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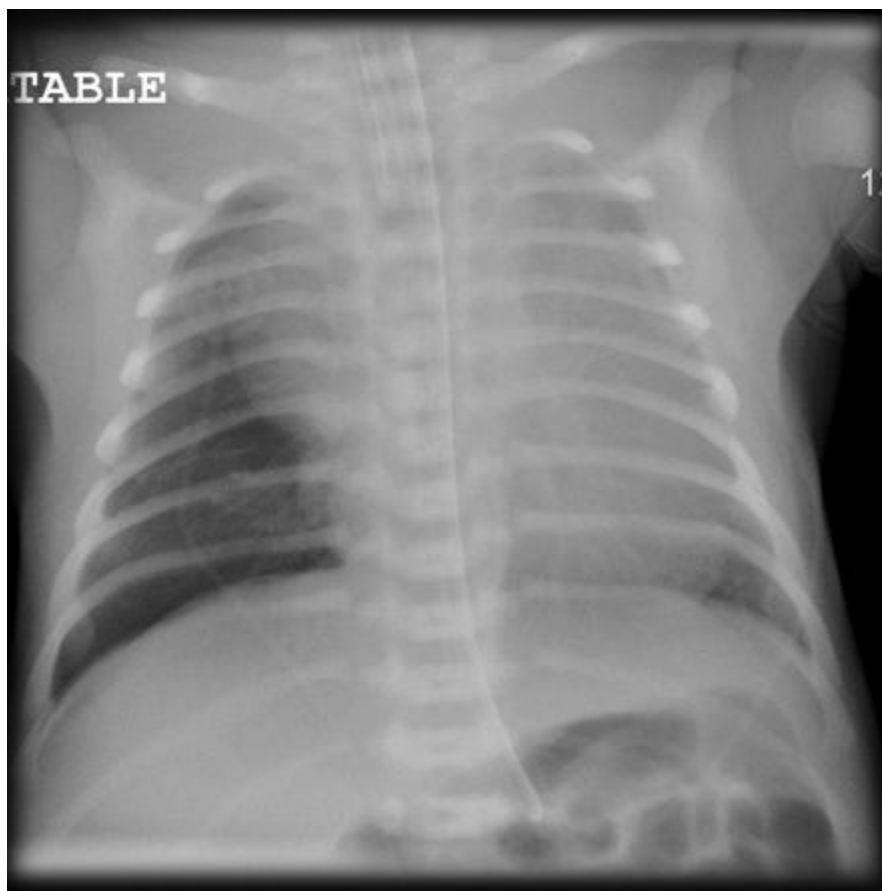
Miami Cancer Institute
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Pediatric Considerations in Radiologic Imaging

