure and the infant may have skin lesions , scalp or previous hospitalization and mother with mastitis .

Lower abdominal pain may be associated with lower lobe pneumonia .

Infant betweenone and three months of ages often have afebrile pneumonia with typically is due to congenital or acquired agent such as Chlamydia trachomatis ,CMV,

Or pneumocystis carinii or RSV .

Pneumonia in immunocompromized patient may be due to P.carinii, gram –ve enteric

Bacteria ,fungi or CMV .

Patient with cystic fibrosis usually due to pseudomonas aeruginosa .

DIAGNOSIS OF PNEUMONIA

Definitive diagnosis of pneumonia require identification of the causative organism .

Sputum for culture ( not easily taken for children ) .

Chest x-ray often shows lower consolidation and pleural effusion or pneumopyothorax that complete pneumonia .

WBC is elevated with predominance of neutrophil , if M .pneumonia suspected

Cold agglutinin are present in peripheral blood film .

Blood culture is essential for Ag detection

M .tuberculosis may be diagnosed by tuberculin skin test and analysis of sputum or gastric aspirates .

Invasive procedures such as bronchoscopy and bronchial –alveolar lavage ,lung aspirate , lung pleural aspirate and lung biopsy done in the unusual clinical picture

Or immune compromised host .

Treatment :-

There is no universally accepted antibiotics regimen for treatment of

Presumed bacterial pneumonia .

The following general guidelines take in consideration :

1.age .

2.severity of illness .

3.presence of illness in the family .

4. previous hospitalization .

5. lab. Studies must be considered when antibiotics is chosen .

( 1) . Children younger than 6 yrs with mild to moderate illness can be observed at

home and given oral antibiotics such as amoxicillin ( 50 mg /kg /day ) or

Ampicillin ( 100 mg / kg /day ) or erythromycin 50 mg/kg /day ) .

Children with more severe illness required hospitalization and intra venous

Cfotaxime ( 100mg/kg /day) ,ceftriaxone ( 50-75mg /kg/day ) or

ceftazidime ( 100mg/kg/day ) after that according to culture .

If streptococcus pneumonia susceptible the crystalline penicillin is drug of choice .

( 2) . children more than 6 yrs with mild to moderate illness can be observed at home

and given oral penicillin or if Mycoplasma pneumonia is likely (macrolides )

can be used such as erythromycin or new generation ( azithromycin and

clarythromycin )

In severe cases hospitalization and I V third generation cephalosporin .

Other supportive treatment :

1 .severe dyspnea or cyanosis is indication for oxygen .

2 . antipyretic may be needed .

3. adequate intake of fluid must be ensured .

4. good nursing and the infant position in the cot should be changed frequently and

his head should be raised above his feet .

5 . blood gas analysis in severe ill case should be done .

6 . ventilatory support may be needed in seriously ill child .

7 . Chest physical therapy may be need to clear the secretion and encuorge cough .

Indication of hospitalization in pneumonia :

1. failure to response to oral antibiotics .
2. inability to take oral antibiotics because of vomiting or poor compliance .
3. lobar consolidation in more than one lobe .
4. immune suppression .
5. moderate to severe respiratory distress .
6. empyema .
7. abscess or pneumatocele .
8. underling cardiopulmonary diseases.

BRONCHIOLITIS

A common disease of lower respiratory tract of infant results from inflammatory obstruction of small airways .

Respiratory syncytial virus ( RSV ) is the causative agent in more than 50% of cases .others may caused by para-influenza , mycoplasma or adenovirus or measles .

There is no firm evidence that bacteria can cause bronchiolitis .

Bronchiolitis occur most commonly in male infant between 3-6 months ,who have not been breast –fed and who is living in crowded condition and have smoker mother .

The source of viral illness is usually a family member with respiratory illness.

Pathophysiology

Acute bronchiolitis is characterized by bronchiolar obstruction due to edema and accumulation of mucus and cellular debris and by invasion of the smaller bronchial by virus ,and because the radius of airway is smaller during expiration the resultant ball valve respiratory obstruction leads to early air

Trapping and over inflation .

Atelactasis may occur when the obstruction becomes complete and trapped air is

Absorbed .

The pathologic process impairs the normal exchange of gasses in the lung.

Ventilation – perfusion mismatched result in early hypoxemia .

