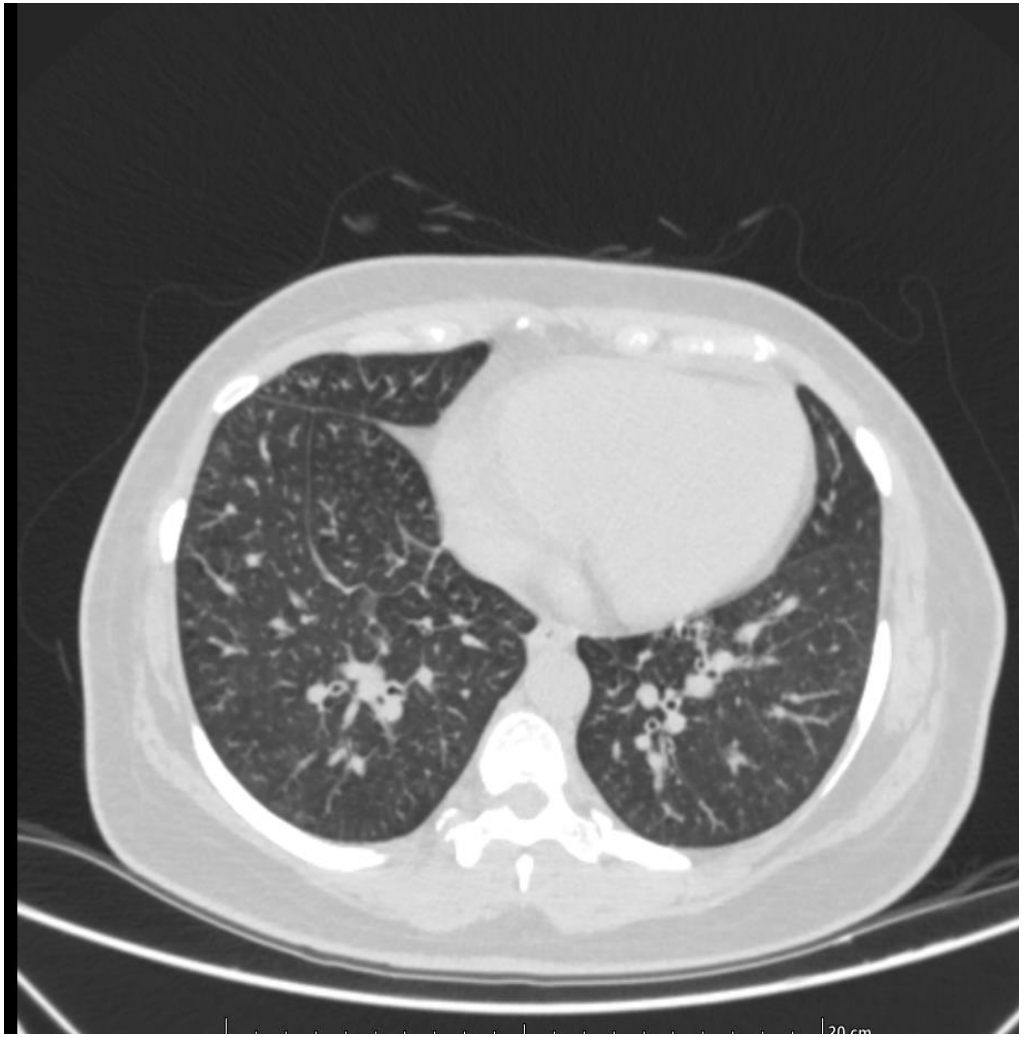
2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM

CASE 2

43 year old female presented with :

- epigastric pain - Since 4 Days, on and off
- Anorexia - Since 4 Days,
- Weight loss - Since 2 Months, 3 kg
- General Weakness - Since 4 Days, on and off
- Evaluated elsewhere and diagnosed to have anemia . She was transfused 1pc.
- CT abdomen & pelvis contrast study was advised.



CT FINDINGS

- Asymmetrical wall thickening involving the distal body of the stomach causing luminal narrowing with multiple omental deposits , gastric lymph nodes, retroperitoneal lymph nodes, suggestive of gastric neoplasm with secondaries.
- Smooth interlobular septal thickening involving the bilateral lungs - the possibility of lymphangitis carcinomatosis.

DIFFERENTIAL DIAGNOSIS

- Gastric adenocarcinoma
- Gastric lymphoma
- Gastric metastasis
- Gastrointestinal stromal tumor (GIST)
- Gastric neuroendocrine – Carcinoid tumor
- Gastritis
- Benign gastric (peptic) ulcer
- Menetrier's disease
- Secondary changes from pancreatitis (from extrinsic inflammatory change)

- OGD scopy and biopsy was done which show ulceroproliferative growth from 45cm from incisors involving the lesser curve, greater curve, anterior wall of mid body, involving 1/2 of the circumference without gastric outlet obstruction.