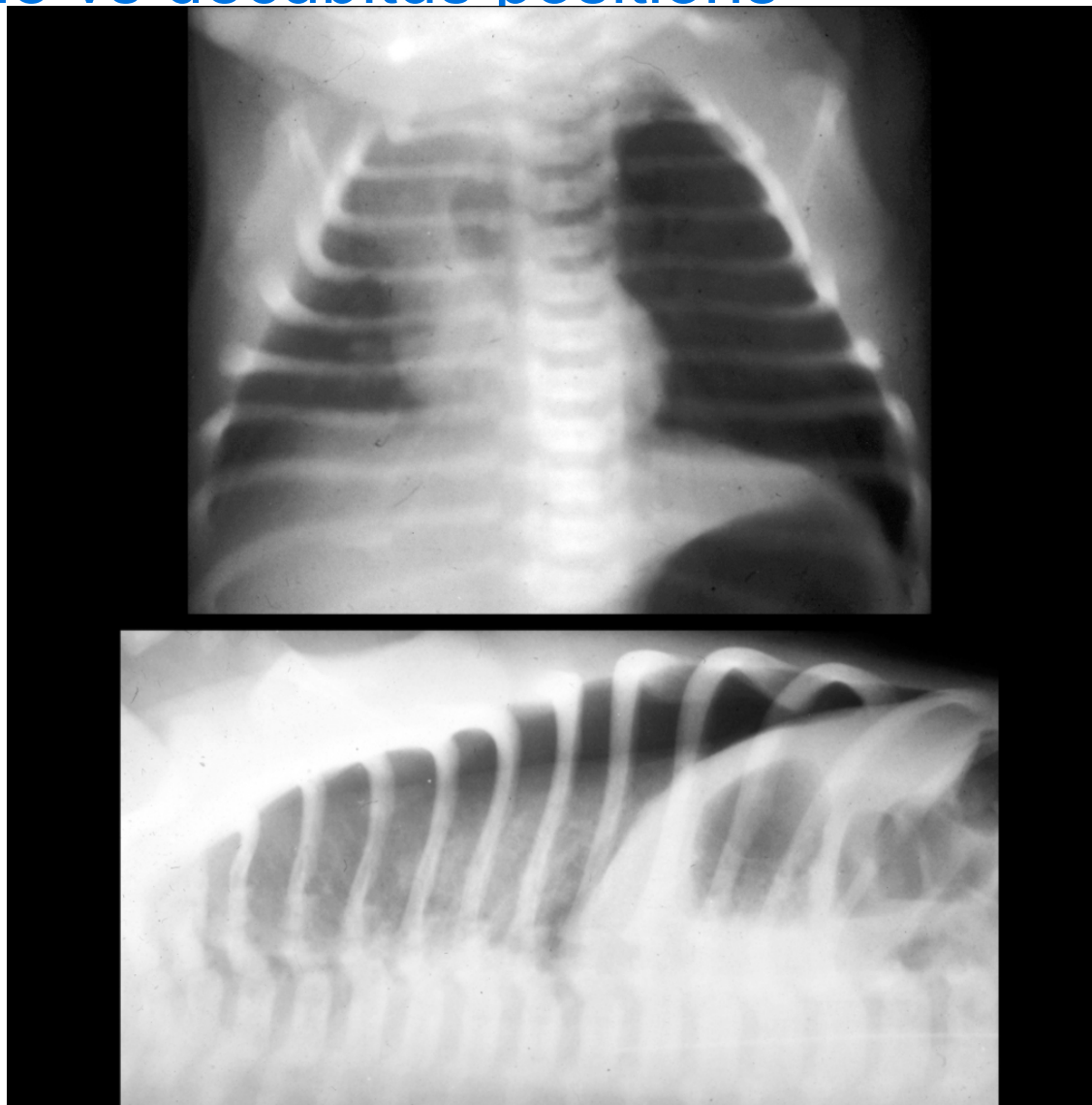
December 9th,

Complications in the Pediatric Oncology Patient

Pneumothorax looks different in children



Pneumothorax in supine vs decubitus positions



Bronchiolitis Obliterans

-Constrictive Bronchiolitis obliterans (not BOOP/COP) most often manifestation of GVHD in children who have undergone HSCT

- Airway obstruction with diffuse air-trapping due to myxoid fibrous tissue filling the distal bronchioles but sparing the alveoli [Chavhan GB, Babyn PS, Nathan PC, Kaste SC. Imaging of acute and subacute toxicities of cancer therapy in children. *Pediatr Radiol*. 2016 Jan;46(1):9-20; quiz 6-8.

doi: 10.1007/s00247-015-3454-1. Epub 2015 Oct 12. PMID: 26459011.]

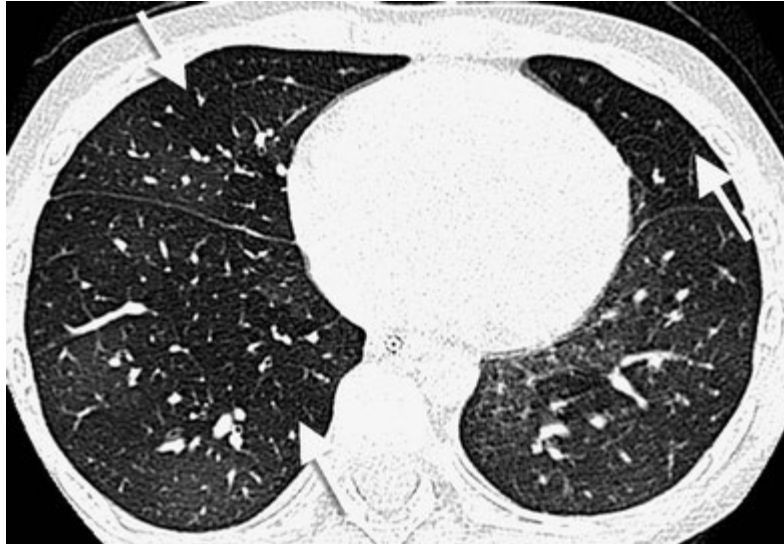
-"High resolution" Chest CT (Ins/Exp)

