TB Intensive
San Antonio, Texas
December 1-3, 2010

Diagnosis of TB: Radiology
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December 3, 2010

Diagnosis of Tuberculosis
Radiology
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Primary Tuberculosis

- TB is divided into primary and post-primary (or reactivation)
- When TB is seen, 20-30% of the new cases are primary TB in adults (prevalence of TB has decreased in developed countries)
- Confirmation of TB is more important
- Most resolve spontaneously, but reactivation may occur without treatment
- Smears are positive in < 20%
- Cultures are positive in 50%
Primary Tuberculosis

• Most pts are asymptomatic; fever and nonproductive cough may occur
• Result of progression of active disease
• Opacities are seen in middle and lower lungs
• Commonly unilateral
• Lymph node enlargement often occurs, and may cause bronchial compression

Primary Tuberculosis

• Seen in pts not previously exposed to M tuberculosis, infants and children (especially under 5 yrs of age)
• There are four main radiologic presentations in primary TB: parenchymal disease, lymphadenopathy, miliary disease, and pleural effusion
Primary Tuberculosis

- Parenchymal disease: dense, homogeneous consolidation of any lobe; predominance in the lower and middle lobes
- 2/3 of cases: resolve without consequences
- 1/3 of cases: scar persists that can calcify (up to 15% of cases) called a Ghon focus
- Other calcification can be seen as calcified nodules

Primary Tuberculosis

- Lymphadenopathy: Seen up to 95% of children and 40% of adults
- Typically, unilateral and right sided, involving the hilum and right paratracheal region, bilateral in about 1/3 of cases
- The combination of calcified hilar nodes and a Ghon focus is called a Ranke complex, (not unique to TB, can be seen with histoplasmosis)
Primary Tuberculosis

• Miliary disease: more commonly seen in the elderly, infants, and immunocompromised host. Usually seen within 6 months of the initial exposure
• Classically is evenly distributed diffuse small 2-3 mm nodules, with a slight lower lobe predominance

Primary Tuberculosis

• Pleural Effusion: Seen in ¼ of pts with primary TB. Often is the only manifestation of TB, seen 3 to 7 months after initial exposure
• Uncommon in infants
• Usually unilateral, complications are rare
• Residual pleural thickening and calcification can occur
• PPD test can be initially negative
Primary Tuberculosis

• The natural history of TB pleuritis is spontaneous resolution over 2 to 4 mo
• There is a high risk of reactivation if not treated
Primary Tuberculosis

- Miliary TB may develop as a result of primary or reactivation TB (post-primary)
- Most commonly affects infants and children (< 5 yr old), the elderly, alcoholics, pts with neoplasm, HIV-infected pts, and other immunocompromised pts
Primary Tuberculosis
Primary Tuberculosis

[Image of a chest X-ray showing signs of primary tuberculosis]

Primary Tuberculosis

[Image of a chest X-ray showing clear signs of primary tuberculosis]
Primary Tuberculosis

Postprimary or reactivation tuberculosis

- Primary TB is usually self-limiting
- Postprimary TB is progressive: cavitation is the hallmark, hematogenous dissemination (miliary), and bronchogenic spread (tree-in-bud)
- Fibrosis and calcification are seen after healing
- Characterized by upper lobes predilection, cavitation and the absence of lymphadenopathy
- Manifestations are parenchymal disease, airway involvement, and pleural extension
Post primary or reactivation tuberculosis

- Parenchymal disease: Early is patchy, poorly defined consolidation, mainly apical and posterior segments of the upper lobes. In the majority, more than one segment is involved, with bilateral disease in 1/3 to 2/3 of pts
- Cavitation is the hallmark and occurs in 50% of cases. Typically have thick, irregular walls, usually multiple cavities within areas of consolidation

Post primary or reactivation tuberculosis

- With airway disease, endobronchial spread of infection, tree-in-bud opacities may develop (suggesting active TB)
- Lymphadenopathy and pneumothoraces described in 5% of pts
Post primary or reactivation tuberculosis

