



Epithelial and Submucosal Lesions of the Stomach: Spectrum of CT Findings

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1. Learning objectives

Learning Objectives

Learning objectives

LEARNING OBJECTIVES

To describe and illustrate the CT imaging findings of gastric lesions, emphasizing the imaging features that help distinguish:

- epithelial from submucosal lesions
- benign from malignant tumors
- tumors from submucosal non-tumorous lesions

2. Background

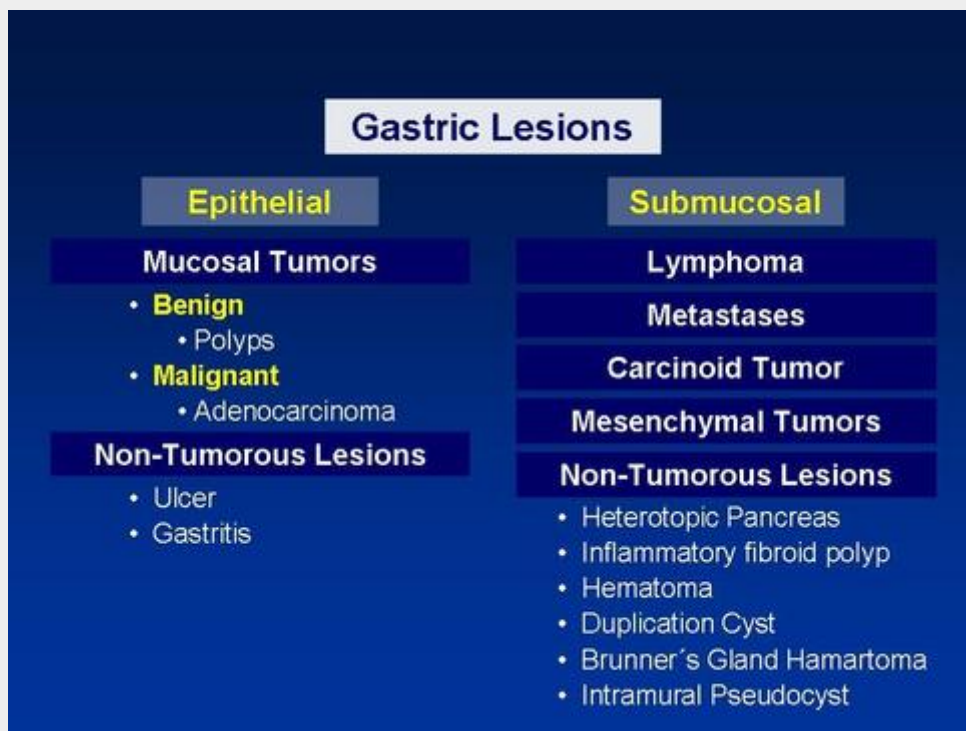
Background

BACKGROUND

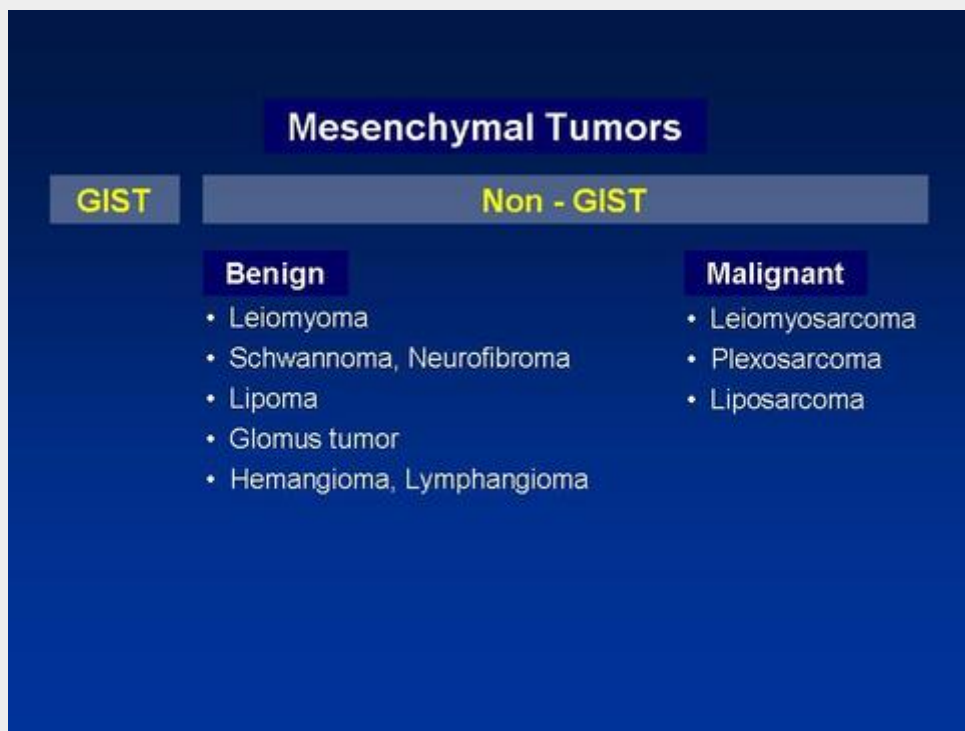
Gastric lesions may be classified:

- according to their origin – epithelial or submucosal
- according to their nature – tumoral or non-tumorous
- according to their biologic behavior – benign or malignant

Gastric lesions



Mesenchymal tumors



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BACKGROUND

The clinical manifestations of gastric lesions span from absence of symptoms or signs of disease to severe abdominal pain in the context of acute abdomen. Their overlap is considerable, as are the radiologic findings.

The accurate characterization of gastric lesions is a mainstay for adequate therapy planning in order to avoid unnecessary or inadequate surgery or follow-up.

Imaging plays an important part in the diagnostic work-up of epithelial lesions, particularly cancer staging and peptic ulceration and an even more important part in the diagnosis of endoscopy-inaccessible submucosal lesions.

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BACKGROUND

Optical endoscopic studies and double-contrast barium meals (DCBM) have been traditionally used as primary tools for gastric lesions' diagnosis. These methods, however, are very uncomfortable for patients.

The advances in Computer Tomography technology, particularly with the introduction of MultiDetector CT (MDCT), with it's multiplanar reformatation capabilities, have shown great potential for the evaluation of gastric disease, providing important information, not only on the gastric wall pathology itself, but also on it's perigastric extension and distant organ involvement.

3. Imaging findings OR Procedure details

Imaging Findings

imaging findings.jpg

IMAGING FINDINGS

In this presentation, we will discuss and illustrate the CT imaging findings of gastric epithelial lesions, namely adenocarcinoma, and submucosal lesions, namely lymphoma, GIST, leiomyoma, lipoma, leiomyosarcoma, heterotopic pancreas, fibroid inflammatory polyp, hematoma and duplication cyst.

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EPITHELIAL LESIONS

Mucosal Tumors

- Benign
 - Polyps
- Malignant
 - Adenocarcinoma

Non-Tumorous Lesions

- Ulcer
- Gastritis

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ADENOCARCINOMA

Origin

Gastritis → atrophy → metaplasia → displasia → carcinoma

Epidemiology

2nd most common cancer (after lung cancer)

Peak prevalence 50 to 70 Yo

Higher incidence in ♂

Higher prevalence in Japan

Risk factors include H. Pylori, pernicious anemia, partial gastrectomy, diet high in nitrates and smoking

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ADENOCARCINOMA

Location

Lower 2/3 (80%)

Clinical presentation

Asymptomatic

Indigestion, nausea, vomiting, early satiety, loss of appetite, melena, hematemesis, weight loss, dysphagia

Metastatic disease

32% present with distant metastatic disease

Liver, lungs, adrenals, kidneys, ovaries, rectum, peritoneum

ADENOCARCINOMA

CT Imaging Findings

Polypoid mass with or without ulceration

Focal, excentric wall thickening with mucosal irregularity or ulceration

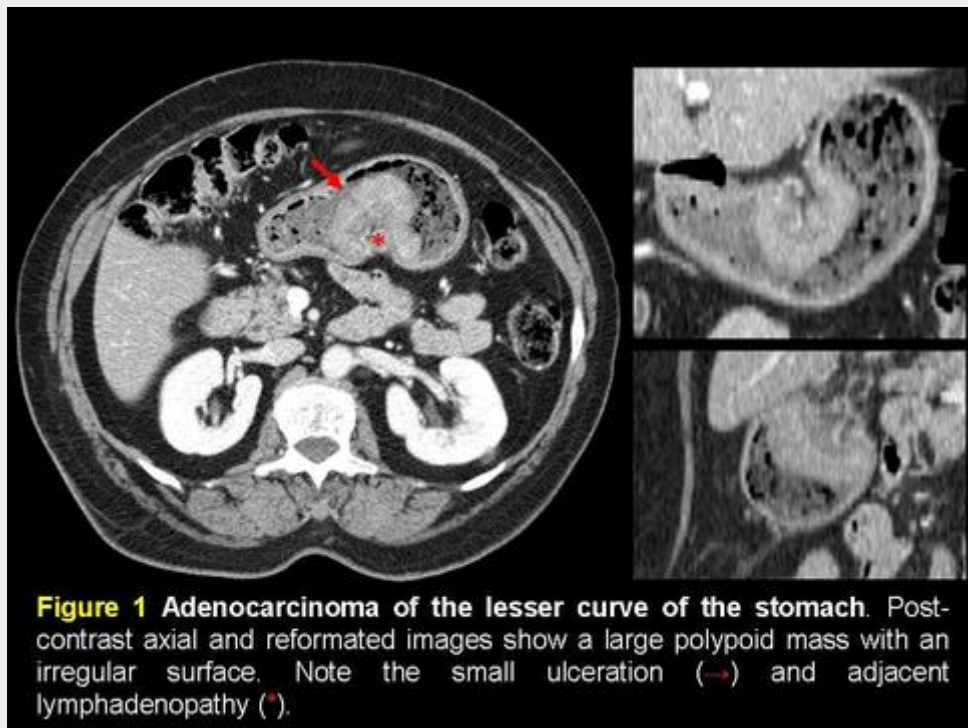
Linitis plastica

Diffuse thickening of the gastric wall

Mucinous adenocarcinoma

Very low attenuation thickening of the gastric wall with punctate miliary calcifications

Polypoid growth type of adenocarcinoma



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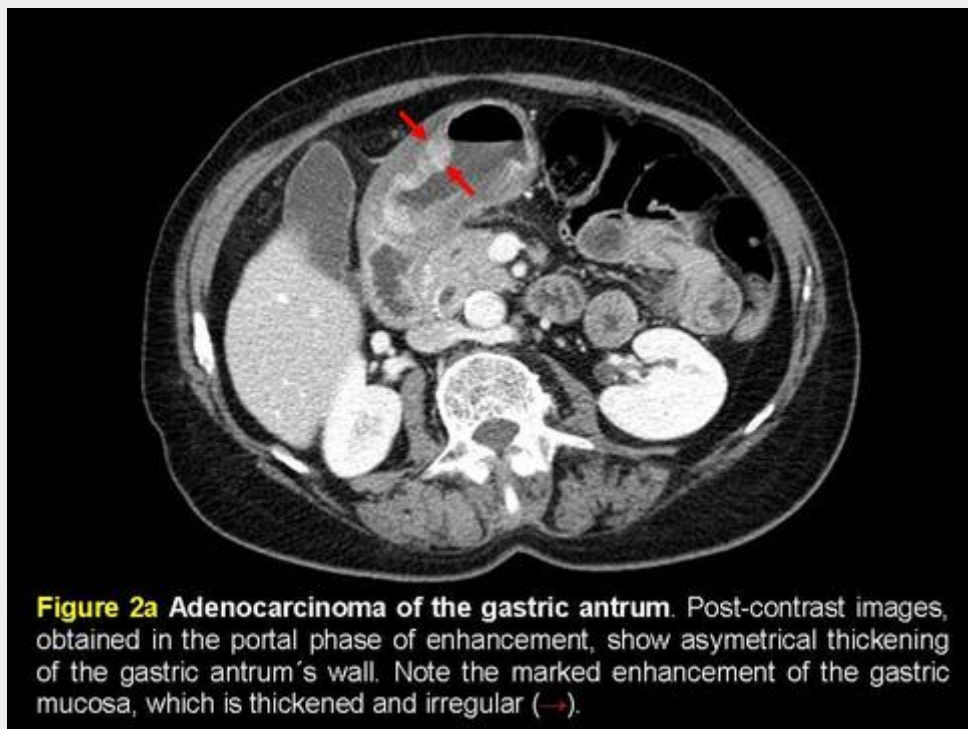


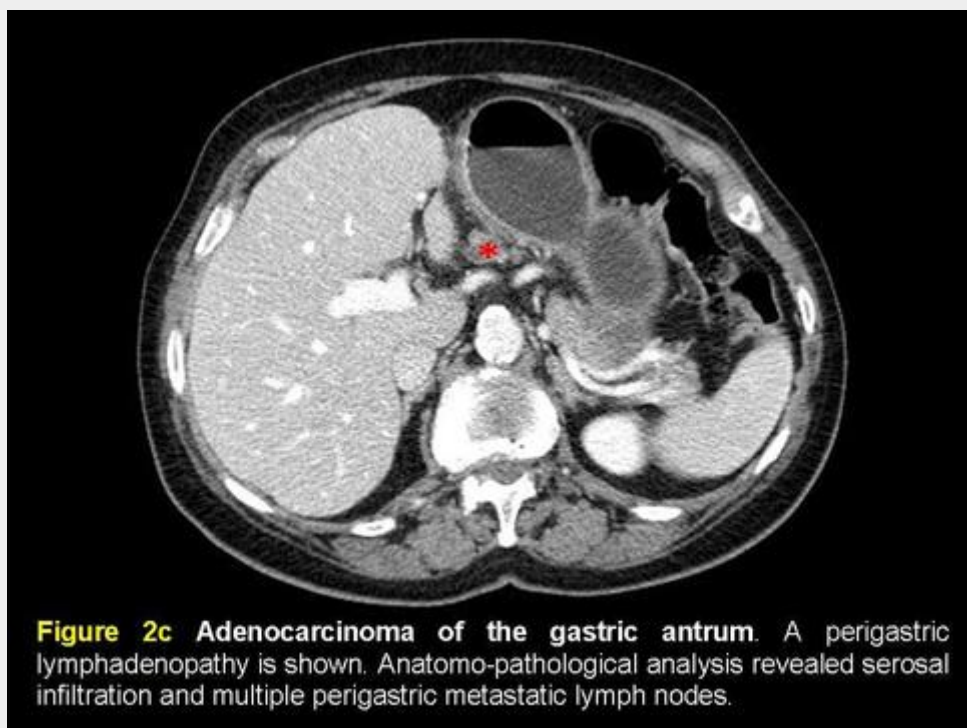
Figure 2a Adenocarcinoma of the gastric antrum. Post-contrast images, obtained in the portal phase of enhancement, show asymmetrical thickening of the gastric antrum's wall. Note the marked enhancement of the gastric mucosa, which is thickened and irregular (→).

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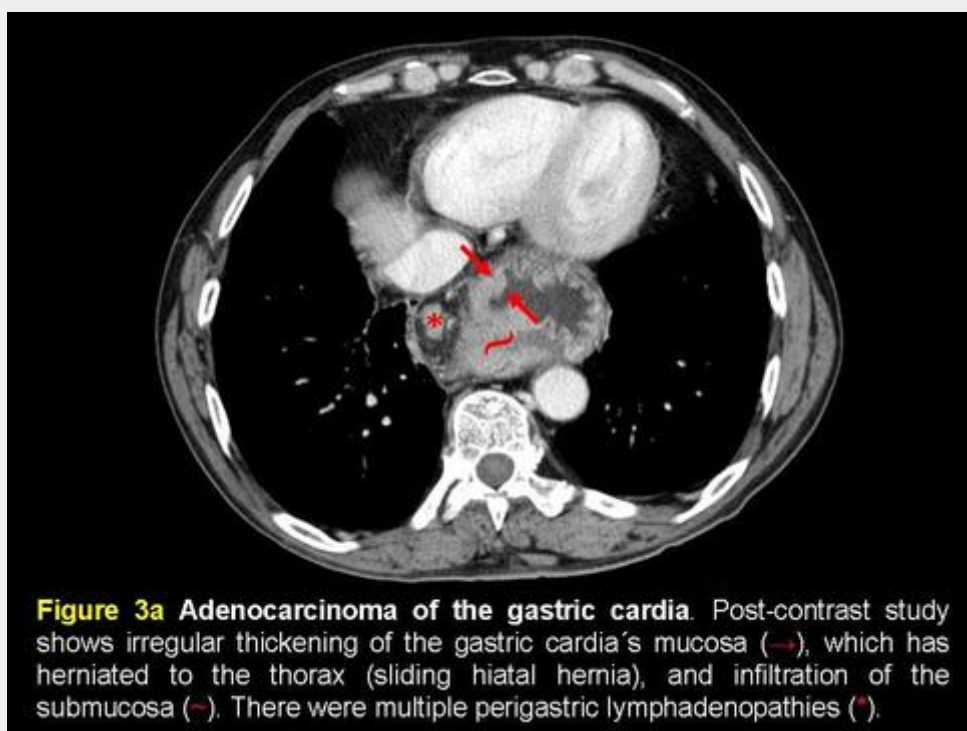


Figure 2b Adenocarcinoma of the gastric antrum. Submucosal infiltration is also apparent (→).

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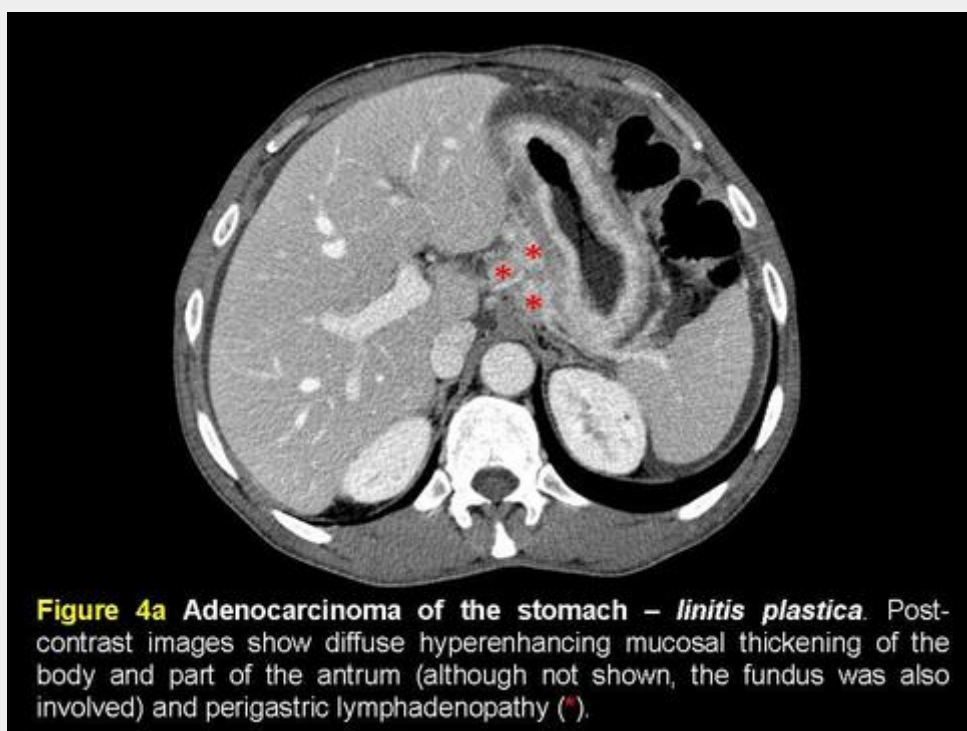
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Linitis plastica



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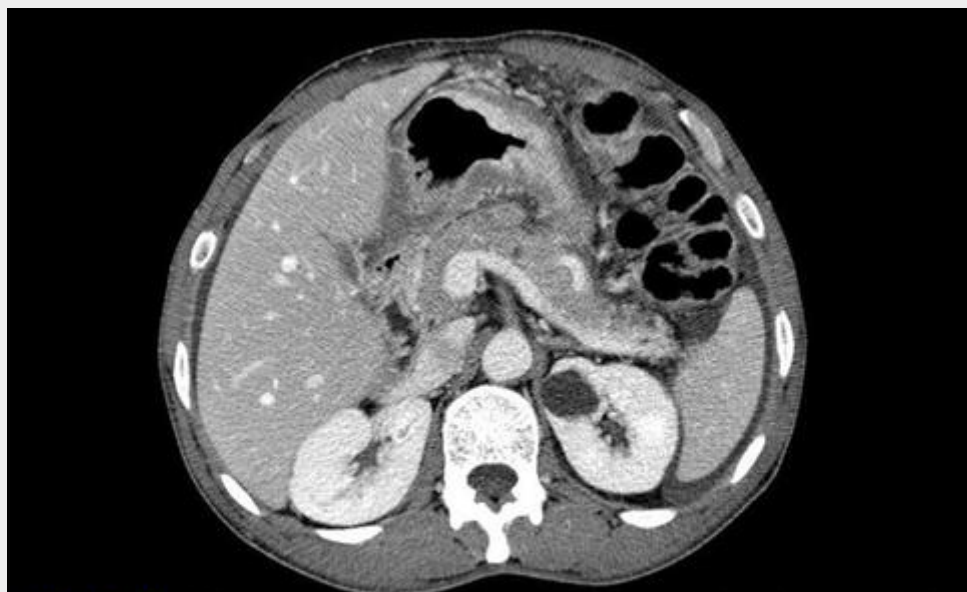


Figure 4b Adenocarcinoma of the stomach – *linitis plastica*. Post-contrast images show diffuse hyperenhancing mucosal thickening of the body and part of the antrum (although not shown, the fundus was also involved).

Linitis plastica

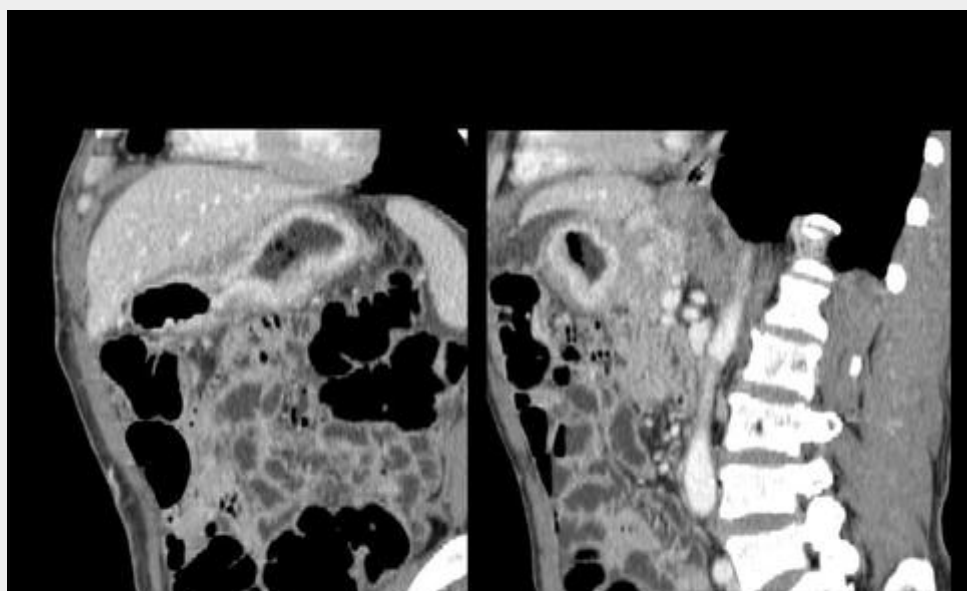


Figure 4c Adenocarcinoma of the stomach – *linitis plastica*. Post-contrast oblique and sagittal reformations better depicting the diffuse thickening of the gastric mucosa in a somewhat underdistended stomach.

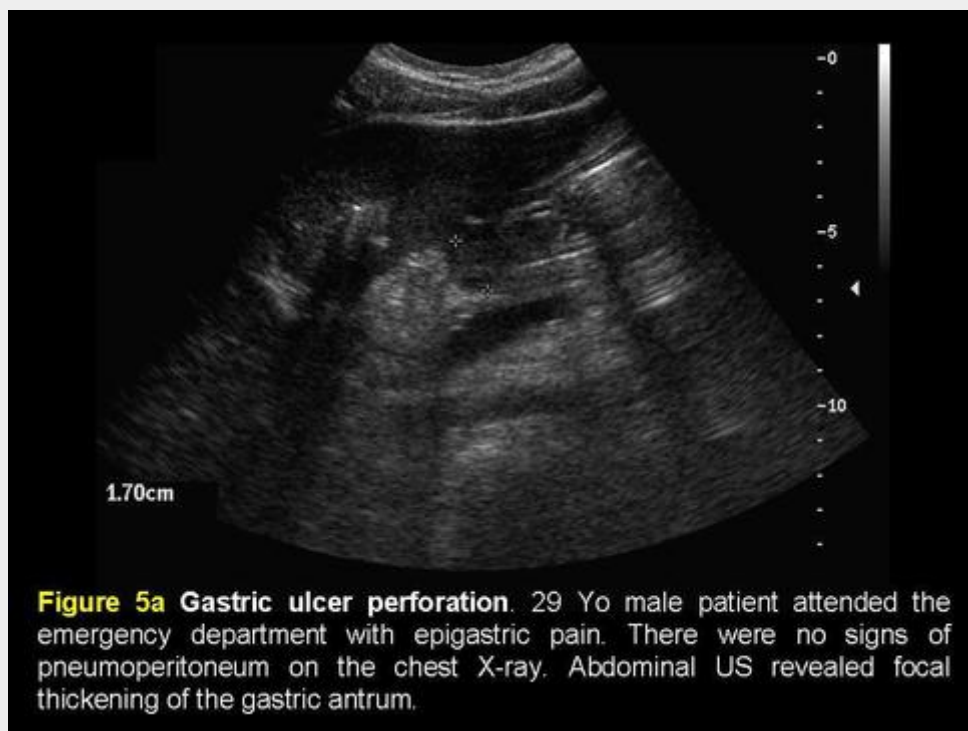
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Differential diagnosis between adenocarcinoma and benign conditions, such as gastritis or peptic ulceration, as seen on CT

Focal, eccentric, enhancing, > 1 cm wall thickening suggests malignancy.

Gastritis and peptic ulceration may present as focal wall thickening which usually does not enhance significantly. There are, however, exceptions.

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epithelial and submucosal lesions of the stomach - versao final.jpg

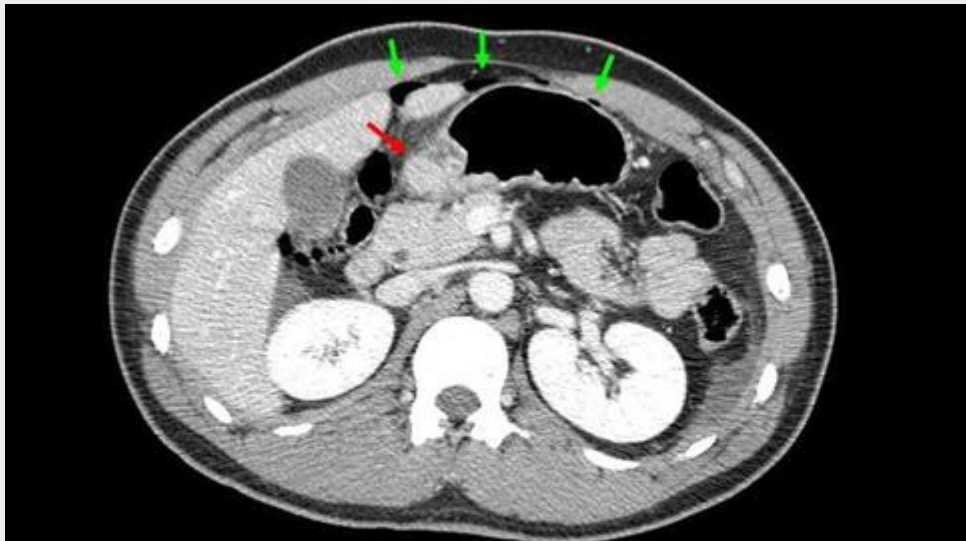


Figure 5b Gastric ulcer perforation. Abdominal CT shows focal hyperenhancing asymmetrical thickening of the gastric antrum (→) suggestive of malignancy. There was a small amount of free intraperitoneal air (→) compatible with perforation. There were, however, no signs of malignancy on the surgical biopsy's histologic analysis.

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SUBMUCOSAL LESIONS	
Mesenchymal Tumors	Lymphoma
Benign	Metastases
<ul style="list-style-type: none">• Leiomyoma• Lipoma• Schwannoma, Neurofibroma• Glomus tumor• Hemangioma, Lymphangioma	Carcinoid Tumor
Malignant	Non-Tumorous Lesions
<ul style="list-style-type: none">• Leiomyosarcoma• Liposarcoma• Plexosarcoma	<ul style="list-style-type: none">• Heterotopic Pancreas• Inflammatory Fibroid Polyps• Hematoma• Duplication Cyst• Brunner's G. Hamartoma• Intramural Pseudocyst

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LYMPHOMA

Origin

MALT-type Lymphoma is thought to originate from follicular gastritis caused by Helicobacter Pylori

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LYMPHOMA

Epidemiology

2 to 5% of malignant gastric lesions

The gastrointestinal tract (GIT) is the most common extranodal site of Non-Hodgkin Lymphoma (NHL)

The stomach is the most common segment of the GIT involved

MALT Lymphoma is considered a different form of extranodal NHL that generally manifests as localized disease and has a better prognosis

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LYMPHOMA

Location

Body and antrum

Clinical presentation

Asymptomatic

Epigastric pain and discomfort, indigestion, nausea, vomiting, gastrointestinal bleeding

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LYMPHOMA

CT findings of NHL

Submucosal nodules

Polypoid lesions

Diffuse wall thickening (4 – 5 cm)

Ulceration (advanced disease)

Bulky lymphadenopathy extending inferiorly beyond renal hilum

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LYMPHOMA

CT findings of NHL

Low grade MALT-type NHL

Absence of or subtle wall thickening

Lymphadenopathy not a prominent feature

High grade MALT-type NHL

Severe thickening, mass formation, ulcer and lymphadenopathy

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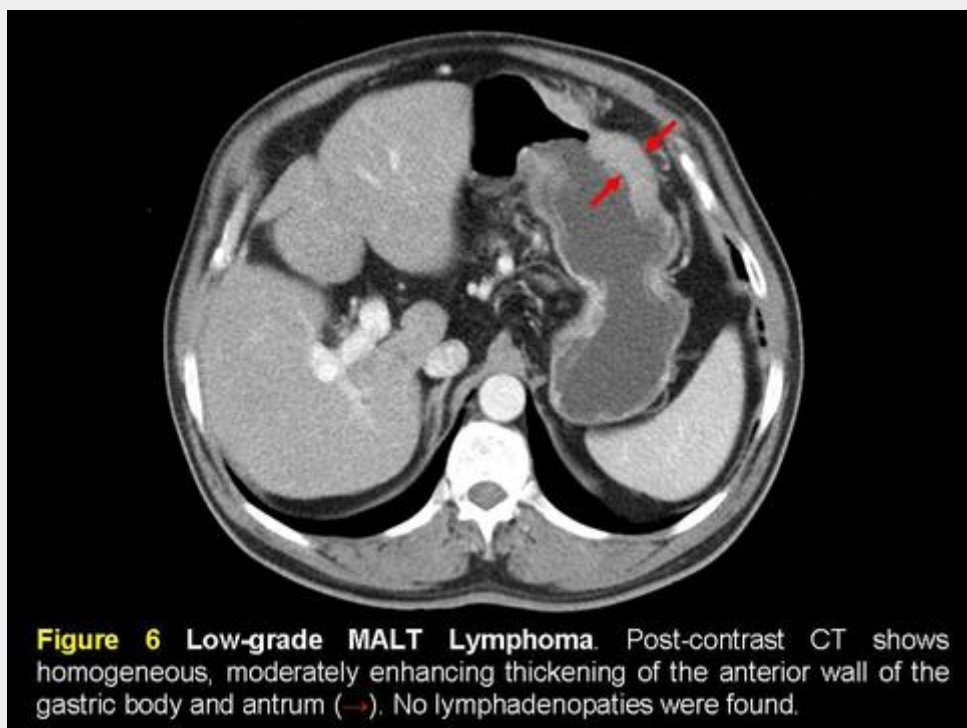
Differential diagnosis between lymphoma and adenocarcinoma as seen on CT

Lymphoma usually presents with greater wall thickening (4 -5 cm) and more diffuse, circumferential involvement.