-Needs to be old enough to follow breathing directions

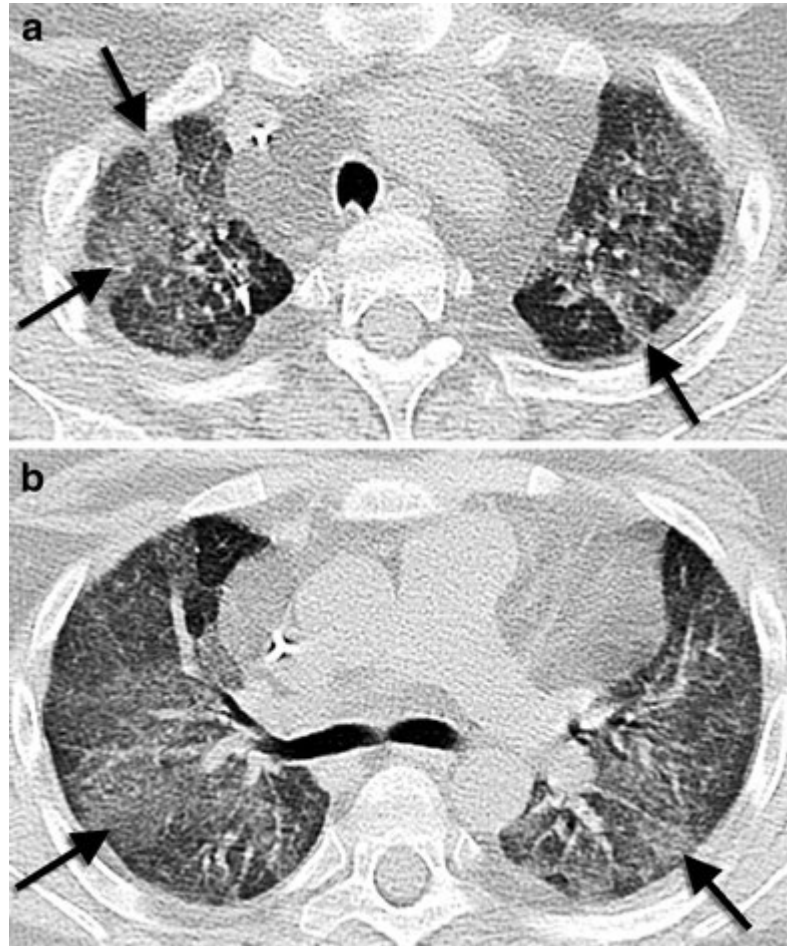
-No contrast needed

- Mosaic attenuation accentuated on Expiratory phase; reduced vascular caliber, bronchial wall thickening; occasionally, bronchiectasis

Bronchiolitis Obliterans 10yo boy with AML



Not to be confused with “BOOP” [Now COP]



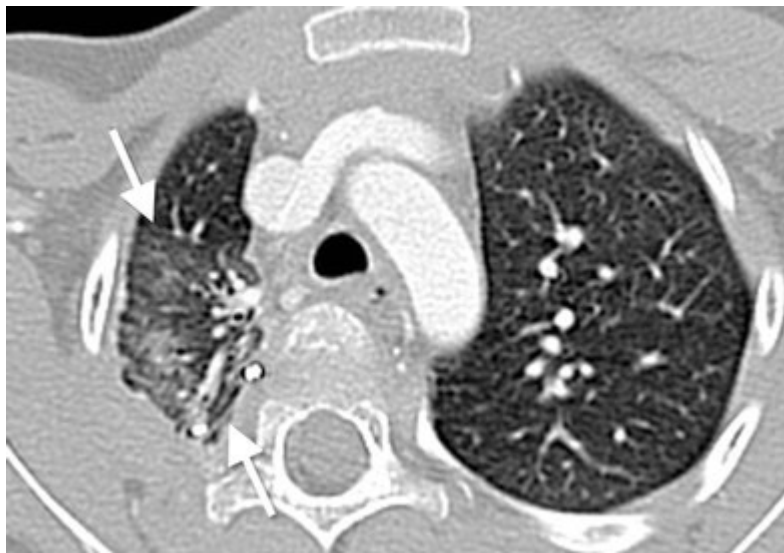
GVHD of the bowel



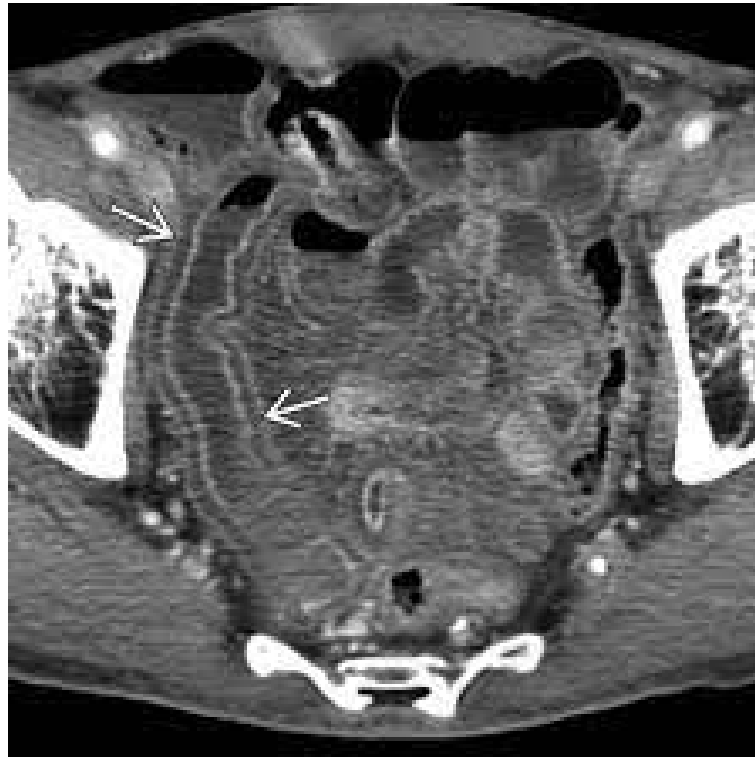
Radiation effects

- imaging depends on time after therapy
- consolidation
- architectural distortion
- volume loss
- frank fibrosis (honeycombing, volume loss, reticular opacities)
- bronchiectasis