DEPARTMENT OF LABORATORY MEDICINE Final Report

Patient Name : Ms I Shakira MRN : 10020001748453 Gender/Age : FEMALE , 42y (09/07/1981)

Collected On : 04/07/2024 01:23 PM Received On : 04/07/2024 04:32 PM Reported On : 10/07/2024 07:37 PM

Barcode : 062407040016 Specimen : Body Tissue Consultant : Dr. Pragnya Coca(MEDICAL ONCOLOGY)

Sample adequacy : Satisfactory Visit No : IP-001 Patient Mobile No : 9566665151

HISTOPATHOLOGY

REGULAR HP SMALL SPECIMEN

CASE No.	H-6800/24
CLINICAL DETAILS	CT scan : Wall thickening body of stomach with sarcoidosis OGD: Ulcero-proliferative lesion lesser curvature, greater curvature and anterior wall midbody. Biopsy taken Clinical Diagnosis: Carcinoma mid body stomach.
SPECIMEN DETAILS	Gastric biopsy Received in 10 % neutral buffered formalin. Biopsy taken Time: 12:40 p.m. Biopsy put in formalin time : 12:48 p.m. Cold ischemic time: 8 minutes Total fixation time in formalin: 6 hours Adequate fixation
GROSS EXAMINATION	Received 9 grey white tissue fragments ranging in size from 0.1 cm to 0.5 cm in maximum dimension. Entire tissue processed in one capsule.
MICROSCOPIC EXAMINATION	Sections studied show ulcerating gastric mucosal fragments with infiltrating neoplastic epithelial cells arranged in sheets and vague glandular pattern. The individual cells are round to oval with pleomorphic vesicular nuclei, eccentrically placed and abundant mucin filled cytoplasm (signet ring cell morphology.
IMPRESSION	Poorly differentiated carcinoma with signet ring cell features. Advice: Kindly correlate with clinical and radiological findings Typed by Dr Nisheena

--End of Report-

- Patient attenders has been explained in detail about poor prognosis. She is planned for palliative chemotherapy (oral capecitabine). Patient attenders wishes to be discharged hence is being discharged against medical advise.

CT PROTOCOL

- Fasting : optimum 6 hrs, minimum 3 hours
- 750-1000 ml of water 10- 20 min prior scan.
- Multiphasic imaging: Late arterial (25-40 sec),venous (60-80 sec) and delayed(3-4 minutes)
- Arterial : tumor detection,
- Venous : nodal status,
- Delayed : depth of mural invasion

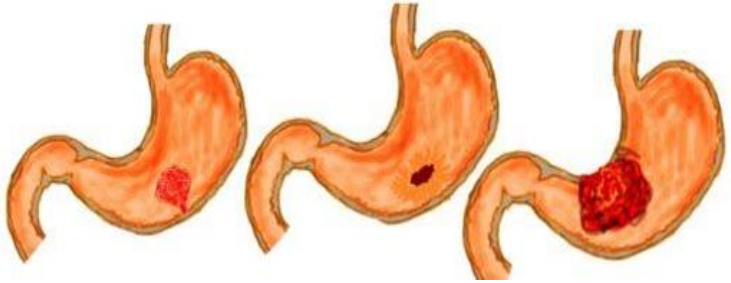
Morphology – Gross

Intestinal type

Bulky tumors

frequently grow along broad cohesive fronts

to form either an exophytic mass or an ulcerated infltrative tumor.



Diffuse type

Not bulky!