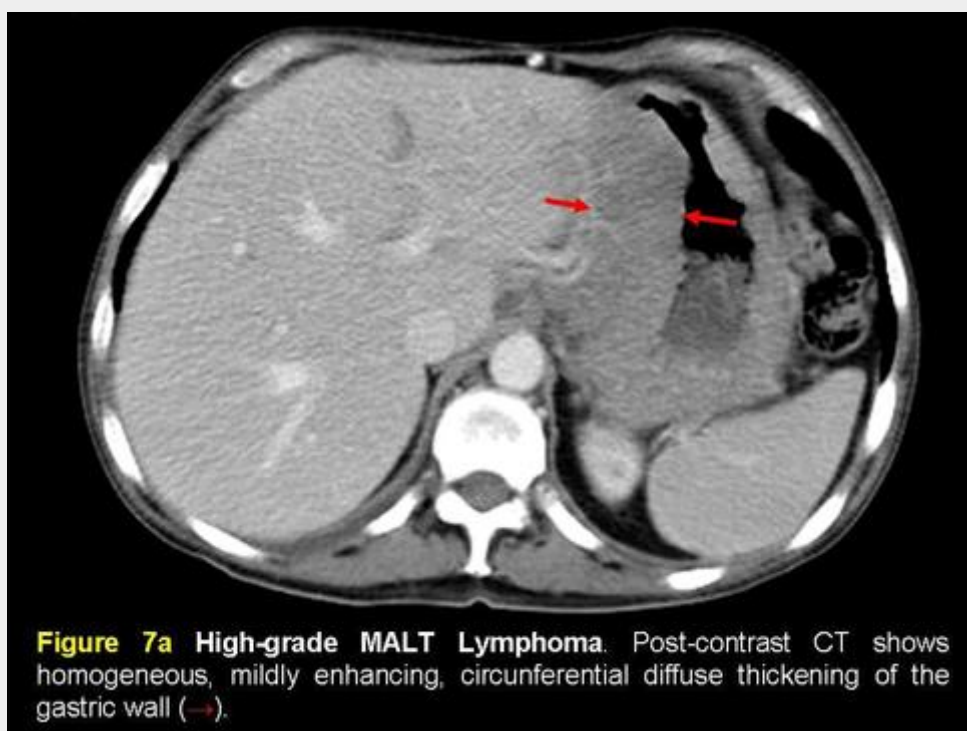
Bulky lymphadenopathy that extend inferiorly beyond renal hylum suggest lymphoma.

Obstruction is much more common in adenocarcinoma.

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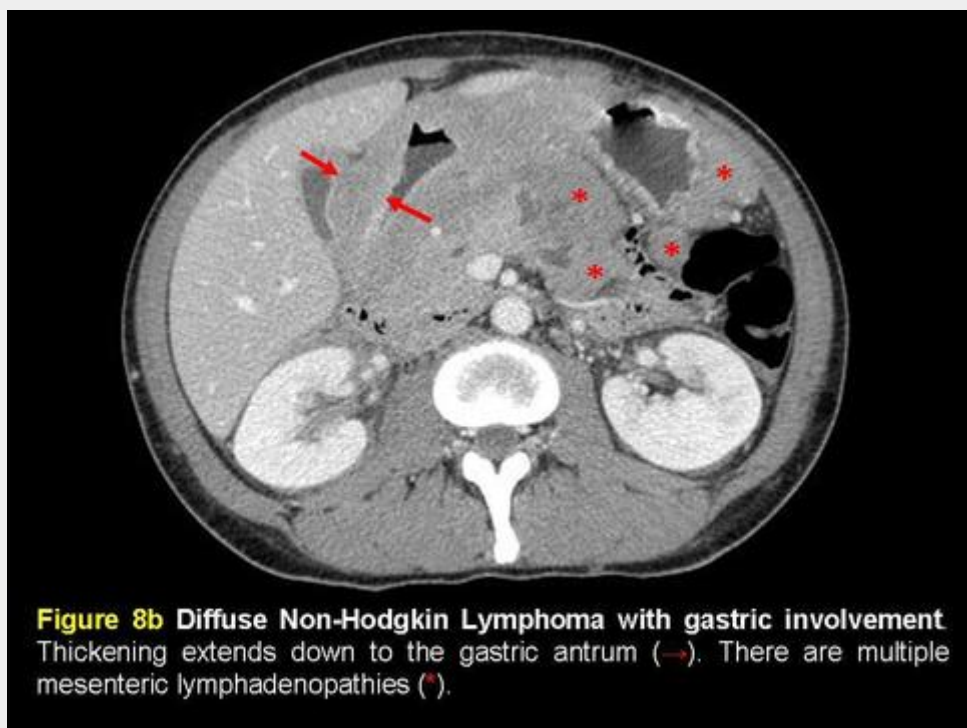
Figure 7b High-grade MALT Lymphoma. A more irregular thickening is seen at the level of the gastric antrum (→). Bulky lymphadenopathy extended down beyond renal hylum (*).

Lymphoma

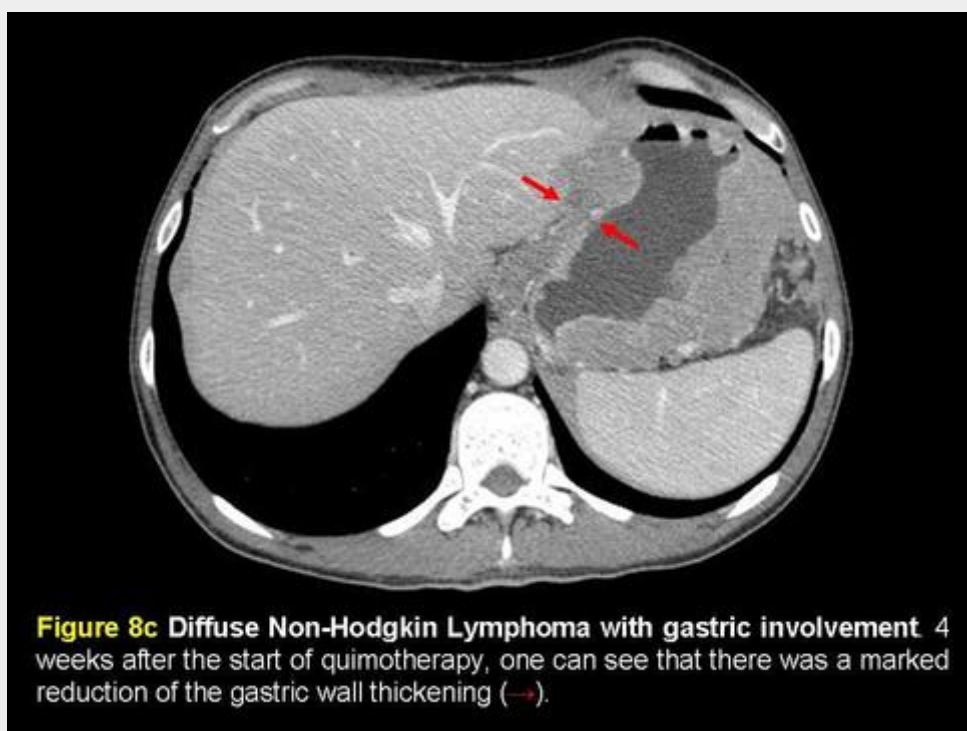


Figure 8a Diffuse Non-Hodgkin Lymphoma with gastric involvement. Diffuse, circumferential, massive thickening of the gastric wall (→). A lymphomatous mass engulfs the right adrenal gland (-). There are perigastric lymphadenopathies (*).

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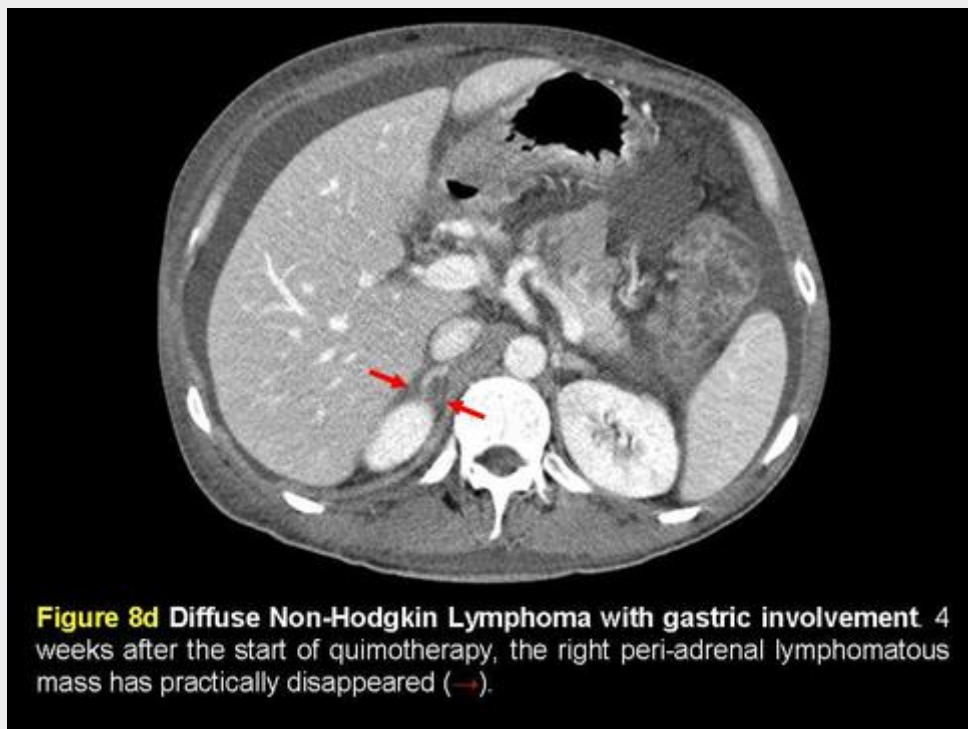


Figure 8d Diffuse Non-Hodgkin Lymphoma with gastric involvement. 4 weeks after the start of chemotherapy, the right peri-adrenal lymphomatous mass has practically disappeared (→).

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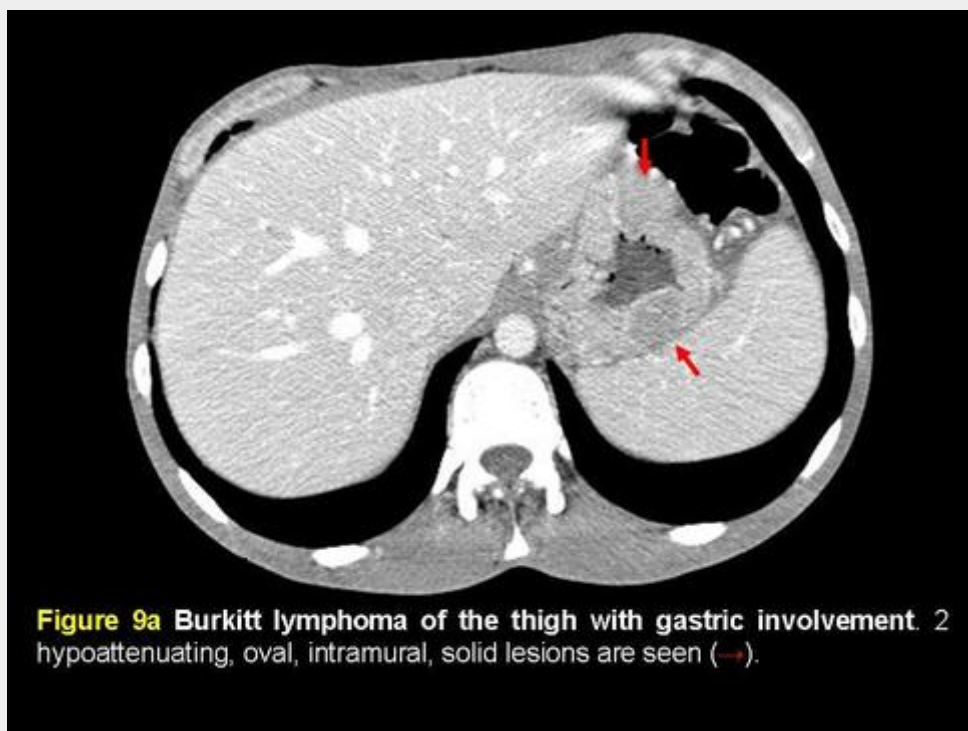
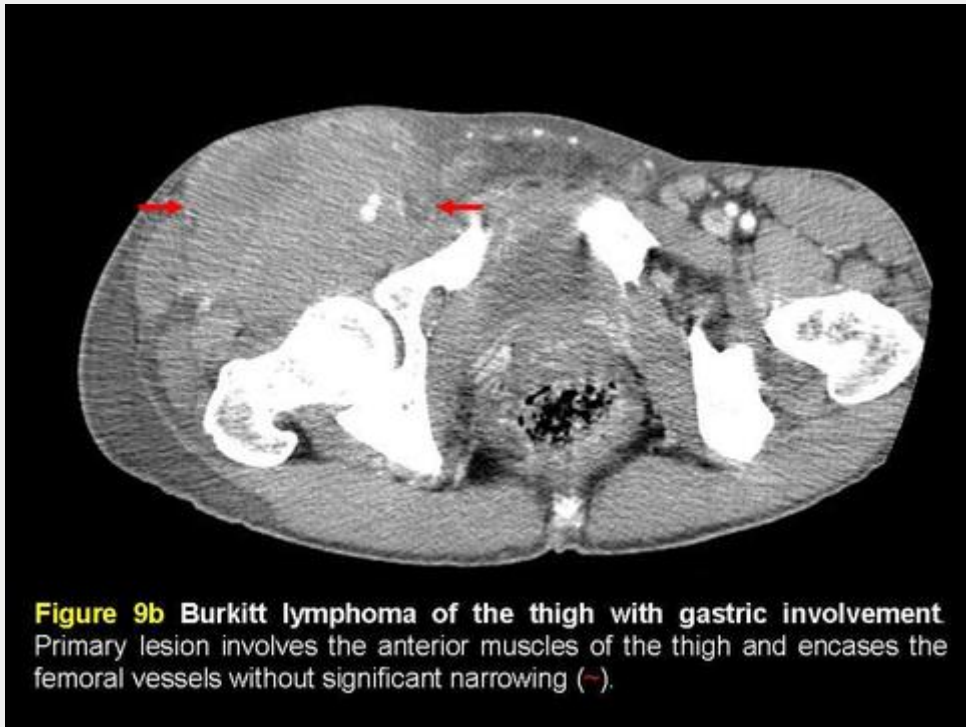
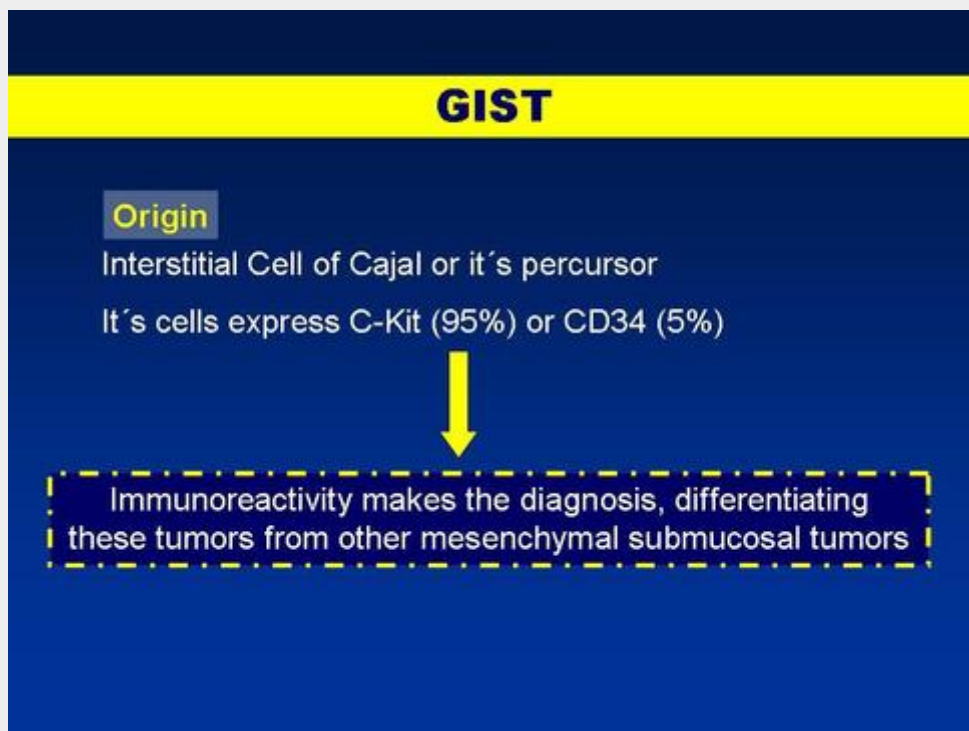


Figure 9a Burkitt lymphoma of the thigh with gastric involvement. 2 hypoattenuating, oval, intramural, solid lesions are seen (→).

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GIST

Epidemiology

- 2,5% of all gastric tumors
- 10-30% are malignant
- 60 a 70% occur in the stomach (better prognosis)
- Higher incidence in middle age and elderly individuals

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GIST

Clinical presentation

- Epigastric pain, dysphagia, obstruction, gastrointestinal bleeding
- Weight loss, palpable mass

Metastatic disease

- 50%, at presentation
- Liver, peritoneum, soft tissues, lung, pleura, lymph nodes

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GIST

CT findings

Solid, heterogeneous, predominately exophytic, large mass

May have areas of necrosis, hemorrhage, cystic degeneration, ulceration or fistulization to the gastrointestinal lumen

Displaces adjacent organs and vessels

May invade adjacent organs in an advanced stage

Small GISTs are more homogeneous and may be intramural or endoluminal (polypoid)

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GIST

CT findings

After IV contrast

Moderate, heterogeneous enhancement

Vessels may be seen crossing the tumor

diapositivo46.jpg

GIST - CT Signs of aggressive behaviour

- Metastases
- Size greater than 5 cm
- Exophytic growth
- Extension into adjacent organs
- Areas of necrosis or calcification

Male gender is more frequently associated to aggressive behaviour
A high mitotic rate at histology is also a sign of aggressive behaviour

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Figure 10b GIST. CT after IV contrast shows minimal enhancement. Note the overlying hiperattenuating, normal thickness mucosal layer, agreeing with it's submucosal origin (→).

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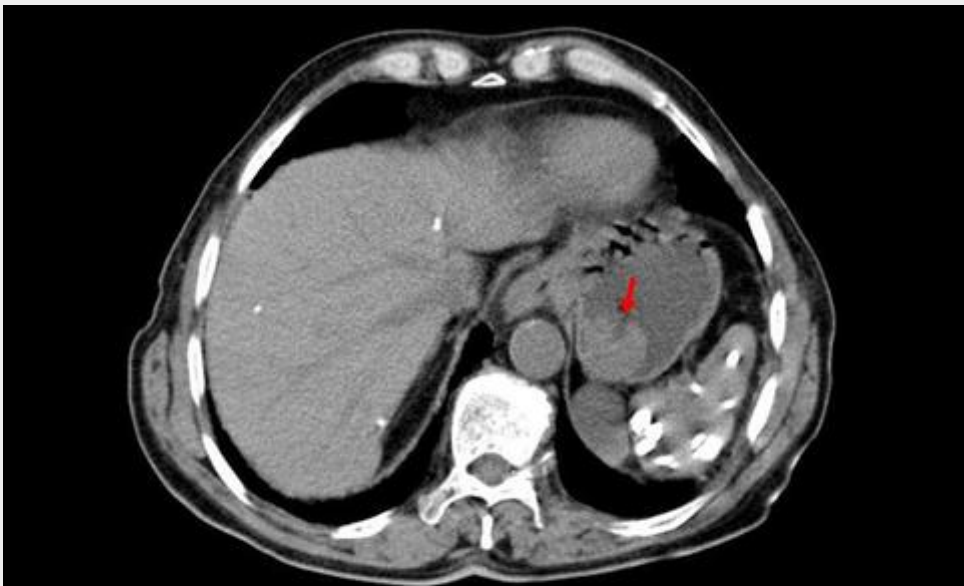


Figure 11a GIST. Pre-contrast CT images shows round, endophytic, soft tissue density mass in the posterior wall of the gastric body (→). Multiple gross liver and spleen calcifications were incidentally found.

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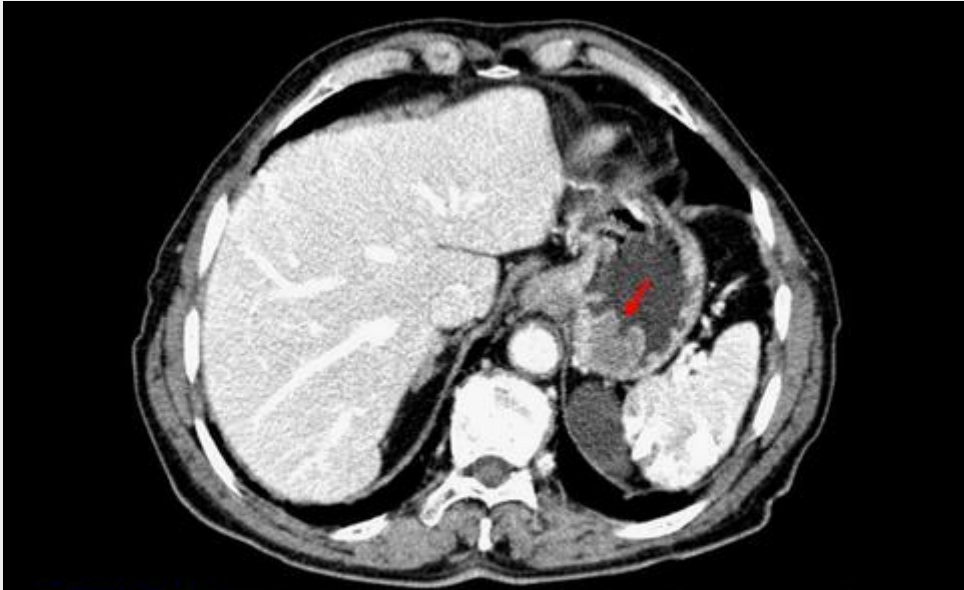


Figure 11b GIST. Post-contrast CT study. The mass enhances moderately and homogeneously. Note hyperenhancing mucosa covering the lesion, in accordance with its submucosal origin, except at its endoluminal pole, where an ulceration is found (→).

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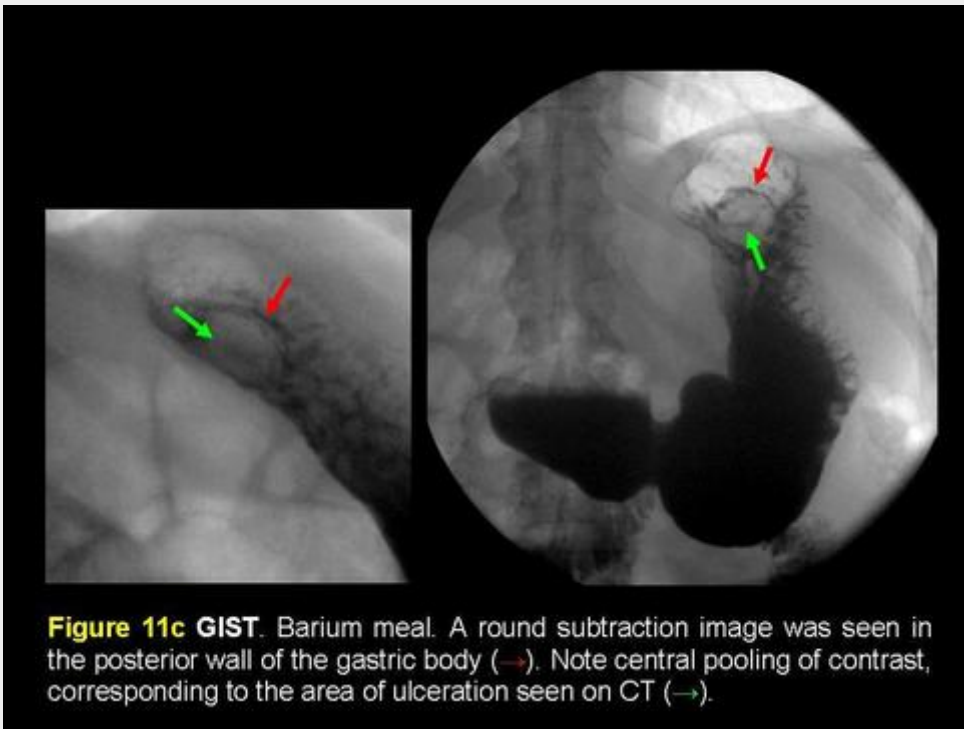


Figure 11c GIST. Barium meal. A round subtraction image was seen in the posterior wall of the gastric body (→). Note central pooling of contrast, corresponding to the area of ulceration seen on CT (→).

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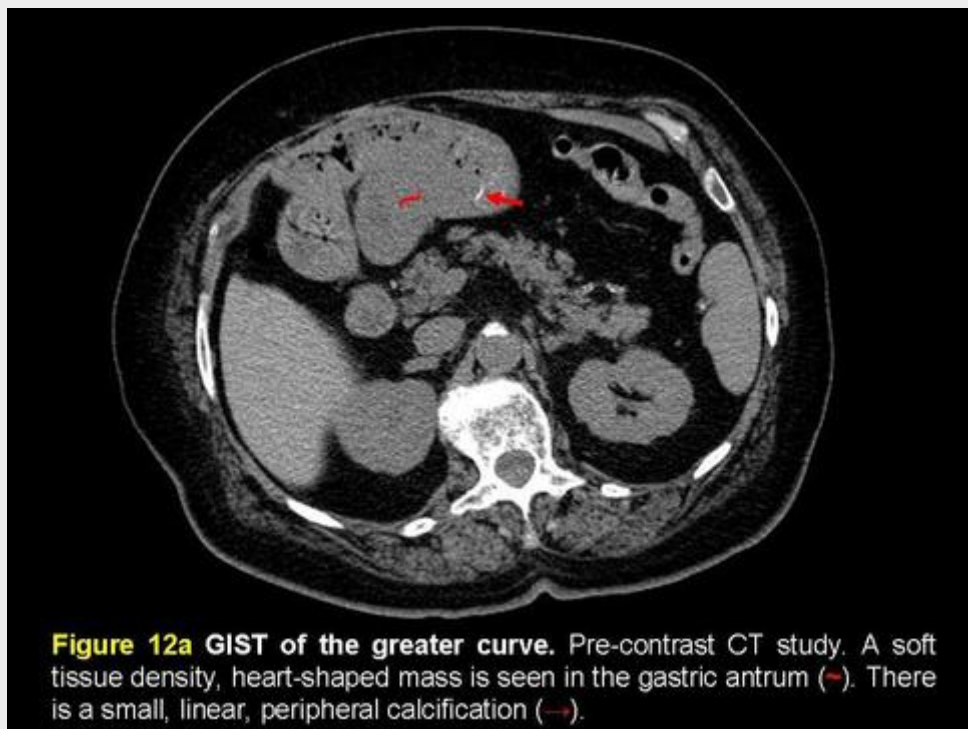


Figure 12a GIST of the greater curve. Pre-contrast CT study. A soft tissue density, heart-shaped mass is seen in the gastric antrum (→). There is a small, linear, peripheral calcification (→).

GIST

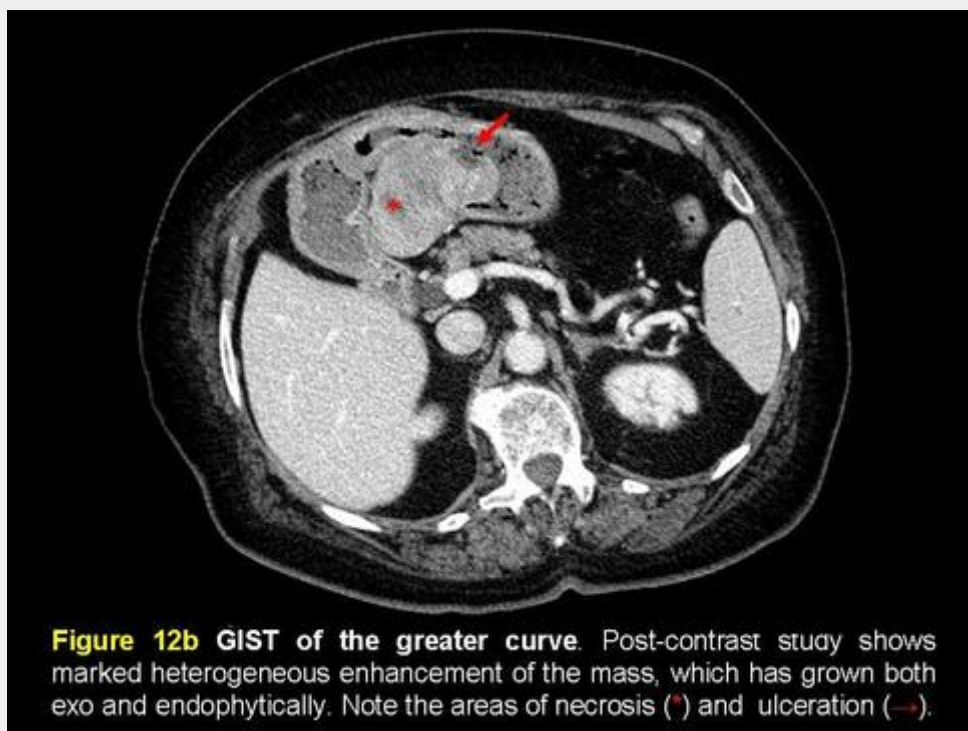
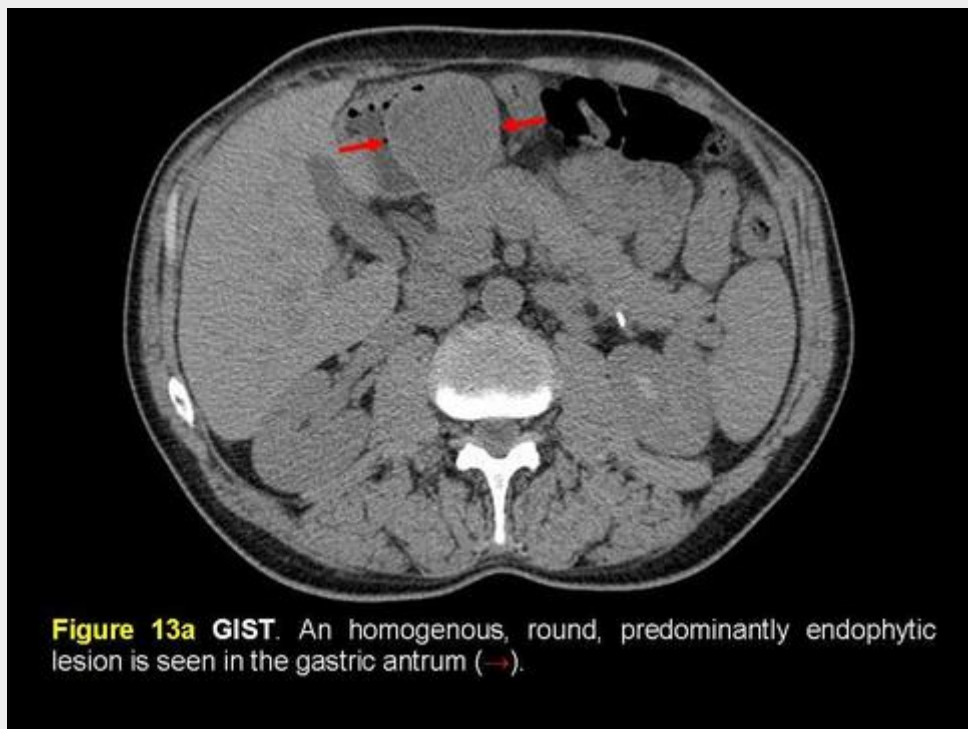
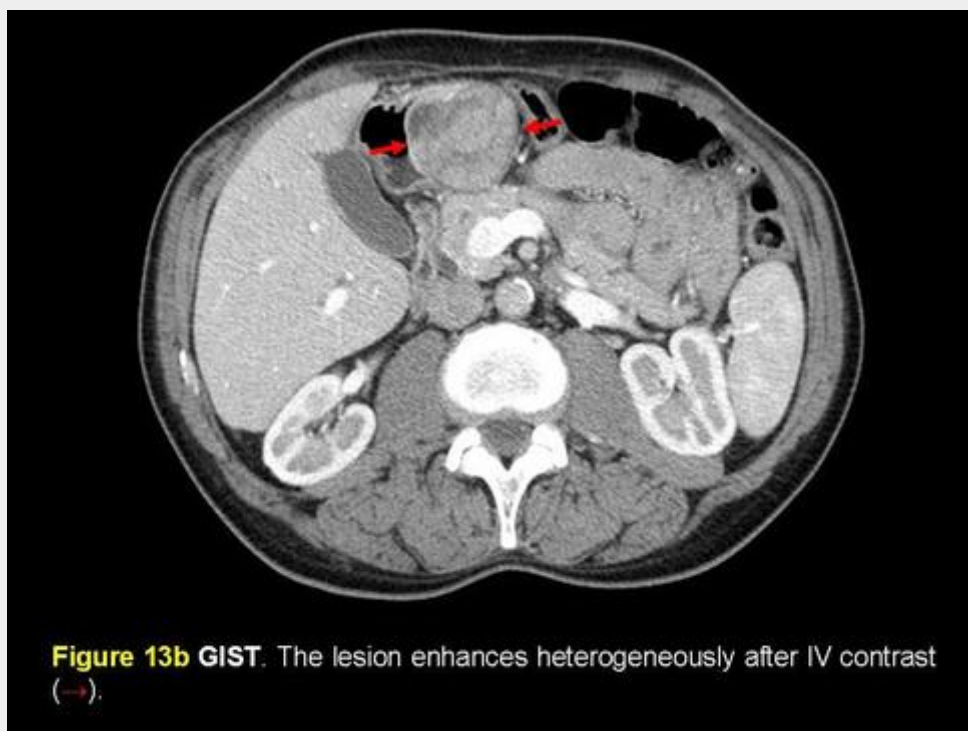


Figure 12b GIST of the greater curve. Post-contrast study shows marked heterogeneous enhancement of the mass, which has grown both exo and endophytically. Note the areas of necrosis (*) and ulceration (→).