Radiation effects



Radiation enteritis

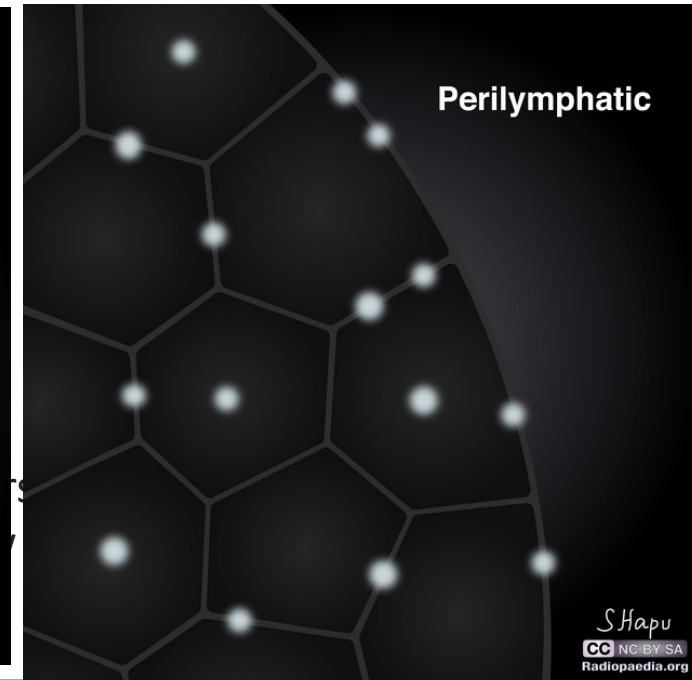
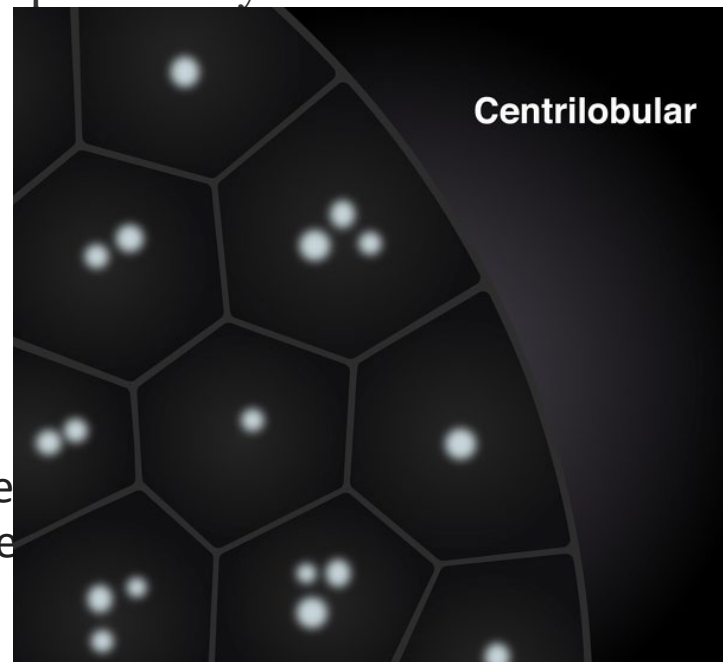


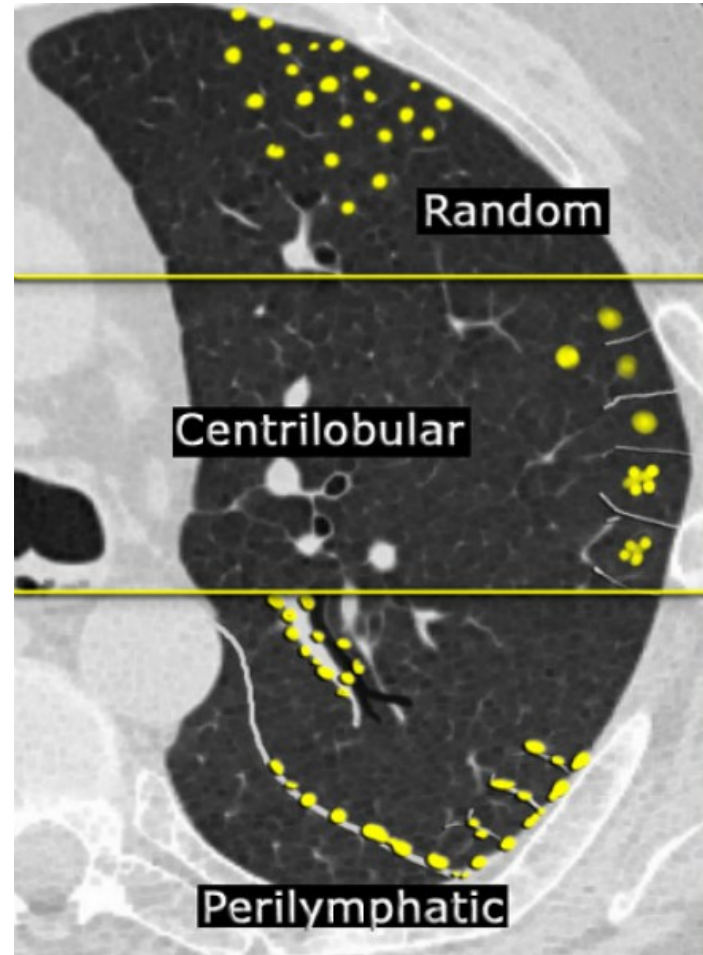
Pulmonary veno-occlusive disease

- diffuse ground-glass opacification
- septal thickening
- peribronchial thickening
- soft-tissue edema around the hila and mediastinum
- small pleural effusions and dilatation of central pulmonary arteries
- centrilobular nodules →→→→→

