

General Imaging

Imaging modalities

Conventional X-rays
Ultrasonography [US]
Computed tomography [CT]
Radionuclide imaging
Magnetic resonance imaging [MRI]
Angiography conventional , CT ,MRI
Interventional techniques



Incremental CT

A slice is imaged in the axial plane after which the table shifts to the next position to image the next slice.
These devices, although still in use, are no longer being manufactured.

[Conventional CT ,Standard CT]



Multislice CT 1999 [Multidetector row CT] [MDCT]

- ◆ Many times faster than spinal CT
- ◆ The X ray tube rotates → Multiple slices per rotation



Multislice CT [MDCT]

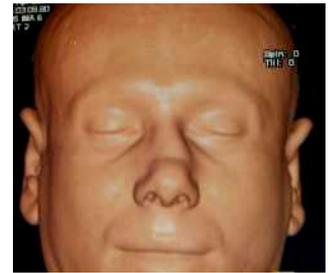
Advantages

- ◆ Very rapid scanning
- ◆ Vascular imaging
- ◆ Virtual endoscopy
- ◆ Vertical reconstruction



Maxillo –facial trauma

- ◆ Fracture lines [Extent, Comminutions, displacement]
- ◆ Soft tissue injuries (orbit)
- ◆ Intracranial complications



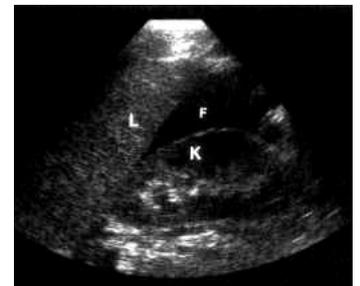
Maxillo –facial trauma Why urgent ?!

- ◆ To remove bone fragments in vital areas [orbit , brain]
- ◆ To reduce fracture before adhesions
- ◆ To release muscles before fibrosis
- ◆ To seal skull floor defects before meningitis
- ◆ To ensure patent air way
- ◆ To remove FBs before infection



Abdominal trauma

- ◆ Portable, rapid, non invasive
- ◆ Inexpensive
- ◆ No oral or IV contrast
- ◆ Serial examinations are possible



Abdominal trauma

- ◆ Oral contrast (water soluble material) → perforation
- ◆ IV contrast (non ionic material)
 - ◆ Maximize the difference between the enhancing parenchyma and the non enhancing hematoma or laceration
 - ◆ Detect urine extravasation
 - ◆ Detect the site of active bleeding



Hemoperitonium

- ◆ Blood collects in the paracolic gutter
- ◆ CT visualization of blood in the peritoneal spaces corresponds with amounts more than 500ml
- ◆ The scan should include the pelvis

Contrast-enhanced CT image shows an obvious layer of high attenuation produced by sedimented blood cells (arrow) in a pelvic hemoperitoneum.

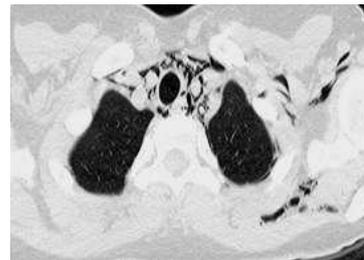


Hematocrit effect



Chest trauma

- ◆ Chest wall : Hematoma , rib fractures , surgical emphysema
- ◆ Pleura : Air, fluid , blood
- ◆ Lung : Contusion , laceration , torsion
- ◆ Mediastinum : Air , blood , aorta , pulmonary artery



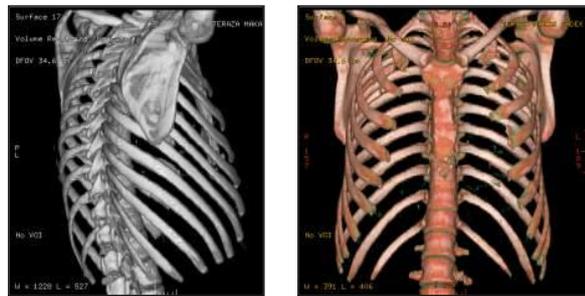
Chest trauma

- ◆ Chest wall : Hematoma , rib fractures , surgical emphysema
- ◆ Pleura : pneumothorax
- ◆ Lung : Contusion , laceration