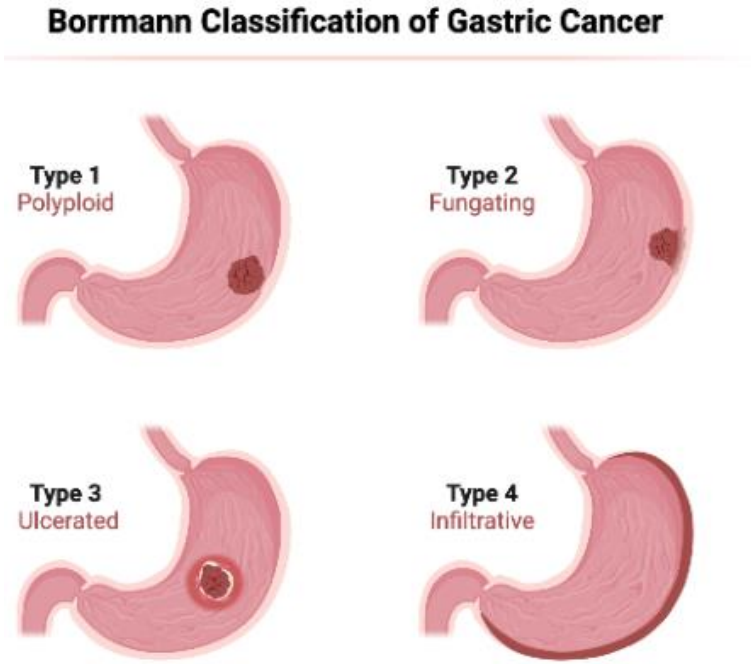
Infiltrative

And evokes **desmoplastic** response which stiffens the gastric wall

Linitis plastica/ leather bottle stomach

large areas of infltration, diffuse rugal flattening and a rigid, thickened wall

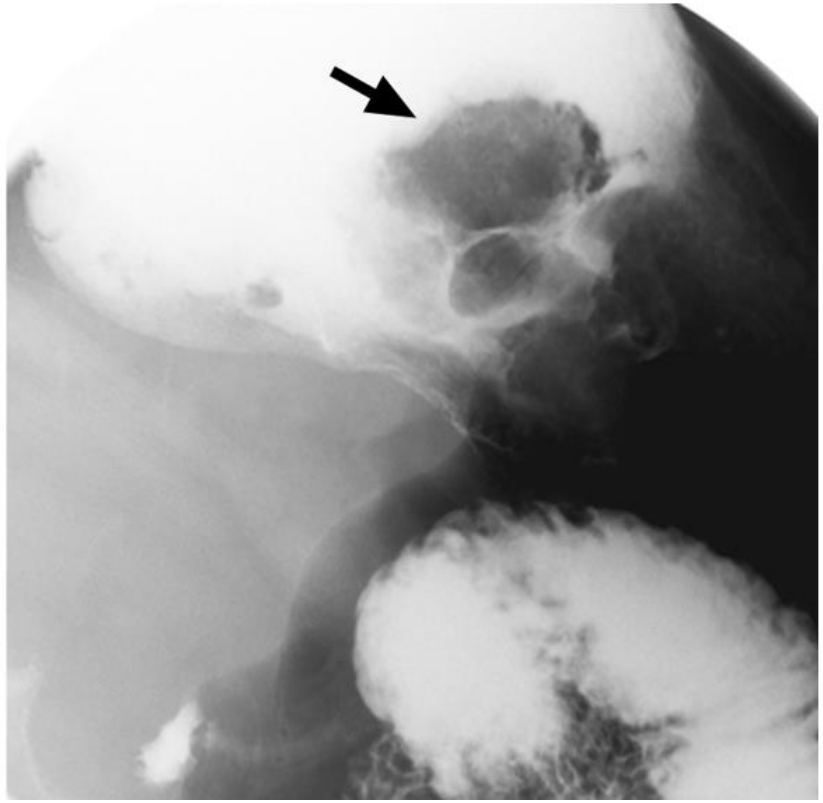
Classification systems



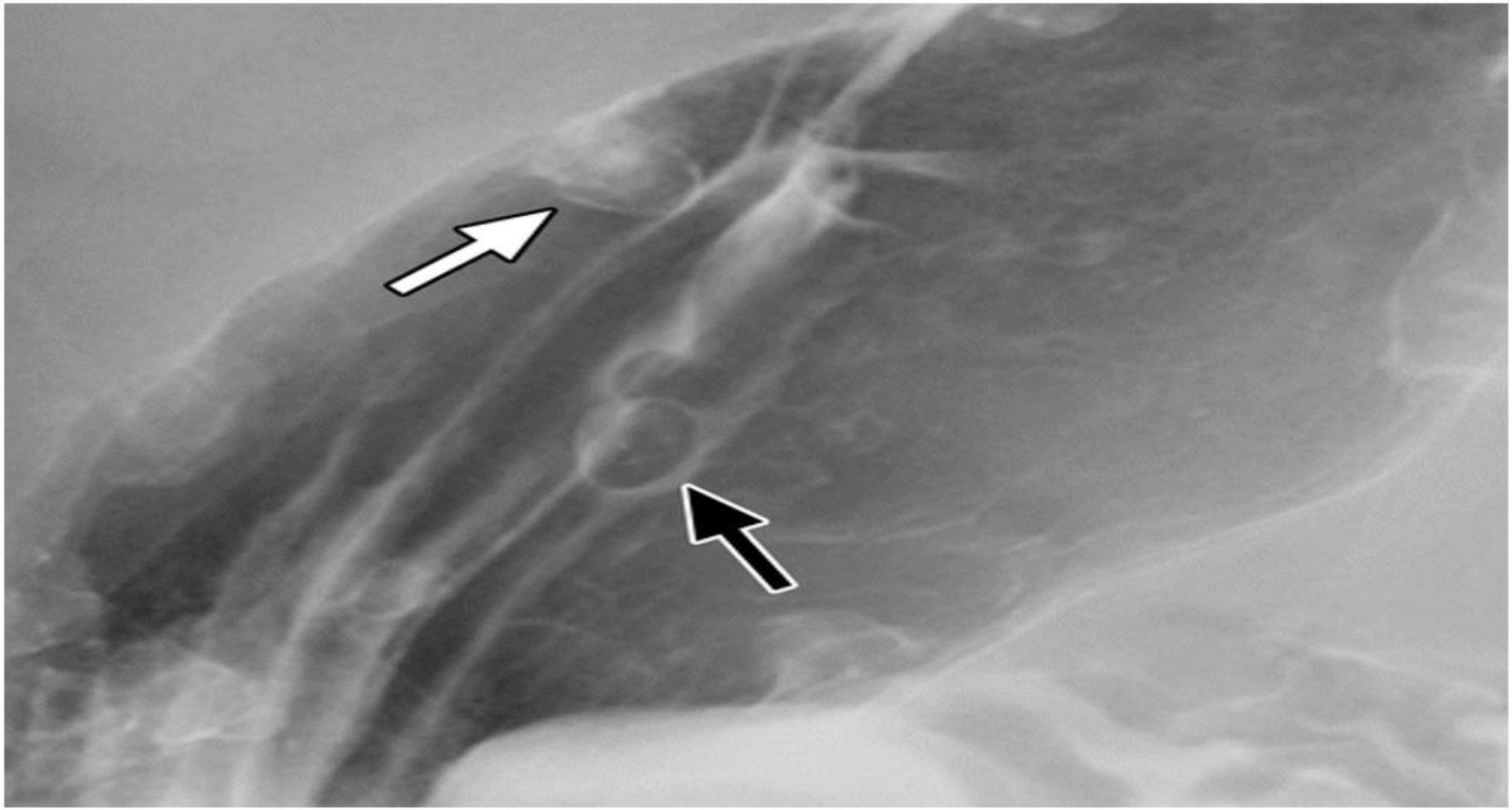
GASTRIC LESIONS

- Neoplastic: - Adenocarcinoma
  - Lymphoma
  -NET
- Mesenchymal lesion - GIST
  - Leiomyosarcoma
  - Lipoma
- Inflammatory and Infective