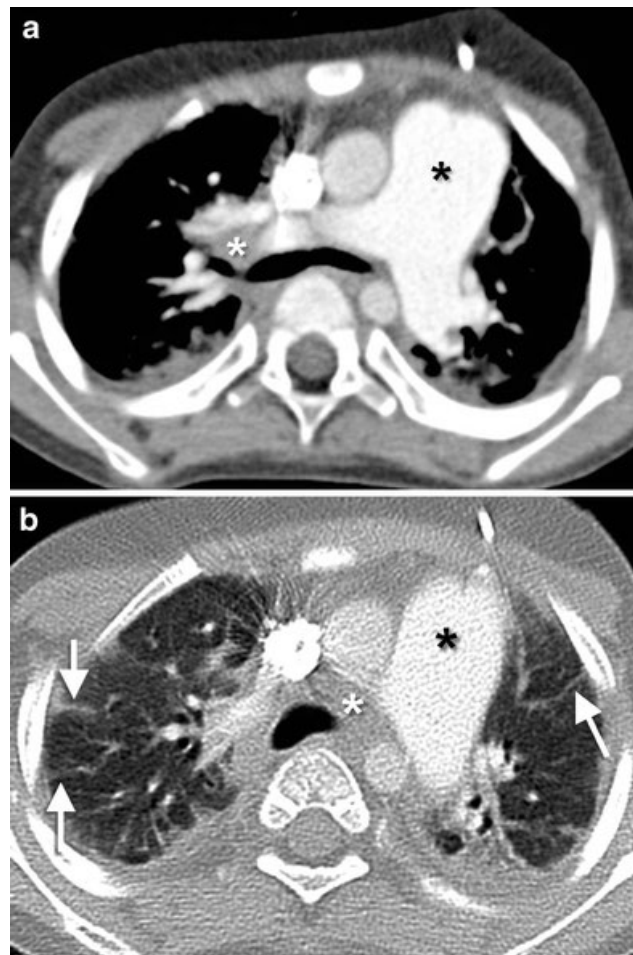
Each feature has overlap with other DDX

[Barker CC, Butzner JD, Anderson RA, Brant R, Sauve
occlusive disease in pediatric hematopoietic stem ce
87.]





Pulmonary veno-occlusive disease in a 5yo boy with T-Cell ALL





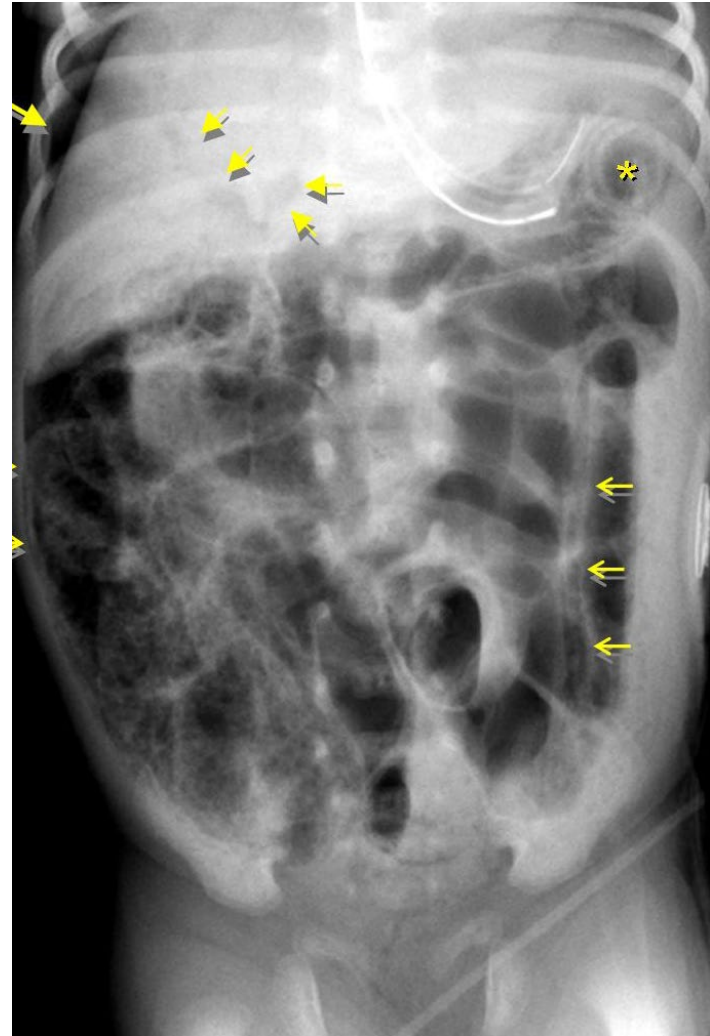
Pulmonary veno-occlusive disease Axial contrast material–enhanced (80 mL iobitridol 350; injection rate, 5 mL/sec) chest CT images obtained with pulmonary window settings at different levels of the thorax show diffuse well-defined **centrilobular** pure ground-glass opacities and increased segmental artery–to bronchus ratio (arrows).

