

Community-Acquired Pneumonia

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COMMUNITY ACQUIRED PNEUMONIA



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COMMUNITY ACQUIRED PNEUMONIA

- Infection of the lung parenchyma in a person who is not hospitalized or living in a long term facility for ≥ 2 weeks.
- 6th leading cause of death in US and most common cause of death due to infectious disease
- 5.6 million cases each year
- Of these 600,000-1.1 million require hospitalization (\$8 billion annually)
- Mortality rate 13.4 per 100,000

MECHANISM OF INFECTION

- Air borne – via the tracheobronchial tree (infected bronchoscope, aspiration or inhalation of micro-organisms) or extension into airway from parenchyma
- Hematogenous
- Direct spread from mediastinum, diaphragm or chest wall

ROLE OF CHEST RADIOGRAPH

- Identify presence, location and extent of disease
- Monitoring response to therapy
- Detect complications (cavitation, abscess, pneumothorax and effusion)
- Additional or alternative diagnoses
- Guide invasive procedures

ROLE OF CT

- Adjunct to CXR
- Superior in detecting:
 - airspace disease
 - centrilobular and acinar nodules
 - centrilobular or perilobular distribution
 - ground glass opacities
 - air bronchograms

CLINICAL DATA

- Degree of dyspnea
- Level of diffusing lung capacity (D_{LCO})
- Presence of fever or leukocytosis
- Cough/productive cough
- Chronicity of symptoms
- Immune status of patient

PATTERNS OF PNEUMONIA IN THE IMMUNOCOMPETENT HOST

Pattern	Possible diagnosis
Lobar	S. Pneumo, Kleb, H Flu, GN
Bronchopneumonia	Atypical, Viral, Legionella
Interstitial	Viral, PCP, Legionella
Cavitary	Anaerobes, Kleb, TB, S. aureus, fungus
Effusion/ Empyema	S. aureus, Kleb

LOBAR PNEUMONIA

- Most common pattern in CAP patients requiring hospitalization
- Non-segmental, homogenous consolidation
- Almost invariably abuts visceral pleura, hence begins peripherally
- Air bronchograms are present due to air filled larger bronchi
- Path. rapid production of abundant edema/ minimal cellular reaction

STREPTOCOCCUS PNEUMONIAE

- Classically lobar with air bronchograms
- Complete lobar involvement less common due to modern antibiotics
- Now most often bronchopneumonia pattern
- Small to moderate sized sterile effusions 46%-49%
- Large effusion suggests empyema

BRONCHOPNEUMONIA

- Typically infection by S. aureus and gram negatives
- Rapid exudation of numerous PMNs limits spread initially
- Consolidation involves the terminal and respiratory bronchioles and adjacent alveoli results in centrilobular nodular opacities measuring 4-10 mm
- Severe disease results in multifocal consolidation

STAPH. AUREUS

- Bilateral > 60%
- Abscess formation with communication with bronchial tree
- Pneumatocoles occur in children; 15% in adults
- Pleural effusion/empyema 50% of patients

KLEBSIELLA PNEUMONIAE

- Abrupt onset, cyanosis, pleuritic chest pain, prostration, moderate fever
- Green, purulent sputum
- Predilection for upper lobes/bulges, fissures
- Abscess and cavity formation
- Greater frequency of effusion and empyema than S. pneumoniae

LEGIONELLA PNEUMOPHILA

- Airspace consolidation/initially peripheral
- Enlarges to involve an entire lobe or contiguous lobes
- Progression is usually rapid despite appropriate antibiotics
- Lower lobe predilection
- Cavitation infrequent in immuno-competent but frequent in immuno-compromised

MYCOPLASMA PNEUMONIA

- Most common cause of nonbacterial pneumonia
- Airspace/interstitial/combination
- Early - fine reticulonodular pattern
- Later - airspace consolidation
- Pleural effusions usually small
- Acute clinical presentation- unilateral or bilateral airspace disease
- Longer duration of symptoms- diffuse bilateral reticulonodular

APPROACH TO PNEUMONIA IN HIV+

- CD4 cell count
- Concurrent antimicrobial therapy
- Travel to areas with prevalence of latent infections
- Known latent infections with pathogens causing reactivation disease
- Underlying respiratory diseases

PNEUMONIA IN AIDS PATIENTS

- Bacterial - occur early in HIV infections; recurrent pneumonias are AIDS defining
- Bronchial invasive aspergillosis
- Obstructing bronchopulmonary aspergillosis (OBA)
- PCP
- Tuberculosis
- Atypical mycobacteria (*M. avium-intracellulare*)
- Fungal infections (*cryptococcus neoformans*)