CLINICAL MANEFISTATION

T he infant first has a mild upper respiratory tract infection with serous nasal discharge and sneezing , these symptoms usually lasts few days and may be accompanied by diminished appetite and fever of 38 c .

The gradual development of respiratory distress characterized by wheezy cough , dyspnea and irritability .

In mild cases symptoms disappear in 3 days .

In more severe cases may develop within several hours .

On examination :- the patient in distress ( subcostal ,inter costal recession ) .

Palpable liver and spleen due to over inflated lung ,wide spread

Fine crepitation may be heard .

The expiratory phase of breathing is prolonged and wheezing are

Audible .

Chest x-ray finding :

1 . hyper inflation of the lung and increased antero –posterior

diameter .

2 . scattered area of consolidation .

3 . sometimes increased translucency of the lungs

DIFFERNTIAL DIAGNOSIS OF BRONCHIOLITIS :

1 . Bronchial asthma that accompanied by repeated episodes with family

history and respond well to bronchodilator .

2 . foreign body usually the history of aspiration and localized sings on

Examination.

3 . Bacterial bronchopneumonia that associated with generalized

obstructive pulmonary over inflation

4 . heart failure , usually with cardiac murmur .

Admission criteria :

( 1) .any risk factors ( age < 3 months , previous severe bronchiolitis , premature

Apnea , chronic lung disease, congenital heart diseases ,

Immunodeficiency , multiple congenital abnormalities ,

Severe neurological diseases ,social concerns ).

( 2) . moderate or severe bronchiolitis .

PROGNOSIS :-

The first three days usually most critical ,after that the

improvement occur rapidly and the death may due to :

1. apneic attach .
2. respiratory failure .
3. severe dehydration .
4. associated some cardiac or immunity problems .

A significant proportion of infant have hyper reactive airways during later

Childhood .

TREATMENT OF BRONCHIOLITIS

1. Hospitalization of infant with respiratory distress .
2. cool place and humidified oxygen to relieve hypoxemia and reduce water

loss from tachypnea .

1. avoidance of sedation to irritable infant.
2. sitting the infant in 40 degree angle and the head and chest slightly elevated

to extend the neck .

5 . intra venous fluid to replace the loss .

6. ribavirin , antiviral given by aerosol for immune deficient patients or with

cardiac diseases .

7 . antibiotics to treat or prevent bacterial invasion .

8 . steroid may be used but sometime may be harmful .

9 . bronchodilators are frequently used .

10 . those patients with impending respiratory failure requiring ventilatory help .

11 . as prevention RSV immune globulin may be given to risky cases .

Discharge if all of the following are confirmed :

1. feeding well 2. no cyanosis in air .

3. apyrexial 4. R.R rate < 50 /min.

5. parents are confident

6. advice parents :

( a).small frequent feeds .

( b). explain peak symptoms are on day 4-5 .

( c) . open access for 48 hrs to return if they have concerns .

( d) . seek help if worsening and feeding difficulties .

BRONCHIOLITIS OBLITERANCE

Un common form of chronic bronchiolitis in which there is endobronchiolar granulation tissues and peribronchiolar fibrosis , this most commonly caused by adenovirus and less commonly bt measles ,influenza ,pertusis

And M . pneumonia .

Most like acute bronchiolitis ,but the course progress often after a period of improvement with increasing respiratory distress with poor respond to bronchodilator

Treatment :

No specific treatment just supportive with trial with steroid and

Bronchodilator .

LUNG ABSCESS .

Lung abscess is a suppurative process resulting in destruction of pulmonary parynchyma and formation of cavity containing purulent material .

Causes :

1 .aspiration of infected material when the local defense mechanismare overwhelmed by surgery or virulent microorganism .

In recumbent position the posterior segments of upper lobes most affected .

In erect position the basilar segments of the lower lobes most affected .

2. pneumonia caused by aerobic pyogenic M.O. like staph.

3 . bronchial obstruction by tumor or foreign body .

4 . metastatic lung abscess secondary to bacteremia or due to septic

thrombophlebitis .

5.rare may caused by amebea .

Clinical manifestation :-

Fever , malaise , anorexia ,weight loss , cough often associated

With hemoptysis and producing copious amount of foul smelling or purulent sputum .

There may be respiratory distress , spiking fever , chest pain and marked leukocytosis

Diagnosis :-

Chest x-ray shows cavity with or without fluid level surrounded by

alveolar infiltration .

Sputum culture reveal mixture of anarobic bacteria .