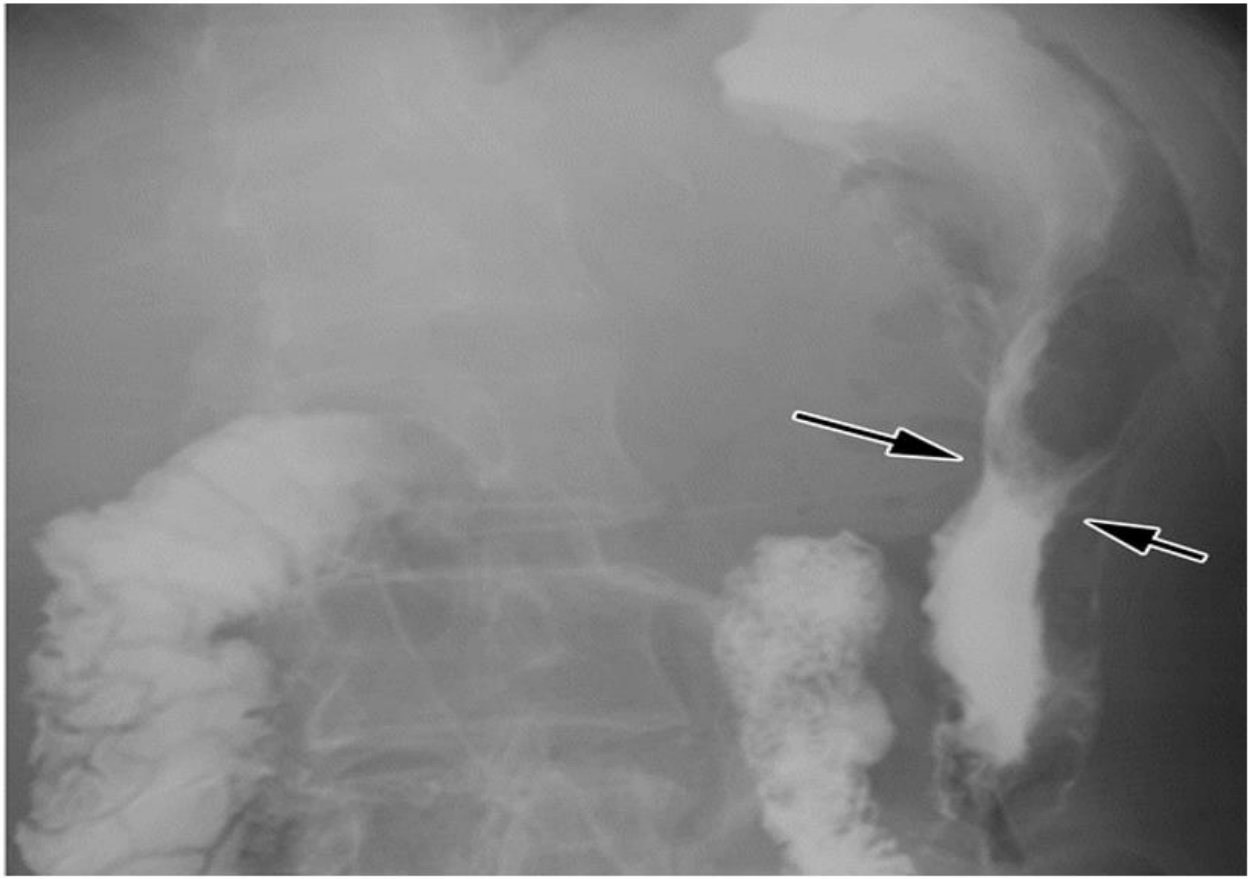
- Fluroscopy -lesion on a dependent or posterior wall; filling defect in barium pool



- lesion on non-dependent or anterior wall; etched in white by a thin layer of barium trapped between edge of mass and adjacent mucosa



