CT Anatomy and Common Diseases of the Abdomen and Pelvis

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Overview

- Basics
- Liver
- Biliary Tree/Gallbladder
- Pancreas
- Spleen
- Adrenal Glands
- Kidneys/Ureters/Bladder
- Esophagus
- Stomach
- Small/Large bowel/Rectum
- Prostate
- Uterus/Cervix/Ovaries
- Bones
Basic CT Premise

ADVANTAGES
- Complete anatomy
- Tissue characterization
- Reproducible
- Precise biopsy localization

LIMITATIONS
- Axial sections only
- Ionizing radiation
- Contrast side effects
- May miss gallstones
What’s The Deal With Contrast?
Hounsfield Units
Characterizes relative densities of tissues to water

<table>
<thead>
<tr>
<th>Substance</th>
<th>Hounsfield Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>-1000</td>
</tr>
<tr>
<td>Fat</td>
<td>-50</td>
</tr>
<tr>
<td>Water</td>
<td>0</td>
</tr>
<tr>
<td>Muscle</td>
<td>+40</td>
</tr>
<tr>
<td>Urinary Calculus</td>
<td>+100 to +400</td>
</tr>
<tr>
<td>Bone</td>
<td>+1000</td>
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</tbody>
</table>
Basic CT Premise

- A short note about orientation when reading cross-sectional imaging:
  - Image you are standing at the foot of the patient’s bed, looking toward their head. This view gives the perspective:

  ![Cross-sectional imaging image with orientation labels: Anterior, Right, Left, Posterior.](image)
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Liver
Basic Anatomy

- hepatic vein
- hepatic artery
- gallbladder
- common bile duct
- portal vein
Liver
Basic Anatomy

- Increased attenuation than spleen with uniform enhancement.
- Right lobe greater size than left lobe.
Benign Entities

- Fatty Liver: response of hepatocytes to toxins.
- Cirrhosis: parenchymal destruction, fibrosis and multiple nodules.
Benign Entities

- Cavernous Hemangioma: most common benign liver tumor.
- Cyst: second most common benign liver mass.
Malignant Entities: Hepatocellular Carcinoma

- A.k.a. ‘Hepatoma’
- Most common primary liver malignancy
- Cirrhosis and hepatitis
- USA = ETOH
- Early heterogeneous enhancement with delayed washout
  - Diffuse
  - Solitary
  - Multinodular
Malignant Entities: Metastasis
Hepatic Metastasis

- **Common primary:**
  - Colon
  - Breast
  - Lung
  - Pancreas
  - Melanoma
  - Sarcoma

- **Hypervascular:**
  - Choriocarcinoma
  - Renal cell
  - Thyroid
  - Breast
  - Melanoma
  - Islet cell
  - Carcinoid
Metastatic Colon Cancer
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- Lies on the underside of the liver b/w right/left lobes
- Normally fluid density
- Wall should not be > 3mm thick.
- High attenuation
  - Blood, pus, vicarious excretion, sludge
Gallstones

- Densities range from less than bile to calcified.
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Pancreas
Chronic Pancreatitis

- Atrophy
- Calcification
  - ETOH usually
- Ductal dilatation
- Pseudocyst
Pancreatic Carcinoma

- Very lethal
- 3% 5 year survival
- Hypodense, enhancing mass
- Biliary/pancreatic dilatation
- Metastases
  - Regional nodes
  - Liver
  - Peritoneum
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Benign Entities
Malignant Entities

Lymphoma

Metastasis

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Adrenal Glands

- Fight and Flight response
- CT is modality of choice
- Inverted Y or V shape
- Limbs are $\leq 5$ mm
- Homogenous
Adrenal Metastasis

- Melanoma
- Renal Cell
- Lung
- Breast
- Colon
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Kidneys: Anatomy And Evaluation

- Retroperitoneal
  - Made up of lobes made of medulla surrounded by cortex.
- 3 Phase CT:
  - Non-contrast
  - Corticomedullary (30-40 seconds)
  - Nephrographic (120 seconds)
Horseshoe Kidney

- Most common fusion anomaly
- Lower poles joined by a fibrous band
- Prevented from normal ascent by IMA
- Increased trauma, stones, infection (from stasis)
Benign Entities

Infarction

Simple Cysts
Renal Cell Carcinoma
(85% Of Solid Renal Masses)

- Typically Solid
- Cystic Variants
- Involve Renal Vein And IVC
Renal Lymphoma

- Primary is rare, but commonly involved by metastatic lymphoma.