C.T. scan and u/s used for diagnosis of lung abscess and sometime

guiding for aspiration

Treatment of lung abscess :

Treatment should be follow the culture ,but in case of an aerobic by gram stain , treatment with clindamycin or piperacillin for 4-6 wks and wait the culture .

Alternative treatment allergic to penicillin is chloramphinicol or metronidazole .

Many consider clidamycin the agent of choice .

Antibiotics should be given intravenous for at least 2-3 wks .

Bronchoscopy is indicated only to identify and remove foreign body .

Chest tube drainage is necessary if empyema present .

Surgical drainage almost never indicated unless :

1 . recurrent hemoptysis .

2 . necrosis .

Asthma

Definition : - asthma is a lung disease characterized by :

1 . Airway obstruction ( or airway narrowing ) that is reversible ( but not completely

So in some patients ) either with treatment or sometime spontaneously

2 . Airway inflammation .

3 . Airway hyper-responsiveness to variety of stimuli .

Incidence :-

Asthma is the most common chronic lung disease of children .

As many as 10 -15 % of boys and 7 – 10 % girls may have asthma at sometime during childhood .

1. before puberty twice as many boys are affected , but at puberty the

incidence is equal .

2 .asthma is more severe in young children because they are more prone to

viral infection and because the smaller airway size increase airway

resistance .

3 . data on the inheritance of asthma are most compatible with polygenic

or multifactorial .

a child with one affected parent has about 25% risk of having asthma,

the risk increases to about 50 % if both parents are asthmatic .

4 . A genetic predisposition combined with environmental factors may

explain most cases of childhood asthma .

Epidemiology :-

Asthma may have its onset at any age . 30 % of patients are symptomatic by one year .

80 – 90 % of asthmatic children have their first symptoms before 4-5 yrs of age ,

Most severely affected children have an onset of wheezing during the first year of life and family history of asthma and other allergic disease, these

children may have growth retardation unrelated to steroid therapy .

The prognosis for young asthmatic is generally good .

About 50% of all asthmatic children are virtually free of symptom within

10 -20 yrs , but recurrence are common in children .

In children who have mild asthma with onset between 2 yrs and puberty ,

The remission rate is about 50% and only 5% experience severe asthma .

In contrast ,resolution is rare in children with severe asthma characterized

By chronic steroid user with frequent hospitalization about 95 % become

Asthmatic adult .

Risk factors for occurrence of asthma include :-

( poverty , black race , birth weight less than 2.5 kg , maternal smoking

Small home size , large family size , intense allergic exposure at infancy )

ETIOLOGY :-

Asthma is a complex disorder involving autonomic , immunogenic ,

Infectious , endocrine and psychological factors .

Vagal sensory ending in airway epithelium causing contraction of smooth muscles .

Immunological factors as extrinsic ( allergic asthma ) have increase IgE level .

Intrinsic asthma no increasing IgE level and negative skin test .

Viral agent are the most important infection triggers .

Endocrine effect on asthma may be worsen in relation to pregnancy and menses .

Thyrotoxicosis increase the severity of asthma .

Psychological factors affection are related more closely to poor control of asthma

Than to the severity of asthma .

Summary of asthma triggers in children :

1 . respiratory infections .

2 . irritant ( cigarette , air pollution .

3 . exercise .

4 . allergic ( inhaled or ingested )

5 . change in the weather .

6 . emotional stress ( cry . laugh ) .

7 . medication like aspirin .

8 . gasroesophageal reflux .

ASTHMA PATHOPHYSIOLOGY

The pathology of asthma include bronchoconstriction , bronchial smooth muscle hypertrophy , mucous gland hypertrophy , mucosal edema , infiltration of inflammatory cells ( eosinopil , neutrophil , basophil , macrophage ) .

Obstruction is most severe during expiration because the intrathoracic airway become smaller during expiration .

Overinflation cause decrease compliance and then increase work of breathing .

Airway obstruction may lead to atelactasis and then ventilation – perfusion mismatch

Further narrowing of airway may lead to pheumothorax .

Hypoxia may damage alveolar cells and then decrease surfactant which normally stabilized alveoli , thus this process may aggravate the tendency toward atelactasis .

CLINICAL FEATURES

The acute episodes are most often caused by exposure to irritant such as cold air or exposure to allergins .

Because airway patency decrease at night many children have acute asthma at night .