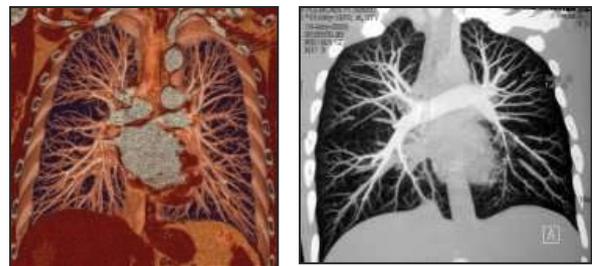
Chest wall

- ◆ Fractures
- ◆ Deformities
- ◆ Neoplasms
- ◆ FB location



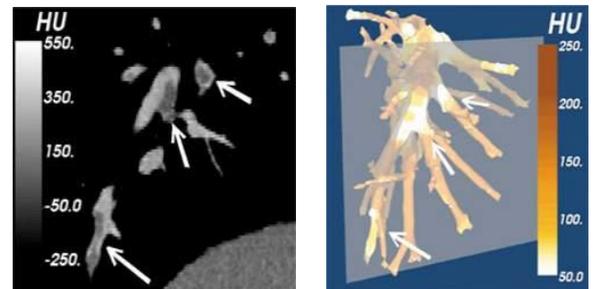
Pulmonary vessels

- ◆ Pulmonary embolism
- ◆ Pulmonary aneurysms
- ◆ Vascular malformation



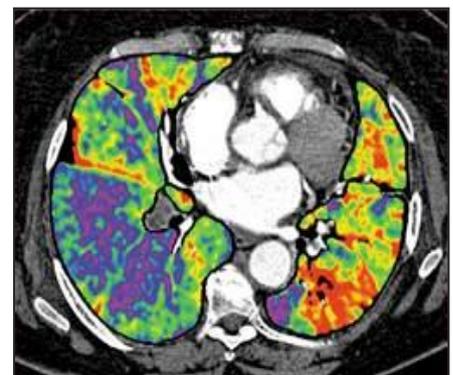
CAD & Bicolor maps

- Bicolor coding of multiplanar reconstructions of the pulmonary arteries to display differences in contrast density suggestive of embolism



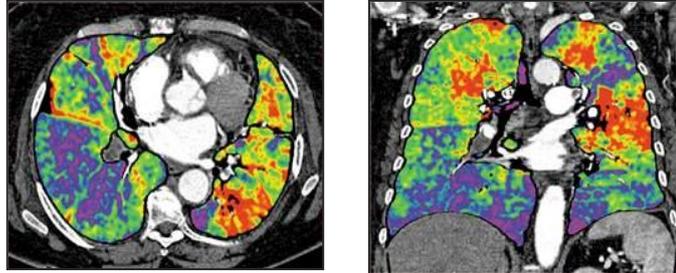
Perfusion Lung Maps

- Using a 4-slice CT scanner, 120 mL of contrast material, and a 30-second scan delay, acquired data in 1.25-mm thick slices are reconstructed to perform an automated 3D segmentation of the lungs.
- The data were used to create a color-coded display of lung density, which was fused with the original CT images.



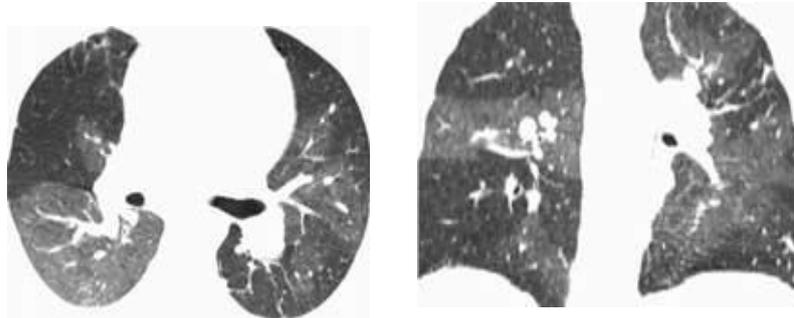
Perfusion Lung Maps

- Homogenous color distribution indicating normal perfusion
- Disturbed color coding on the density map distal to the embolus



