ii. Lung diseases

iii. Symptoms of rheumatic diseases

B. Physical findings

a. Rales may be heard on auscultation

b. Look for widened and rounded tips of the finger and toes (clubbing)

4. Laboratory/Diagnostics

c. Chest X-RAY – usually ordered for adults with cough and progressive shortness of breath. Changes with the lung parenchyma, especially the lower lobes, are demonstrated on chest x-ray and high-resolution CT (Computed Tomography) scan. Other changes include interstitial infiltrates, nodules and cystic changes called "honeycombing"

d. High resolution computed tomography (HRCT) - obtain on all patients with suspicion of IPF. Characteristics which confirm IPF include peripheral, bibasilar reticular opacities, opacities with architectural distortion, traction bronchiectasis and honeycombing. Honeycombing is further described as cystic airspaces approximately 3 to 10 cm in diameter usually in a sub pleural location.

e. PFT (Pulmonary Function Test) - Complete PFTs, spirometry, lung volumes, diffusing capacity for carbon monoxide (DLCO) and resting and ambulatory pulse oximetry are obtained in virtually all patients with ILD (Interstitial Lung Disease). In patients with IPF, studies typically show a restrictive ventilatory defect. Some patients may show a coexisting bronchoconstriction in their small airways. The diffusing capacity of lung for carbon dioxide is commonly reduced. This is a manifestation of altered ventilation and perfusion in the lungs.

f. ABG and pulse oximetry - may show hypoxemia as the disease progresses. When the disease is severe, there is retention of carbon dioxide.

g. Routine lab findings are not helpful

i. When patients are undergoing an initial evaluation for interstitial lung disease, serologic studies may be of benefit in identifying subclinical rheumatic disease.

ii. If IPF is suspected, antinuclear antibodies should be obtained

therapy that were once a Class II or III but have improved to a Class I.

- WHO Class II: No symptoms at rest but uncomfortable and short of breath with normal activity such as climbing a flight of stairs, grocery shopping, or making the bed.
- WHO Class III: May not have symptoms at rest but activities greatly limited by shortness of breath, fatigue, or near fainting. Patients in this class have a challenging time doing normal chores around the house and have to take breaks while doing activities of daily living.

- WHO Class IV: Symptoms at rest and severe symptoms with any activity. Patients in this class may faint especially while bending over with their heads lowered. Most patients in this class are also volume overloaded with edema in their feet and ankles from right heart failure

6. Pulmonary angiography – will confirm thromboembolic disease, if needed an inferior vena cava filter can be deployed at the same time
7. Cardiac MRI – investigate for cardiac anomalies that have be the cause of PH especially if a transesophageal echocardiogram is contraindicated
8. Right heart catheterization - essential for investigation of pulmonary hypertension. Measurements of pulmonary pressures are obtained to determine elevations and help in diagnosis
9. Other tests may be considered to rule out thromboembolic disorders
    - Lower extremity Doppler
    - Ventilation/perfusion scan- critical for excluding thromboembolic disease but could also be abnormal in pulmonary veno-occlusive disease and fibrosing mediastinitis
    - Computed tomography (CT): confirms suspicious of thromboembolic disease, estimates lung parenchyma and mediastinum. High resolution images can assess for interstitial or bronchiolar disease

10. Discuss pharmacological and non-pharmacological patient management of pulmonary hypertension.

    The goal of PH treatment is to consistently improve oxygenation, hemodynamic measures, WHO functional class, and the six-minute walk. Management depends on the specific category

    A. Treatment of underlying disorders that may contribute to hypoxemia including the following
        a. COPD

b. Congestive heart failure- diuretics, loop ± aldosterone antagonist ± thiazides
c. Obstructive Sleep apnea

B. Supplemental oxygen during the night- these patients frequently have nocturnal desaturations even without a diagnosis of OSA