Cough is non productive early in the course of attack accompanied by wheezing ,

Tachypnea , dyspnea , prolonged expiration and use of accessory muscles of

Respiration .

Hyperinflation of the chest , tachycardia and pulsus paradoxus may be present in severe asthma .

Cough may present without wheezing or wheezing may be present without cough .

Asthma may present only with chronic night cough only .

When the patient is in extreme respiratory distress the cardinal signs ,wheezing may be strikingly absent only after bronchodilator treatment gives partial relief of the airway .

Abdominal pain is common due to contraction of abdominal muscles and diaphragm ,

Vomiting is common .

DIFFERENTIAL DIAGNOSIS :

1 . Respiratory ( infection , foreign body aspiration , tracheomalacia , cystic fibrosis ,

Bronchiectasis , alpha 1 – anti trypsin deficiency ) .

2 . cardiac ( congenital heart disease with failure , vascular ring ) .

3 . G.I.T ( gastro- esophageal reflux , H type fistula ) .

4 . Miscellaneous ( immune deficiency , psychogenic cough ) .

LABORATORY STUDIES IN ASTHMA

1 . Complete blood count , generally normal but esonophelia suggest atopy .

2 . sputum whitish with esonophilia and purulent sputum suggest infection .

3 . chest x-ray normal between episodes

Hyperinflation , atelactasis , pneumomediastinum or presence of pneumothorax .

May be present .

4 . pulmonary function test .

5 . serum IgE

6 . Allergy skin test .

7 . arterial blood gas analysis .

CLASSIFICATION OF ASTHMA SEVERITY IN

GENERAL

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C/F before R symptoms night time symptoms lung function

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Step 4 severe continual symptoms frequent FEV or PEFR <60%\_

Persistent limited activity

frequent exacerbation

Step 3 moderate daily symptoms >one time/wk FEVorPEFR>60-80%

Persistent exacerbation affect activity

Exacerbation >2times/wk

Step2 mild symptoms>2times/wk >2times/mon. FEV or PEFR>80%

persistent but < one time a day

Step1 mild symptoms<2times/wk <2times/mon. FEV or PEFR>80%

Intermittent exacerbation breif

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

FEV =Forced expiratory volume in 1st second

PEFR = Peaked expiratory flow rate

CLASSIFICATION OF SEVERITY OF ACUTE ASTHMA EXACERBATION

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mild moderate severe resp. arrest imminent

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Symptoms:

\_breathlessness at walking at talking at rest

\_ talk in sentences phrases word

\_alertness may be agitated agitated usually agitated drowsy confused

Signs :

\_ R.R increased increased >30/min.

\_Accessory not used common used usually paradoxical thoraco

muscles Abdominal movem

\_wheeze end of expiration throughout throughout absent

Exhalation respiratory cycle

\_pulse/min: <100 100 -120 >120 bradycardia

\_pulsus paradoxus absent may be present often present absent

Functional assessment:

\_SaO2 >95% 91-95% <91% often cyanosis

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ TREATMENT OF BRONCHIAL ASTHMA

1 . Mild intermittent asthma .

\*long term control uually no daily medication needed .

\*quick relief by short acting bronchodilators in form inhaled beta 2 agonist .

2 . Mild persistent asthma .

\* long term control by anti-inflammatory therapy inform of low dose inhaled

corticosteroid or bronchodilators , cromolyn or nedocromil may be used .

some evidence suggest that leukotrien antagonism are effective .

\* quick relief by short acting bronchodilators in form of inhalers .

3 . Moderate persistent asthma .

\* long term control by daily anti –inflammatory treatment inform of inhaled

corticosteroid and long acting bronchodilators .

\*quick relief by short acting bronchodilators .

4 . Severe persistent asthma .

\* long term control daily anti-inflammatory therapy inform of inhaled

corticosteroid ( high dose )and long acting bronchodilators , anti-leukotien or

theophyline .

\* quick relief by short acting bronchodilators .

Treatment of severe asthma ( status asthmaticus )

1 . Admission and continuous oxygen to keep saturation more than 90 % .

2 . Aerosilized albuterol ( salbutamol ) in a dose 0.15 mg /kg may be repeated hourly

3 . Methyl prednisolone 1-2 mg/kg intravenously 6 hourly or

Hydrocortisone 10 mg /kg

4 . Aminophyline administral either loading dose 5 mg /kg followed by continuous

infusion or bolus therapy 1mg /kg 6 hourly ( slow infusion ) .