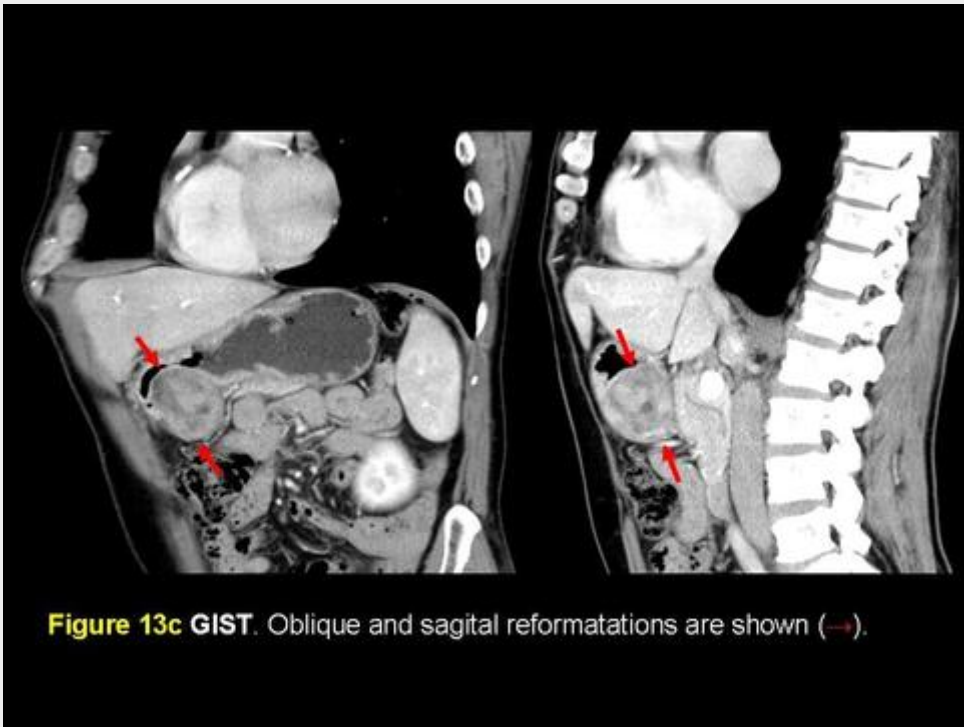
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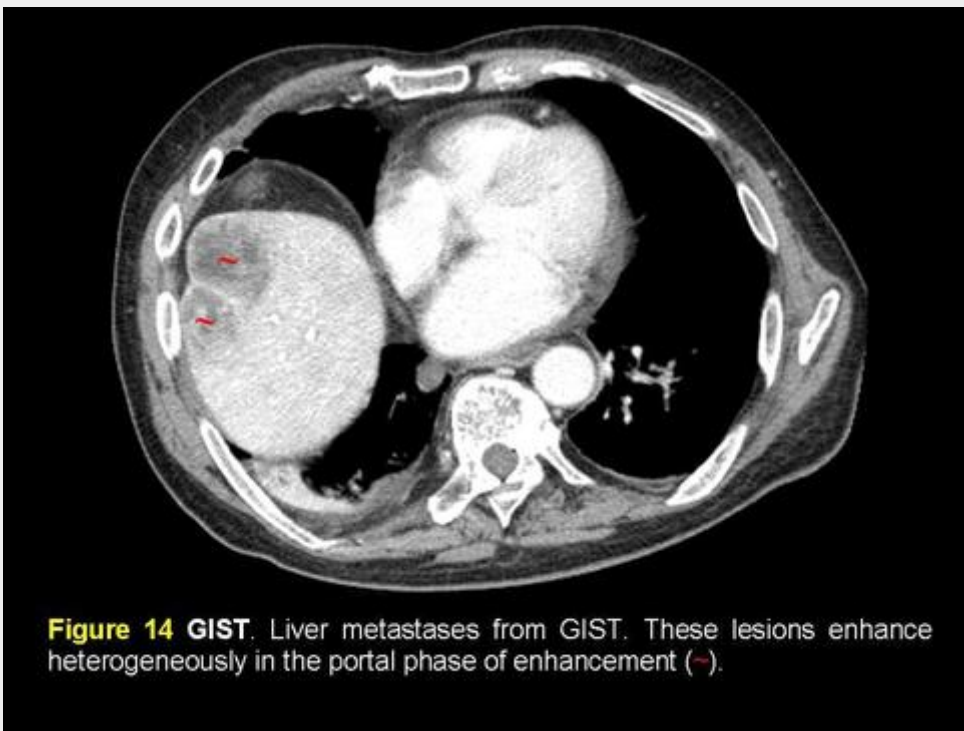
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diapositivo57.jpg



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LEIOMYOMA

Origin
Smooth muscle in the muscularis propria or muscularis mucosa

Epidemiology
Rare in the stomach (higher incidence in the esophagus)
Adult age

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LEIOMYOMA

Preferential location
Antrum and body

Clinical presentation
Usually asymptomatic
Epigastric pain, gastrointestinal bleeding

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LEIOMYOMA

CT findings

Round or oval solid hypodense homogeneous mass

Generally < 3 cm

Well defined margins

May be intramural or exhibit intra or extraluminal growth

May ulcerate or present areas of calcification

After IV contrast

May present a discrete homogeneous enhancement

Always enhances less than the mucosa

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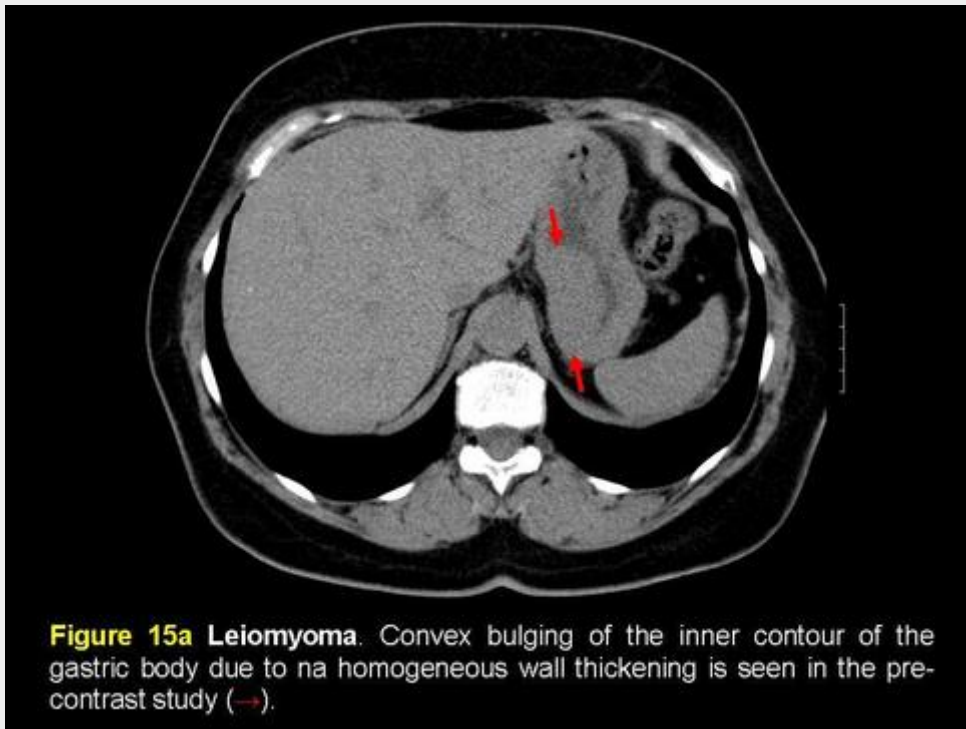


Figure 15a Leiomyoma. Convex bulging of the inner contour of the gastric body due to a homogeneous wall thickening is seen in the pre-contrast study (→).

Leiomyoma

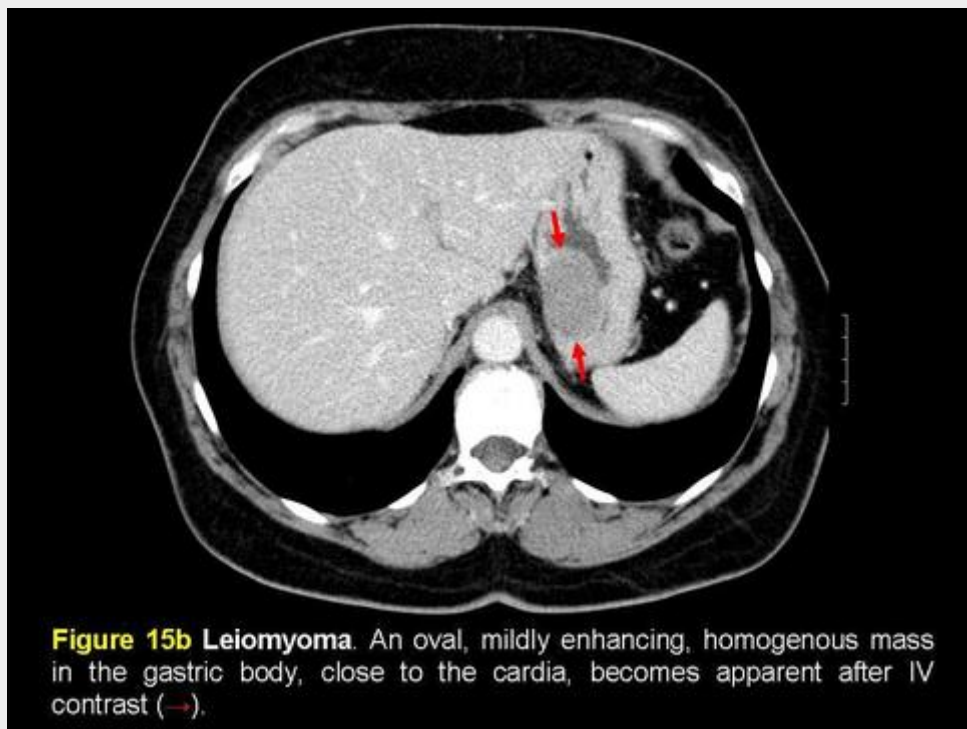


Figure 15b Leiomyoma. An oval, mildly enhancing, homogenous mass in the gastric body, close to the cardia, becomes apparent after IV contrast (→).

diapositivo63.jpg

LIPOMA

Origin

Proliferation of mature adipose tissue enclosed in a fibrous capsule

Epidemiology

3% of all benign gastric tumors

5% of all gastrointestinal lipomas

May present with areas of ulceration ou cystic degeneration

diapositivo64.jpg

LIPOMA

Preferential Location

75% occurs as solitary lesions of the antrum

Clinical Presentation

When > 4 cm, may produce gastrointestinal bleeding, abdominal pain or obstruction due to ulceration or intussusception

diapositivo65.jpg

LIPOMA

CT imaging Findings

Well defined mass with homogeneous fat attenuation

After IV contrast

No significant enhancement

Lipoma



Figure 15a Lipoma. Unenhanced axial CT image shows a floating, endophytic, fat-attenuation lesion in the greater curve of the stomach (→).

lipomadiap2.jpg

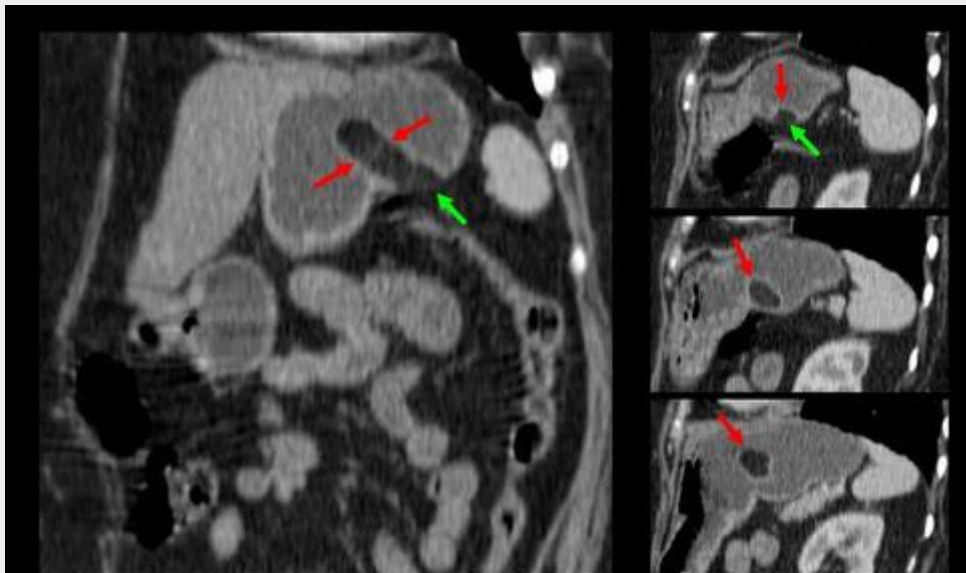


Figure 15b Lipoma (→). Post-contrast CT, coronal (*left*) and sagittal reformations (*right*). Note how the normal enhancing submucosal layers of the stomach's wall are interrupted by the fat-attenuation tumor, at its area of implantation (→). Note also the enhancing mucosa overlying it.

lipoma21.jpg

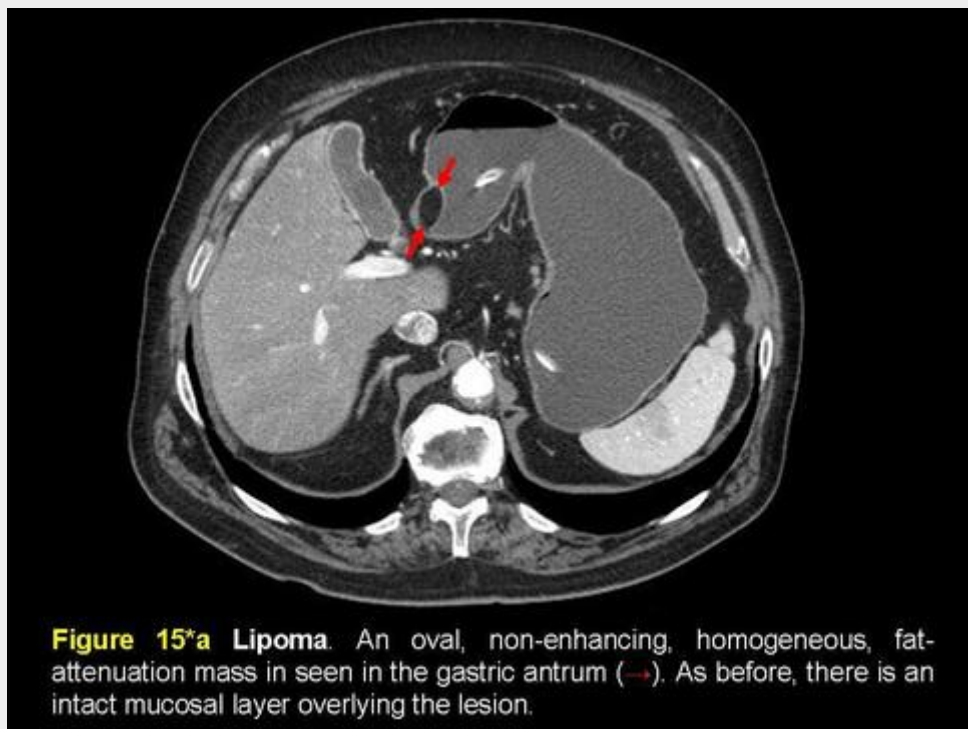


Figure 15*a Lipoma. An oval, non-enhancing, homogeneous, fat-attenuation mass is seen in the gastric antrum (→). As before, there is an intact mucosal layer overlying the lesion.

lipoma22.jpg

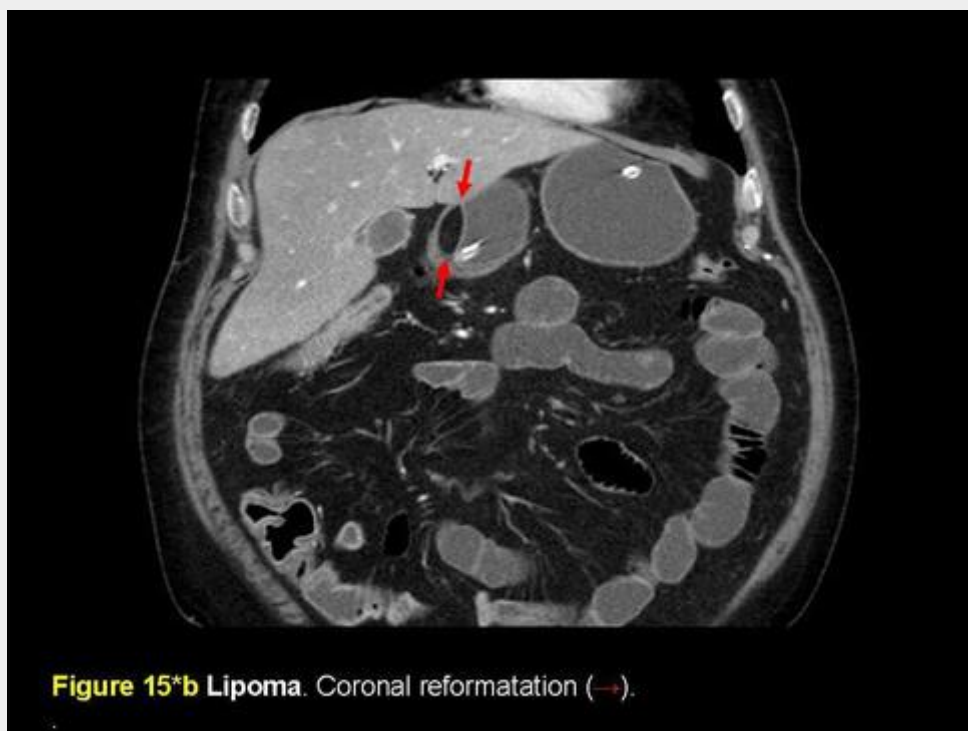


Figure 15*b Lipoma. Coronal reformatation (→).

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LEIOMYOSARCOMA

Origin

Smooth muscle in the muscularis propria or muscularis mucosa

Epidemiology

Rare gastric tumor (1%)

Higher incidence in adult ♂ (2:1)

Average age at presentation - 56 Yo

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LEIOMYOSARCOMA

Preferential location

Antrum and body

Clinical presentation

Nausea, vomiting, epigastric pain, weight loss, bleeding, palpable mass

Metastatic disease

May metastize hematogeneously to liver or lung

diapositivo71.jpg

LEIOMYOSARCOMA

CT findings

Solid hypoattenuating, homogenous or heterogeneous, > 5 cm, mass

Exophytic growth

May become superinfected, ulcerate or fistulize

May present with necrotic areas or calcifications

May invade surrounding organs such as liver, spleen and pancreas

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LEIOMYOSARCOMA

CT findings

After IV contrast

Heterogenous enhancement

May present areas of necrosis

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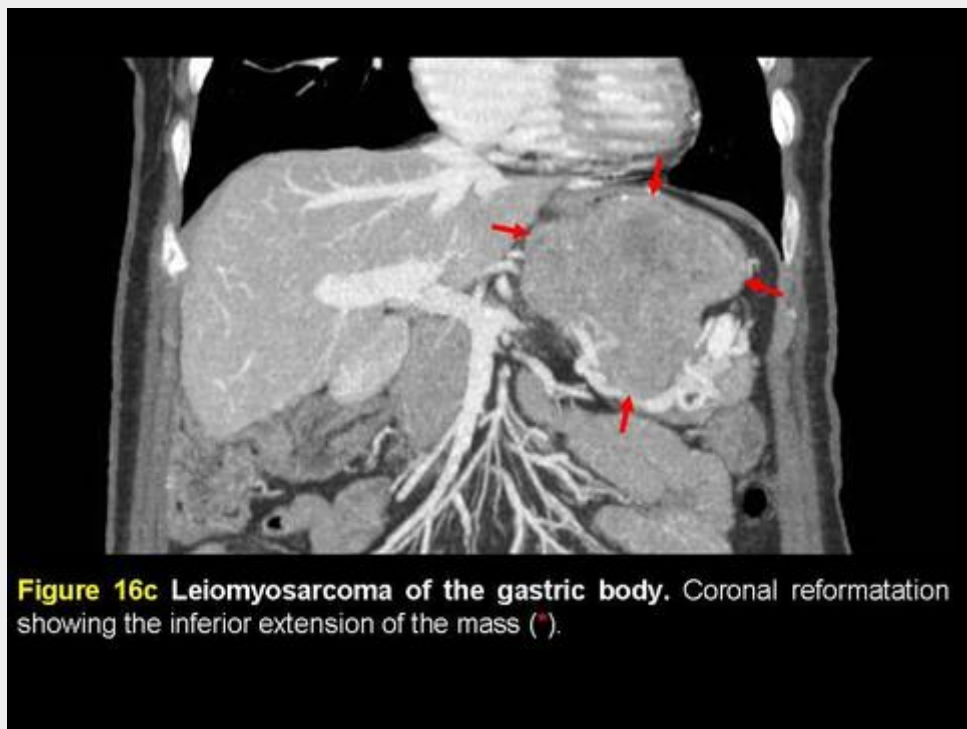
Figure 16a Leiomyosarcoma of the gastric body. Pre-contrast study shows a soft tissue density mass extending from the posterior wall of the gastric body to the upper pole of the spleen (→). Note areas of high attenuation within the mass due to intratumoral hemorrhage (*).

Leiomyosarcoma



Figure 16b Leiomyosarcoma of the gastric body. Post-contrast study shows central non-enhancing area corresponding to the areas of hemorrhage seen in the pre-contrast study (*). Patient had attended the Emergency Department with upper gastrointestinal bleeding. An ulceration was apparent in the posterior wall of the gastric body at endoscopy (not seen on CT).

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HETEROTOPIC PANCREAS

Origin

Pancreatic tissue remnants, with all pancreatic tissue components

Epidemiology

Present in 0.6 to 14 % of autopsies

Present in 1 in every 500 gastric surgical specimens

Higher incidence in ♂, 40-60 Yo

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HETEROTOPIC PANCREAS

Preferential location

Antrum or greater curvature, less than 6 cm from the pylorus in 85-95%

Clinical Presentation

Asymptomatic

Epigastric pain (70%), early satiety (30%)

Gastrointestinal hemorrhage, obstruction

Pancreatitis, pseudocyst formation, insulinoma, adenoma, malignant transformation

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HETEROTOPIC PANCREAS

CT findings

Oval or rounded, well-defined mass measuring 1 to 3 cm

Smooth or lobulated margins

Central umbilication (20 to 40%)

May present with cystic areas

After IV contrast

Intense enhancement \approx pancreas

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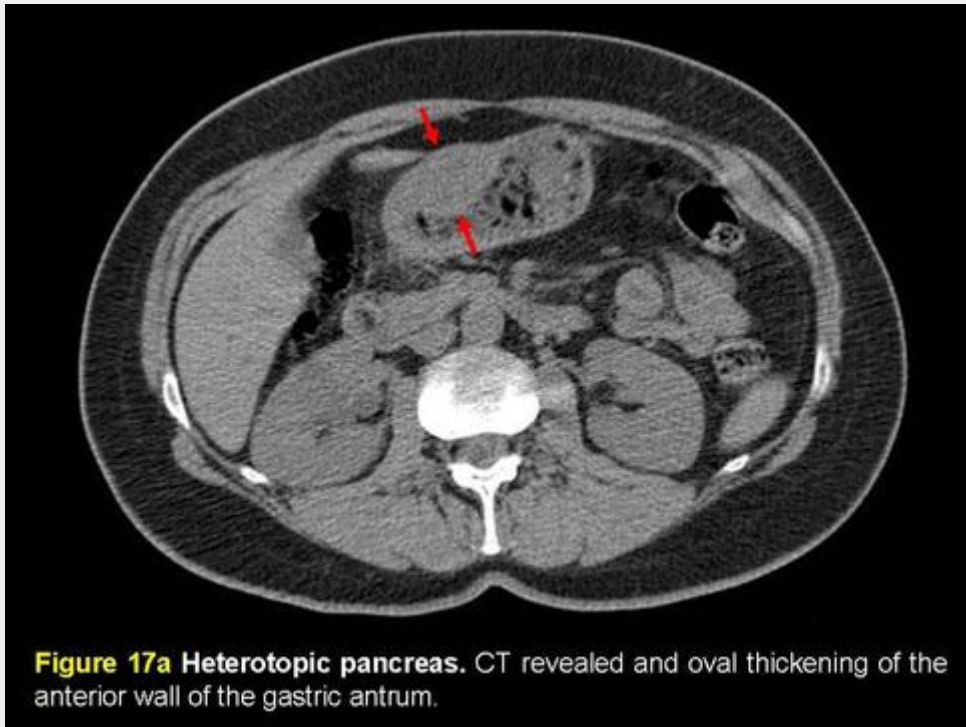


Figure 17a Heterotopic pancreas. CT revealed and oval thickening of the anterior wall of the gastric antrum.

Heterotopic pancreas

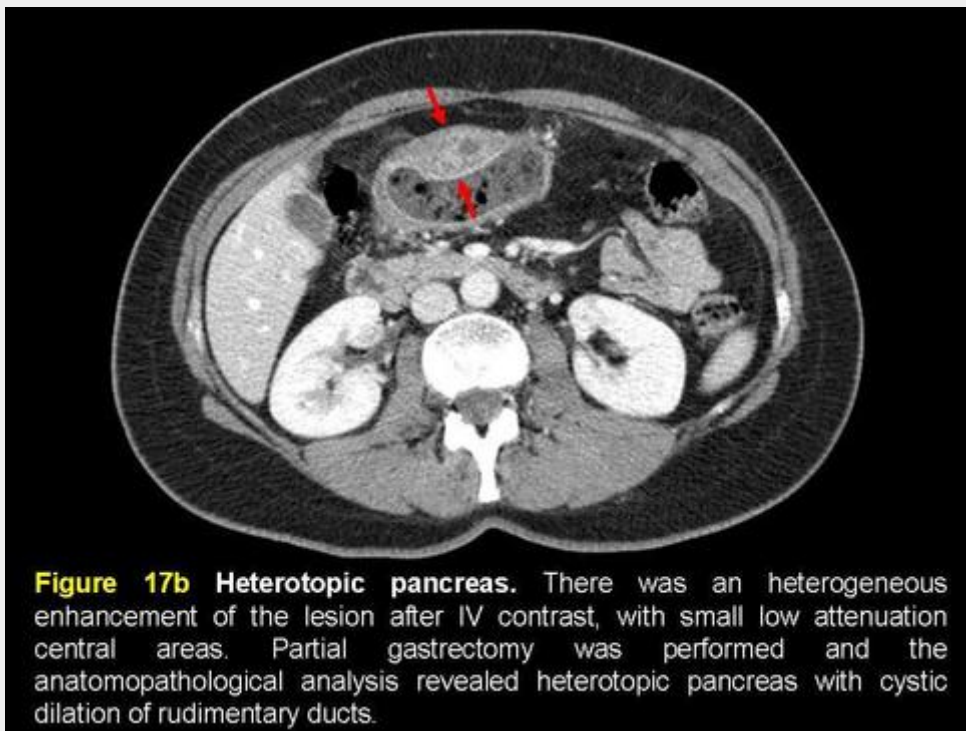


Figure 17b Heterotopic pancreas. There was an heterogeneous enhancement of the lesion after IV contrast, with small low attenuation central areas. Partial gastrectomy was performed and the anatomopathological analysis revealed heterotopic pancreas with cystic dilation of rudimentary ducts.

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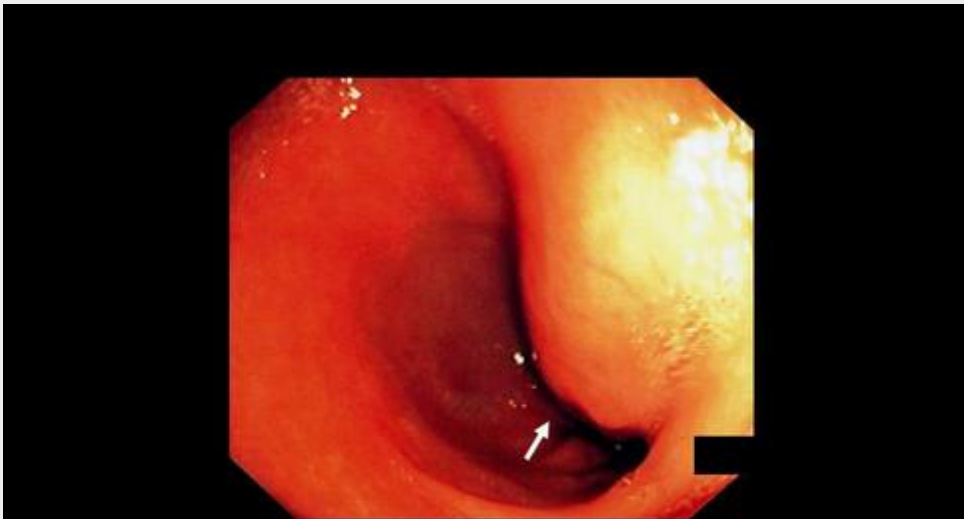


Figure 17c Heterotopic pancreas. Endoscopy showed an oval deformity of the anterior surface of the gastric antrum overlaid with normal looking mucosa except for a small depression at its apex (→) which could correspond to an ulceration or to the draining orifice of a rudimentary pancreatic duct.