C. Consider anticoagulation due to increased risk for intrapulmonary thrombosis and thromboembolism. Chronic anticoagulation improves survival, primarily in idiopathic pulmonary hypertension. Warfarin is dosed to achieve an INR of 1.5 – 2.5. It can be stopped for invasive procedures without "bridging" with heparin

D. If polycythemia is severe, (hematocrit > 60%) therapeutic phlebotomy should be considered to yield a hematocrit of approximately 55%. Diuretics may be need for fluid retention

E. Pharmacological therapy. Usually started for symptomatic patients in WHO functional classes II III or IV who have shown "reversibility" or a response to a vasodilator given in the right heart catheterization procedure.

a. Prostanoids, induce vasodilation, inhibit cellular growth, and inhibit platelet aggregation.

i. Calcium channel blockers - limited role in therapy. Should not be used empirically in the absence of demonstrated acute vasoreactivity. ' Improvement in functional class (to I or II) is not seen, additional or alternative therapy should be instituted

ii. Nifedipine 90-240 mg PO daily

iii. Diltiazem 240-720 mg daily

b. Prostacyclins

i. Epoprosternol (Flolan, Veletri)

1. Initiated in controlled setting, usually in the hospital
2. Initial dose is 2 ng/kg/min; titrate upward in increments of 2 ng/kg/min every 15 min or longer until dose limiting effects or intolerance of the drug occur

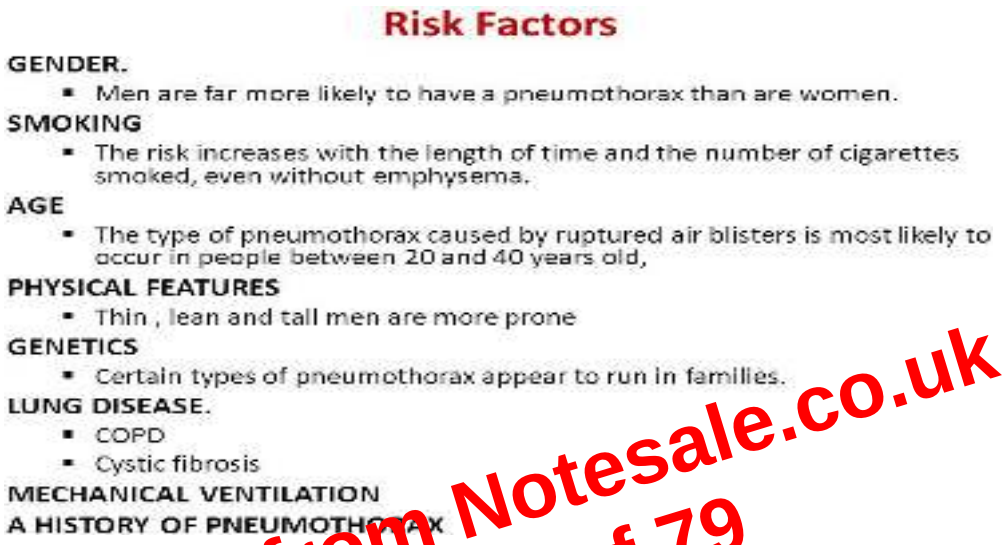
ii. Treprostinil (Remodulin, Tyvasc)

1. Initiated in controlled setting or in hospital
2. Injection: 1.25 ng/kg/min continuous SQ or through a central line infusion. If the dose cannot be tolerated, decrease the dose to .625 ng/kg/min

