Gastrointestinal Stromal Tumor... (GIST)

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History

- 53yr old male
- lorry truck driver
- Pmhx of HCV
- Incidental discovery of periampullary mass on MRI during HCV work up.
- On enquiry; sporadic epigastric pain + right sided abdominal pain… 1/10
Examination

- No jaundice
- No palpable abdominal mass
- No NVD
Endoscopic Ultrasound: periampullary mass

- A round, hypoechoic and heterogenous mass with well demarcated borders at the ampullary region

3.8 cm X 4 cm
Endoscopic ultrasound: mass compressing SMV

- Mass adjacent to SMV with compression
Endoscopic Ultrasound: periportal lymph nodes

- Peri-portal lymph nodes
Endoscopic Ultrasound and FNAC

- Bulging mass in the periampullary position in the duodenum.
- Size 4 x 3.8 cm
- Not invading the pancreas but in proximity to the SMV
- Large periportal lymph nodes

FNAC:
- Main mass: ATYPICAL cells
- Lymph nodes: NO EVIDENCE OF MALIGNANCY
CT Abdomen: periampullary mass

periampullary mass which has areas of low attenuation in centre with peripheral enhancement in arterial phase
Obtuse angle indicating Intramural mass
CT abdomen with contrast
CT Abdomen: periportal lymphnodes

Axial CT with contrast
CT findings

- Large exophytic mass arising from the region of the neck of the pancreas.
- Predominantly arterially enhancing with large areas of necrosis.
- Multiple locally enlarged frankly pathologic appearing lymph nodes.
- No frank metastases were identified.
Differential Diagnosis

- GIST of duodenum
- Non-functioning endocrine tumor
- Lymphoma (focal)
- Duodenal villous adenocarcinoma
## The differential

<table>
<thead>
<tr>
<th></th>
<th>NFET</th>
<th>GIST</th>
<th>LYMPHOMA</th>
<th>VILLOUS ADENOCARCINOMA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>demography</strong></td>
<td>30+ M=F</td>
<td>40-70 M=F</td>
<td>CHILDREN &amp; ADULTS M&gt;F</td>
<td>50-70 M=F</td>
</tr>
<tr>
<td><strong>C/P</strong></td>
<td>Non specific symps related to mass effect eg Abd pain NVD + NO endo synd.; late presentation and large size</td>
<td>ASYMP... INCIDENTAL DISCOVERY AND NON SPECIFIC SYMPS</td>
<td>LYMPHADENOPATHY</td>
<td></td>
</tr>
</tbody>
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# The differential

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<tr>
<td><strong>Growth Pattern</strong></td>
<td>Exophytic (Dumbellsign)</td>
<td>Infiltrative Ulcerations</td>
<td>Concentric growth in lumen wall i.e early obstruction</td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>3-24 cm</td>
<td>Large 3 -15, up to 40 cm, 65% &gt; 5 cm</td>
<td>Variable</td>
<td>Average 4 cms</td>
</tr>
<tr>
<td><strong>Margin &amp; Contour</strong></td>
<td>Well defined</td>
<td>Well defined 65% Poor 35%(large Lobulated &gt; Smooth)</td>
<td>Nodular, polypoidal</td>
<td>Irregular Asymmetrical Nodular</td>
</tr>
<tr>
<td><strong>Necrosis/Hge</strong></td>
<td>occasionally</td>
<td>Common, esp large</td>
<td>occasionally</td>
<td>Occasionally</td>
</tr>
<tr>
<td><strong>Enhancement</strong></td>
<td>Hyper, ISO Heterogenous&gt;</td>
<td>Good to Mod Hetero&gt;</td>
<td>Homogeneous</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td><strong>Specific feature</strong></td>
<td>Ca 20%</td>
<td>Ca rarely, Cavitation</td>
<td>Aneurysmal Dilat of Intestine dt ulceration &amp; Cavitation</td>
<td></td>
</tr>
<tr>
<td><strong>Mets</strong></td>
<td>LNS LIVER</td>
<td>Liver, peritoneum</td>
<td>LNS</td>
<td>LNS Liver, Lung OTHERS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO LNS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management & Complication

- Patient underwent a **Whipple’s procedure** and tumor was completely resected.

- Pathology report
  - significant for **GIST in the duodenum**
  - all other tissues (pancreas, LNS, Gall bladder) came in with normal findings.

- Patient developed a fistula as a complication of the procedure which resolved over the course of 2 months.
Gist: background & pathophysiology

- GIST is a **rare** tumor of the GI about 3% of all tumors.
- Accounts for 80% of mesenchymal tumors
- Interstitial cells of Cajal of the intestine are argued to be the precursors of the GIST or at least shares a common precursor cell.
GIST: background & pathophysiology

- **GIST** expresses **CD117 antigen**, also known as **C-KIT protein membrane receptor**.

- On mutation the Tyrosine kinase component of this antigen is unchecked leading to unchecked growth of cells and tumor development.

- Most common sites are
  - **Stomach** 60-70%,
  - **Small intestine** 20-30%,
  - **Anorectal** 10%
  - **Esophagus** 1%
GIST: Demography

Demography

■ Age: Shows unimodal peak incidence in age groups between 40-70yrs.

■ Sex: Almost equal incidence.

■ Race: No predilection.
GIST: Morbidity & Mortality

Patients with primary disease (no mets) show a median disease specific survival of 60 months (5 yrs).

- Patients with Mets show 10-24 months, and patients with recurrence show 12 months of survival.

- Recurrence is typical, 40% some suggest 91% on long term follow up.
GIST: clinical presentation

Up to 75% of GISTs are discovered when they are less than 4 cm in diameter and are either Asymptomatic or associated with Nonspecific symptoms frequently diagnosed incidentally.