Neutropenic colitis

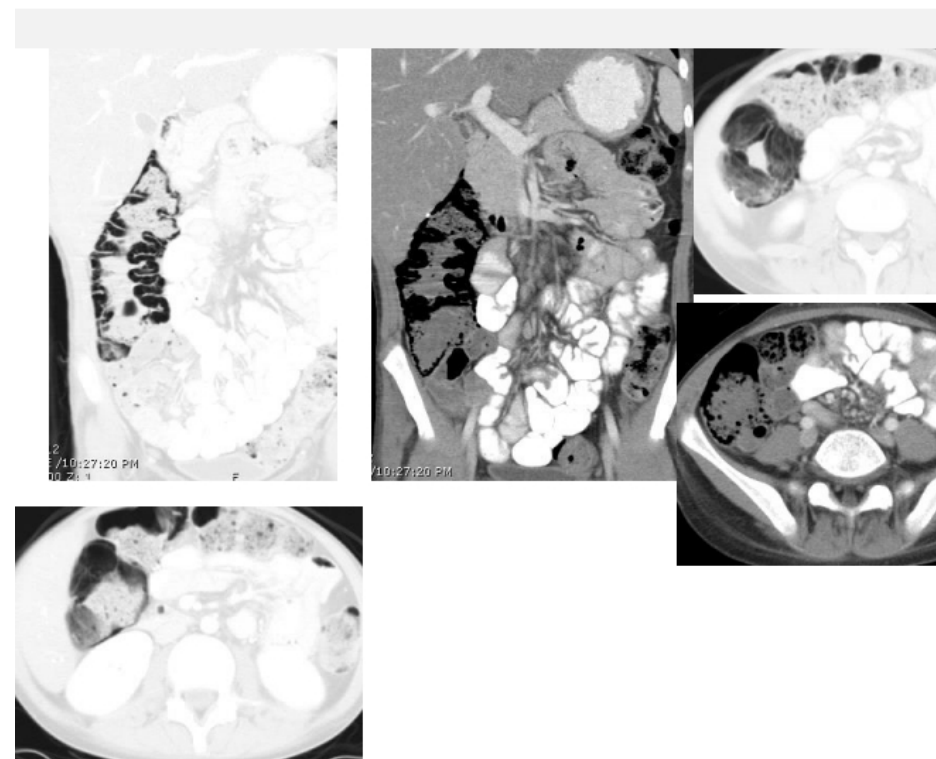
- Colitis but predominantly involves cecum and ascending colon.
- C.Diff, CMV and GVHD usually more diffuse.

“Benign” pneumatosis intestinalis

- Steroids,
- GVHD
- Infection



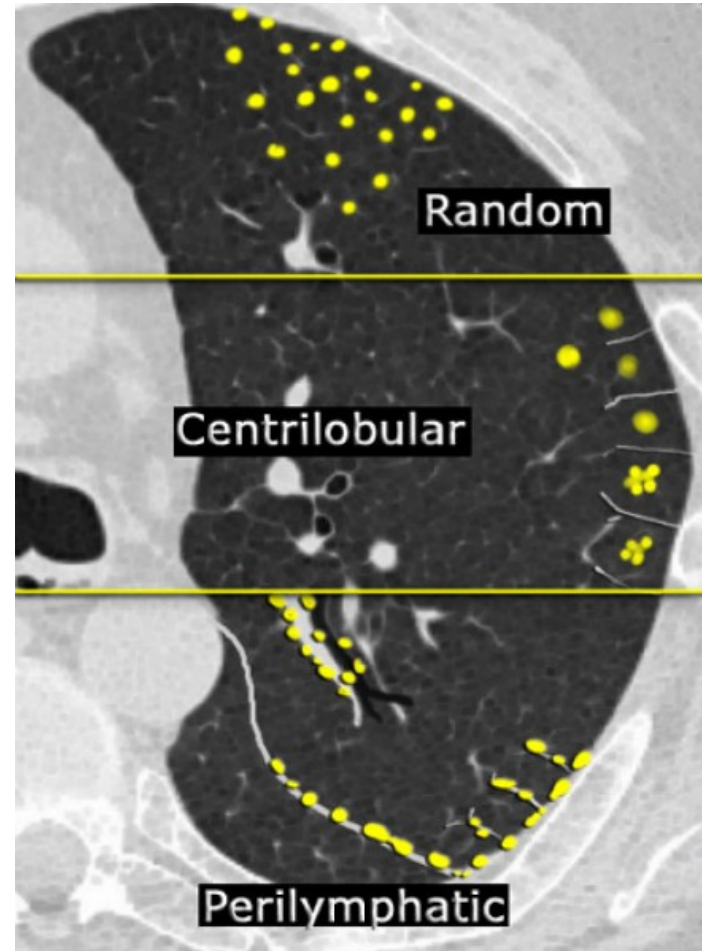
Another child with pneumatosis intestinalis