- Airway involvement: Characterized by bronchial stenosis, leading to lobar collapse or hyperinflation, obstructive pneumonia, and mucoid impaction.
- Bronchial stenosis is seen in 10% - 40% of pts with active TB.
- Tree-in-bud opacities and bronchiectasis can be seen.
Post primary or reactivation tuberculosis

- Pleural extension: Pleural effusions are more common in primary TB, up to 18% with postprimary, usually are small and associated with parenchymal disease
- Effusions are typically septated, can be stable for yrs
- Pleura may become thickened, tuberculous empyema and risk of bronchopleural fistula. Residual pleural thickening and calcification

Post primary or reactivation tuberculosis

- Hemoptysis is common. Hemoptysis due to bleeding from dilated vessels in bronchiectatic areas related to infection or from mycetoma formation in an old cavity
- Severe hemoptysis can be sec to erosion of an expanding cavity into a pulmonary artery called Rasmussen aneurysm
Post primary or reactivation tuberculosis
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Tuberculosis and Immunocompromised Host

- Higher prevalence of extrapulmonary involvement
- 38% of immunocompromised pts with TB have pulmonary involvement only, but up to 30% have only extrapulmonary involvement
- May have a normal chest radiograph due to limited immune response

Tuberculosis and HIV

- Manifestations depend on the degree of immunodeficiency
- Higher CD4 count behaves like TB reactivation
- Lower CD4 count behaves like primary tuberculosis
- Up to 40% suffer disseminated TB disease
- The majority of pts show a typical chest radiographic appearance but normal CXR are not unusual
Tuberculosis and HIV

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Tuberculosis and HIV
Tuberculosis and Immunocompromised Host (ESRD)

Tuberculosis and EtOH abuse
Extrapulmonary Tuberculosis

- Hematogenous seeding of nonpulmonary organs by the tuberculous bacillus is common
- About 50% pts with active tuberculosis have extrapulmonary involvement, (in order of frequency): lymph nodes, pleural space, GU tract, bone and joint sites, meninges, and peritoneum-GI tract

Extrapulmonary Tuberculosis

- The likelihood of extrapulmonary involvement increases in immunocompromised pts
- Laryngeal tuberculosis is an uncommon but highly infectious form of extrapulmonary TB, usually the result of lower airway disease (probably due to hematogenous spread)
Extrapulmonary Tuberculosis

Extrapulmonary Tuberculosis can affect any organ

- Cardiac: pericarditis, pericardial effusion, myocarditis
- CNS: meningitis, tuberculomas, tuberculous abscesses, cerebritis, and miliary TB
- Head and neck: lymphadenitis (scrofula), less common sinonasal, thyroid, skull base
- Musculoskeletal: spinal column, pelvis, hip, and knee (spondylitis, osteomyelitis, arthritis)
- Abdominal: lymphadenopathy, peritonitis, ileocecal region, hepatosplenic, adrenal
- Genitourinary: renal, ureters, bladder, genital (fallopian tubes in women and seminal or prostate gland in men)
Extrapulmonary Tuberculosis

Pott’s Disease
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Pott’s Disease

CT scanning for optimal radiology evaluation

• Do you need a Chest CT to diagnose pulmonary tuberculosis?

• Probably “no”, more useful in extrapulmonary, immunocompromised pts with normal CXR, apical disease, and associated lung masses
EtOH abuse and RUL opacity

EtOH abuse and RUL opacity
EtOH abuse and RUL opacity

Miliary opacities and EtOH abuse
EtOH abuse and miliary opacities
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EtOH abuse and miliary opacities

Miliary tuberculosis
Miliary tuberculosis

Miliary tuberculosis
Tuberculosis with bronchogenic spread

RUL cavity
Biapical Involvement

Biapical Involvement
? masses

RUL nodule
RUL nodular opacities

Plombage and thoracoplasty
Thank you