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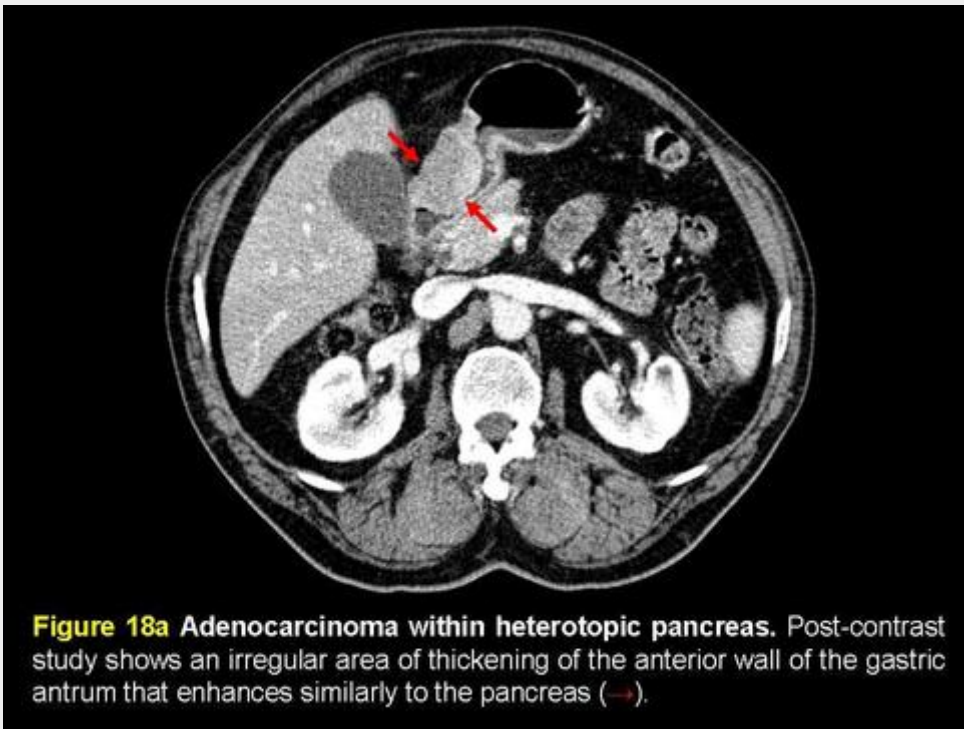


Figure 18a Adenocarcinoma within heterotopic pancreas. Post-contrast study shows an irregular area of thickening of the anterior wall of the gastric antrum that enhances similarly to the pancreas (→).

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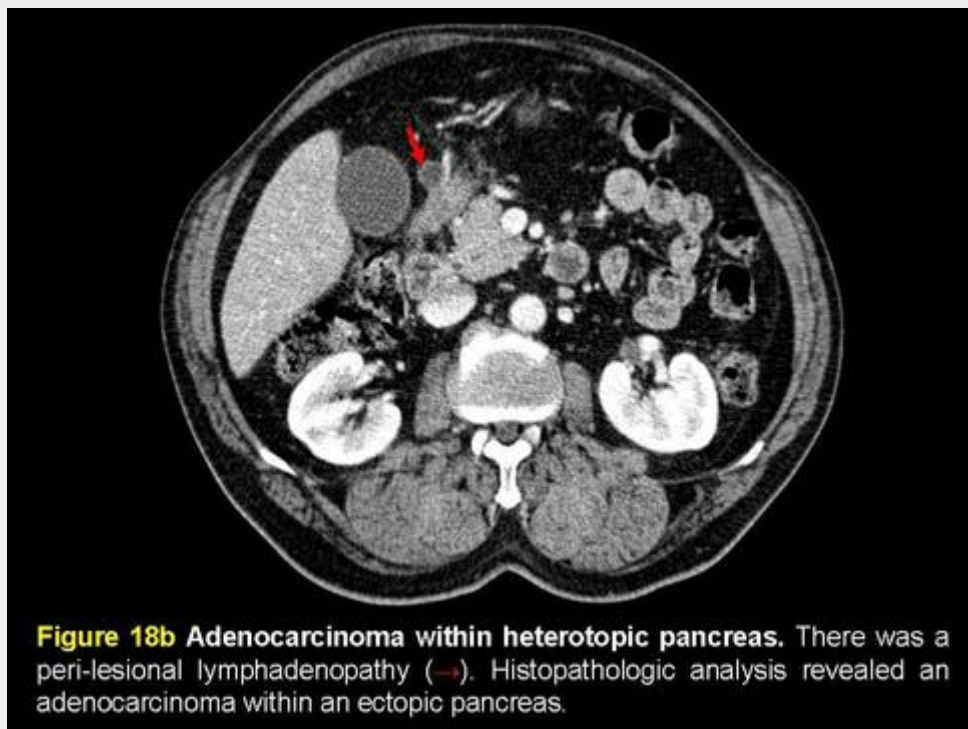


Figure 18b Adenocarcinoma within heterotopic pancreas. There was a peri-lesional lymphadenopathy (→). Histopathologic analysis revealed an adenocarcinoma within an ectopic pancreas.

diapositivo88.jpg

INFLAMMATORY FIBROID POLYP

Origin

Pseudotumor with an allergic or inflammatory origin

Epidemiology

Rare

80% of all gastrointestinal fibroid inflammatory polyps are located in the stomach

diapositivo89.jpg

INFLAMMATORY FIBROID POLYP

Preferential location

Antrum

Clinical presentation

Most are asymptomatic

May cause anemia, gastrointestinal bleeding, abdominal pain, vomiting, weight loss, obstruction or intussusception

diapositivo90.jpg

INFLAMMATORY FIBROID POLYP

CT findings

Solid, soft tissue density, submucosal mass

May be sessile or pedunculated, resembling mucosal masses on precontrast study

After IV contrast

May present peripheral and central scattered areas of enhancement

diapositivo91.jpg

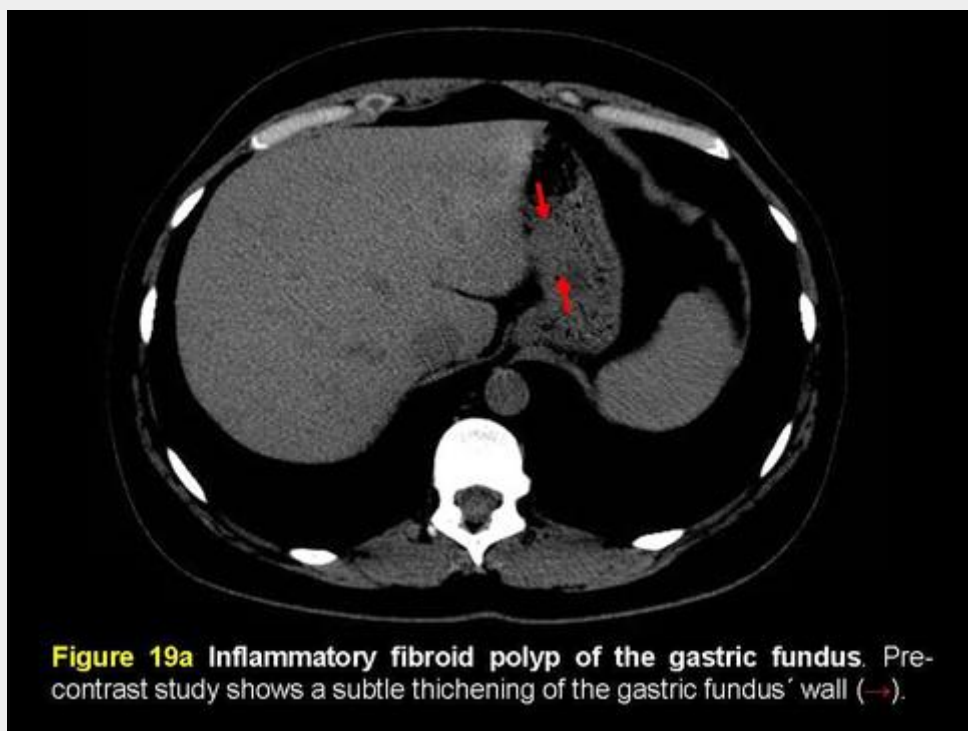


Figure 19a Inflammatory fibroid polyp of the gastric fundus. Pre-contrast study shows a subtle thickening of the gastric fundus' wall (→).

diapositivo92.jpg

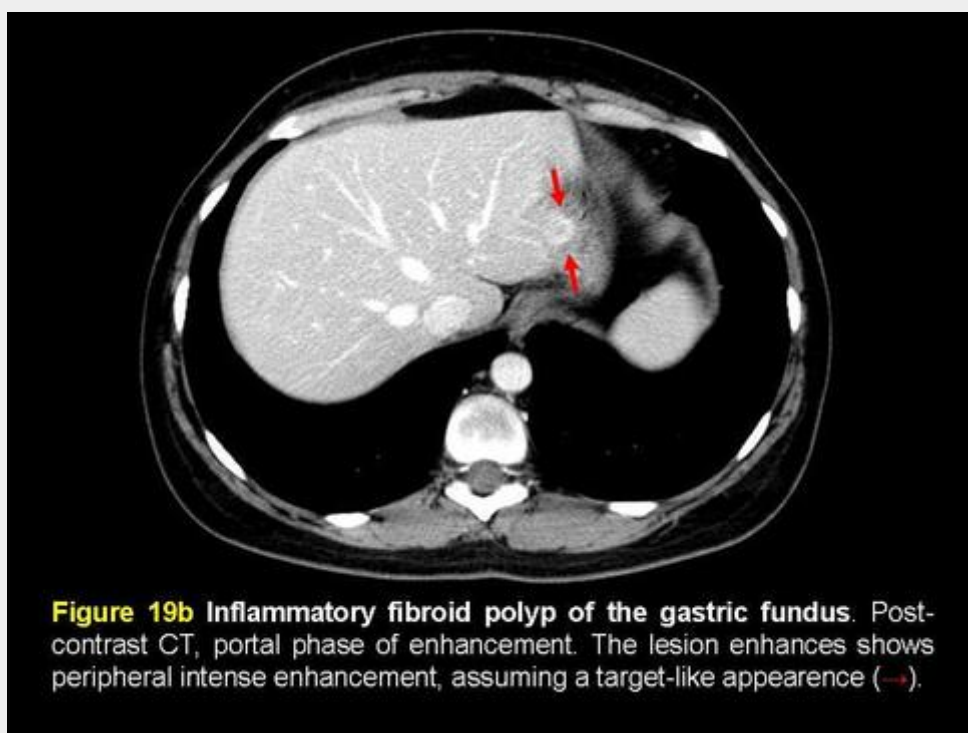


Figure 19b Inflammatory fibroid polyp of the gastric fundus. Post-contrast CT, portal phase of enhancement. The lesion enhances showing peripheral intense enhancement, assuming a target-like appearance (→).

diapositivo93.jpg

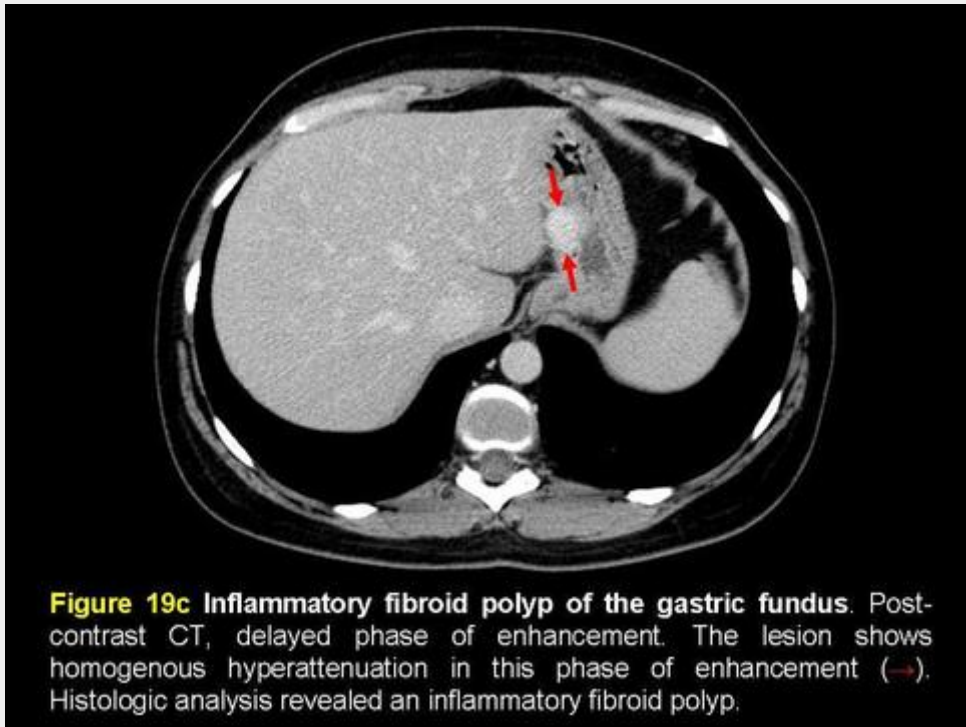


Figure 19c Inflammatory fibroid polyp of the gastric fundus. Post-contrast CT, delayed phase of enhancement. The lesion shows homogenous hyperattenuation in this phase of enhancement (→). Histologic analysis revealed an inflammatory fibroid polyp.

diapositivo94.jpg

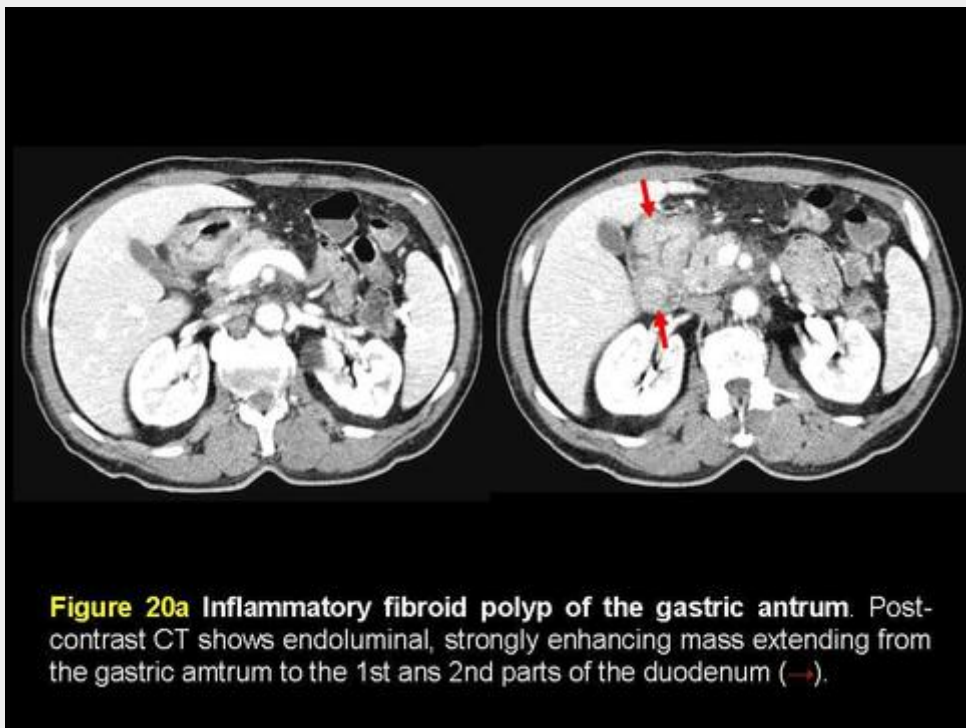


Figure 20a Inflammatory fibroid polyp of the gastric antrum. Post-contrast CT shows endoluminal, strongly enhancing mass extending from the gastric antrum to the 1st and 2nd parts of the duodenum (→).

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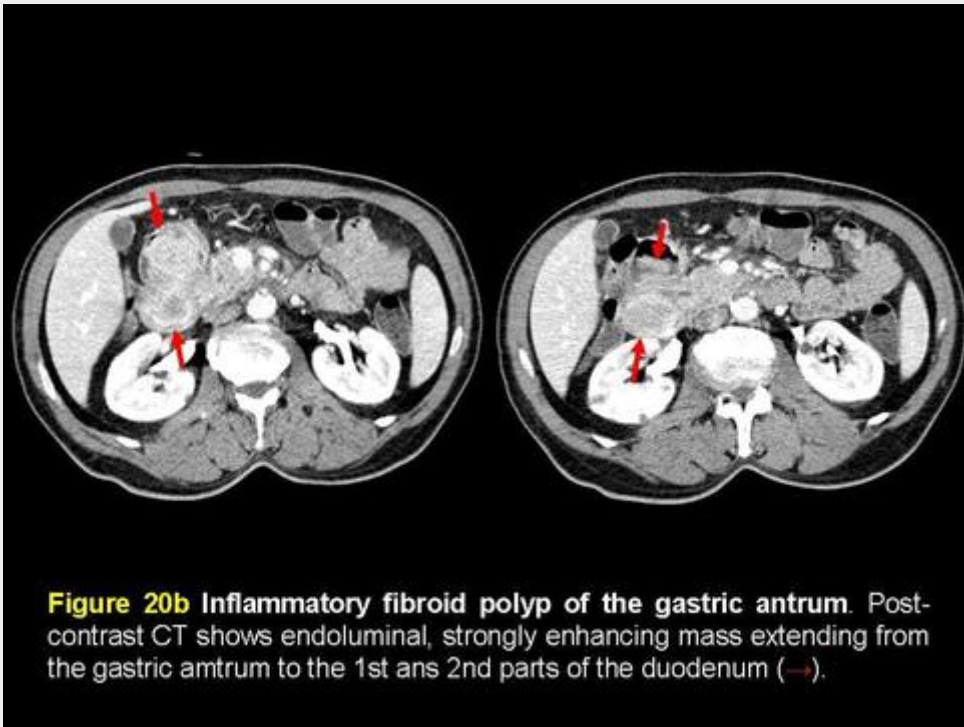


Figure 20b Inflammatory fibroid polyp of the gastric antrum. Post-contrast CT shows endoluminal, strongly enhancing mass extending from the gastric antrum to the 1st and 2nd parts of the duodenum (→).

Inflammatory fibroid polyp

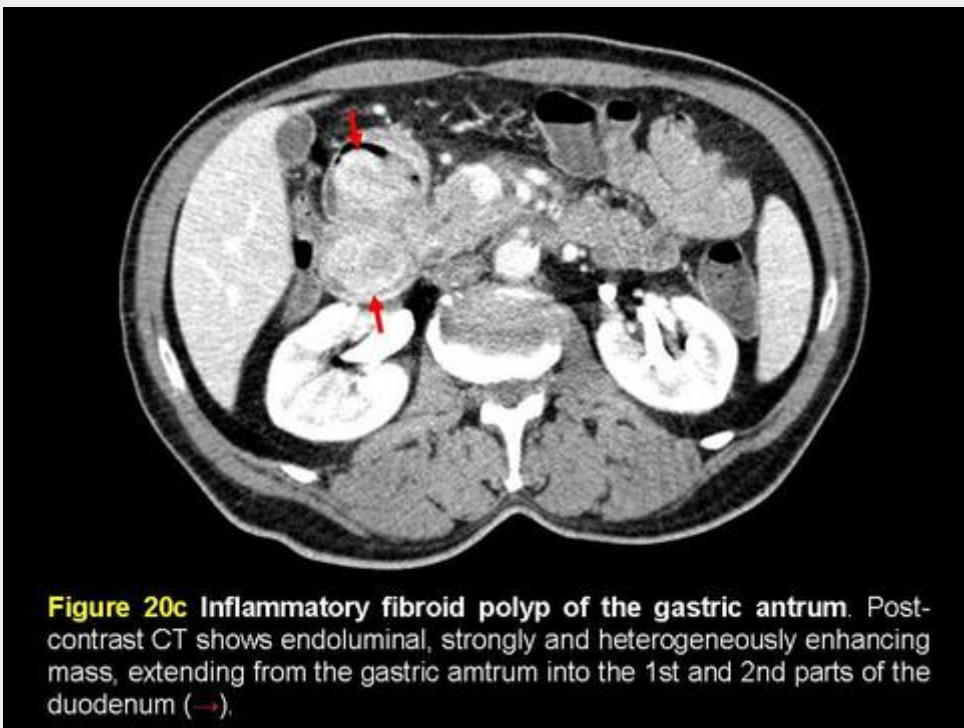


Figure 20c Inflammatory fibroid polyp of the gastric antrum. Post-contrast CT shows endoluminal, strongly and heterogeneously enhancing mass, extending from the gastric antrum into the 1st and 2nd parts of the duodenum (→).

diapositivo97.jpg

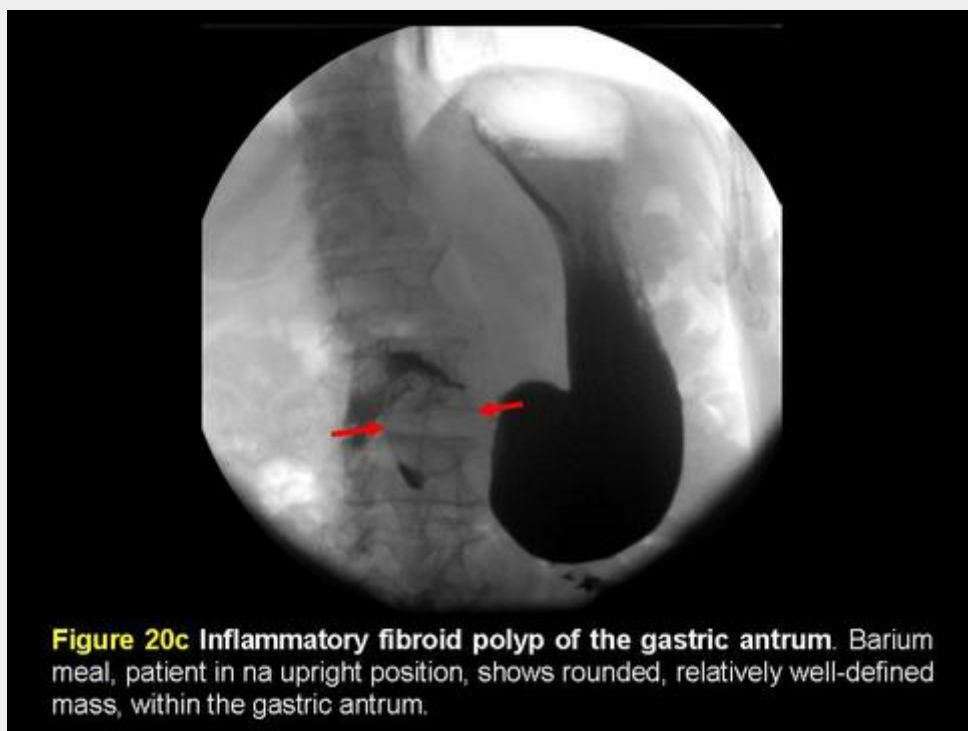


Figure 20c Inflammatory fibroid polyp of the gastric antrum. Barium meal, patient in an upright position, shows rounded, relatively well-defined mass, within the gastric antrum.

diapositivo98.jpg



Figure 20d Inflammatory fibroid polyp of the gastric fundus. Barium meal, supine position, showing prolapse of the antral mass into the 1st and 2nd parts of the duodenum.

diapositivo16.jpg

INTRAMURAL HEMATOMA

Origin

Trauma, ruptured abdominal aortic aneurism, anticoagulation therapy or blood dyscrasia

Epidemiology

Present in 0.6 to 14 % of autopsies and 1 in every 500 gastric surgical specimens

Higher incidence in ♂, 40-60 Yo

diapositivo17.jpg

INTRAMURAL HEMATOMA

Preferential location

Fundus

Clinical Presentation

Abdominal pain, anemia, hypotension and, on rare instances, obstruction

INTRAMURAL HEMATOMA

CT findings

Well-circumscribed submucosal or subserosal mass

High-attenuation in the acute phase, in the pre-contrast study

Decreasing attenuation over time

After IV contrast

Active bleeding may be apparent in the acute phase as contrast extravasation from a feeding artery or from a vein

No enhancement in the chronic phase

Mural Hematoma

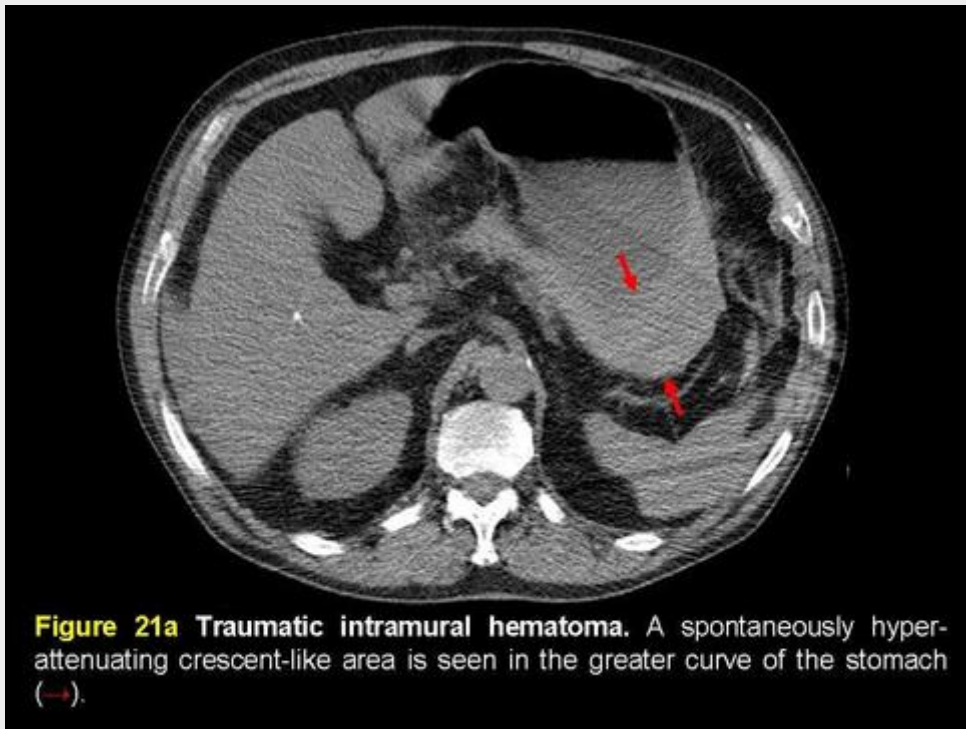


Figure 21a Traumatic intramural hematoma. A spontaneously hyperattenuating crescent-like area is seen in the greater curve of the stomach (→).

diapositivo3.jpg

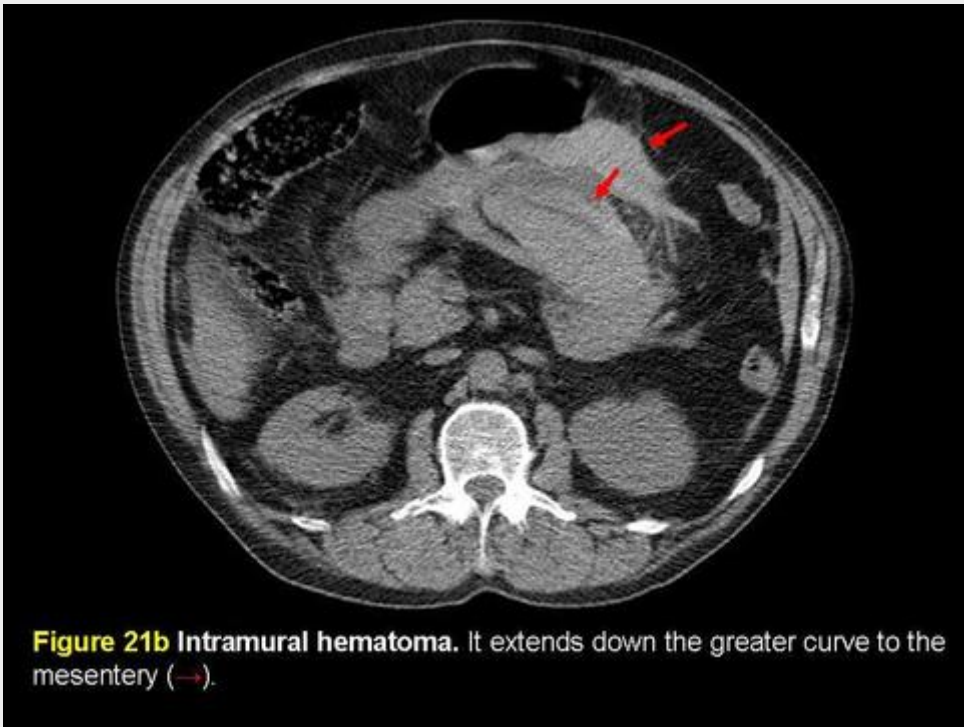


Figure 21b Intramural hematoma. It extends down the greater curve to the mesentery (→).

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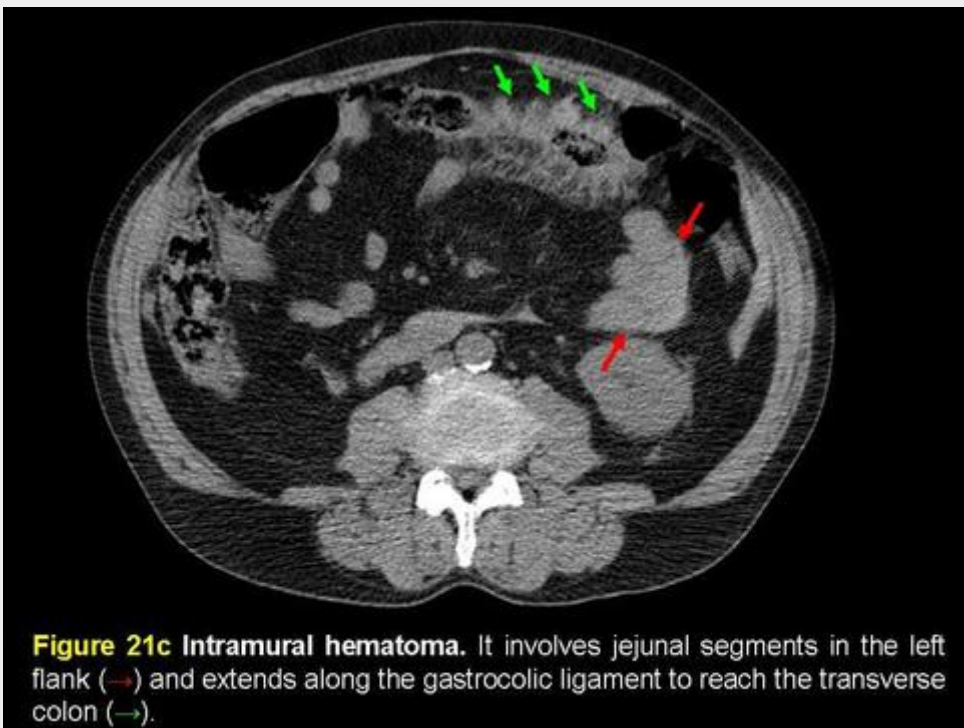


Figure 21c Intramural hematoma. It involves jejunal segments in the left flank (→) and extends along the gastrocolic ligament to reach the transverse colon (→).

diapositivo8.jpg

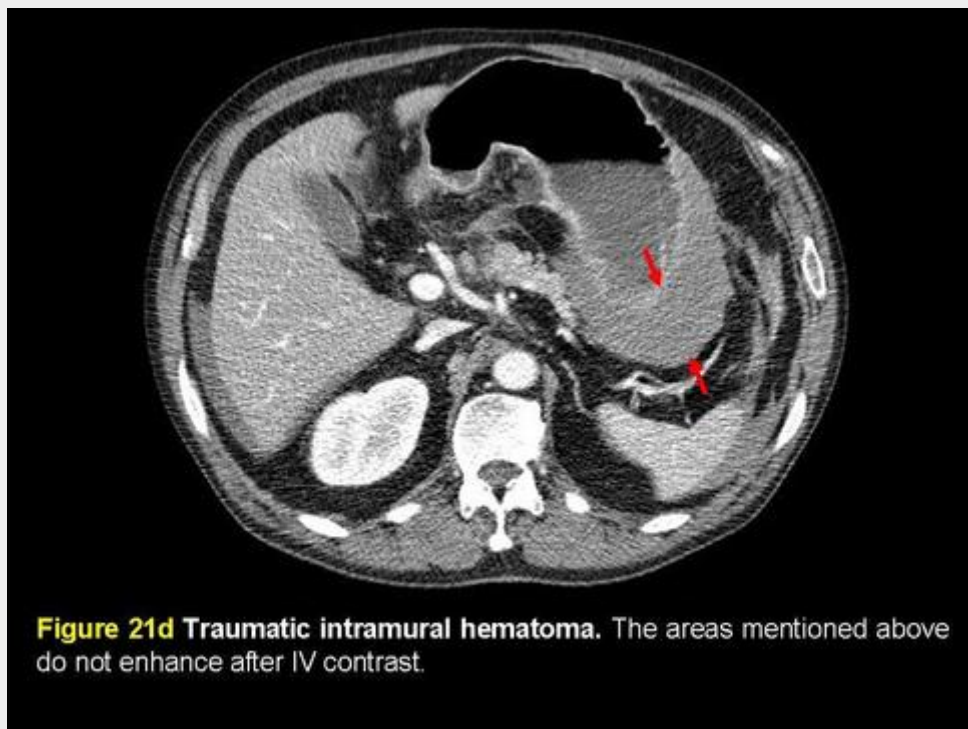


Figure 21d Traumatic intramural hematoma. The areas mentioned above do not enhance after IV contrast.