- The incidence of PSP is less in women. The difference between the rates in men and women is unknown. Factors that have been proposed or shown to predispose patients to PSP include smoking, family history, Marfans syndrome, homocystinuria and thoracic endometriosis

f. Iatrogenic pneumothorax occurs after thoracentesis, central line placement, trans bronchial biopsy, thoracic needle biopsy and barotrauma from mechanical ventilation

b. Discuss the etiology and risk factors for developing a pneumothorax

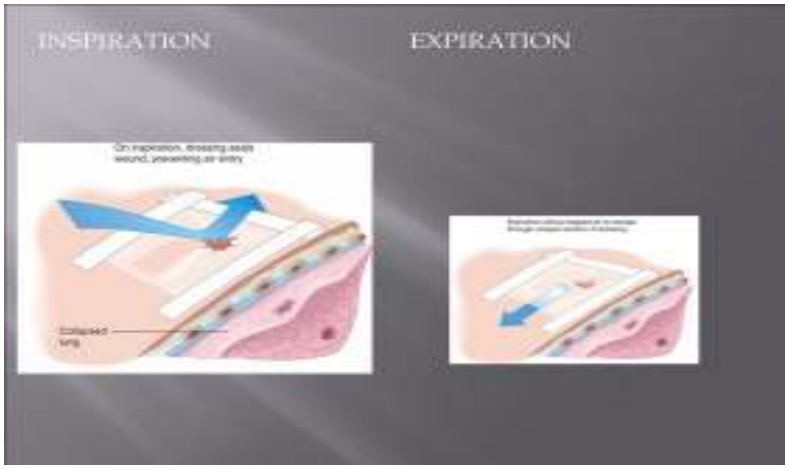


c. Describe the subjective and physical exam findings of a patient with a pneumothorax.

Upon interview questioning patients commonly complain of ipsilateral chest or shoulder pain with acute onset. If the patient reports a history of recent chest trauma or medical procedure, this can assist you in your diagnosis and the presence of pneumothorax should be explored. Their symptoms will suggest a collapsed lung. Symptoms do not always predict the size of the pneumothorax

a. You will see findings that may include
    i. Respiratory distress, hypoxia and tachypnea are likely to be seen in patients with a large pneumothorax in a patient with underlying lung diseases
    ii. Hyperresonance to percussion on the affected side
    iii. Decreased level of consciousness (LOC) if hypoxemia is extreme
    iv. Hypotension
    v. Cyanosis
    vi. Tachycardia
    vii. Shallow respirations
    viii. Chest pain

f. Treatment for open pneumothorax includes application of a three-sided dressing leaving one side unsecured to allow air to escape



g. Massive hemothorax requires fluid resuscitation with Lactated Ringer solution before thoracostomy due to the loss of tamponade effect. Consider auto transfusion.

The pulmonary embolism rule out criteria (PERC rule)*[1]

Age <50 years
Heart rate <100 bpm
Oxyhemoglobin saturation ≥95%
No hemoptysis
No estrogen use
No prior DVT or PE
No unilateral leg swelling
No surgery/trauma requiring hospitalization within the prior four weeks

DVT: deep venous thrombosis; PE: pulmonary embolus; bpm: beats per minute.

* This rule is only valid in patients with low clinical probability of PE (gestalt estimate <15 percent). In patients with a low probability of PE who fullfil all eight criteria, the likelihood of PE is low and no further testing is required. All other patients should be considered for further testing with sensitive D-dimer or imaging.

