STAGING UPPER GI TRACT MALIGNANCIES

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SCBT/MR 2010
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13:00-13:20
## GI TRACT Cancers

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal cancer</td>
<td>152,478</td>
<td>57,896</td>
</tr>
<tr>
<td>Pancreas</td>
<td>33,730</td>
<td>32,300</td>
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<tr>
<td>Stomach</td>
<td>22,280</td>
<td>11,430</td>
</tr>
<tr>
<td>Esophagus</td>
<td>14,550</td>
<td>13,770</td>
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<tr>
<td>Liver</td>
<td>12,210</td>
<td>10,110</td>
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<tr>
<td>Gallbladder</td>
<td>6,350</td>
<td>3,128</td>
</tr>
<tr>
<td>Biliary tract</td>
<td>2,790</td>
<td>2,150</td>
</tr>
</tbody>
</table>
BARRETT’S ASSOCIATED ADENOCARCINOMA OF GEJ

- Is the most rapidly rising neoplasm in men in North America and Europe

ADENOCARCINOMA
- 1975- 0.38/100,000
- 2005- 2.63/100,000

SQUAMOUS CELL
- 1975- 3.1/100,000
- 2005- 1.9/100,000
SQUAMOUS CELL ESOPHAGEAL CA

INTESTINAL TYPE GASTRIC CA
ADENOCARCINOMA OF ESOPHAGUS

DIFFUSE TYPE GASTRIC CA
EARLY UGI CANCER: THE AMERICAN PERSPECTIVE

- We don’t screen asymptomatic pts
- We spend our healthcare dollar on OC and CTC
STAGING

- MDCT
- EUS
- MR
- PET
- PET/CT
PET-CT IN ESOPHAGEAL CANCER

- Changed stage in 26% of patients
- Changed management in 18% of patients

CONTRAST AGENTS

- **POSITIVE CONTRAST** (Ba, I)
- **NEUTRAL CONTRAST** (WATER)
- **NEGATIVE CONTRAST** (AIR)
ADVANTAGES OF WATER AS CONTRAST AGENT FOR UGI CANCERS

- SUPERB DISPLAY OF MURAL ENHANCEMENT
- AIR AND + CONTRAST LEAD TO ALGORITHM OVER OR UNDERSHOOT
- WELL TOLERATED, PRODUCES GOOD DISTENTION
- + CONTRAST OBSCURES CTA
<table>
<thead>
<tr>
<th>STAGE</th>
<th>T</th>
<th>N</th>
<th>M</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>IIa</td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
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<tr>
<td>IIb</td>
<td>T1</td>
<td>N1</td>
<td>M0</td>
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<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td>IIIa</td>
<td>T3</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>ANY N</td>
<td>M0</td>
</tr>
<tr>
<td>IV</td>
<td>ANY T</td>
<td>ANY N</td>
<td>M1</td>
</tr>
</tbody>
</table>
T STAGING OF UGI CANCERS

- Early gastric cancer (T1s, T1)
- Advanced gastric cancer (T2, T3, T4)

EUS:
- Mucosa (superficial):
  - Hyperechoic
- Mucosa (deep):
  - Hypoechoic
- Submucosa:
  - Hyperechoic
- Muscularis propria:
  - Hypoechoic
- Serosa:
  - Hyperechoic
- Adjacent organ
CT AND MR STAGING LIMITATIONS

- N STAGING: CANNOT Dx CA IN NL SIZED NODE, CANNOT DDx CA FROM REACTIVE HYPERPLASIA IN BIG LN
- T STAGING: CANNOT DEPICT T1, T2 AND T3 LESIONS RELIABLY
TRACHEOBRONCHIAL INVASION

- SUSPECT IF TUMOR CAUSES INWARD BOWING OF POSTERIOR TRACHEAL OR BRONCHIAL WALL OR DISPLACES TRACHEA OR BRONCHI FROM SPINE
- LOSS OF FAT PLANES AT LEVEL OF TUMOR BUT PRESERVED ABOVE AND BENEATH LEVEL OF TUMOR
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AORTIC INVASION

- <45° INVASION UNLIKELY
- 45-90° INVASION INDETERMINATE
- >90° INVASION LIKELY
- INVASION LIKELY IF SMALL TRIANGLE OF FAT BETWEEN ESOPHAGUS, AORTA, AND SPINE OBLITERATED
• <45° INVASION UNLIKELY
• 45-90° INVASION INDETERMINATE
• >90° INVASION LIKELY
• INVASION LIKELY IF SMALL TRIANGLE OF FAT BETWEEN ESOPHAGUS, AORTA, AND SPINE OBLITERATED
- <45° invasion unlikely
- 45-90° invasion indeterminate
- >90° invasion likely
- Invasion likely if small triangle of fat between esophagus, aorta, and spine obliterated
CT T STAGING

- T1 - LOW DENSITY SUBMUCOSA HIGHLIGHTING ENHANCING MUCOSA
- T2 - SMOOTH OUTER BORDER OF THICK WALL AND CLEAR FAT PLANE AROUND LESION
- T3 - IRREGULAR BORDER OF THICK WALL OR BLURRED FAT PLANE AROUND LESION
- T4 - OBLITERATION OF FAT PLANES BETWEEN TUMOR AND ADJ ORGANS
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3D MDCT and CT Esophagography

- T staging accuracy 42.9%
- N staging accuracy 85.7%

STAGING ESOPHAGEAL CANCER: MDCT

- T stage accuracy axial alone: 67%
- T stage accuracy axial + MPR: 77%
- N stage accuracy axial alone: 59%
- N stage accuracy axial + MPR: 67%

STAGING GASTRIC CANCER: MDCT

- T-stage accuracy axial alone: 77%
- T-stage accuracy axial + VG: 84%
- N-stage accuracy: same
- M-stage accuracy: same

Kim Radiology 236: 879-885, 2005
MDCT STAGING OF GASTRIC CANCER

- T staging  MPR 89%; Axial  73%
- N staging  MPR 78%; Axial  71%
- Primary tumour detection: Axial 91%; MPR 96%; MPR+VG  98%

Kim HJ Radiology 240: 879-885, 2007
EUS vs MDCT FOR LN STAGING SCC ESOPHAGUS

- EUS
  - sens 68%
  - spec 58%
  - acc 64%

- MDCT
  - sens 33%
  - spec 75%
  - acc 51%

Takizawa K J Gastro Hepatol 24: 1687-1691, 2009
CT N STAGING: GASTRIC CANCER

- LN > 8mm SIZE
- HYPERATTENUATING LN (>100 HU) OF ANY SIZE
- CLUSTER OF ≥ 3 LNs
N STAGING

- EUS > CT, MR, PET for local LN
- CT ≥ MR for distant LAD
- PET/CT great for distant LAD
GASTRIC CANCER: TUMOR SPREAD

- DIRECT EXTENSION
- PERITONEAL SEEDING
- LYMPHATIC SPREAD
- HEMATOGENOUS METASTASES
GASTRO-HEPATIC LIGAMENT

GASTROCOLIC LIGAMENT

GASTRO-SPLENIC LIGAMENT
PERITONEAL IMPLANTS
UPPER GI CANCERS

CT

Invasion or mets

STOP

Unresectable

STOP

XRT+Chemo

No invasion or mets

EUS with Bx

Resectable

PET/CT

Surgery +XRT+Chemo