- Patterns of primary:
  - Diffuse (enlargement)
  - Multiple bilateral masses
  - Solitary bulky tumor
  - Invasion of the renal sinus
Renal Metastatic disease (hematogenous spread)

- Lung
- Breast
- Colon
- Melanoma
Transitional cell carcinoma

- 85-90% uroepithelial tumors
- Most are exophytic
- 4:1 male:female
- Mets: regional nodes, liver, lung, bone
- Very often multiple
Transitional cell carcinoma
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Esophagus

- Varices
- Hiatal hernia
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- Quiz
Stomach
Gastric Lymphoma/Carcinoma

**Lymphoma**
- 2% of gastric neoplasms
- Most are non-Hodgkins
- Better prognosis than adenocarcinoma
- Increased thickening of the gastric wall > 3cm

**Carcinoma**
- 3rd most common GI malignancy
- 95% adenocarcinoma
- Direct invasion
- Lymphatic spread
- Hematogenous
  - Liver, adrenals, ovaries
Gastric Lymphoma
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Wall Thickening

- Hemorrhage
- Tumor
- Edema
  - Infectious
  - Inflammatory
  - Ischemic
Carcinoid

- Most common neoplasm of the small bowel
- Mets to the nodes, liver, lung
- Produce vasoactive substances
- Ileum most common
- Intense local desmoplastic reaction due to serotonin release
Large Intestine

- Taenia coli are longitudinal bands of muscle that shorten the colon to form the haustra
- Formation, transport, evacuation of feces
- So, you can recognize the colon on CT by feces and haustral markings
Colitis

- Non-specific
  - Infectious
    - Clostridium difficile
  - Amebiasis
- Inflammatory
  - Crohn’s
  - Ulcerative
- Ischemic
- Post radiation
Colorectal Cancer

- Most common CA of the GI tract/2nd most common cause of CA death
- 95% Adenocarcinoma
- Most are annular constricting lesions
- Metastasis: Direct invasion, regional nodes, liver
Colorectal Cancer

- Focal wall thickening
- Luminal mass
- Luminal narrowing
- Calcification
- Enhancement
- Necrosis
Rectal Cancer
Recurrent Rectal Cancer
Metastatic Disease

- Lymphatic
- Hematologic
- Direct invasion
- Intraperitoneal seeding
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Normal Prostate

- Found at the base of the bladder
- Up to 4 cm in size
- Seminal vesicles are just below it “bowtie”
Prostate Cancer

- 3rd leading CA death in men
- CT alone usually cannot differentiate from benign hyperplasia of the gland
- Look for adenopathy and peri-prostate spread
Prostate Cancer Metastasis

- Seminal vesicle enlargement
- Nodal involvement

- Bone metastasis
  - Liver, lungs, and kidneys at end stages
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Uterus And Cervix

- Normal enhancement
- Variable position of uterus
- Rounded cervix
Cervical Cancer

- Most common gynecological malignancy
- 95% squamous
- Extension to adjacent organs and pelvic sidewall
- Regional adenopathy
- Metastasis: lung, bone, brain
Cervical Cancer
Recurrent Cervical Cancer
Ovary

- Not well defined by CT
- Oval
- Cysts
- Variable position
Ovarian Cancer

- Only 3% of all female malignancy, but 15% of deaths!
- Can be cystic, solid or mixed
- Typically large masses
- Often associated with ascites
- Wall thickness > 3mm
Ovarian Cancer Metastasis

- Extension to adjacent organs
- Peritoneal implantation
  - Omental caking
- Ascites
- Lymph nodes - follow gonadal vessels

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Normal Lymph Nodes

- Oblong
- Fatty hilum
- Typically < 1cm short axis
Abnormal Lymph Nodes

- Generally >1cm short axis
- Round
- Low density - necrosis
- Calcification
Mesenteric Adenopathy
Retroperitoneal Adenopathy
Pelvic And Inguinal Adenopathy
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Bones

- Bone is a metastatic target of:
  - Prostate, breast, kidney, thyroid, lung
Metastatic Esophageal Ca
THANK YOU!
Questions?