Pitfall in children

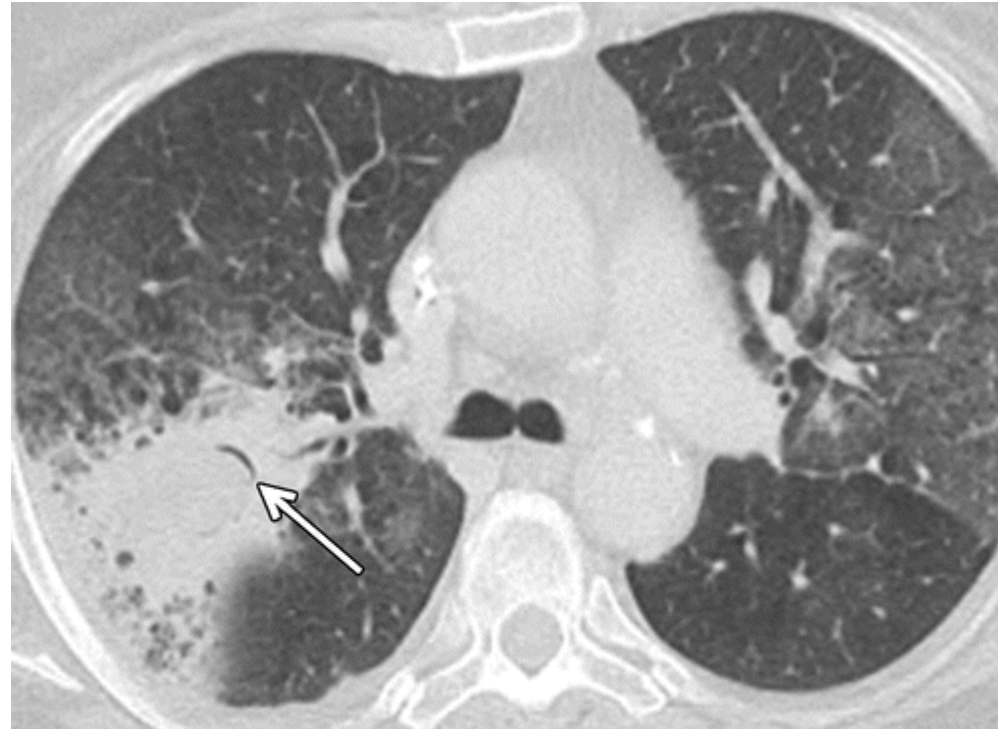


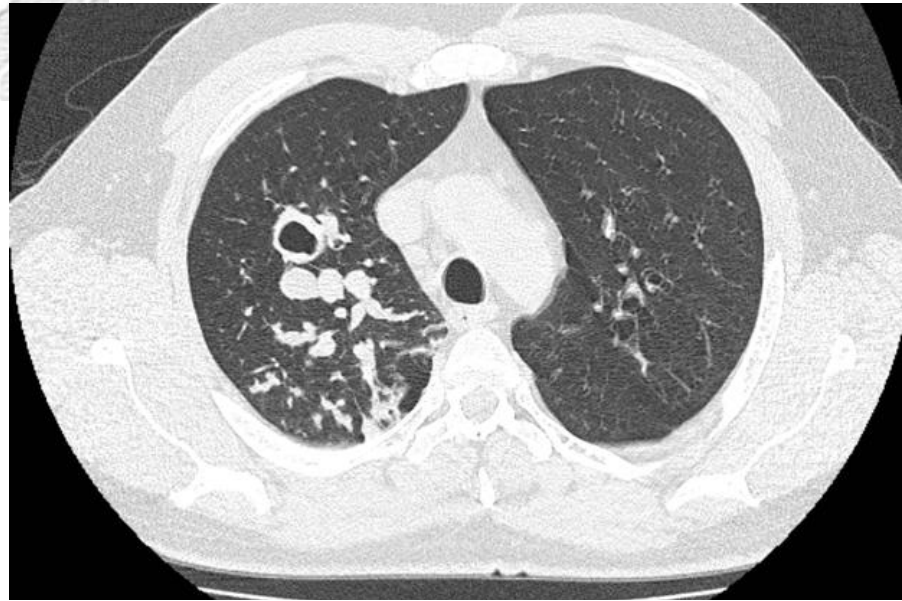
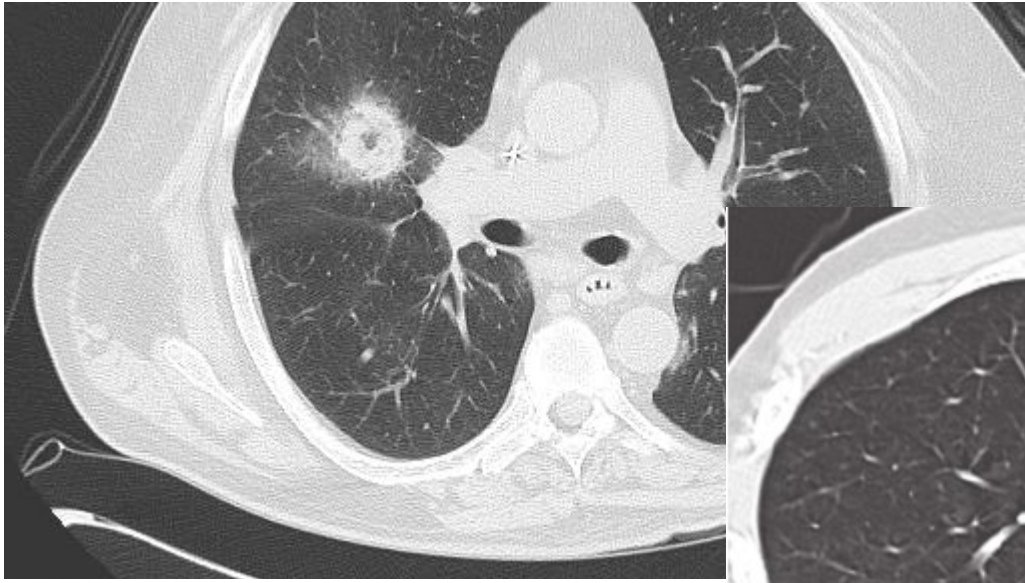
Fungal infection