linitis plastica, with a diffuse absence of gastric distensibility

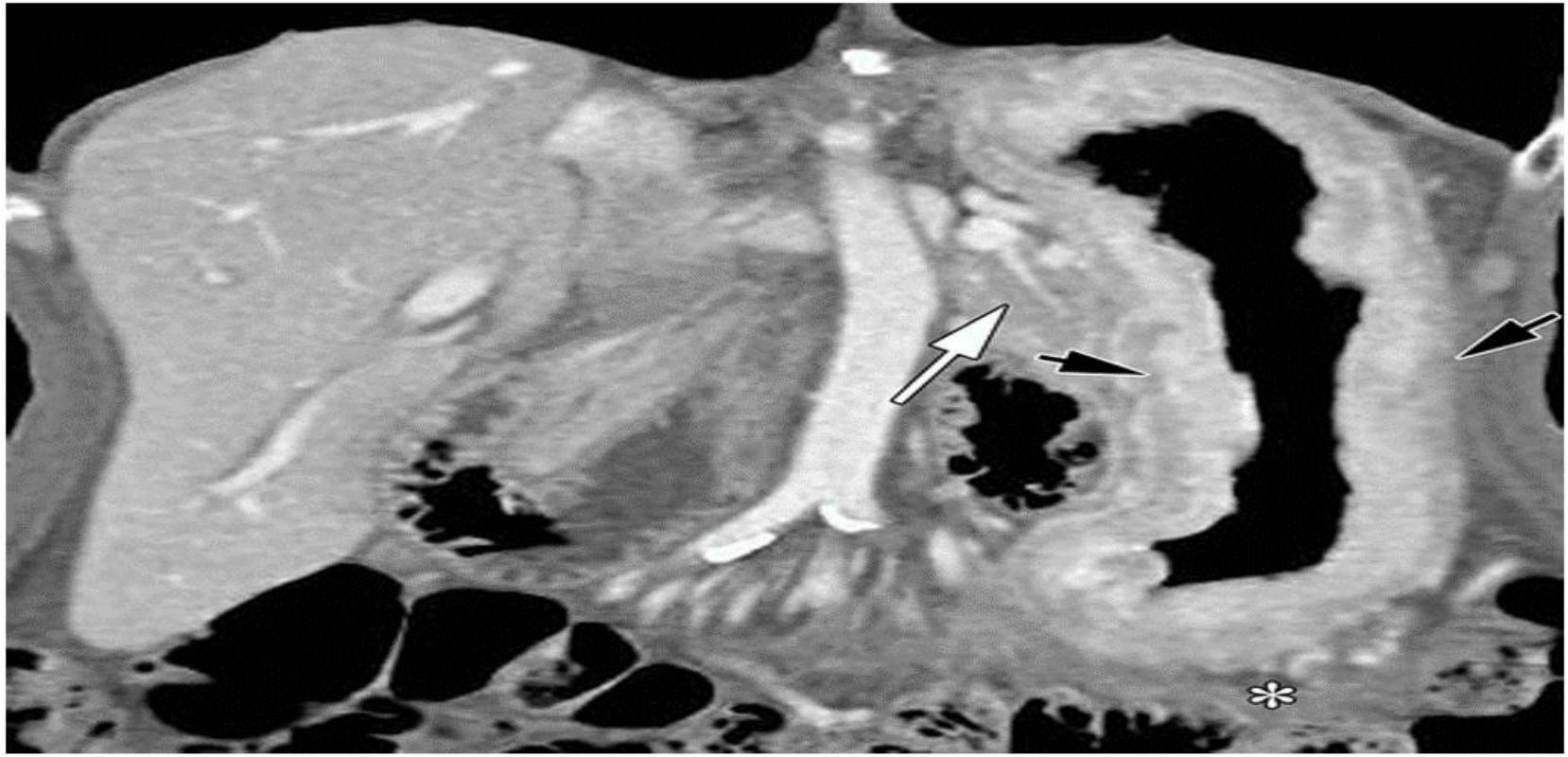


CT FINDINGS

- Gastric wall thickening
- Abnormal wall enhancement
- Effacement of normal enhancement pattern
- Perigastric fat stranding
- Lymphadenopathy
- Metastatic disease

Wall Thickening

- Asymmetric focal wall thickening
- Wall thickening> 15 mm
- Focal irregular polypoid lesion
- Pseudothickening: GE junction, fundus, pylorus.



Diffuse thickening and enhancement (linitis plastica) of the stomach.

Enhancement Characteristics

- Many lesions show prominent enhancement in arterial phase;critical for diagnosis of early gastric cancers.
- Fibrotic,scirrhous lesions: progressive enhancement from inner to outer wall
- Mucinous type: less enhancement due to presence of mucin

Staging Category	Definition	CT Appearance
Tumor		
T1a	Tumor invades lamina propria or muscularis mucosa	Findings of these tumors are not visible on CT images
T1b	Tumor invades submucosa	Mucosal thickening and enhancement Hypoattenuating submucosal stripe remains visible
T2	Tumor invades muscularis propria	Loss of submucosal hypoattenuating stripe but smooth outer gastric wall
T3	Tumor penetrates subserosal connective tissue without invasion of the visceral peritoneum or adjacent structures	Mildly blurred but generally smooth outer gastric wall, with a few small linear areas of stranding Nodular or sheetlike soft-tissue thickening within perigastric ligaments
T4a	Tumor invades serosa (visceral peritoneum)	Nodular or irregular serosal surface, infiltration of surrounding peritoneal fat
T4b	Tumor invades adjacent structures, such as spleen, transverse colon, liver, diaphragm, pancreas, abdominal wall, adrenal gland, kidney, small intestine, and retroperitoneum	Direct invasion into adjacent organs and structures
Node		
N0	No regional nodal involvement	...
N1, N2, N3	Regional nodal involvement	Short-axis, >6–10-mm irregular contour; heterogeneous enhancement; cluster of nodes
Metastasis		
M0	No distant metastatic disease	...
M1	Distant metastasis involving distant nodes, nondirect extension into other organs, or peritoneal carcinomatosis	Distant (nonregional) lymph nodes—for example, peripancreatic, mesenteric root, retroperitoneal, and para-aortic nodes Peritoneal carcinomatosis involving ascites, peritoneal nodules, plaques, fat stranding, thickening, and/or enhancement