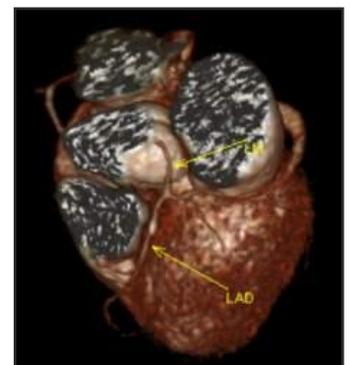
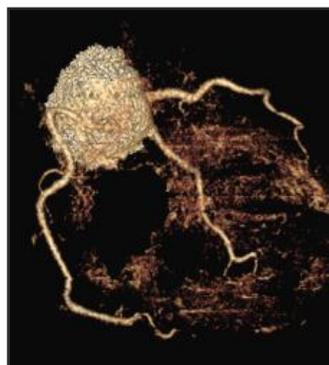
Chronic embolism

Axial and coronal reformatted images demonstrate the classic mosaic perfusion pattern hypoperfusion with small vessels of the affected lung segments and relative hyper perfusion and normal vessels of normal lung



Coronary vessels

- ◆ Occlusion
- ◆ Stenosis
- ◆ Anomalies
- ◆ Grafts
- ◆ Stents



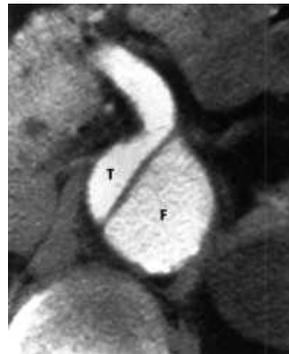
Aorta

- ◆ Occlusion
- ◆ Stenosis
- ◆ Aneurysms
- ◆ Dissection
- ◆ Leakage
- ◆ Anomalies
- ◆ Grafts
- ◆ Stents



Aortic dissection

- ◆ Extent
- ◆ False lumen
- ◆ Leakage
- ◆ Involvement of major vessels



Limb vessels

- ◆ Occlusion
- ◆ Stenosis
- ◆ False aneurysms
- ◆ Dissection
- ◆ Leakage



Occluded superficial femoral artery

Computed tomography angiography (CTA) demonstrates the site of occlusion and collateral arteries that reconstitute the SFA via the profunda femoris



Mesenteric vessels

- ◆ Thrombosis
- ◆ Stenosis
- ◆ Leakage
- ◆ Anomalies

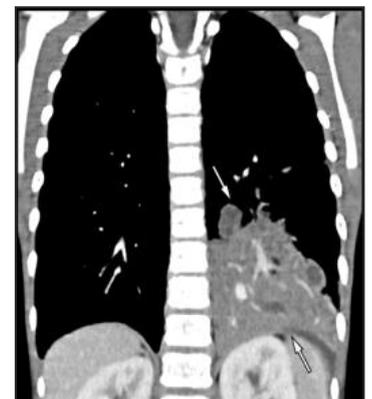


Detailed examination of the Superior Mesenteric Artery and Celiac Artery. Scan time = 9.4 seconds. 1mm slice thickness



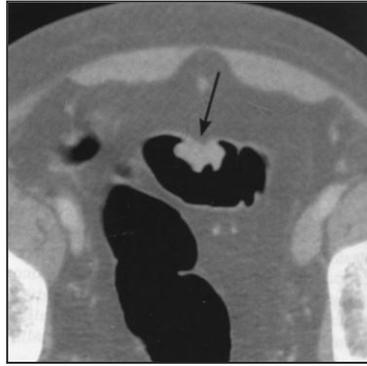
Sequestration

Bronchopulmonary sequestration in 3-year-old boy. Coronal reconstruction of contrast-enhanced CT scan shows opacity within left lower lobe with prominent vessels. Feeder vessel from aorta is seen



Virtual endoscopy

- ◆ Computed processing of the data obtained from cross-sectional imaging
- ◆ Slices are combined to generate a volumetric image
- ◆ Virtual endoscopy visualizes the inner surface of structures present in volumetric image



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