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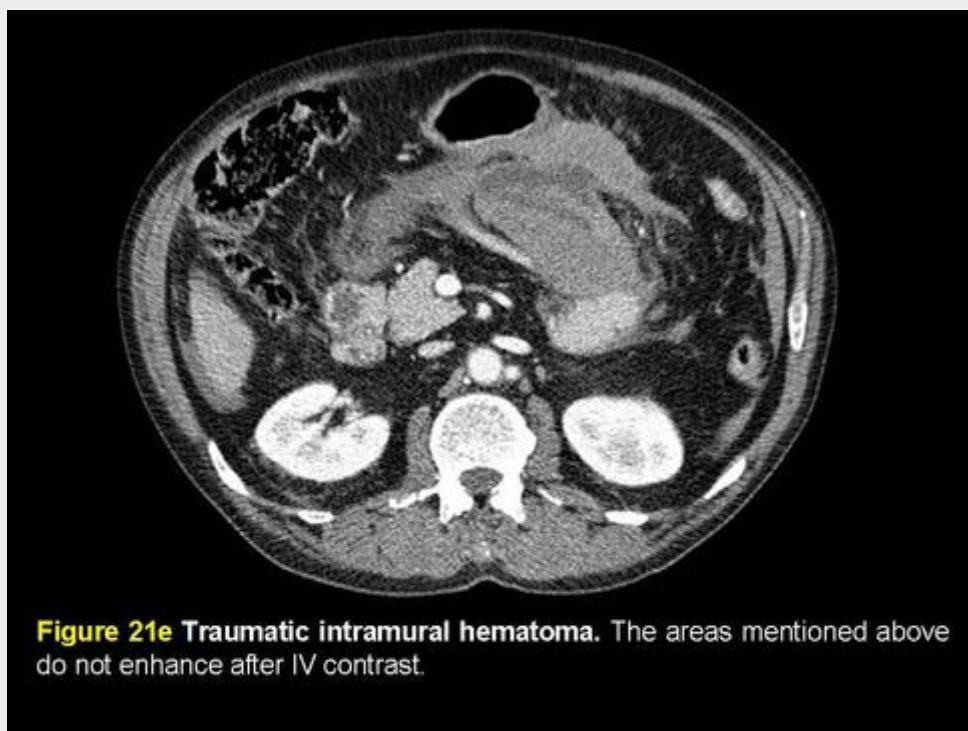
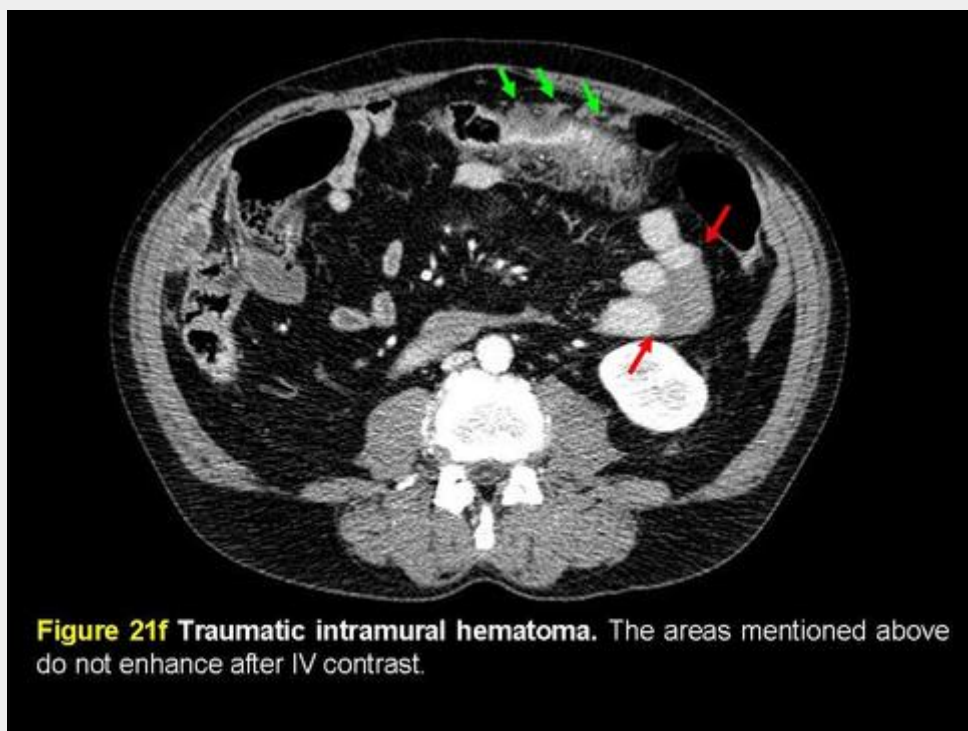
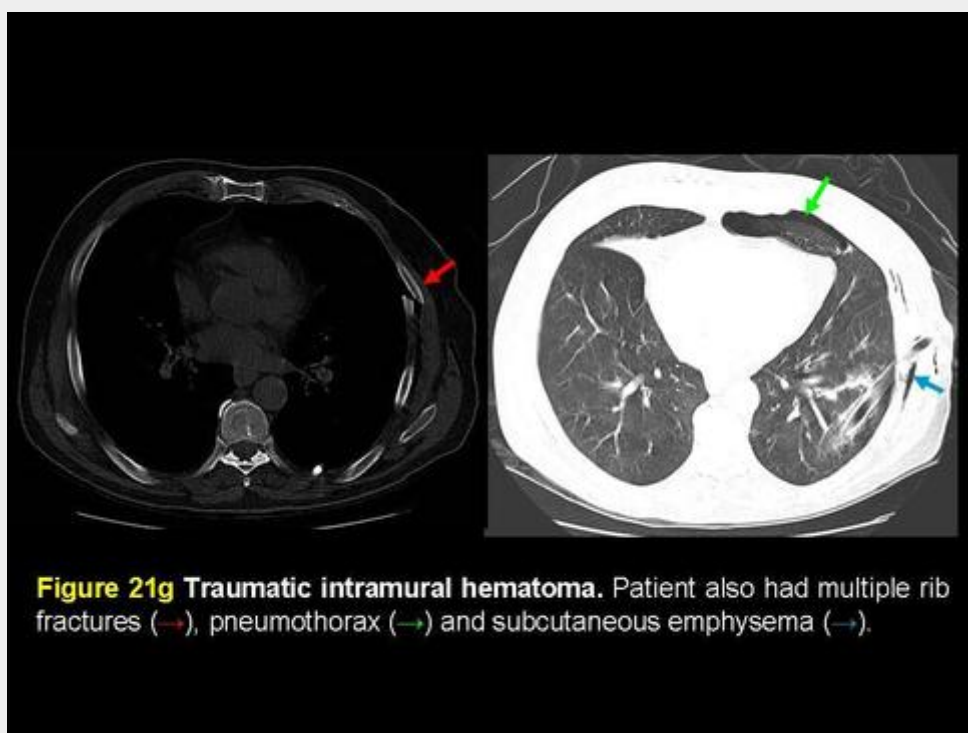


Figure 21e Traumatic intramural hematoma. The areas mentioned above do not enhance after IV contrast.

diapositivo10.jpg



diapositivo1.jpg



diapositivo99.jpg

DUPLICATION CYST

Origin

Congenital malformation than may involve any segment of the gastrointestinal tract

Epidemiology

Rare

Higher incidence in children (mean age – 3 Yo)

Higher incidence in the small bowel

4% located in the stomach

diapositivo100.jpg

DUPLICATION CYST

Preferential location

Greater curve, particularly the antrum

Clinical presentation

Most are asymptomatic

May cause abdominal pain, vomiting, weight loss

Rarely, recurrent pancreatitis, intracystic bleeding, infection or neoplasm may occur.

DUPLICATION CYST

CT findings

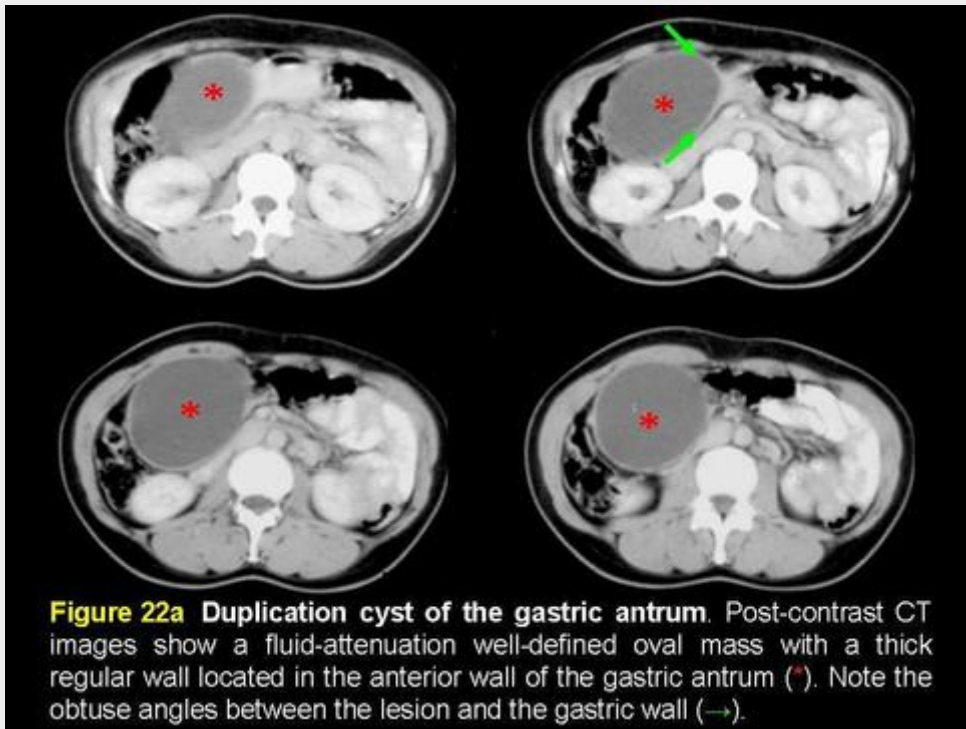
Homogeneous, water-attenuation, well-defined lesion

Thick, regular wall

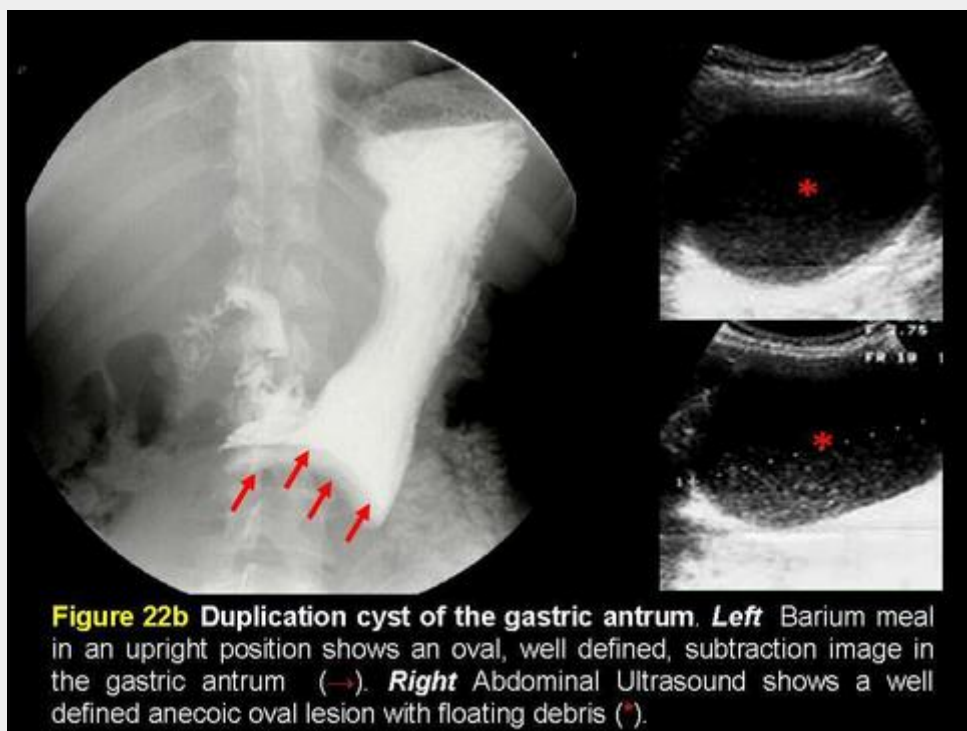
After IV contrast

Enhancement of the wall

Duplication cyst



diapositivo13.jpg



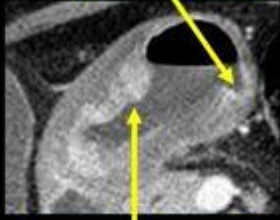
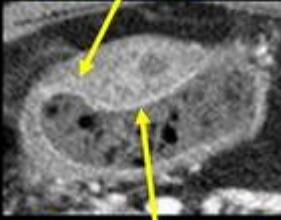
diapositivo14.jpg



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Differential diagnosis between epithelial and submucosal lesions as seen on CT

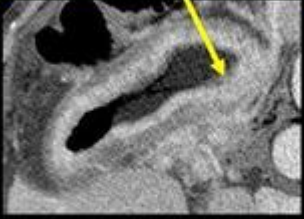

Smooth contour and right of obtuse angles with adjacent wall suggest submucosal origin

EPITHELIAL LESION Adenocarcinoma	SUBMUCOSAL LESION Heterotopic pancreas
<p>Acute angle</p>  <p>Irregular surface</p>	<p>Obtuse angle</p>  <p>Regular surface</p>

diapositivo6.jpg

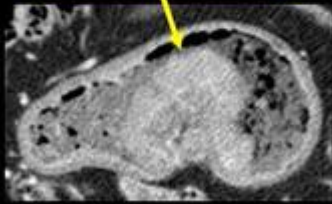

Differential diagnosis between epithelial and submucosal lesions as seen on CT

Overlying normal-thickness mucosal layer suggests submucosal origin (although it may ulcerate)

EPITHELIAL LESION Adenocarcinoma	SUBMUCOSAL LESION Lipoma
<p>Thickened mucosal layer</p> 	<p>Normal thickness mucosal layer</p> 

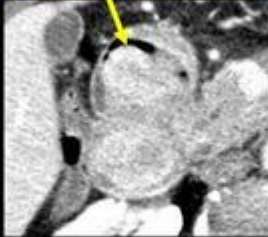
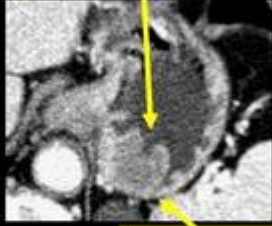
diapositivo7.jpg

Differential diagnosis between epithelial and submucosal lesions as seen on CT
Exophytic growth suggests submucosal origin

EPITHELIAL LESION Adenocarcinoma	SUBMUCOSAL LESION Leiomyosarcoma
<p>Endophytic growth</p> 	<p>Exophytic growth</p> 

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Differential diagnosis between epithelial and submucosal lesions as seen on CT
There are many exceptions!

SUBMUCOSAL LESION Inflammatory fibroid polyp	SUBMUCOSAL LESION Small GIST
<p>Endophytic growth</p> 	<p>Endophytic growth</p> <p>Acute angle</p> 

4. Conclusion

Conclusion

Conclusions

CONCLUSIONS

CT can provide important information regarding epithelial and submucosal lesions of the stomach.

Although the CT imaging findings in many gastric lesions overlap, some of them have typical features that may suggest a specific diagnosis.

5. References

References

diapositivo107.jpg

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SPECIAL THANKS

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7. Mediafiles

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Conclusions

CONCLUSIONS

CT can provide important information regarding epithelial and submucosal lesions of the stomach.

Although the CT imaging findings in many gastric lesions overlap, some of them have typical features that may suggest a specific diagnosis.

Duplication cyst

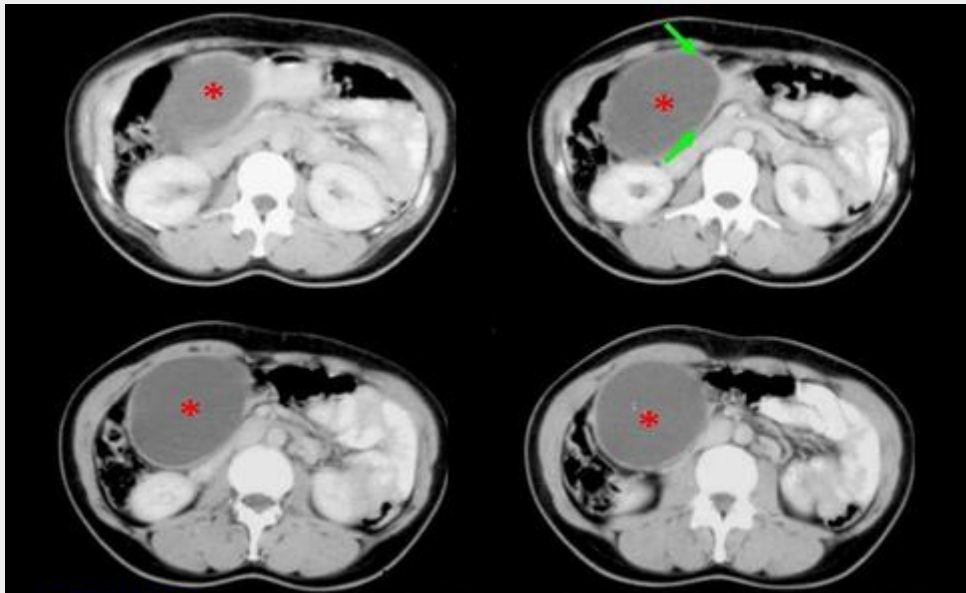


Figure 22a Duplication cyst of the gastric antrum. Post-contrast CT images show a fluid-attenuation well-defined oval mass with a thick regular wall located in the anterior wall of the gastric antrum (*). Note the obtuse angles between the lesion and the gastric wall (→).

GIST

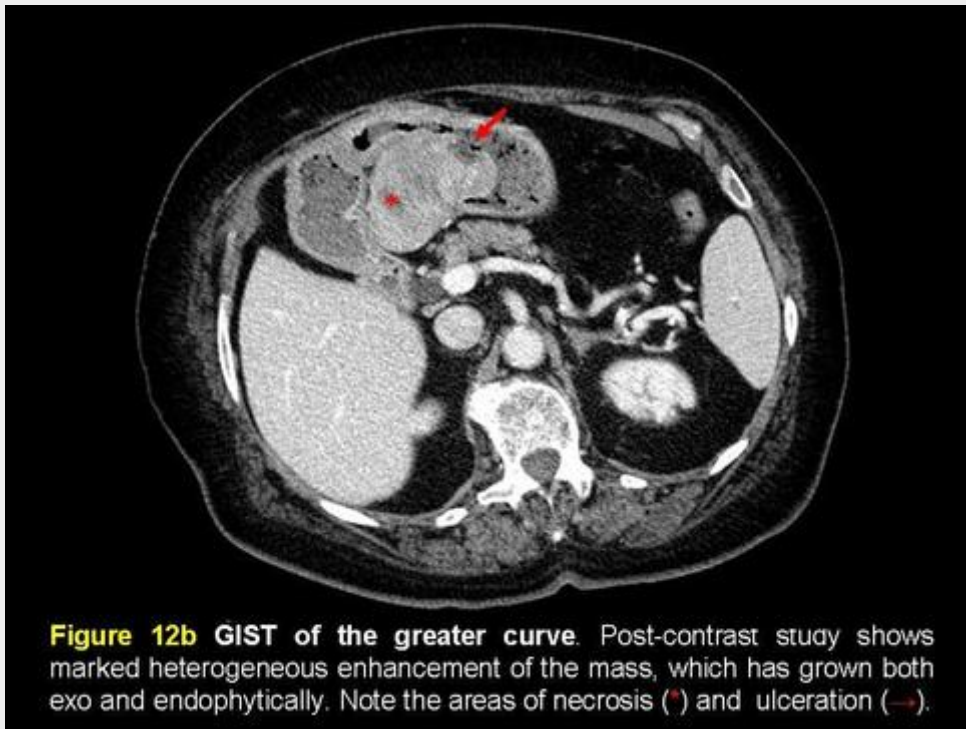
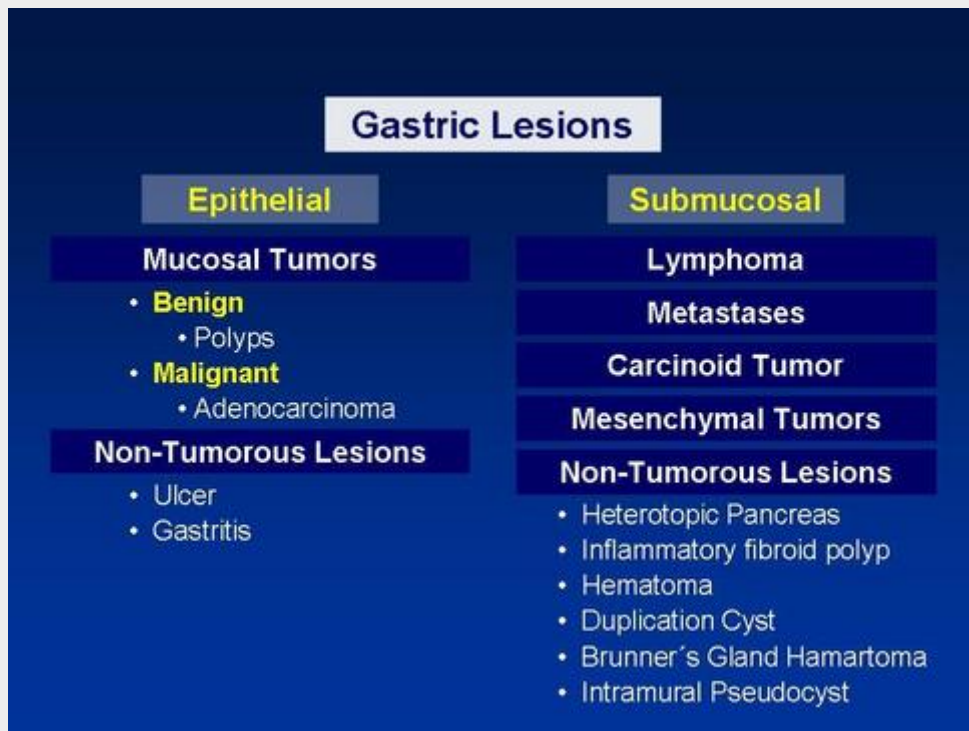


Figure 12b GIST of the greater curve. Post-contrast study shows marked heterogeneous enhancement of the mass, which has grown both exo and endophytically. Note the areas of necrosis (*) and ulceration (→).

Gastric lesions



Heterotopic pancreas

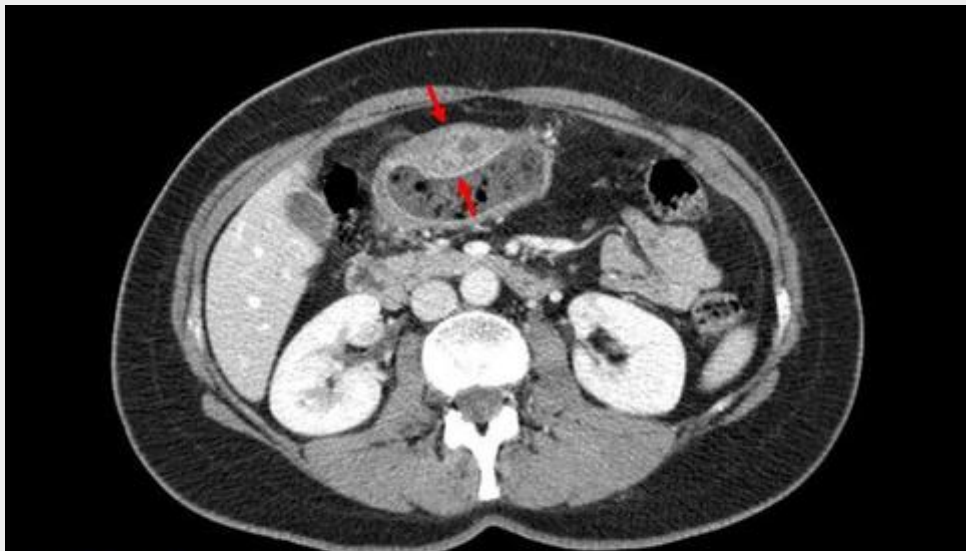


Figure 17b Heterotopic pancreas. There was an heterogeneous enhancement of the lesion after IV contrast, with small low attenuation central areas. Partial gastrectomy was performed and the anatomopathological analysis revealed heterotopic pancreas with cystic dilation of rudimentary ducts.

Inflammatory fibroid polyp

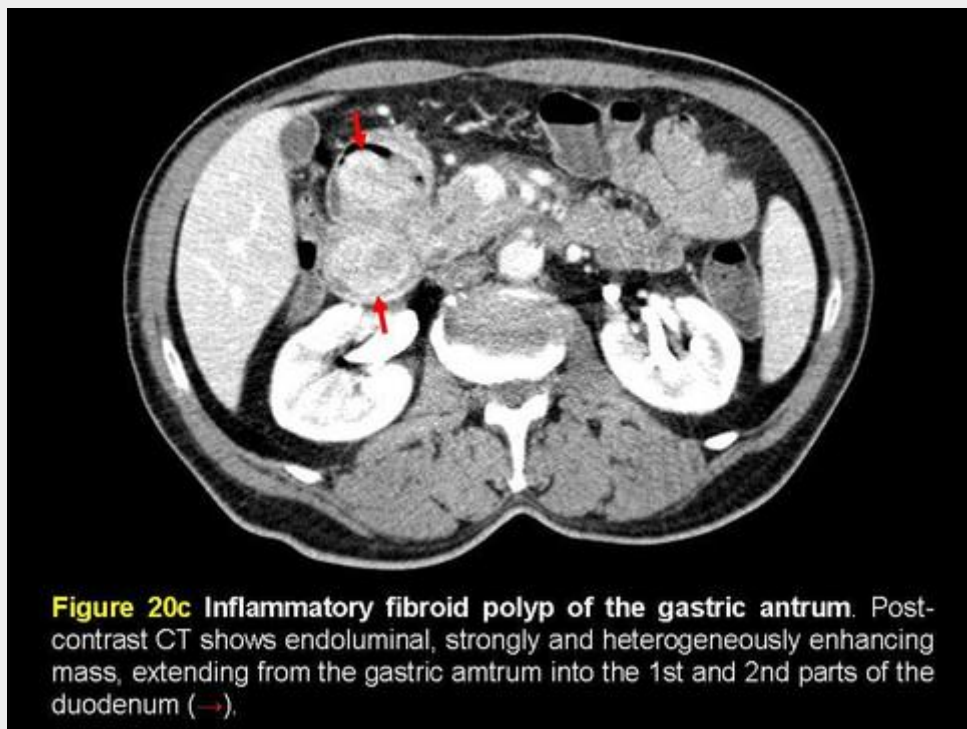


Figure 20c Inflammatory fibroid polyp of the gastric antrum. Post-contrast CT shows endoluminal, strongly and heterogeneously enhancing mass, extending from the gastric antrum into the 1st and 2nd parts of the duodenum (→).

Learning objectives

LEARNING OBJECTIVES

To describe and illustrate the CT imaging findings of gastric lesions, emphasizing the imaging features that help distinguish:

- epithelial from submucosal lesions
- benign from malignant tumors
- tumors from submucosal non-tumorous lesions

Leiomyoma

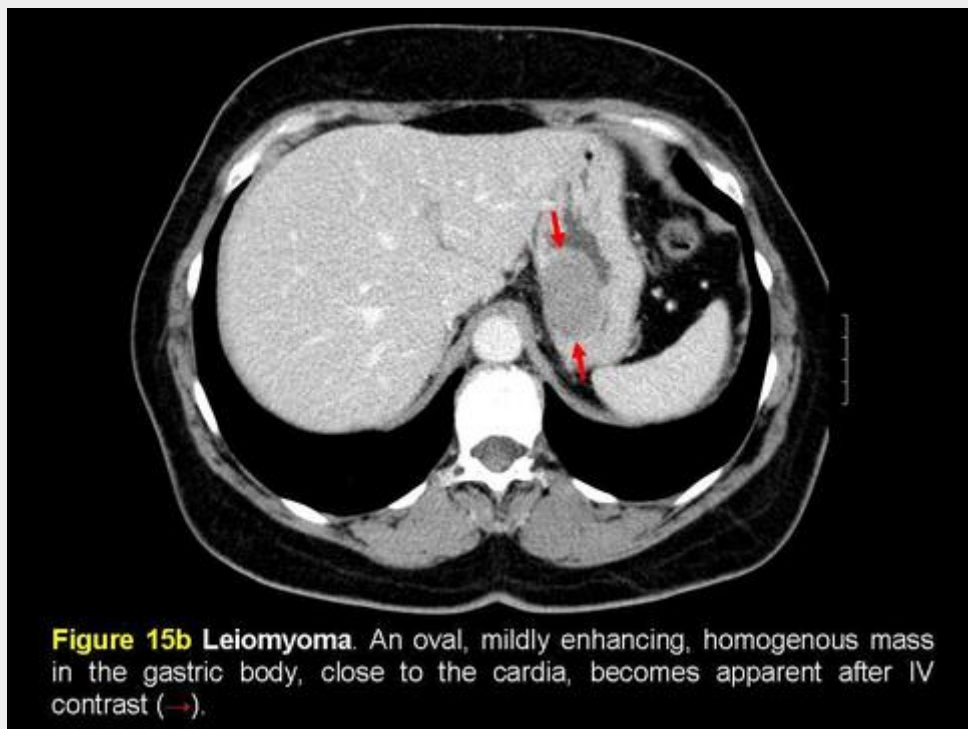


Figure 15b Leiomyoma. An oval, mildly enhancing, homogenous mass in the gastric body, close to the cardia, becomes apparent after IV contrast (→).