Fungal infection

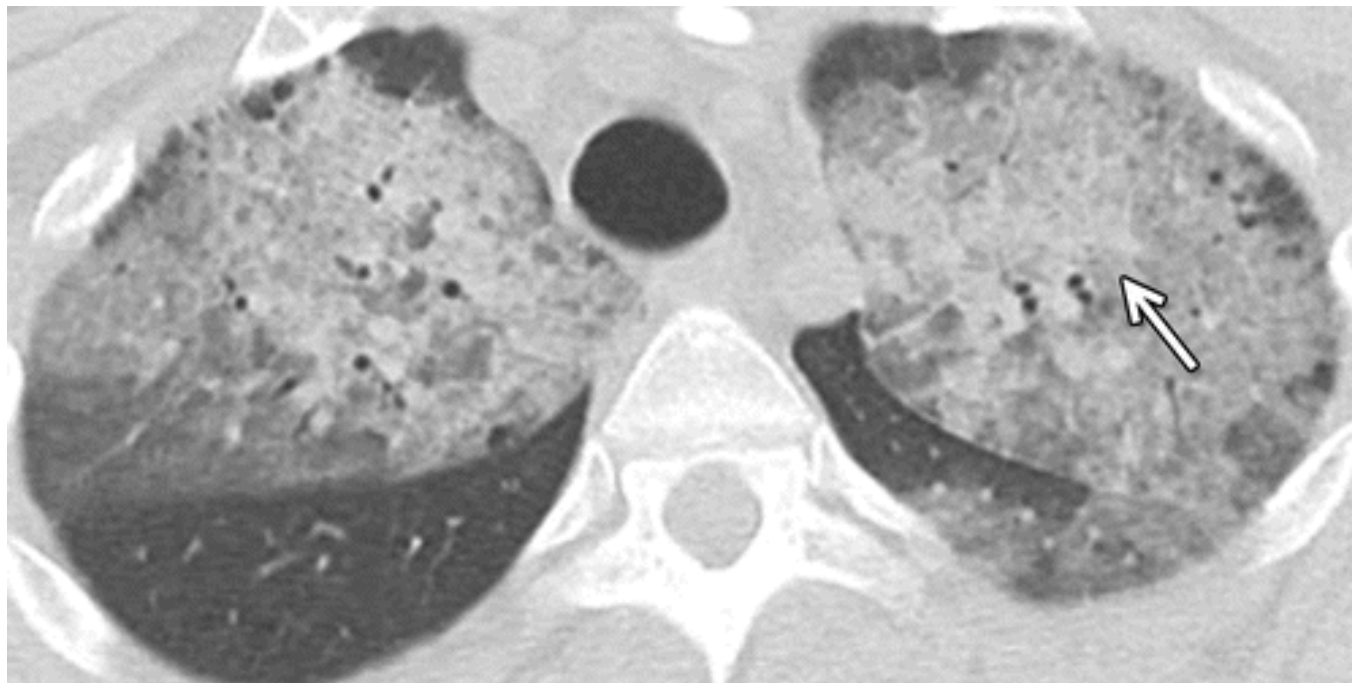
GG halo –
angioinvasive;
Air crescent –
immune
response after
immune
reconstitution





Acute P Jirovecii

Effusions
uncommon
Crazy paving
and cysts in
classic form



Fungal disease of liver/spleen

MRI; CT; US → decreasing sensitivity

CT NEEDS IV contrast. A scan requested in the arterial phase has been shown to have higher sensitivity than the routine portal-venous phase of contrast. Also, delayed scan is superior to portal-venous phase. Doing both may not be wise in children though.

MRI does not always need IV contrast though increases the specificity



Relation to immune status

-Sensitivity of US, CT and MRI have been shown to be related to immune reconstitution. [Semelka, Richard C., et al.

"Hepatosplenic fungal disease: diagnostic accuracy and spectrum of appearances on MR imaging." *AJR. American journal of roentgenology* 169.5 (1997): 1311-1316.]

-Unlikely to detect fungal findings on US in a patient with neutropenia

-During count recovery, nodule volume on imaging can INCREASE due to infiltration of immune cells, complicating interpretation. [Aspasia Katragkou, Brian T Fisher, Andreas H Groll, Emmanuel Roilides, Thomas J Walsh, Diagnostic Imaging and Invasive Fungal Diseases in Children, *Journal of the Pediatric Infectious Diseases Society*, Volume 6, Issue suppl_1, September 2017, Pages S22–S31]

-Similarly, nodules can shrink or even disappear during chemotherapy-induced neutropenia.[Pestalozzi BC, Krestin GP, Schanz U, Jacky E, Gmür J. Hepatic lesions of chronic disseminated candidiasis may become invisible during neutropenia. *Blood*. 1997 Nov 15;90(10):3858-64]

9yo F with fungal disease