BACTERIAL PNEUMONIA

- Acute airspace process with chills, fever and purulent sputum
- Most episodes due to *Strep.pneumoniae* and *Hemophilus influenzae*
- CD4 count greater than 200 cells/mm³
- More frequently multilobar and associated with bacteremia than immunocompetent

PNEUMOCYSTIS CARINII PNEUMONIA

- Dyspnea, dry cough
- Most common opportunistic pulmonary infection in AIDS
- CD4 count less than 200 cells/mm³
- Bilateral symmetric perihilar ground glass opacity
- Bilateral reticular, granular or airspace opacities. Untreated progresses to airspace consolidation
- Cystic lung disease
- Spontaneous pneumothorax

TUBERCULOSIS

- Radiographic appearance varies with CD4 count
- CD4 counts greater than 200 cells/mm³ - reactivation pattern often with cavitation
- CD4 count less than 200 cells/mm³ - pattern of primary TB, cavitation less common, LNE more common

TUBERCULOSIS IN AIDS

- Comparison with normal hosts, AIDS patients more likely present:
 - Lymph node enlargement
 - Diffuse lung disease
 - Bronchogenic spread
 - Miliary disease
 - Extrapulmonary disease

IMMUNE RECONSTITUTION SYNDROME

- Observed in AIDS patients treated for TB also receiving antiretroviral treatment
- New or worsening LNE
- Lung parenchymal disease
- Pleural effusions
- Accompanying fever
- Mediated by heightened immune response
- Cultures for TB negative
- Steroid therapy may benefit

ATYPICAL MYCOBACTERIAL INFECTIONS

- Usually secondary to MAI
- Less commonly *M. Kansaii*
- Usually encountered with CD4 less than 50/mm³
- Immune reconstitution syndrome can be associated

ASPERGILLOSIS IN AIDS

- Four forms
 - Bronchial invasive
 - Chronic necrotizing
 - Obstructing bronchopulmonary aspergillosis (OBA)
 - Necrotizing tracheobronchial disease

CMV RADIOLOGIC APPEARANCE

- Lobar consolidation
- Diffuse and focal parenchymal haziness
- Multiple small nodules with "halo" sign

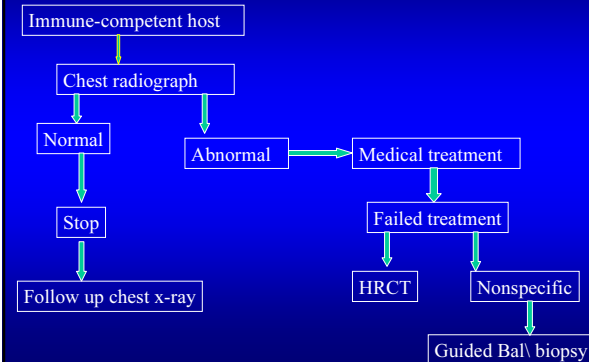
IMMUNOSUPPRESSED NON-AIDS

- Pulmonary infection most common fatal infection
- Acute immunosuppression greater risk for infection than chronic
- Time line post transplant (<30 days, 30-120 days, >120 days)
- Type of organ transplant

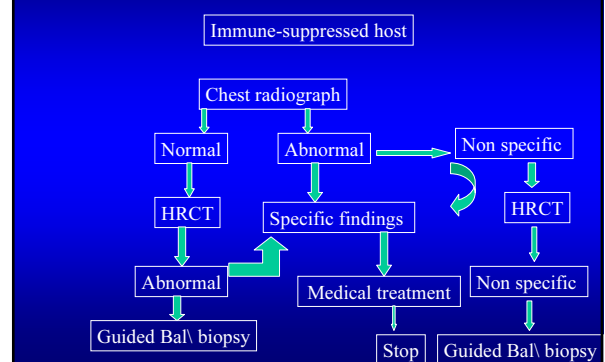
MIMICS OF PNEUMONIA

- COP
- Bronchogenic carcinoma; lymphoma
- Acute or chronic eosinophilic pneumonia
- Vasculitis - Wegener's granulomatosis, Churg-Strauss alveolar hemorrhage
- Alveolar proteinosis
- Radiation pneumonitis

ALGORITHM FOR EVALUATION OF PATIENTS HAVING PNEUMONIA



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CONCLUSION

- Integrating clinical and imaging findings helps in accurate evaluation
- Knowledge of the patient's immune status is a powerful tool in arriving at a short list of possible causative organisms

TAKE HOME POINTS

- Bilateral pneumonia-immunosuppressed, viral, PCP
- Cavitation in bacterial prior to treatment
- Fungal cavitation post treatment and after counts return
- Viral imaging worse than patient
- Always follow pneumonia to resolution