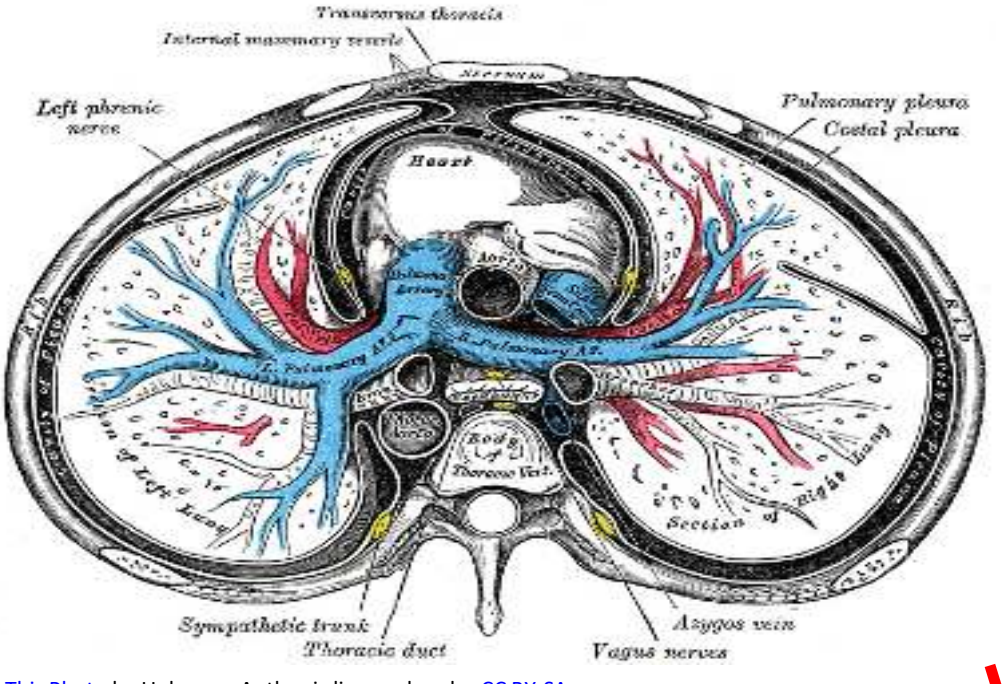
Reference:

1. *Kline JA, Courtney DM, Kabrhel C, et al. Prospective multicenter evaluation of the pulmonary embolism rule-out criteria. J Thromb Haemost 2008; 6:772.*

UpToDate

https://www-uptodate-com.libux.utmb.edu/contents/clinical-presentation-evaluation-and-diagnosis-of-the-nonpregnant-adult-with-suspected-acute-pulmonary-embolism?search=pulmonary%20embolism&topicRef=8253&source=see_link#H11827084

Some clinicians and hospitals measure D-dimer in ALL low-risk patients. *According to UpToDate (2021) the PERC Rule is preferred due to extensive validation of this approach and reduction of unnecessary testing (D-dimer and imaging).



a. Saddle – clot lodges at the bifurcation of the main pulmonary artery (PA) and often extends into the R and L main pulmonary arteries

b. Lobar - Most PEs move beyond this bifurcation and lodge distally in the main lobar, segmental and sub segmental branches of the PA.

c. PE can be bilateral or unilateral.

iii. Streptokinase: 250,000 units over 30 minutes then 100,000 units/hr for 24 hr (compared to alteplase), increased incidence of allergic response (compared to alteplase) and resistance to affect due to antibody formation

iv. Once fibrinolytic therapy is completed, begin heparin or enoxaparin when the PTT is less than 2 times control

f. Hemodynamic support may be needed for massive emboli with hypotension

g. Surgical embolectomy is reserved for those patients with massive emboli in the central pulmonary arteries and the clot is causing hypotension and shock

h. Inferior vena cave interruption (or inferior vena cava filter; "umbrella" device; Greenfield filter) is indicated when the risk of further emboli is perceived to be high or when there is an absolute contraindication to anticoagulation

i. Supplemental oxygen is indicated to keep oxygen saturation above 90%

j. Prognosis depends on several factors including recurrence, the presence of chronic thromboembolic pulmonary hypertension (CTEPH) and avoidance of treatment. If left untreated the mortality rate is approximately 30%.