Symptoms are vague, nonspecific abdominal pain or discomfort. Patients also describe early satiety or a sensation of abdominal fullness. Rarely, an abdominal mass is palpable.

GISTs may also produce symptoms secondary to obstruction or hemorrhage. GISTs occur with a higher than expected frequency in patients with type 1 neurofibromatosis.
GIST: Differential Diagnosis

- **Differential diagnosis:**
  - Gastrointestinal carcinoid
  - Adenocarcinoma
  - Gastric carcinoma
  - Liposarcoma

- **Others to be Considered:**
  - Angiosarcoma
  - Inflammatory fibroid polyp
  - Inflammatory myofibroblastic tumor (pseudotumor, fibrosarcoma)
  - Intra-abdominal fibromatosis
  - Kaposi sarcoma
  - Lipoma
  - Lymphoma, abdominal
  - Melanoma, metastatic
  - Schwannoma, GI
GIST: Menu of tests

- **Plain radiographs**
  - Usually offer little for the evaluation of GISTs
  - They may show up as soft tissue masses or the mass effect of the tumor eg. Deformed gastric air shadow or displaced loops or multiple air fluid levels indicating bowel obstruction collections of air can be detected within necrotic tumors

  Barium-enhanced images demonstrate predominantly intramural masses with potential exophytic components, margins usually are smooth with ulceration En face, the intraluminal surfaces often have well-defined margins
XRAY AND BARIUM IMAGES OF COMPANION PATIENTS WITH GIST
GIST ON UPPER GI

Patient 1
Incidentally found on upper GI work up for peptic dx

Patient 2
Barium collects in the exophytic ulcer crater

Patient 3
Upper GI image obtained during the single contrast enhancement portion shows an incidentally found mass. The smooth borders suggest a submucosal process. At surgery, a GIST was found.

Vu Nguyen et al, 2004 http:\ www.emedicine.com
GIST: Ultrasound

**Ultrasound**
- Larger GISTs appear as complex masses with cystic and solid components

**Endoscopic ultrasound:**
- Hypoechoic masses that are contiguous with the fourth hypoechoic layer of the GI wall, which corresponds to the muscularis propria
- Characteristics associated with malignancy include tumor size greater than 4 cm, an irregular extraluminal border, echogenic foci, and cystic spaces
GIST: CT Scan

- CT is **ideal** in defining the endoluminal and exophytic extent of tumor.

- Smaller GISTs appear as **smooth, sharply defined** intramural masses with **homogenous** attenuation.

- Larger GISTs with necrosis appear as **heterogeneous** masses with **enhancing borders** of variable thickness and **irregular central areas** of fluid, air, or oral contrast attenuation that reflect necrosis.

- Occasionally, dense focal calcifications
- Overlying mucosal ulcerations and extension into nearby structures may be present.
Metastasis in GIST are mainly hepatic and peritoneal.

**GIST DOES NOT METASTASIZE TO LNS**

Lymphnode metastasis is uncommon and is a characteristic radiologic finding of GIST.

CT is sensitive for the detection of metastatic liver lesions.

Liver lesions can be hypervascular or appear as cystic multilocular lesions with fluid-fluid levels.
CT IMAGES OF COMPANION PATIENTS WITH GIST
Companion patient 4: GIST in Fundus of stomach showing dumbbell sign

Axial CT of the abdomen with contrast

Vu Nguyen et al, 2004 http://www.emedicine.com
Companion patient 5: GIST in SI

Axial CT of the abdomen

Vu Nguyen et al, 2004 http://www.emedicine.com
GIST: (Mets in liver pre / post Gleevec)

Vu Nguyen et al, 2004 http://www.emedicine.com

Axial CT of the abdomen with contrast

Vu Nguyen et al, 2004 http://www.emedicine.com
GIST: CT Scan

- GISTs appear as sharply delineated, heterogeneous masses with cystic and necrotic areas.

  The masses tend to be isointense relative to skeletal muscle on T1-weighted images and hyperintense on T2-weighted images
GIST: benign vs malignant

- Unfortunately, no standard exists for their classification.
- Many criteria such as number of mitotic figures, size, presence of necrosis and hemorrhage among others.
- Size is the most important and most reliable
- Tumor <5 cm is described as having low malignancy potential
- Tumor >5 cm is described as being of high malignancy potential.
GIST: Treatment

- Surgery remains the definitive treatment of choice.
- Only effective, specific, nonsurgical therapy for GISTs is imatinib mesylate (gleevec).
- Radiation and Chemo have yielded poor results.
In Conclusion

- Key points to Remember:
  - GIST is RARE....
  - Demo: 40-70 yrs/M=F
  - Patho: CD117 +VE (C-KIT) in more than 90%
  - C/P: Non specific. Vague Abd pain, NVD rarely obst
  - Radio: CT best modality proven.

  **Smaller GISTS appear as smooth, sharply defined intramural masses with homogenous attenuation**

  **Larger GISTS with necrosis appear as heterogeneous masses with enhancing borders of variable thickness and irregular central areas of fluid**

  **Bottom line: Exophytic mass, heterogenous, hyperenhancing Liver Mets with NO LNS is very suggestive of GIST**
In Conclusion

Role of Radiology in GIST

- It is more of a *suggestive tool* rather than a cut off measure.
- Determines potential malignancy via *size*.
- In most literature *CT* is thought to be the *best* modality available (However some advocate that MRI is the gold standard?)
In Conclusion

- Worthy of note

Diagnosis of GIST may be complemented by immunohistochemical studies of FNAC samples.

However not all CD117+ cells are GIST.
References:

- Gastrointestinal stromal tumors of the Duodenum: CT and Barium Findings
- Mye-Cheol kim et al AJR August 2004
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