Beside that laboratory work should include blood gas analysis and electrolytes .

Chest x-ray is advisable if there are localized abnormalities on auscultation or

failure response to the treatment .

Fluid therapy may be needed due to loss that result from ( hyper ventilation , poor

oral intake , diuretic effect of theophyline ) .

Mechanical ventilation may be needed if medical therapy failed .

DRUGS USED IN ASTHMA

1 .Bronchodilators :-

A . B2-adrenergic agonist include albuterol ( sabutamol ) , terbutaline ,

epinephrine and isoproterenol .

for example albuterol ( o.1-0.15 mg/kg / dose ) 3 times daily orally .

aerosol ( 0.o1-0.03 ml/kg ) diluted with 2 ml of normal

saline up to 4 times daily .

side effects tachycardia , tremor .

B . Xanthine ( theophyline and its derivatives ) are effective

bronchodilators but have significant side effect like irritability ,

hyperactivity , hematemesis and seizure this can be minimized by

beginning with small dose and increase slowly and available as

rapid release and slow release .

C . Anticholinergic such as ipratropium bromide as atropine derivative ,

have slower onset of action and provide less maximal bronchodilation .

2 . Corticosteroid :-

They have significant side effect when used orally for long period

Oral preparation are extremely effective , however low dose therapy

Usually 3-5 days .

Low dose ( alternative day ) steroid therapy can be used effectively

for patient whose asthma can not be controlled with inhaled steroid

because o high effective and can be used safely for chronic asthma .

Mode of action of steroid :

1 . suppression of mediators .

2 . enhance response to agents that increase cyclic AMP .

3 . Enhance response to B2 agonist .

3 . Cromolyn :-

Is a mast cell stabilizers that inhibit pulmonary histamine release .

It given to prevent ( not treat ) asthma .

4 . nedocromil :-

Is effective in long term asthma ( 4 mg by inhalation ) but has no clear

cut advantage over cromolyn .

5 . Leukotriene inhibitors :-

These agent improve pulmonary function by afford protection

against bronchospasim induced by exercise cold air and allergens.

Zafirlukast and Zileutin given above 12 yrs .

Montelukast can be given in children above 2 yrs .

6 . Ketotifen :-

Antihistamine with mass cell stabilizers used for prevention .

7 . Methotrexate :-

Remain as experimental therapy for patient with severe steroid

dependent asthma .

8 . Future therapy :-

Monoclonal Anti IgE antibodies are undergoing clinical trial in

patients with allergen induced asthma

EDUCATION ABOUT ASTHMA

1 . Patients should be aware about the triggering factors to be avoided .

2 . patients and parents should know how to use medication .

3 . parents should understand that asthma is chronic disorder with acute exacerbation .

4 . emphasize the importance of compliance and adherence to treatment .

5 . avoid unnecessary restriction in the life style of the child or family .

INHERITED LUNG DISEASES

------------------------------------------

CYSTIC FIBROSIS :-

The most common lethal inherited disease of whitish that defined as a disease of the exocrine gland that cause viscoid secretion ,the GIT , and pulmonary system are most commonly and most severely affected .

Pathogenesis :-

Cystic fibrosis is inherited as autosomal recessive gene that located on chromosome no. 7 .

The defect in cystic fibrosis is thought to be blocked or closed chloride channel in the cell membrane of epithelial cells . this blockage traps chloride ions inside the cell and draws ions and water into the cell . this process results in dehydration of the mucous secretion .

Clinical features :-

1 . respiratory insufficiency , occurs eventually in more than 95 % of all patients and caused by abnormal mucous gland secretion in the airway producing airway obstruction and secondary infection , cough , dyspnea , bronchiectasis , pneumothorax and finely corpulmonale is a late complication .

1. GIT , chronic diarrhea and malabsorption .
2. electrolytes in sweats ( sodium and chloride is high ) .
3. reproductive defect including sterile male and reduce fertility in females .
4. hepatic manifestation , that ends with portal hypertension .
5. pancreatic with diabetic mellitus .
6. skeletal abnormalities with arthritis and joint pain .
7. nasal including chronic sinusitis with nasal polyps .

Diagnostic criteria of cystic fibrosis :-

1 . positive sweat test by skin test > 6 MEq /L .

2 . typical pulmonary manifestation .