Leiomyosarcoma

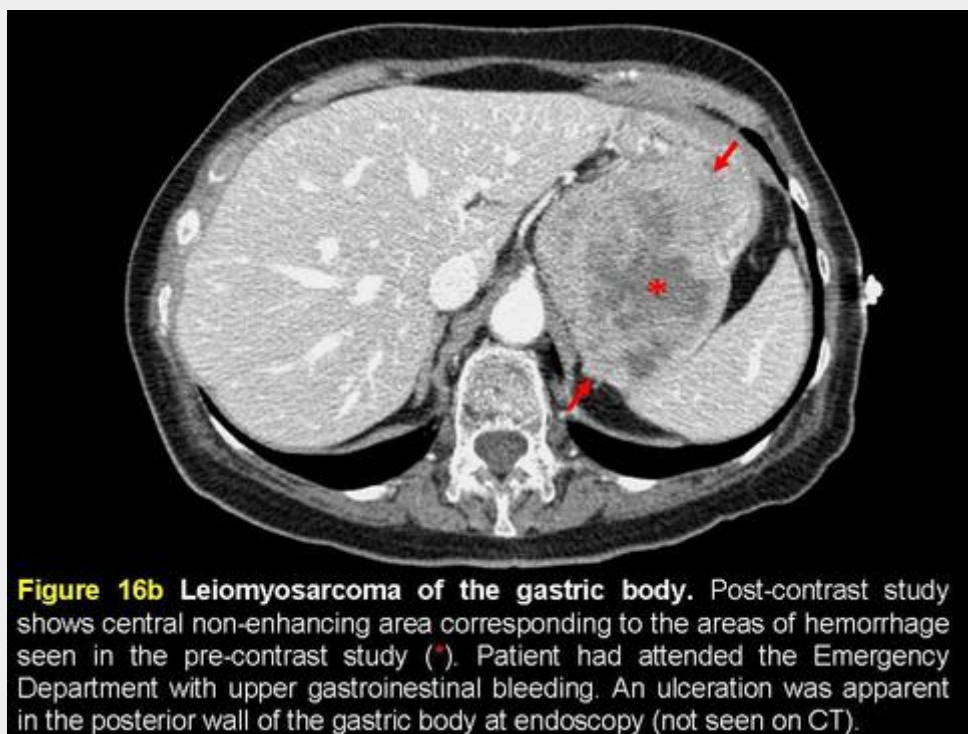


Figure 16b Leiomyosarcoma of the gastric body. Post-contrast study shows central non-enhancing area corresponding to the areas of hemorrhage seen in the pre-contrast study (*). Patient had attended the Emergency Department with upper gastrointestinal bleeding. An ulceration was apparent in the posterior wall of the gastric body at endoscopy (not seen on CT).

Linitis plastica

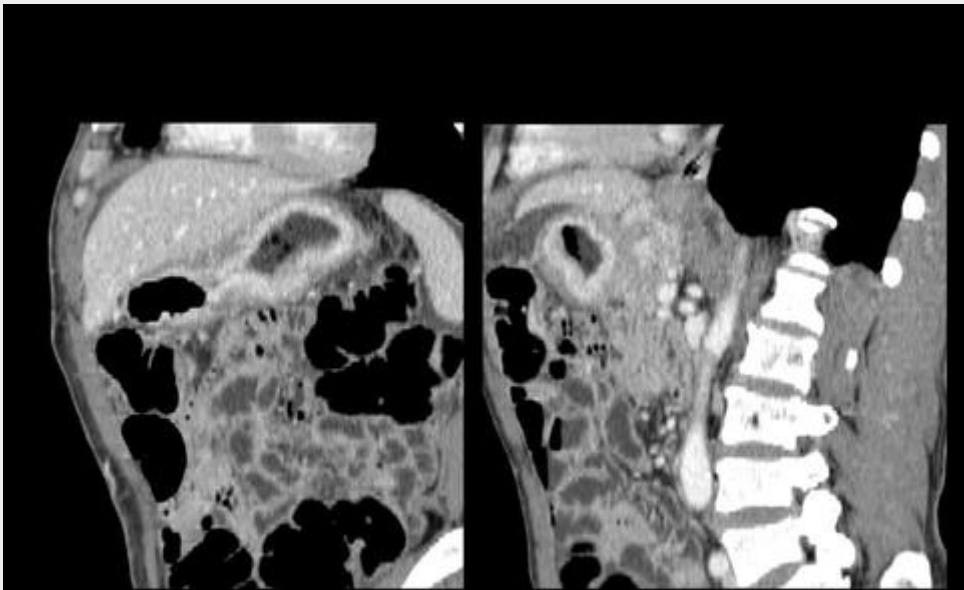


Figure 4c Adenocarcinoma of the stomach – *linitis plastica*. Post-contrast oblique and sagittal reformations better depicting the diffuse thickening of the gastric mucosa in a somewhat underdistended stomach.

Linitis plastica



Figure 4a Adenocarcinoma of the stomach – *linitis plastica*. Post-contrast images show diffuse hyperenhancing mucosal thickening of the body and part of the antrum (although not shown, the fundus was also involved) and perigastric lymphadenopathy (*).

Lipoma

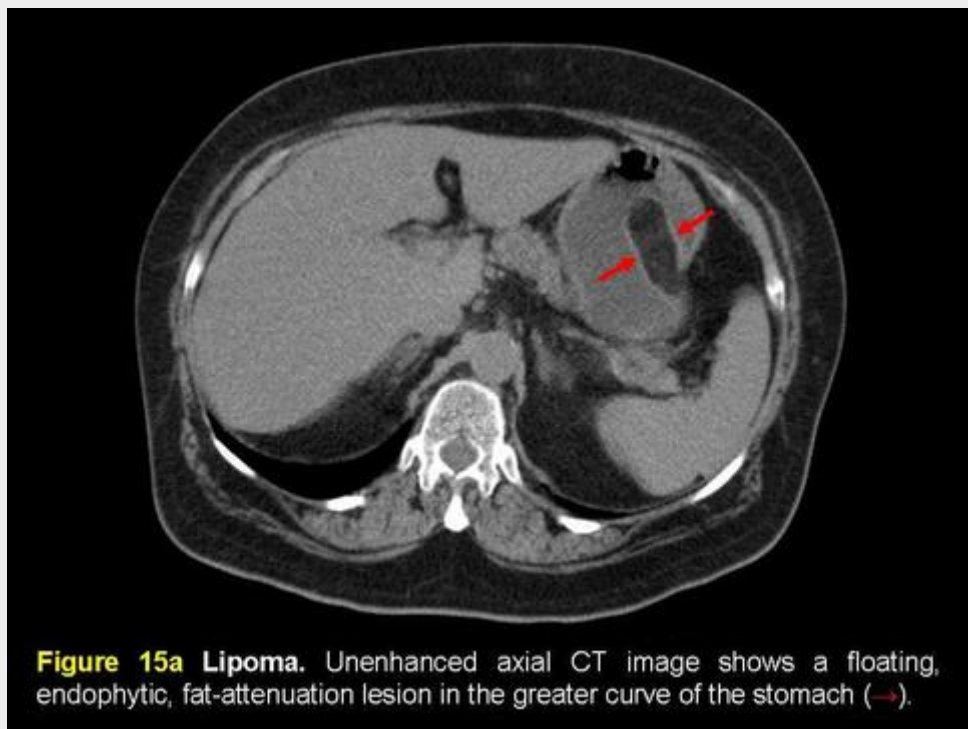


Figure 15a Lipoma. Unenhanced axial CT image shows a floating, endophytic, fat-attenuation lesion in the greater curve of the stomach (→).

Lymphoma

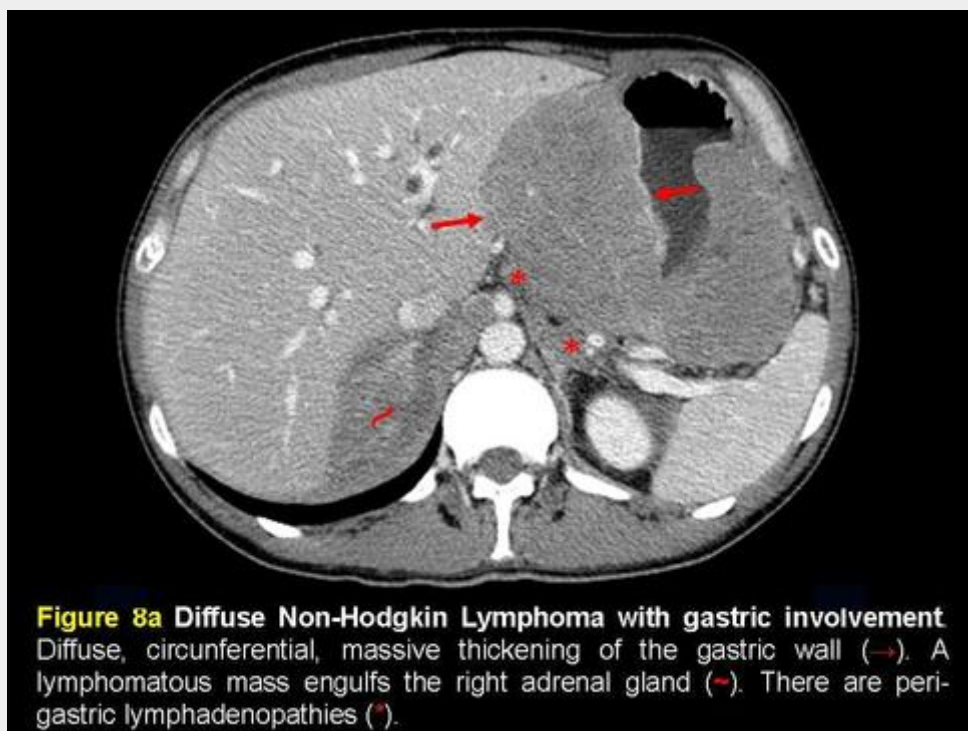


Figure 8a Diffuse Non-Hodgkin Lymphoma with gastric involvement. Diffuse, circumferential, massive thickening of the gastric wall (→). A lymphomatous mass engulfs the right adrenal gland (→). There are perigastric lymphadenopathies (*).

Mesenchymal tumors

Mesenchymal Tumors					
GIST	Non - GIST				
	<table border="1"><thead><tr><th>Benign</th><th>Malignant</th></tr></thead><tbody><tr><td><ul style="list-style-type: none">• Leiomyoma• Schwannoma, Neurofibroma• Lipoma• Glomus tumor• Hemangioma, Lymphangioma</td><td><ul style="list-style-type: none">• Leiomyosarcoma• Plexosarcoma• Liposarcoma</td></tr></tbody></table>	Benign	Malignant	<ul style="list-style-type: none">• Leiomyoma• Schwannoma, Neurofibroma• Lipoma• Glomus tumor• Hemangioma, Lymphangioma	<ul style="list-style-type: none">• Leiomyosarcoma• Plexosarcoma• Liposarcoma
Benign	Malignant				
<ul style="list-style-type: none">• Leiomyoma• Schwannoma, Neurofibroma• Lipoma• Glomus tumor• Hemangioma, Lymphangioma	<ul style="list-style-type: none">• Leiomyosarcoma• Plexosarcoma• Liposarcoma				

Mural Hematoma

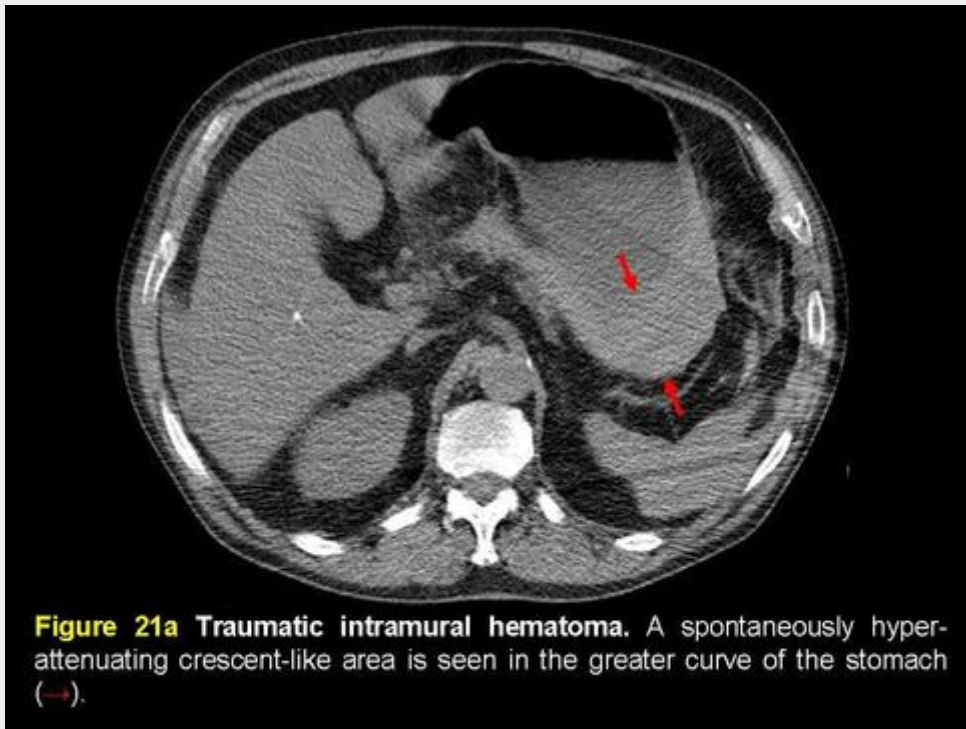
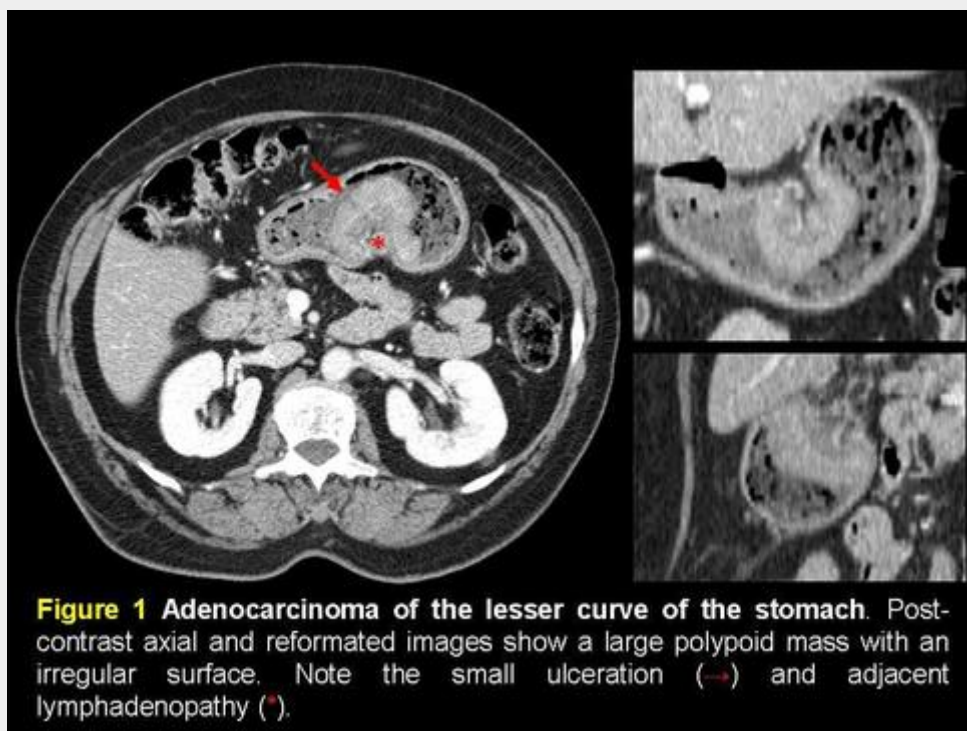


Figure 21a Traumatic intramural hematoma. A spontaneously hyperattenuating crescent-like area is seen in the greater curve of the stomach (→).

Polypoid growth type of adenocarcinoma

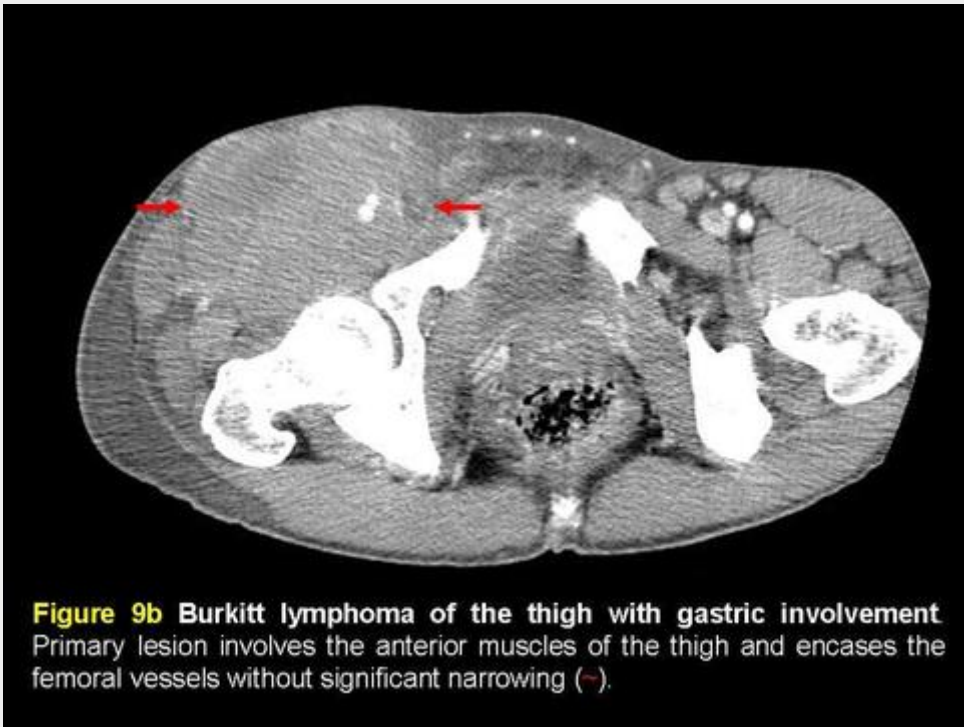


Special thanks

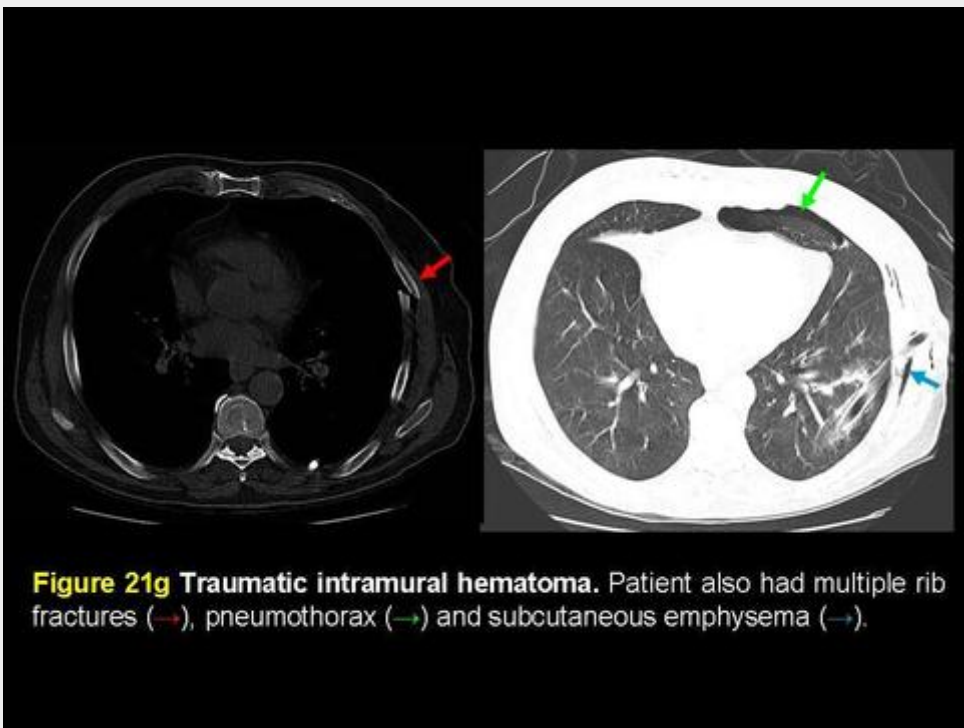
SPECIAL THANKS

Paula Vecor, MD
Henrique Rodrigues, MD

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diapositivo1.jpg



diapositivo2.jpg

LEIOMYOMA

Preferential location

Antrum and body

Clinical presentation

Usually asymptomatic

Epigastric pain, gastrointestinal bleeding

diapositivo3.jpg

BACKGROUND

Gastric lesions may be classified:

- according to their origin – epithelial or submucosal
- according to their nature – tumoral or non-tumorous
- according to their biologic behavior – benign or malignant

diapositivo3.jpg

LEIOMYOSARCOMA

Preferential location

Antrum and body

Clinical presentation

Nausea, vomiting, epigastric pain, weight loss, bleeding, palpable mass

Metastatic disease

May metastize hematogeneously to liver or lung

diapositivo3.jpg

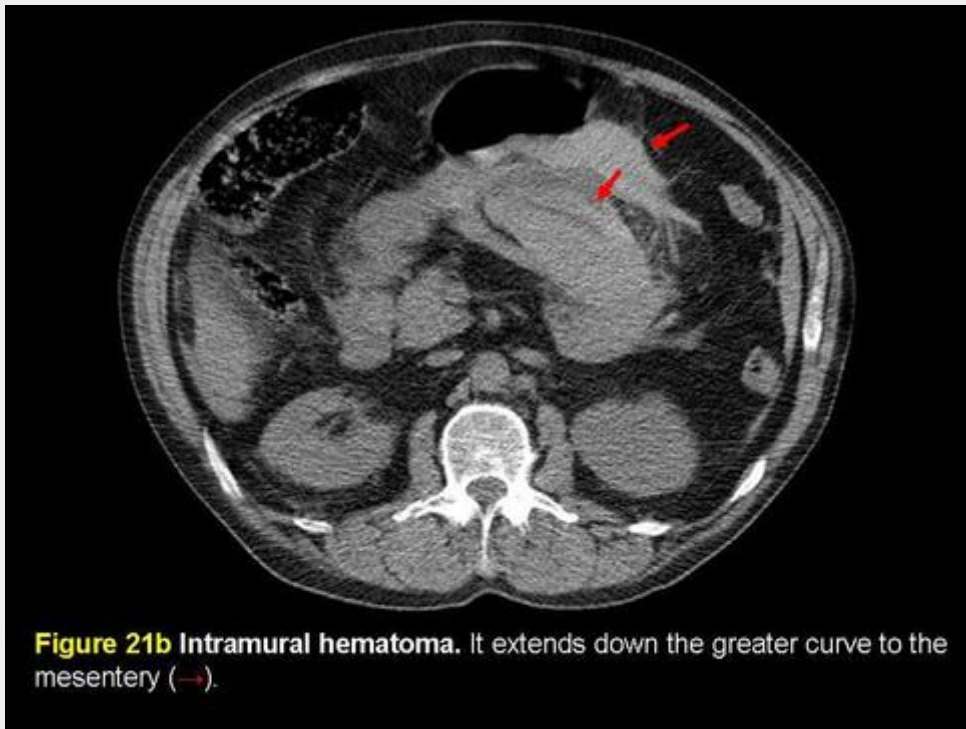


Figure 21b Intramural hematoma. It extends down the greater curve to the mesentery (→).

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LEIOMYOSARCOMA

CT findings

After IV contrast

Heterogenous enhancement

May present areas of necrosis

diapositivo6.jpg

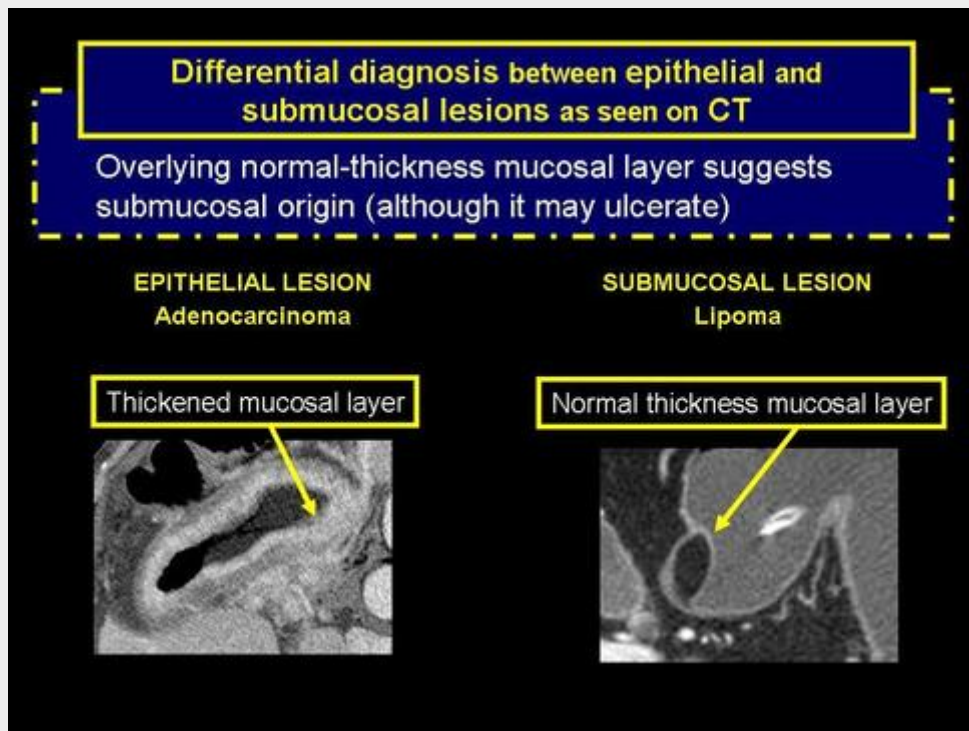
BACKGROUND

The clinical manifestations of gastric lesions span from absence of symptoms or signs of disease to severe abdominal pain in the context of acute abdomen. Their overlap is considerable, as are the radiologic findings.

The accurate characterization of gastric lesions is a mainstay for adequate therapy planning in order to avoid unnecessary or inadequate surgery or follow-up.

Imaging plays an important part in the diagnostic work-up of epithelial lesions, particularly cancer staging and peptic ulceration and an even more important part in the diagnosis of endoscopy-inaccessible submucosal lesions.

diapositivo6.jpg



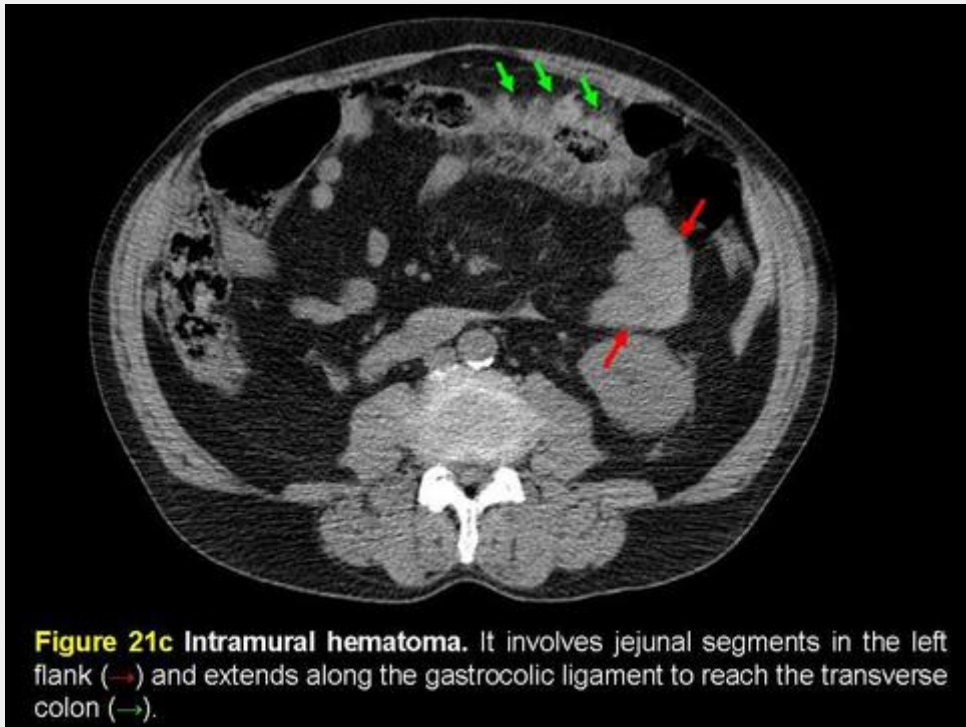
diapositivo7.jpg

BACKGROUND

Optical endoscopic studies and double-contrast barium meals (DCBM) have been traditionally used as primary tools for gastric lesions' diagnosis. These methods, however, are very uncomfortable for patients.