Dissemination of disease

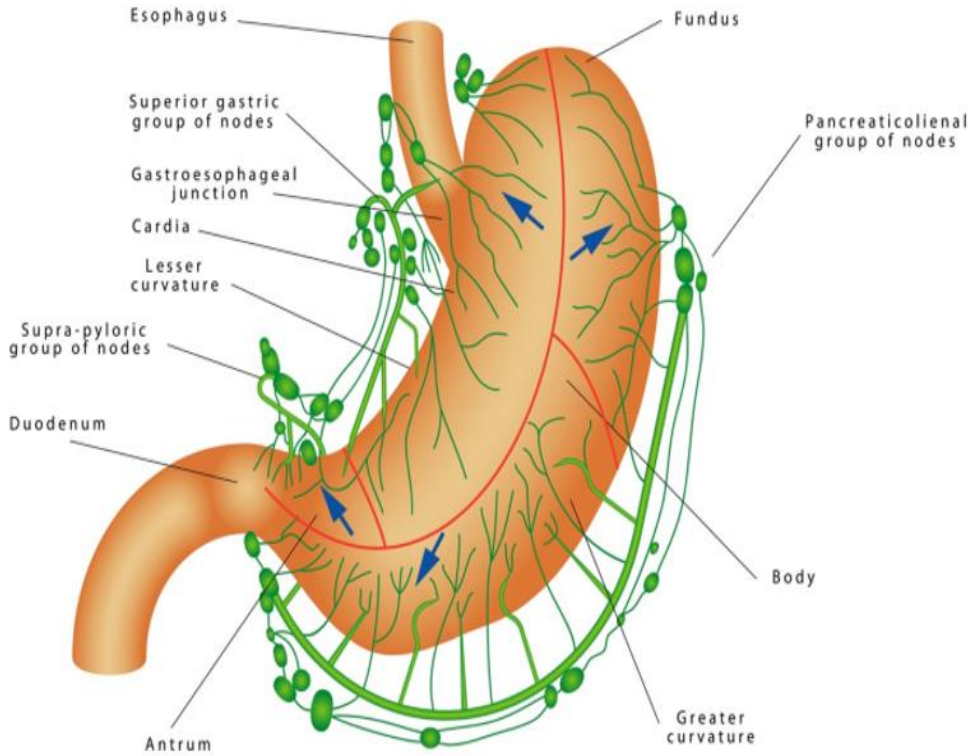
- Direct invasion
- Lymphatic
- Transperitoneal
- Hematogenous

Direct Invasion

- Direct invasion into adjacent organs occurs along the perigastric ligaments and is considered as T4b disease.
- Liver : GHL,HDL
- Colon: GCL
- Spleen: GSL
- Pancreas: SRL or HDL
- Diaphragm,abdominal wall,adrenal,kidney,small bowel,retroperitoneum

Routes of Disease Spread

- **Lymphatic Dissemination**



STOMACH LYMPHATIC DRAINAGE

Lymphatic dissemination

- Present in most of patients at diagnosis
- May be seen in early gastric cancer as well
- Regional/perigastric: paracardial,lesser curve,greater curve,suprapyloric,infrapyloric
- Extraperigastric: Left gastric,common hepatic artery,coeliac artery,splenic hilum ,HDL,SMV
- Distant /M1: Retropancreatic,mesenteric root,middle colic,para aortic,peripancreatic,infradiaphragmmatic,paraesophageal
- Increased number of LGA,CHA and CA nodes are associated with poorer outcome

Transperitoneal spread

- This gastric carcinomatosis can occur in advanced stage gastric cancer.
- Imaging findings :
- Ascites
- Soft tissue nodules
- Plaque like thickening
- Prominent fat stranding
- Irregular peritoneal thickening
- Calcification in mucinous carcinoma

Hematogenous metastases

- Liver – most common (as stomach is drained by portal system)
- Other organs - Lung, bones, adrenal, CNS

MRI

- Can be used as additional or alternate modality to CECT
- For detection of liver metastases

ROLE OF PET CT

- Mainly used for detecting metastases
- Limited in evaluation of primary tumors
- Mucinous,signet ring and poorly differentiated tumors show less uptake
- False positives: inflammation and infection

GASTRIC LYMPHOMA

- represents the most common site of extranodal lymphoma
- Three distinct types:

-Low grade MALT lymphoma

-Primary sporadic lymphoma

-Secondary involvement of stomach by systemic lymphoma

Dawson five criteria that must be met for the diagnosis of a primary gastrointestinal lymphoma to be made:

1.	No palpable superficial lymph nodes are seen.
2.	Chest radiographic findings are normal (ie, no adenopathy).
3.	The white blood cell count (both total and differential) is normal.
4.	At laparotomy, the alimentary lesion is predominantly involved, with lymph node involvement (if any) confined to the drainage area of the involved segment of gut.
5.	There is no involvement of the liver and spleen.