I. Discuss Pulmonary Vasculitis Types and Treatments

A. Granulomatosis with polyangiitis (formerly known as Wegener granulomatosis)

a. Necrotizing granulomas of the respiratory tract, both upper and lower, pulmonary micro angiitis and glomerulonephritis

b. Associated with the following

i. Hemoptysis

ii. Dyspnea

iii. Cough

iv. Pulmonary infiltrates

c. Antineutrophilic cytoplasmic antibodies (ANCA) are often positive (ANCA is used to detect and diagnose certain forms of autoimmune vasculitis)

d. Treatment includes prednisone 1 mg/kg per day or cyclophosphamide (Cytoxan) 2 mg/kg/day with reasonable chance of remission with 1 ear

e. Treatment has two components

i. Induction of remission with initial immunosuppressive therapy

ii. Maintenance immunosuppressive therapy for a period of time to prevent remission

f. Treatment is based on severity of disease (mild, moderate to severe)

Differential Diagnosis:

Disorders most likely to be confused with acute cholecystitis are:

- Perforated peptic ulcer
- Acute pancreatitis
- Appendicitis,
- Perforated colonic carcinoma or diverticulum

TREATMENT

Acute cholecystitis usually subsides with a conservative regimen, including:

  - Admission
  - Fasting
  - Intravenous fluids - replacement of fluids and electrolytes
  - Analgesics- morphine or meperidine can be administered for pain
  - IV antibiotics: a 2nd or 3rd generation cephalosporin with the addition of metronidazole 500mg q 6 hours
  - Laparoscopic gallbladder resection – cholecystectomy – is usually required in acute attacks. Surgical treatment for chronic cholecystitis is the same as for acute.
  - Overall mortality rate is < 0.2% with surgery, except for older patients in which it is higher.

DISORDERS OF THE PANCREAS

- Pancreatitis: inflammation of the pancreas
- Relatively rare
- Potentially serious disorder
- Incidence is equal in men and women
- More common between 50-60 years of age
- More likely to occur in African Americans

Risk Factors:

- Obstructive biliary tract disease (particularly cholelithiasis)
- Alcoholism
- Peptic ulcers

- Malnutrition
- Fat-soluble vitamin deficiency
- Diabetes mellitus (known as type 3C to differentiate it from type 1 or 2)

Essentials of Diagnosis

- Chronic/intermittent epigastric pain
- Steatorrhea – indicated by bulky, foul, fatty stools
- Weight loss
- Abnormal pancreatic imaging.

Labs/Diagnostics:

- Amylase and lipase may be elevated; however normal values do not exclude diagnosis
- Alkaline phosphatase and bilirubin may be elevated- due to compression of bile duct
- Glycosuria- may be present
- Excess fecal fat – need stool analysis
- Abdominal Xray's: may show calcification due to pancreaticolithiasis in 30% of patients
- CT pancreas: may show ductal dilatation, heterogeneity, or atrophy of pancreatic gland
- ERCP: MOST SENSITIVE imaging study for chronic pancreatitis; shows dilated ducts, intraductal stones, strictures, and pseudocysts
- MRCP and EUS: less invasive alternatives to ERCP

Complications:

- Opioid addiction- common
- Diabetes mellitus – brittle control
- Pancreatic pseudocyst or abscess
- Cholestatic liver enzymes with or without jaundice
- Malnutrition
- Bile duct stricture
- Exocrine pancreatic insufficiency
- Osteoporosis
- Peptic ulcer
- Pancreatic cancer – may relate to tobacco and alcohol abuse

Treatment:

- Low fat diet
- Avoid chronic opioid usage- consider, acetaminophen, NSAID's or Tramadol
- Pancreatic enzyme replacement
- H2 receptor antagonist, or PPI
- Insulin - if required
- Prevention of disease progression includes lifestyle modification- stop alcohol use, tobacco.
- Endoscopic therapy or surgery – indicated to treat underlying biliary tract disease, drain pseudocysts, eliminate obstruction of pancreatic duct, etc.