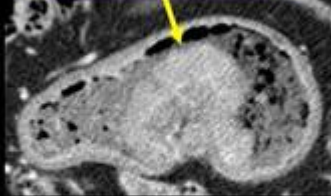
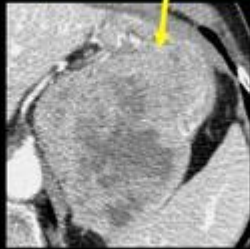
The advances in Computer Tomography technology, particularly with the introduction of MultiDetector CT (MDCT), with it's multiplanar reformatation capabilities, have shown great potential for the evaluation of gastric disease, providing important information, not only on the gastric wall pathology itself, but also on it's perigastric extension and distant organ involvement.

diapositivo7.jpg



diapositivo7.jpg

Differential diagnosis between epithelial and submucosal lesions as seen on CT
Exophytic growth suggests submucosal origin

EPITHELIAL LESION Adenocarcinoma	SUBMUCOSAL LESION Leiomyosarcoma
Endophytic growth	Exophytic growth
	

diapositivo8.jpg

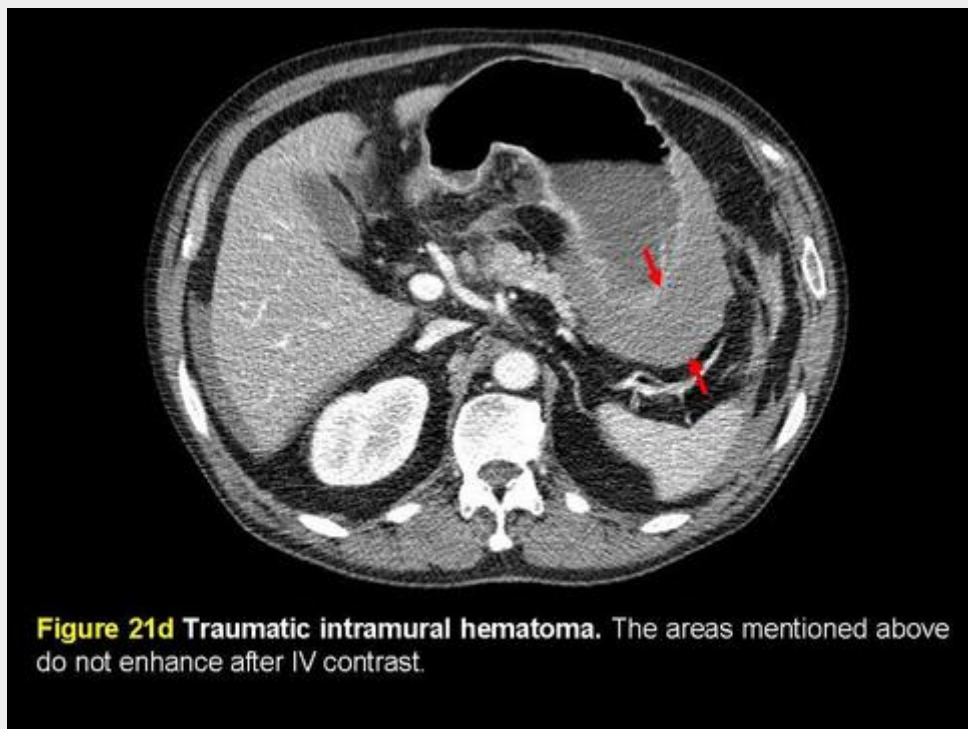


Figure 21d Traumatic intramural hematoma. The areas mentioned above do not enhance after IV contrast.

diapositivo9.jpg

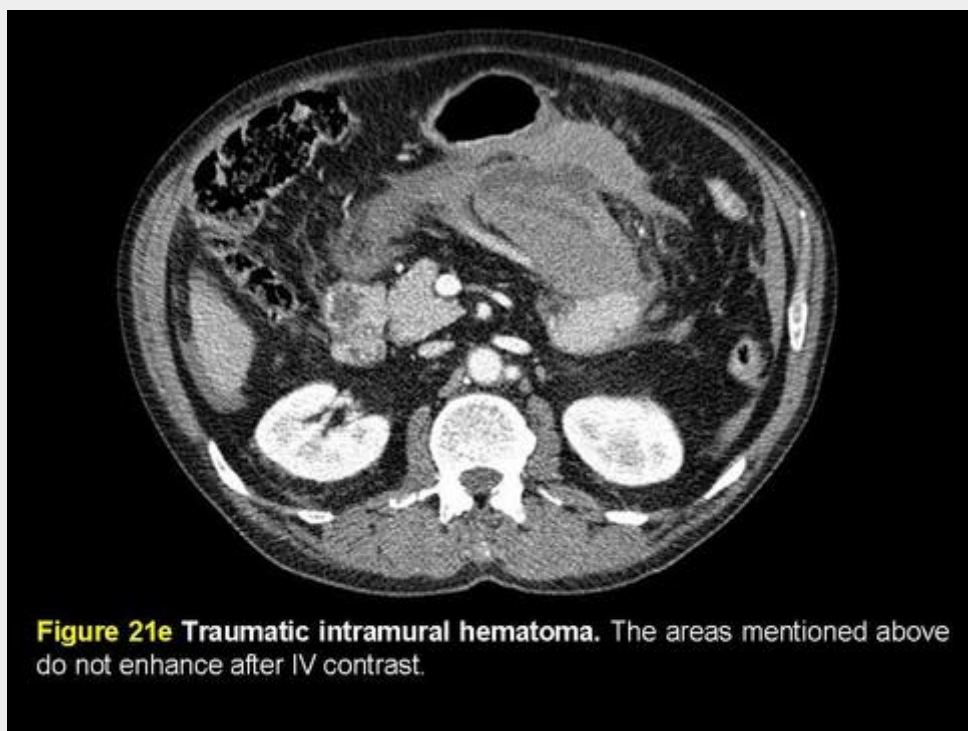


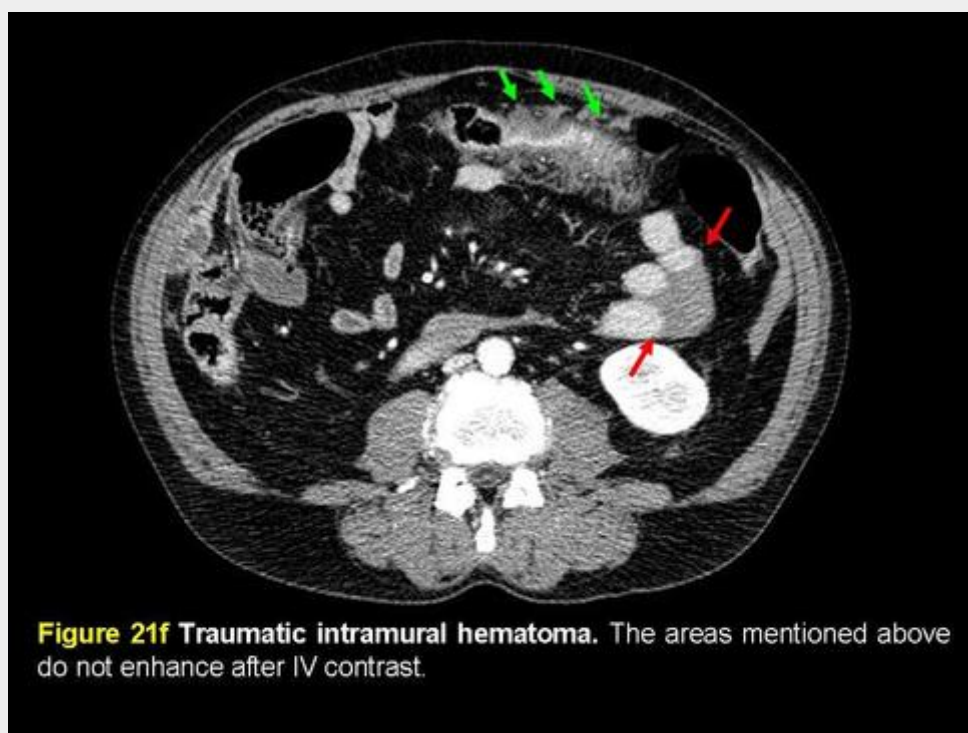
Figure 21e Traumatic intramural hematoma. The areas mentioned above do not enhance after IV contrast.

diapositivo9.jpg

EPITHELIAL LESIONS

- Mucosal Tumors
 - Benign
 - Polyps
 - Malignant
 - Adenocarcinoma
- Non-Tumorous Lesions
 - Ulcer
 - Gastritis

diapositivo10.jpg



diapositivo10.jpg

ADENOCARCINOMA

Origin

Gastritis → atrophy → metaplasia → displasia → carcinoma

Epidemiology

2nd most common cancer (after lung cancer)

Peak prevalence 50 to 70 Yo

Higher incidence in ♂

Higher prevalence in Japan

Risk factors include H. Pylori, pernicious anemia, partial gastrectomy, diet high in nitrates and smoking

diapositivo11.jpg

ADENOCARCINOMA

Location

Lower 2/3 (80%)

Clinical presentation

Asymptomatic

Indigestion, nausea, vomiting, early satiety, loss of appetite, melena, hematemesis, weight loss, dysphagia

Metastatic disease

32% present with distant metastatic disease

Liver, lungs, adrenals, kidneys, ovaries, rectum, peritoneum

diapositivo12.jpg

ADENOCARCINOMA

CT Imaging Findings

Polypoid mass with or without ulceration

Focal, excentric wall thickening with mucosal irregularity or ulceration

Linitis plastica

Diffuse thickening of the gastric wall

Mucinous adenocarcinoma

Very low attenuation thickening of the gastric wall with punctate miliary calcifications

diapositivo13.jpg

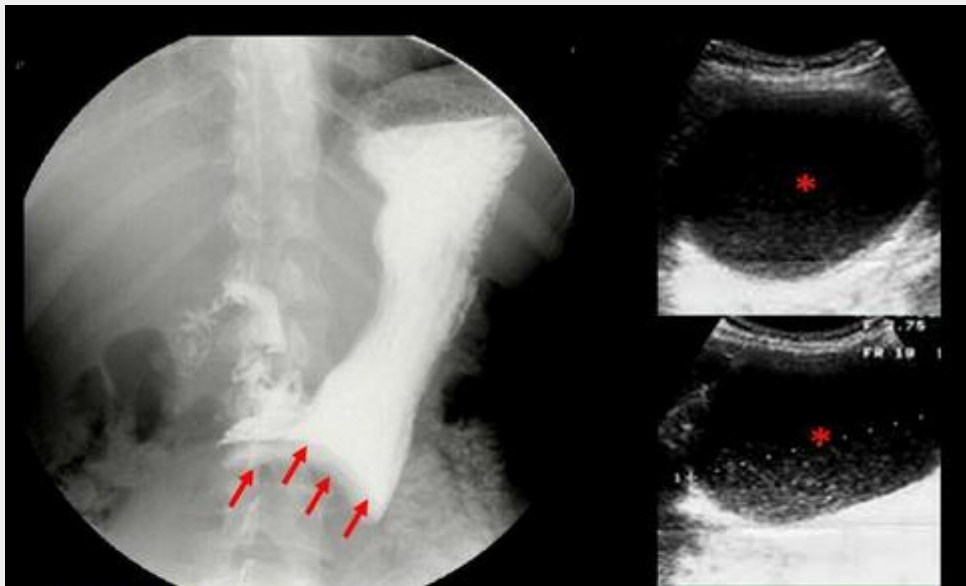


Figure 22b Duplication cyst of the gastric antrum. *Left* Barium meal in an upright position shows an oval, well defined, subtraction image in the gastric antrum (→). *Right* Abdominal Ultrasound shows a well defined anechoic oval lesion with floating debris (*).

diapositivo13.jpg

Differential diagnosis between adenocarcinoma and benign conditions, such as gastritis or peptic ulceration, as seen on CT

Focal, eccentric, enhancing, > 1 cm wall thickening suggests malignancy.

Gastritis and peptic ulceration may present as focal wall thickening which usually does not enhance significantly. There are, however, exceptions.

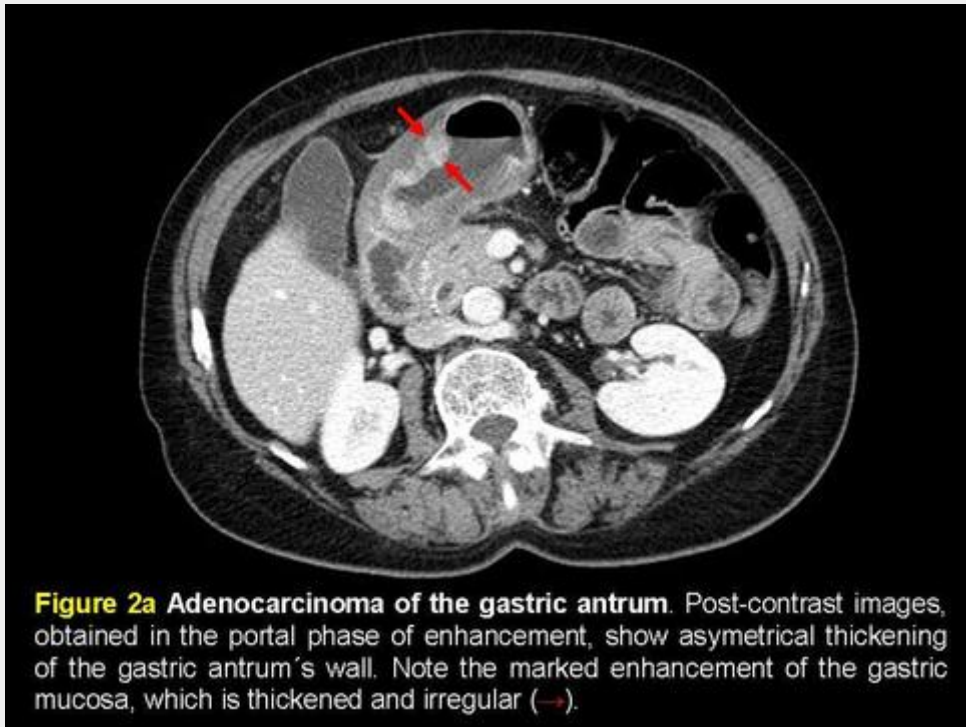
diapositivo14.jpg



Figure 22c Duplication cyst of the gastric antrum. Photograph obtained during surgical excision.

Images in Figure 21 were courtesy of Paula Vedor, MD, from Serviço de Radiologia do Hospital de S. Teotónio – Viseu.

diapositivo15.jpg



diapositivo15.jpg

HETEROTOPIC PANCREAS

Preferential location

Antrum or greater curvature, less than 6 cm from the pylorus in 85-95%

Clinical Presentation

Asymptomatic

Epigastric pain (70%), early satiety (30%)

Gastrointestinal hemorrhage, obstruction

Pancreatitis, pseudocyst formation, insulinoma, adenoma, malignant transformation

diapositivo16.jpg

INTRAMURAL HEMATOMA

Origin

Trauma, ruptured abdominal aortic aneurism, antikoagulation therapy or blood dyscrasia

Epidemiology

Present in 0.6 to 14 % of autopsies and 1 in every 500 gastric surgical specimens

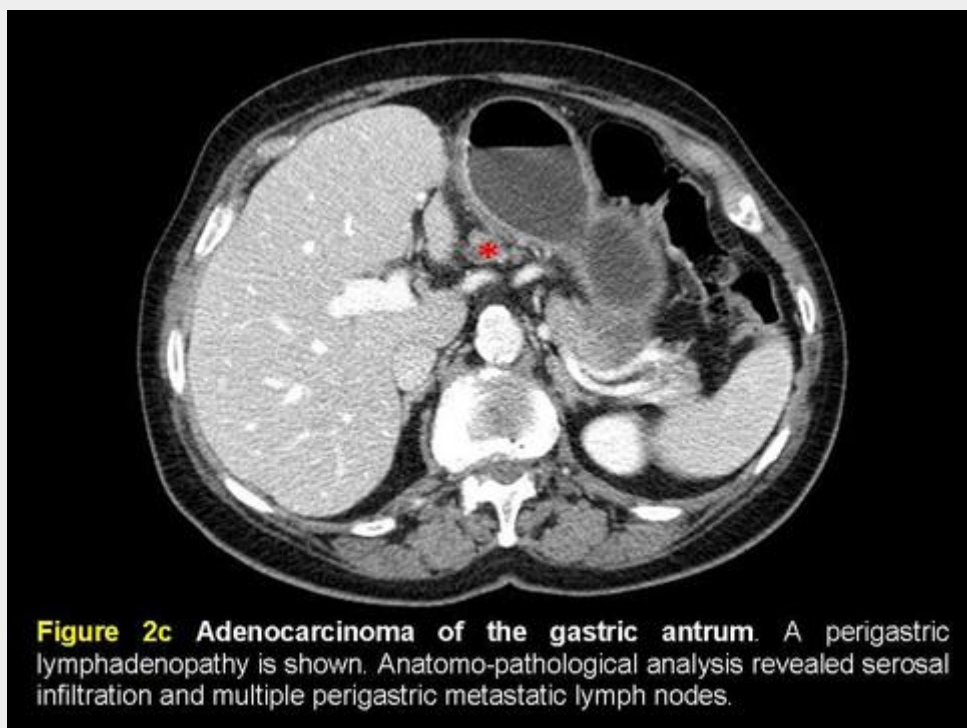
Higher incidence in ♂, 40-60 Yo

diapositivo16.jpg



Figure 2b Adenocarcinoma of the gastric antrum. Submucosal infiltration is also apparent (-).

diapositivo17.jpg



diapositivo17.jpg

INTRAMURAL HEMATOMA

Preferential location

Fundus

Clinical Presentation

Abdominal pain, anemia, hypotension and, on rare instances, obstruction

diapositivo18.jpg

INTRAMURAL HEMATOMA

CT findings

Well-circumscribed submucosal or subserosal mass

High-attenuation in the acute phase, in the pre-contrast study

Decreasing attenuation over time

After IV contrast

Active bleeding may be apparent in the acute phase as contrast extravasation from a feeding artery or from a vein

No enhancement in the chronic phase

diapositivo18.jpg



Figure 3a Adenocarcinoma of the gastric cardia. Post-contrast study shows irregular thickening of the gastric cardia's mucosa (→), which has herniated to the thorax (sliding hiatal hernia), and infiltration of the submucosa (↔). There were multiple perigastric lymphadenopathies (*).

diapositivo19.jpg

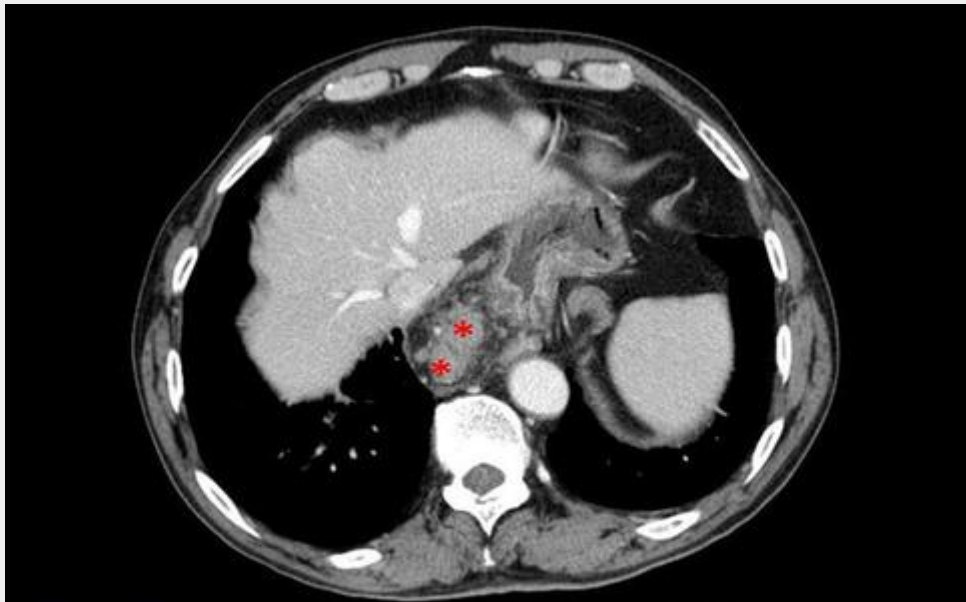


Figure 3b Adenocarcinoma of the gastric cardia. Perigastric lymphadenopathies seen below the mass (*). Serosal infiltration and lymph node metastasis were confirmed in the surgical specimen's histologic analysis.

diapositivo21.jpg

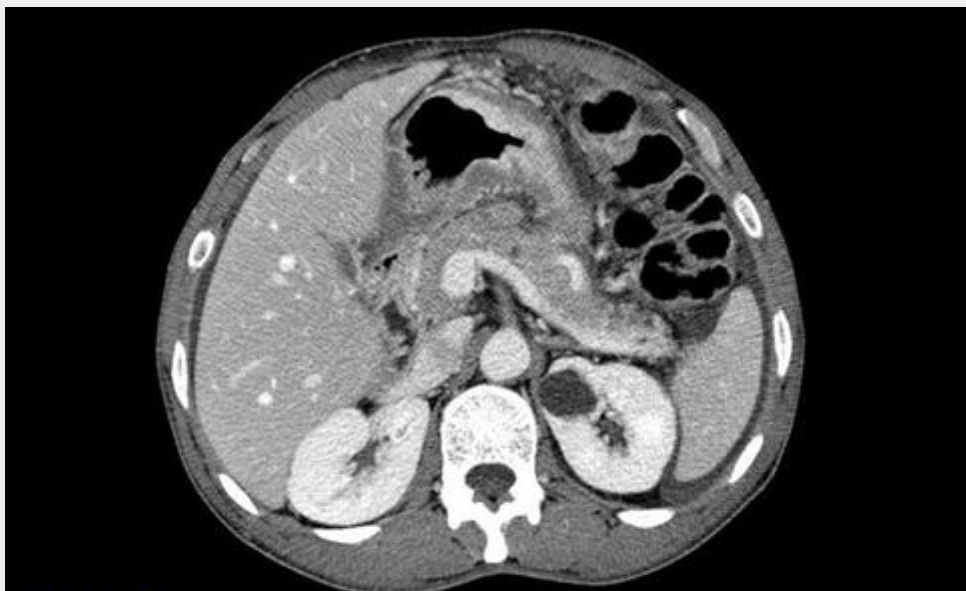


Figure 4b Adenocarcinoma of the stomach – *linitis plastica*. Post-contrast images show diffuse hyperenhancing mucosal thickening of the body and part of the antrum (although not shown, the fundus was also involved).

diapositivo23.jpg

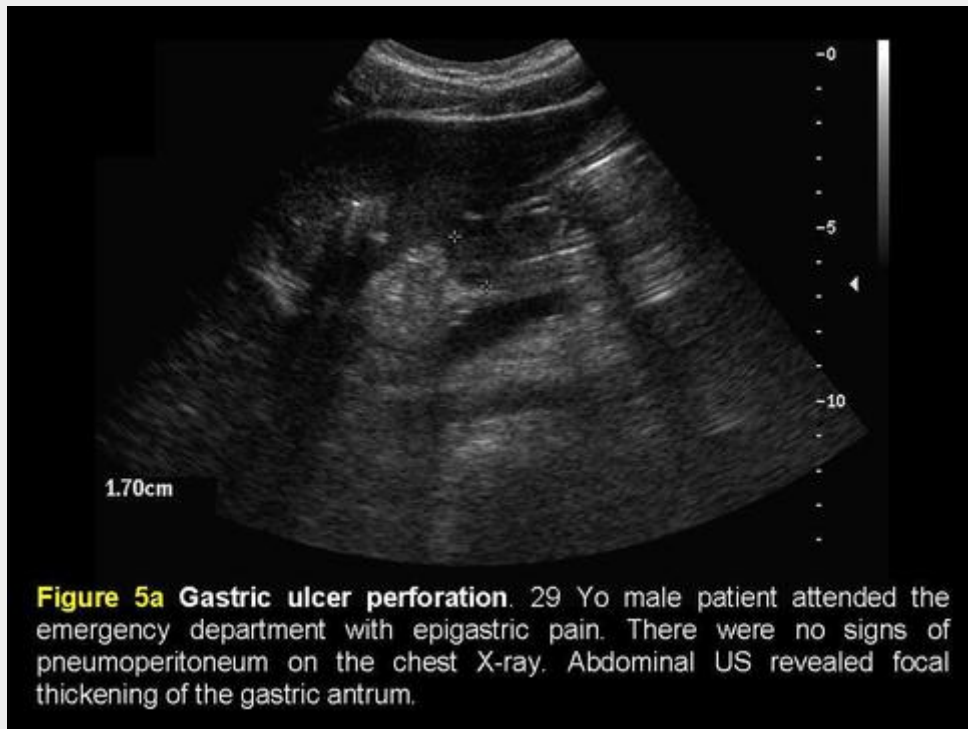


Figure 5a Gastric ulcer perforation. 29 Yo male patient attended the emergency department with epigastric pain. There were no signs of pneumoperitoneum on the chest X-ray. Abdominal US revealed focal thickening of the gastric antrum.

diapositivo25.jpg

SUBMUCOSAL LESIONS	
Mesenchymal Tumors	Lymphoma
Benign	Metastases
<ul style="list-style-type: none">• Leiomyoma• Lipoma• Schwannoma, Neurofibroma• Glomus tumor• Hemangioma, Lymphangioma	Carcinoid Tumor
Malignant	Non-Tumorous Lesions
<ul style="list-style-type: none">• Leiomyosarcoma• Liposarcoma• Plexosarcoma	<ul style="list-style-type: none">• Heterotopic Pancreas• Inflammatory Fibroid Polyps• Hematoma• Duplication Cyst• Brunner's G. Hamartoma• Intramural Pseudocyst

diapositivo26.jpg

LYMPHOMA

Origin

MALT-type Lymphoma is thought to originate from follicular gastritis caused by Helicobacter Pylori

diapositivo27.jpg

LYMPHOMA

Epidemiology

2 to 5% of malignant gastric lesions

The gastrointestinal tract (GIT) is the most common extranodal site of Non-Hodgkin Lymphoma (NHL)

The stomach is the most common segment of the GIT involved

MALT Lymphoma is considered a different form of extranodal NHL that generally manifests as localized disease and has a better prognosis

diapositivo28.jpg

LYMPHOMA

Location

Body and antrum

Clinical presentation

Asymptomatic

Epigastric pain and discomfort, indigestion, nausea, vomiting, gastrointestinal bleeding

diapositivo29.jpg

LYMPHOMA

CT findings of NHL

Submucosal nodules

Polypoid lesions

Diffuse wall thickening (4 – 5 cm)

Ulceration (advanced disease)

Bulky lymphadenopathy extending inferiorly beyond renal hilum

diapositivo30.jpg

LYMPHOMA

CT findings of NHL

Low grade MALT-type NHL

Absence of or subtle wall thickening

Lymphadenopathy not a prominent feature

High grade MALT-type NHL

Severe thickening, mass formation, ulcer and lymphadenopathy

diapositivo31.jpg

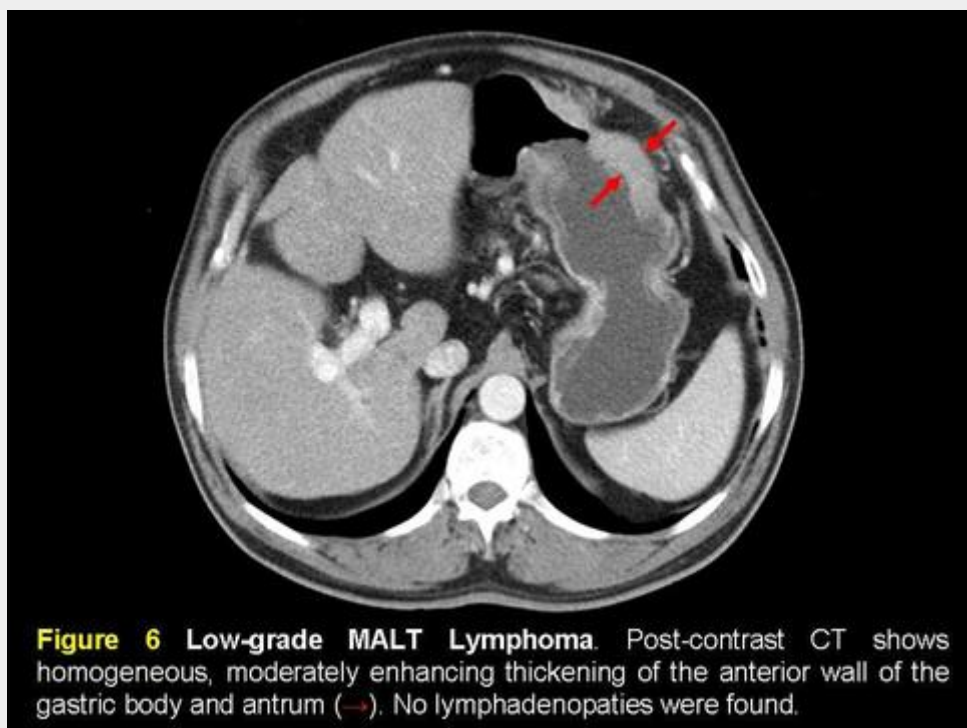
Differential diagnosis between lymphoma and adenocarcinoma as seen on CT

Lymphoma usually presents with greater wall thickening (4 -5 cm) and more diffuse, circumferential involvement.

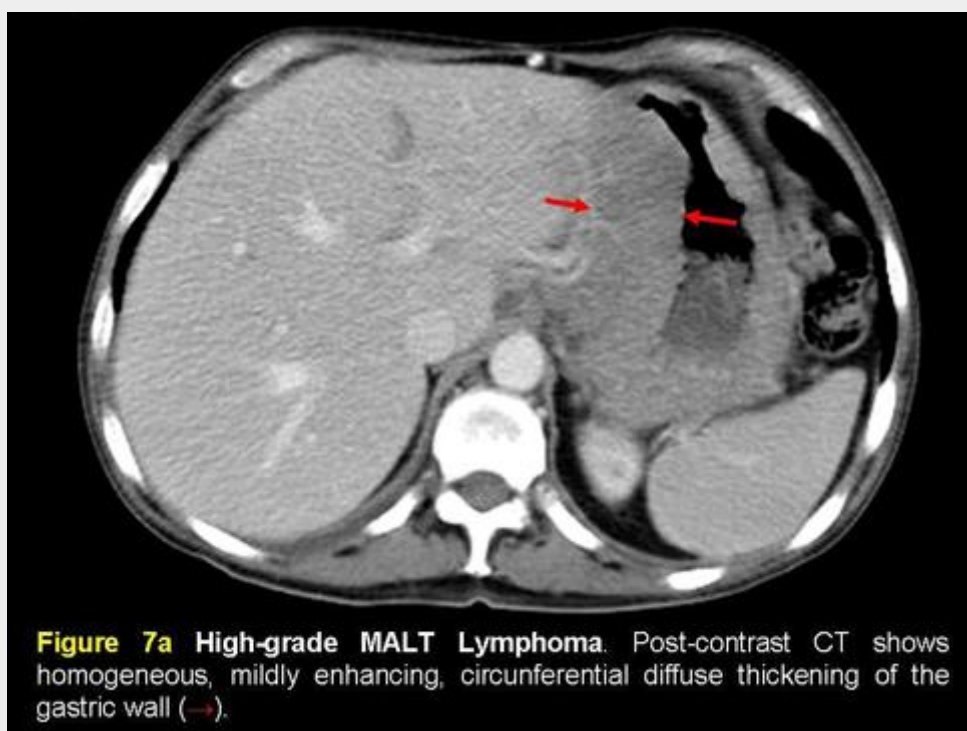
Bulky lymphadenopathy that extend inferiorly beyond renal hylum suggest lymphoma.

Obstruction is much more common in adenocarcinoma.

diapositivo32.jpg



diapositivo33.jpg



diapositivo34.jpg



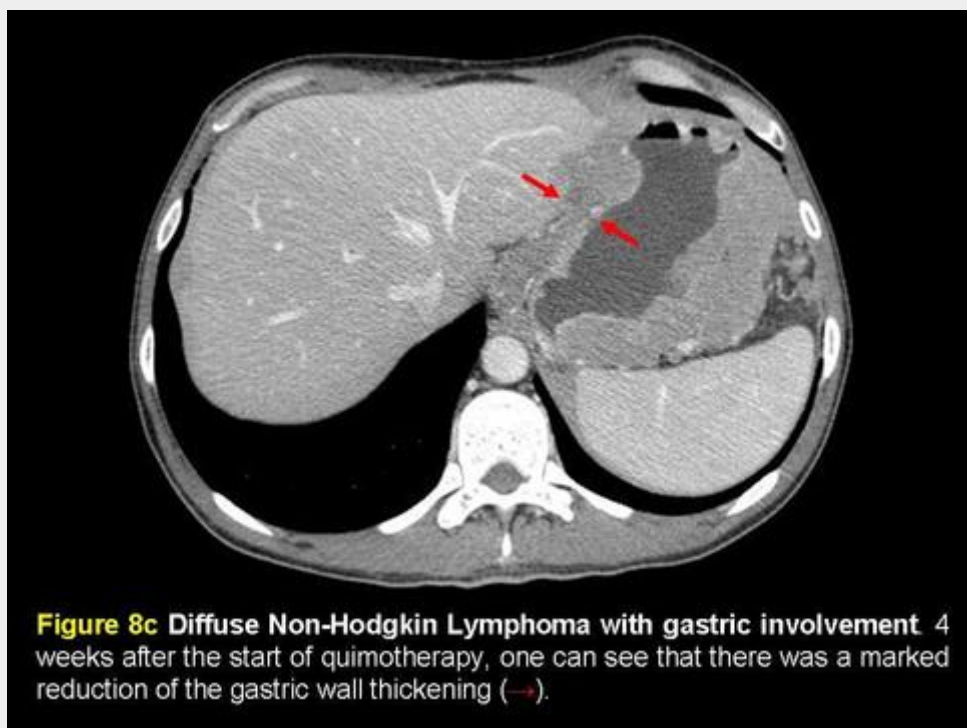
Figure 7b High-grade MALT Lymphoma. A more irregular thickening is seen at the level of the gastric antrum (→). Bulky lymphadenopathy extended down beyond renal hylum (*).

diapositivo36.jpg



Figure 8b Diffuse Non-Hodgkin Lymphoma with gastric involvement. Thickening extends down to the gastric antrum (→). There are multiple mesenteric lymphadenopathies (*).