3 . typical GIT manifestation ( meconium ileus , chronic diarrhea , rectal prolapse ,

billiary cirrhosis ) .

4 . positive family history .

Therapy :-

1 . treatment of pulmonary problems .

2 . chest physiotherapy ( postural drainage , active cycle of breathing ) .

3 . antibiotics given orally , I.v or aerosol especially for staph. And pseudomonas

infection ( aminoglycosides , cephalosporin can be used ) .

4 . bronchodilators and steroid .

5 . pancreatic enzymes replacement .

6 . vitamins supplement , high calorie and protein diet .

7 . treatment of complication accordingly .

8 . lung transplant .

DISEASES OF PLEURA

PLEURAL EFFUSION :--

Accumulation of fluid in the pleural space whenever the local hydrostatic forces pushing fluid out of the vascular space exceed osmotic forces pulling fluid back into the vascular space .

Etiology :-

1 . congestive heart failure .

2 . hypoprotienemia .

3 . obstruction of lymphatic drainage .

4 . malignancy .

5 . collagen vascular disease .

6 . infection of pleura is due to strepto cocus , pneumonaie , H . influenza or T .B .

Clinical features :-

In general clinical features of primary disease is the presenting symptoms , but the patient may complain from pain , dyspnea , and sings of respiratory insufficiency resulting from compression of the underling lung tissues .

Physical finding include :-

Dullness to percussion , decrease breath sounds , mediastinal shift and decrease tactile fremitus .

Diagnosis :-

Is confirmed by chest x-ray . postero- anterior shows uniform opacity with

a curved upper border , when air is also present the fluid line is horizontal .

decubitus views may be helpful to distinguish fluid collection from other densities

in the thorax .

diagnostic thoracocetesis may be necessary to establish the cause of the effusion and to exclude infection .

Most patients with effusion should undergo diagnostic thoracocentesis unless the:-

1 . underling causes for the effusion are clearly evident .

2 . the patient does not have significant respiratory distress .

3 . infection not suspected .

Comparison between transudates and exudates pleural effusion :

Transudate exudates

--------------- ------------

1 . low specific gravity < 1.015 high specific gravity

2 . low protein ( < 2.5 g/ dl high protein > 3g / dl

3 . decrease lactic dehydrogenase increase lactic deh.

4 . low cell count high cell count

5 . high PH low PH

6 . normal glucose low glucose

Treatment : -

Treatment directed to the underlying condition that cause the effusion and at relief of mechanical consequences of the fluid collection .

Small effusion especially if they are trnsudate usually require no treatment .

Large effusion may require drainage with chest tube especially if the fluid is

purulent ( empyema ) .

If the underlying condition is treated successfully the prognosis for patient with pleural effusion including empyema is excellent .

PNEUMOTHORAX:-

Is the accumulation of air in the pleural space that may result from external trauma or from leakage of air from the lung or air way ,it may occur spontaneously .

Predisposing condition include :-

1 . mechanical ventilation .

2 . asthma .

3 . disorder of collagen .

4 . cystic fibrosis .

5 . infection especially staph. Pneumonia , T.B.

6 . Iatrogenic ( tracheostomy , thorachocentesis ) .

Symptoms of pneumothorax :-

Chest pain , dyspnea , and cyanosis . If the air leak accumulate with mediastinum , subcutaneous emphysema may become apparent .

Physical finding :-

Decreased breath sounds , tympanic percussion note , sings of mediastinal shift and subcutaneous crepitance .

Few or no physical sings of pneumothorax may be present if the amount of air collection is small , but symptoms may progress rapidly if the air in the pleural space is under pressure ( tension pneumothorax ) with death resulting if the tension

not relieved .

DIAGNOSIS :-

The radiography usually confirms the diagnosis ,although in the infant there may be difficulty in distinguishing pneumothorax from a large diaphragmatic hernia or giant emphysematous bulla , drink of gastrografin usually resolve the difficulty .

TREATMENT OF PNEUMOTHORAX :-

The treatment depend on the amount of air collected and the nature of the underling cause ,

Small pneumothorax often do not need treatment and resolve spontaneously .

Large pneumothrax and tension peumothorax require immediate drainage of air .

In emergency situation a simple needle aspiration may sufficient , but placement of chest tube may be require for resolution .

Sclerosing the pleural surfaces to obliterate the pleural space may benefit patient with recurrent pneumothoraces .