Lymphoma vs Carcinoma

- Lymphoma

Large lesion >15 cm

Multiple masses

Diffusely infiltrating lesion with large nodular folds without significant narrowing

- Carcinoma

Small < 5 cm

Solitary

Annular constricting lesion

Linitus plastica with luminal compromise

Adenopathy is seen with both adenocarcinoma and lymphoma, but if it extends below the renal hila or the lymph nodes are bulky, lymphoma is more likely

CT scan findings in Lymphoma

- Diffuse or segmental wall thickening
- The mass is usually homogeneous in attenuation, but may contain focal areas of low density representing necrosis
- Polypoid mass lesion with or without ulcer
- Preservation of the perigastric fat planes at CT is more likely to be seen in lymphoma than in adenocarcinoma
- Gastric outlet obstruction is an uncommon feature
- Lymphadenopathy
- Involvement of other organs in secondary lymphoma

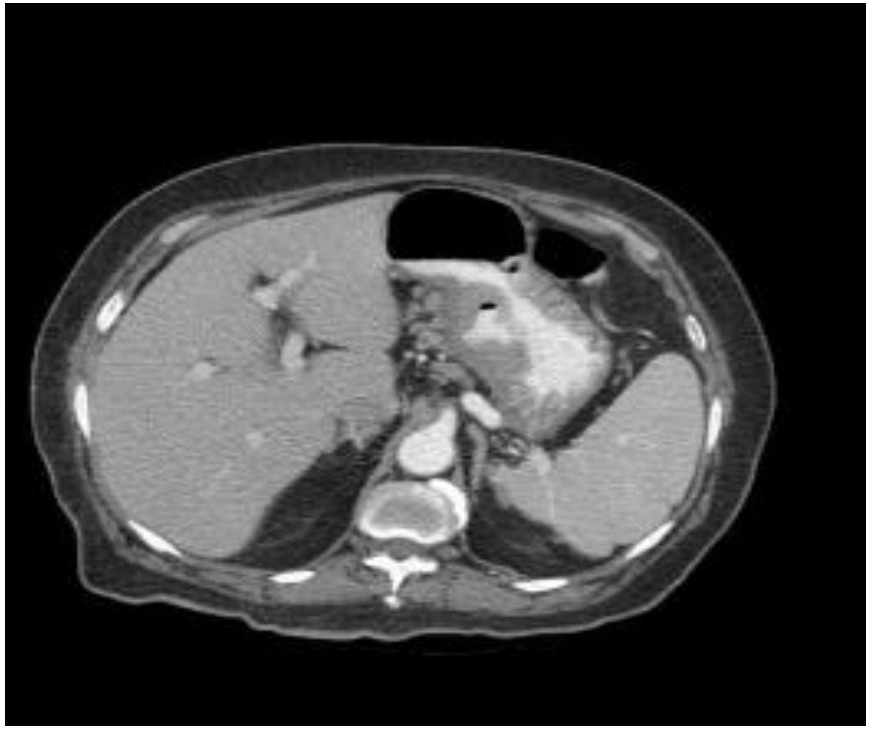
GIST

Radiographic features

- These tumors appear as rounded soft tissue masses, arising from the wall of a hollow viscus (most commonly the stomach) with an endoluminal or exophytic growth.
- Mucosal ulceration is present in 50% of cases with large necrotic cavities communicating with the lumen also seen.
- Differentiating between a benign from a malignant GIST radiologically is difficult . The diagnosis of malignant GIST requires histopathologic analysis, but certain characteristics suggest malignancy.

1. exogastric growth
2. diameter >5 cm
3. central necrosis
4. extension to other organs

Ulcerated mass demonstrating air-fluid level ,also referred to as Torricelli-Bernoulli sign



CT scan findings in GIST

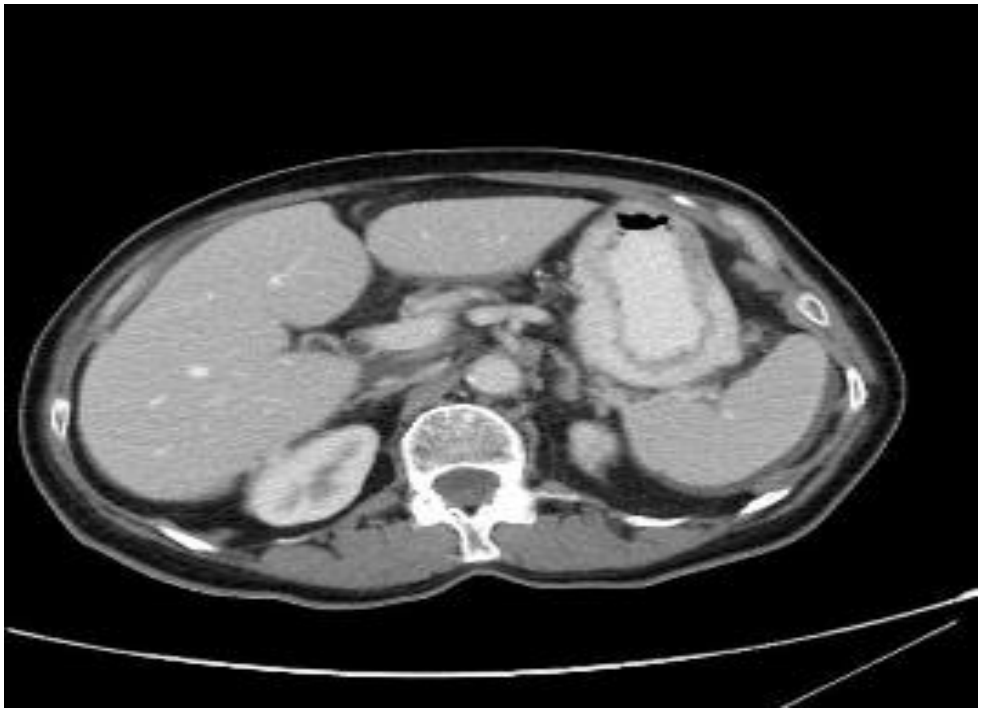
- Exophytic, submucosal mass,may be intraluminal or combined
- Small lesion- homogenous intense enhancement
- Heterogeneity increases with size due to necrotic changes
- Mucosal ulceration in ~ 50%
- Metastasis to liver and peritoneum