Prognosis:

- Leads to disability
- Reduced life expectancy
- Risk of pancreatic cancer

When to admit:

- Severe pain
- Jaundice
- fever

- Chronic cholestatic liver disease distinguished by inflammation and fibrosis of*BOTH* intrahepatic and extrahepatic bile ducts leading to multifocal bile duct strictures.
- Likely autoimmune-mediated and progressive disorder usually leading tocirrhosis

Labs/Diagnostics:

- Elevated cholestatic profile: elevated alkaline phosphatase and AST/ALT
- Cholangiography: either performed by MRI cholangiopancreatography (MRCP)or endoscopic retrograde cholangiopancreatography (ERCP); PSC changes include multifocal bile duct strictures and segmental dilations
- ERCP is Gold Standard for diagnosis PSC.
- Cholangiographic findings are:
  - Segmental fibrosis of the bile ducts with saccular dilatations betweenstrictures
- Should exclude biliary obstruction by stone or tumor
- Liver biopsy- not necessary if cholangiographic findings are characteristic
- Patients with PSC are at increased risk for developing cholangiocarcinoma (7-9%)

Management:

- Endoscopic management of strictures to relieve biliary obstruction is maintreatment for PSC
- Patients who are experiencing symptoms, such as pruritus, cholangitis orjaundice and worsening liver function are candidates for endoscopic management.
- The only long-term effective treatment for PSC is liver transplantation
- Episodes of acute bacterial cholangitis may be treated with Ciprofloxacin 750mg bid po or IV.

Characteristic Features of Intrahepatic Bile Duct Disorders

	Secondary BiliaryCirrhosis	Primary BiliaryCholangitis	Primary SclerosingCholangitis
Etiology	Extrahepatic bile duct obstruction Biliary atresia Gallstones Stricture Carcinoma of the pancreatic head	Possible autoimmune	Unknown Possible autoimmune 50-70% associated with inflammatory bowel disease-- ulcerative colitis
Signs and Symptoms	Pruritus, Jaundice, Malaise, Dark Urine, Light Stools, Hepatosplenomegaly	Same as secondary biliary cirrhosis Insidious onset	Same as secondary biliary cirrhosis Insidious onset

- Symptomatic electrolyte abnormalities, either hypo or hyper states

- Surgical – any post-operative patient that requires more intense hemodynamic or respiratory monitoring than standard care
- Miscellaneous - any patient that, for any reason, requires frequent hemodynamic monitoring, assessments, and/or procedures. This can include patients on experimental protocols utilizing new therapies with potential or unknown complications. Patients that suffer injuries from lightening, near drowning, hyper or hypothermia should also be monitored initially in an ICU setting.

9. Guidelines for Patient Discharge from the ICU

Best practice, thorough clinical assessments and common sense should also guide your decision to remove a patient from the intensive care unit. Examples of reasonable situations/conditions that warrant ICU discharge include:

- The patient's physiological status has improved or stabilized, and ICU monitoring is no longer indicated
- The patient's physiological status has worsened or deteriorated but active interventions are no longer planned or aggressive measures will be withdrawn. A lower level of care is now appropriate. If the patient is at end of life, this may also be best for family and friends to be around the patient.

10. Guidelines for Management of The Electronic Medical Record (EMR)

Customized order sets, progress notes and ordering may exist in the work environment. The benefits of these include improvement in outcomes by incorporation of evidence-based practice, decrease in errors and periodic review by hospital committees. They enable you to keep a current working list that you are responsible for as a primary provider or consultant.

11. Pre-operative Assessments

When you are asked to do a preoperative assessment of a patient, the primary concern or emphasis is placed on cardiovascular disease. Is there a current diagnosis or risk factors that could indicate undiagnosed ischemia? Approach the patient in the same manner as an admission to your service by evaluating PMH, PSH, FH, SH, Allergies, ROS, and meds. Then perform a complete head to toe physical exam regardless of the perceived risk of the procedure. Do not perform a focused exam only on the system which is the focus of the procedure.

Consider the following areas when you evaluate the patient:

a. Laboratory and diagnostic screening. Pay particular attention to the results of the following tests:
    - Urinalysis – an untreated UTI may progress to urosepsis if not noticed