GASTRIC METASTASES

- They are rare ,found in less than 2% of patients who die of a carcinoma
- direct invasion or lymphatic spread to stomach
  - distal esophageal carcinoma
    - polypoid, lobulated mass in gastric fundus
    - radiologically indistinguishable from primary gastric carcinoma
  - pancreatic carcinoma
    - pancreatic tumor will be evident
    - irregular extrinsic gastric compression
  - omental and peritoneal metastases: ovary, uterus, breast, pancreas
    - lesions as small as 1 cm can be seen
    - lacy reticular pattern to bulky masses /omental cake which displace and indent gastric wall

- hematogenous spread to stomach
  - malignant melanoma
  - breast cancer: "leather bottle" appearance (linitis plastica)
    - markedly thickened gastric wall demonstrating enhancement, preservation of mucosal folds

Gastric metastases from breast carcinoma



- Metastatic disease can manifest as multifocal gastric masses or diffuse wall thickening with rigidity and flattening of the mucosa (linitis plastica).
- Diffuse metastatic disease involving the stomach may be impossible to differentiate from diffuse primary gastric adenocarcinoma at cross-sectional imaging.

GASTRITIS

- Radiological signs include thick folds(gastric folds greater than 5 mm),inflammatory nodules and erosions.

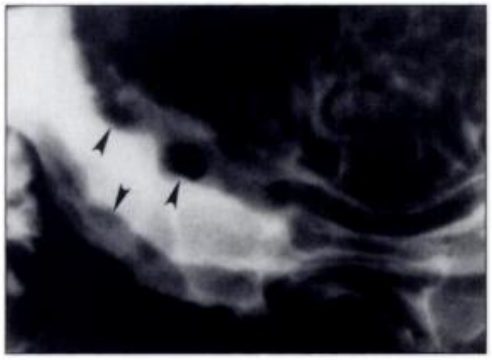


Fig. 2.—Gastritis caused by nonsteroidal antiinflammatory drugs in 58-year-old woman. Compression radiograph of stomach reveals multiple nodules (*arrowheads*) and thickened mucosal folds in antrum.

Fig. 1.—*Helicobacter pylori* gastritis in 63-year-old man.

MENETRIER'S DISEASE

- The thickened rugae appear as areas of thickened mucosa that project into the gastric lumen to a degree that may resemble convolutions of brain . Gastric wall thickness is normal between folds

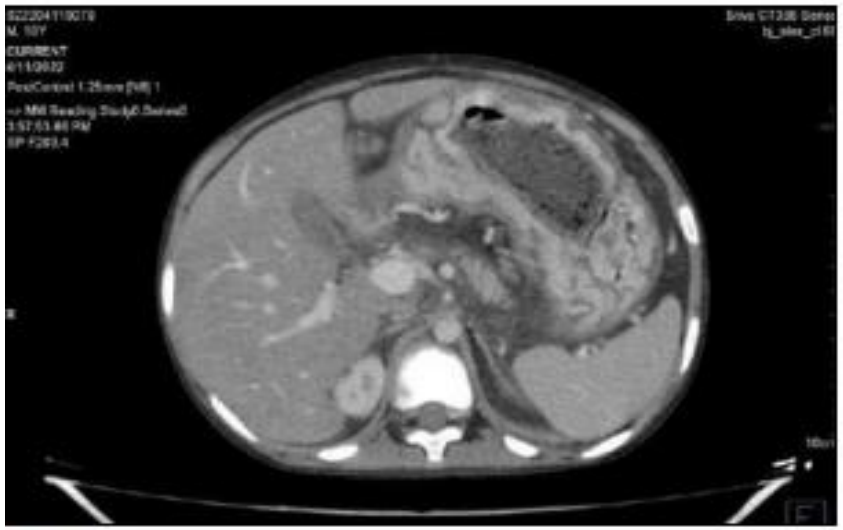


Fig 4: Abdominal computed tomography (CT) images obtained with intravenous Ominpaque showing giant cerebriform enlargement of rugal folds in the gastric fundus and body

Carcinoids.

- **Carcinoid tumors** are a type of neuroendocrine tumor .
- Most commonly occur in small bowel (ileum).
- Gastric carcinoid are rare.
- They can cause a desmoplastic reaction in nearby tissue, leading to fibrosis and tethering of the adjacent bowel.

CT

- polypoid or plaque-like appearance.
- hyperenhancing on arterial phase.
- can cause distortion and focal fixation of the affected small bowel loop.
- calcifications are present in up to 70% of case