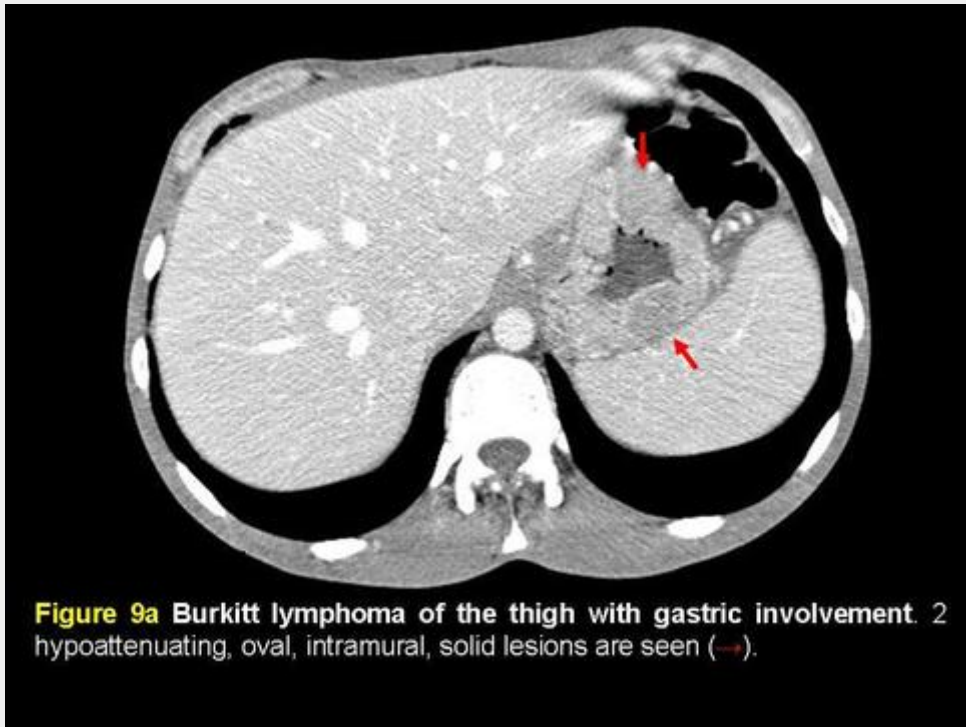
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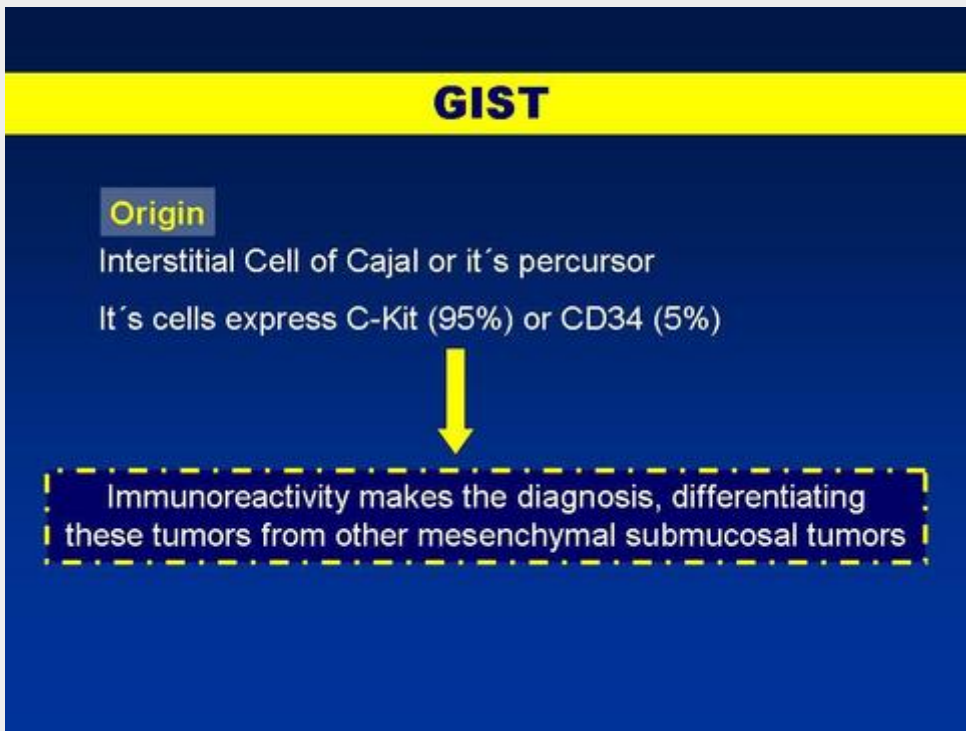
diapositivo38.jpg



diapositivo39.jpg



diapositivo41.jpg



diapositivo42.jpg

GIST

Epidemiology

- 2,5% of all gastric tumors
- 10-30% are malignant
- 60 a 70% occur in the stomach (better prognosis)
- Higher incidence in middle age and elderly individuals

diapositivo43.jpg

GIST

Clinical presentation

- Epigastric pain, disphagia, obstruction, gastrointestinal bleeding
- Weight loss, palpable mass

Metastatic disease

- 50%, at presentation
- Liver, peritoneum, soft tissues, lung, pleura, lymph nodes

diapositivo44.jpg

GIST

CT findings

Solid, heterogeneous, predominately exophytic, large mass

May have areas of necrosis, hemorrhage, cystic degeneration, ulceration or fistulization to the gastrointestinal lumen

Displaces adjacent organs and vessels

May invade adjacent organs in an advanced stage

Small GISTs are more homogeneous and may be intramural or endoluminal (polypoid)

diapositivo45.jpg

GIST

CT findings

After IV contrast

Moderate, heterogeneous enhancement

Vessels may be seen crossing the tumor

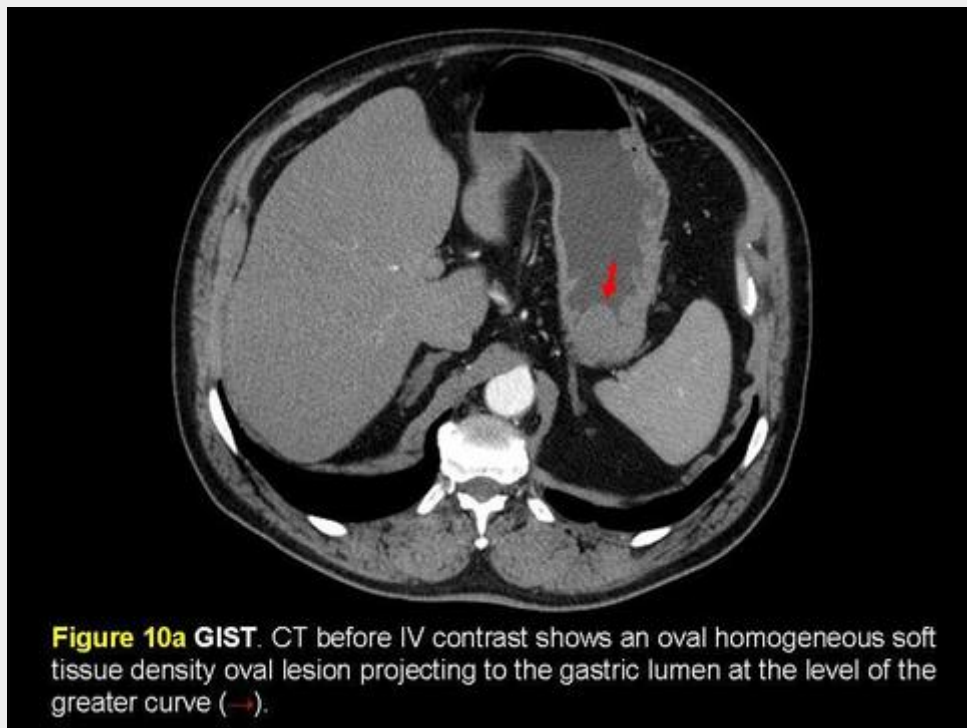
diapositivo46.jpg

GIST - CT Signs of aggressive behaviour

- Metastases
- Size greater than 5 cm
- Exophytic growth
- Extension into adjacent organs
- Areas of necrosis or calcification

Male gender is more frequently associated to aggressive behaviour
A high mitotic rate at histology is also a sign of aggressive behaviour

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diapositivo48.jpg

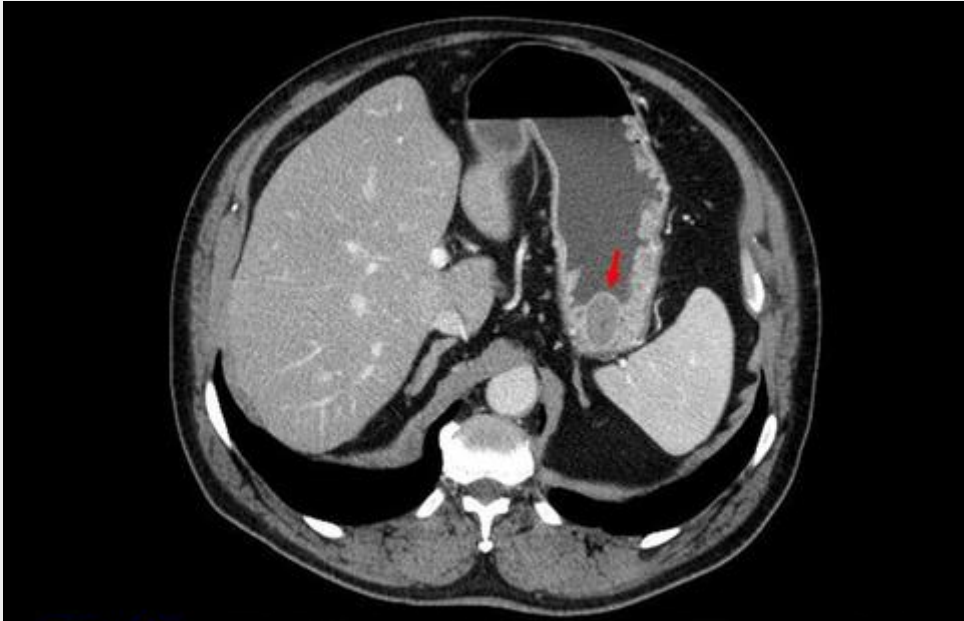


Figure 10b GIST. CT after IV contrast shows minimal enhancement. Note the overlying hiperattenuating, normal thickness mucosal layer, agreeing with it's submucosal origin (→).

diapositivo49.jpg

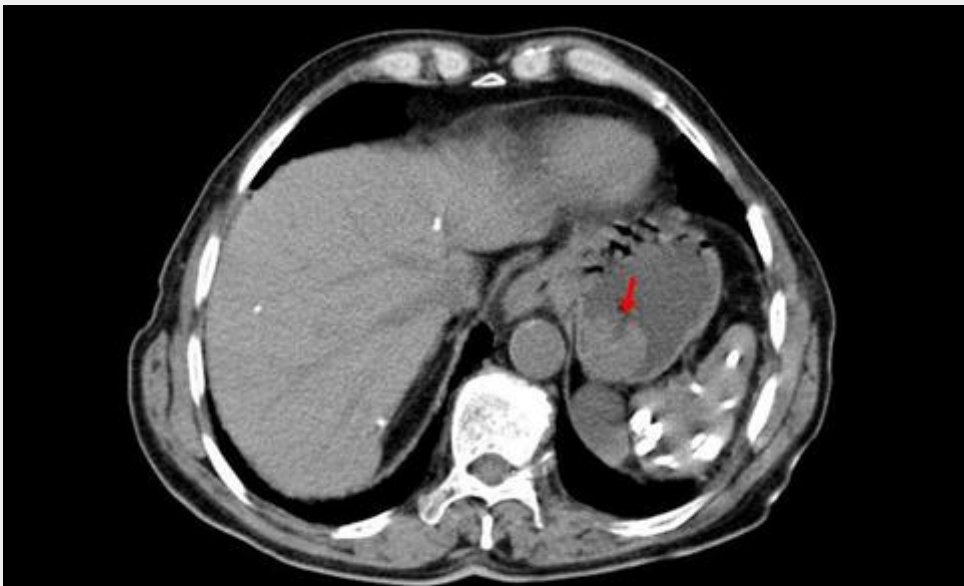


Figure 11a GIST. Pre-contrast CT images shows round, endophytic, soft tissue density mass in the posterior wall of the gastric body (→). Multiple gross liver and spleen calcifications were incidentally found.

diapositivo50.jpg

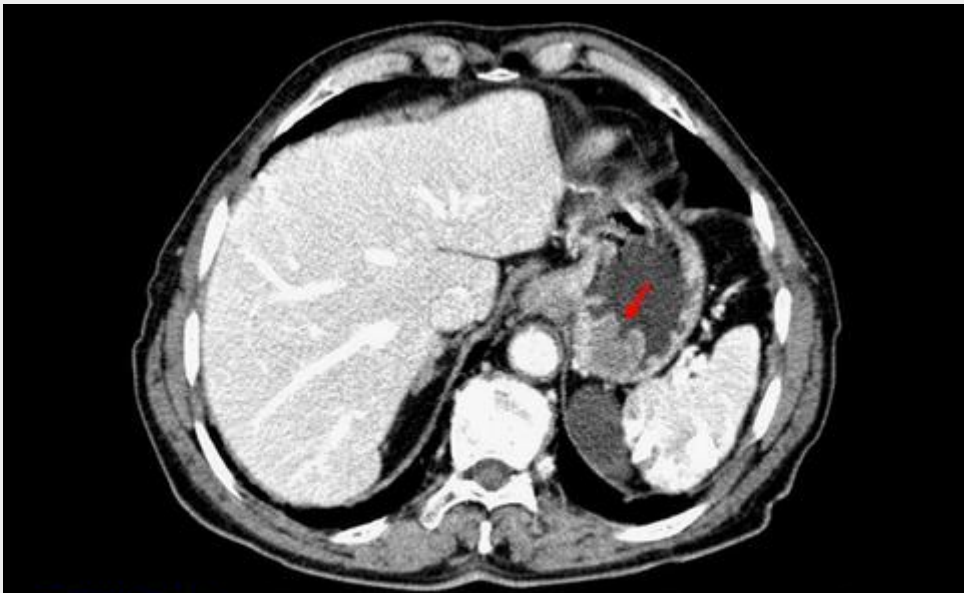


Figure 11b GIST. Post-contrast CT study. The mass enhances moderately and homogeneously. Note hyperenhancing mucosa covering the lesion, in accordance with its submucosal origin, except at its endoluminal pole, where an ulceration is found (→).

diapositivo51.jpg

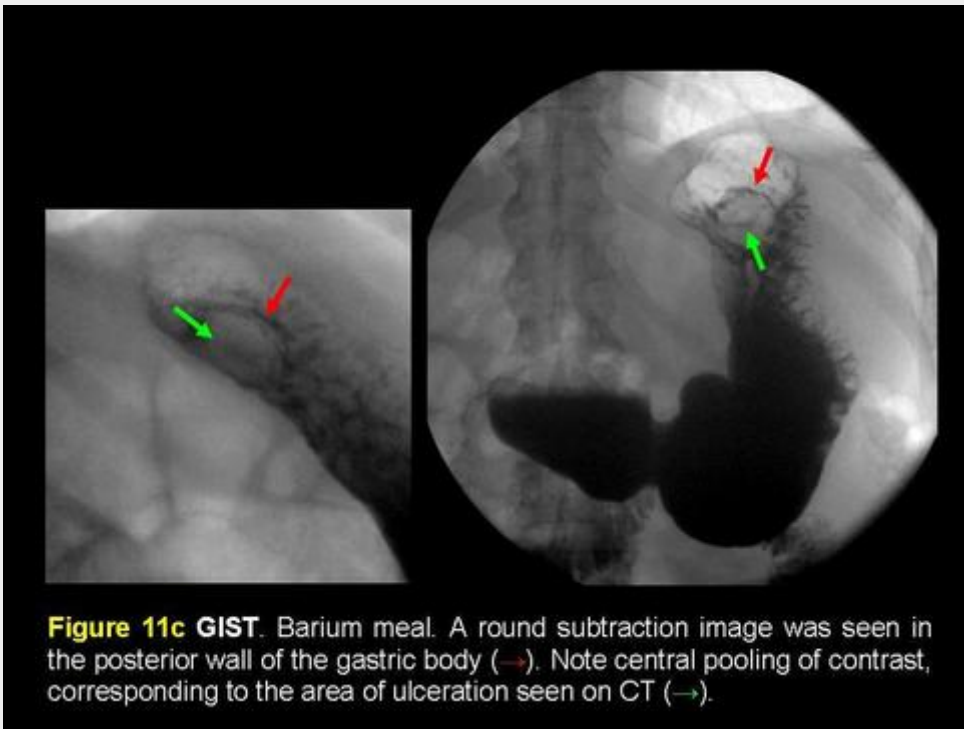


Figure 11c GIST. Barium meal. A round subtraction image was seen in the posterior wall of the gastric body (→). Note central pooling of contrast, corresponding to the area of ulceration seen on CT (→).

diapositivo52.jpg

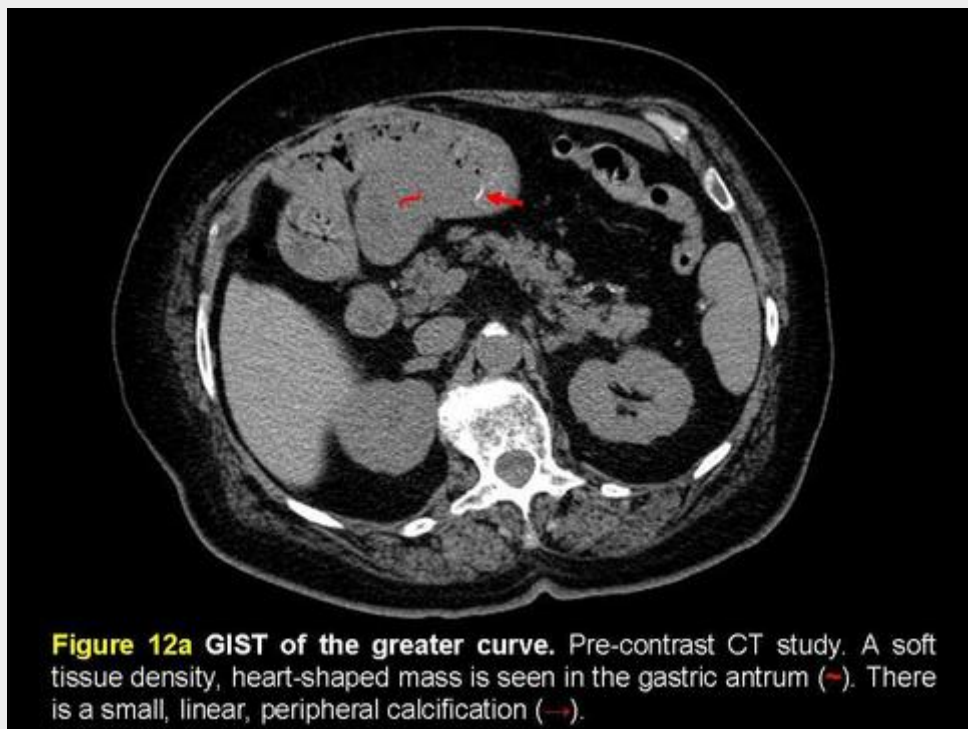


Figure 12a GIST of the greater curve. Pre-contrast CT study. A soft tissue density, heart-shaped mass is seen in the gastric antrum (→). There is a small, linear, peripheral calcification (→).

diapositivo54.jpg

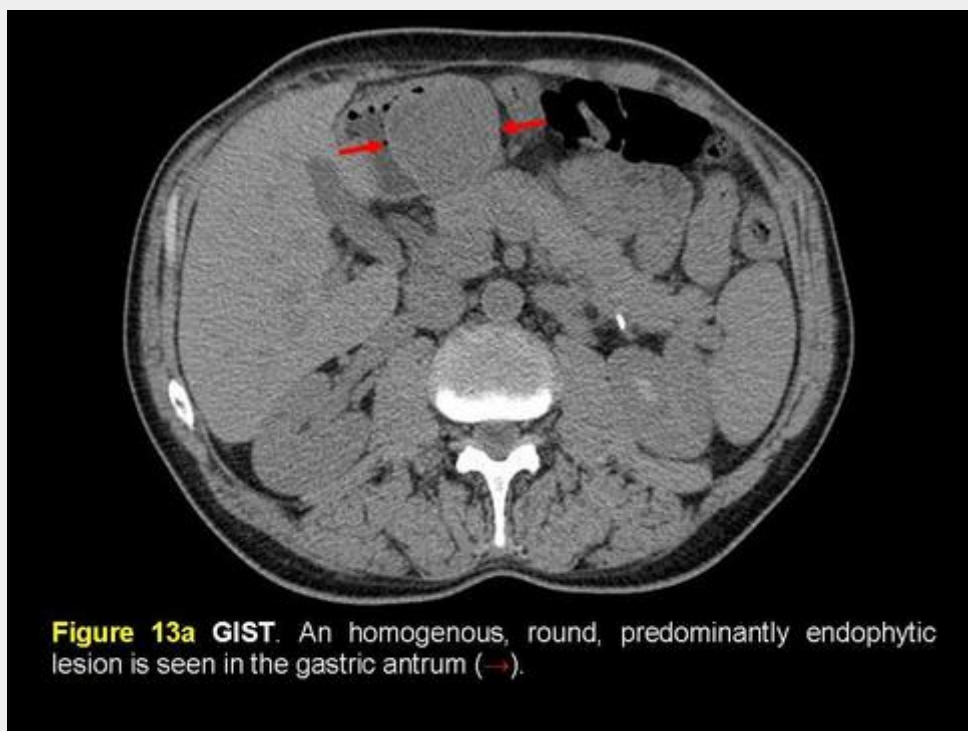


Figure 13a GIST. An homogenous, round, predominantly endophytic lesion is seen in the gastric antrum (→).

diapositivo55.jpg



Figure 13b GIST. The lesion enhances heterogeneously after IV contrast (→).

diapositivo56.jpg

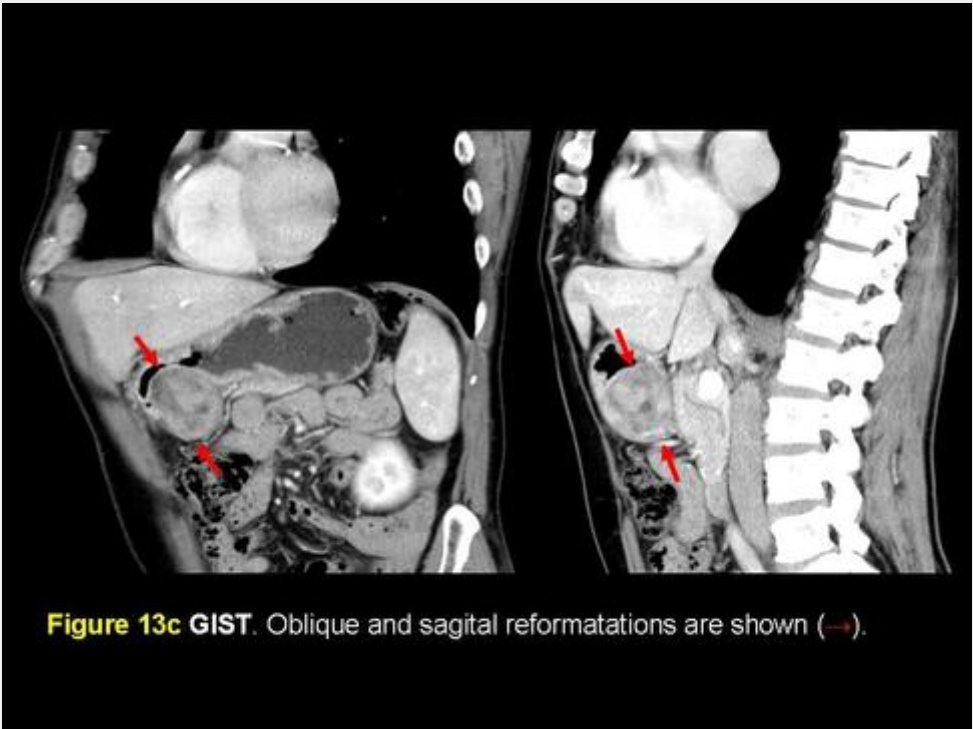


Figure 13c GIST. Oblique and sagittal reformations are shown (→).

diapositivo57.jpg



diapositivo58.jpg

LEIOMYOMA

Origin
Smooth muscle in the muscularis propria or muscularis mucosa

Epidemiology
Rare in the stomach (higher incidence in the esophagus)
Adult age

diapositivo60.jpg

LEIOMYOMA

CT findings

Round or oval solid hypodense homogeneous mass

Generally < 3 cm

Well defined margins

May be intramural or exhibit intra or extraluminal growth

May ulcerate or present areas of calcification

After IV contrast

May present a discrete homogeneous enhancement

Always enhances less than the mucosa

diapositivo61.jpg

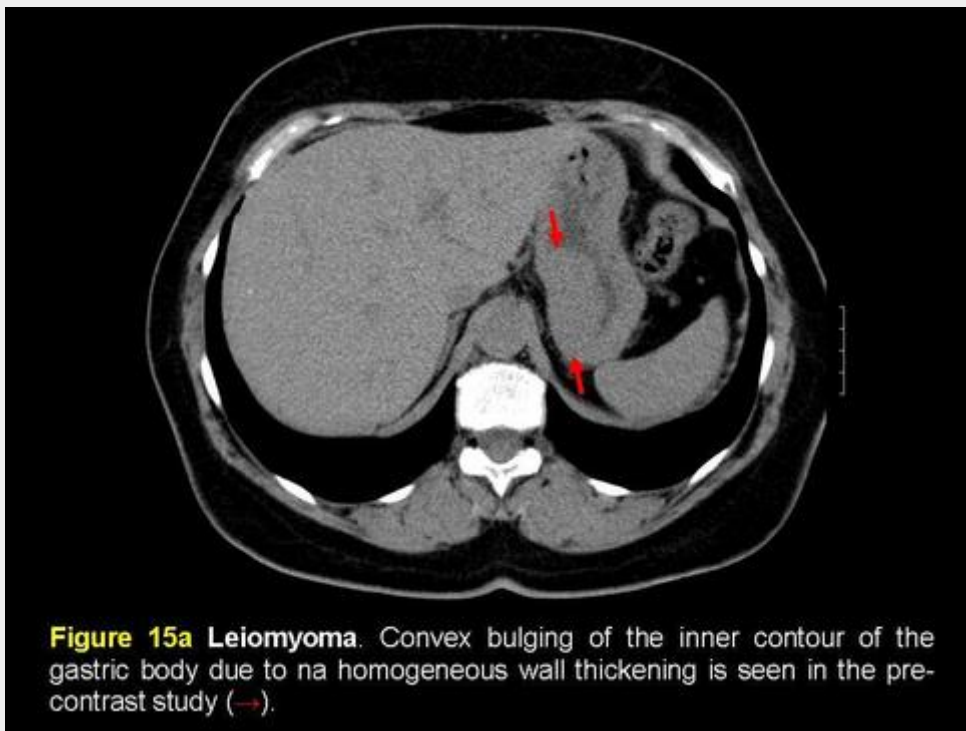


Figure 15a Leiomyoma. Convex bulging of the inner contour of the gastric body due to a homogeneous wall thickening is seen in the pre-contrast study (→).

diapositivo63.jpg

LIPOMA

Origin

Proliferation of mature adipose tissue enclosed in a fibrous capsule

Epidemiology

3% of all benign gastric tumors

5% of all gastrointestinal lipomas

May present with areas of ulceration ou cystic degeneration

diapositivo64.jpg

LIPOMA

Preferential Location

75% occurs as solitary lesions of the antrum

Clinical Presentation

When > 4 cm, may produce gastrointestinal bleeding, abdominal pain or obstruction due to ulceration or intussusception

diapositivo65.jpg

LIPOMA

CT imaging Findings

Well defined mass with homogeneous fat attenuation

After IV contrast

No significant enhancement

diapositivo69.jpg

LEIOMYOSARCOMA

Origin

Smooth muscle in the muscularis propria or muscularis mucosa

Epidemiology

Rare gastric tumor (1%)

Higher incidence in adult ♂ (2:1)

Average age at presentation - 56 Yo

diapositivo71.jpg

LEIOMYOSARCOMA

CT findings

Solid hypoattenuating, homogenous or heterogeneous, > 5 cm, mass

Exophytic growth

May become superinfected, ulcerate or fistulize

May present with necrotic areas or calcifications

May invade surrounding organs such as liver, spleen and pancreas

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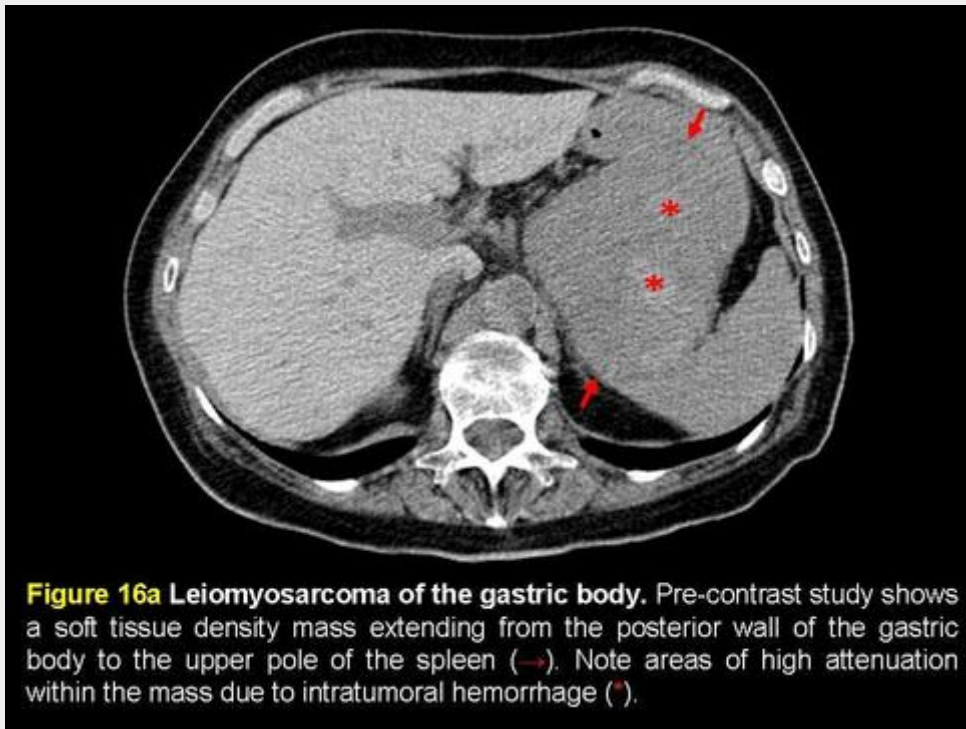
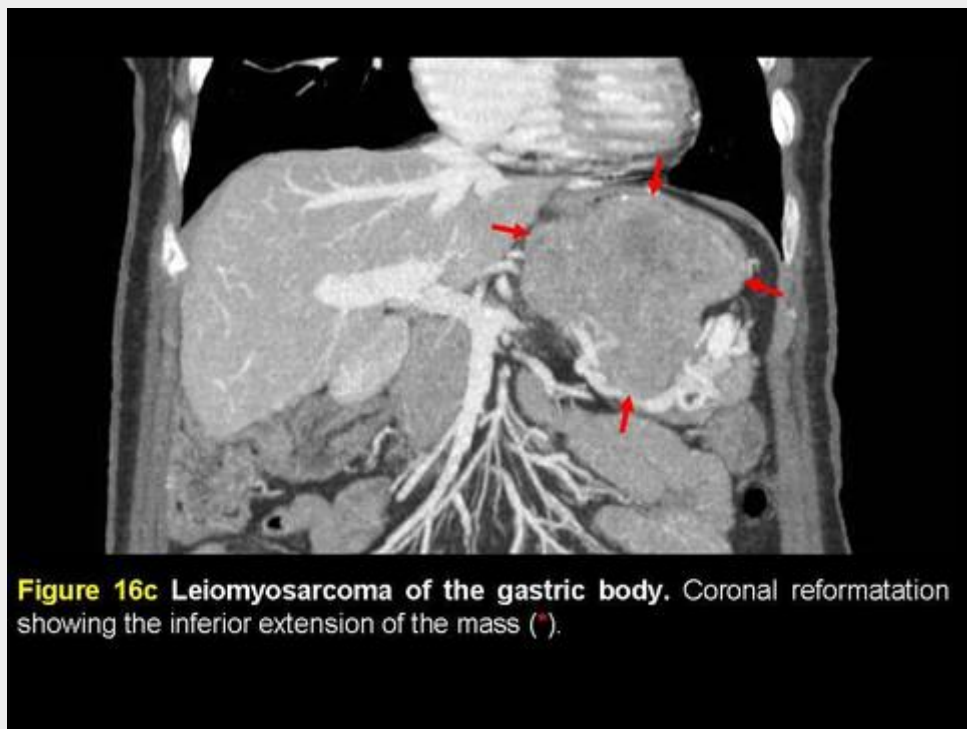


Figure 16a Leiomyosarcoma of the gastric body. Pre-contrast study shows a soft tissue density mass extending from the posterior wall of the gastric body to the upper pole of the spleen (→). Note areas of high attenuation within the mass due to intratumoral hemorrhage (*).

diapositivo75.jpg



diapositivo80.jpg

HETEROTOPIC PANCREAS

Origin

Pancreatic tissue remnants, with all pancreatic tissue components

Epidemiology

Present in 0.6 to 14 % of autopsies

Present in 1 in every 500 gastric surgical specimens

Higher incidence in ♂, 40-60 Yo

diapositivo82.jpg

HETEROTOPIC PANCREAS

CT findings

Oval or rounded, well-defined mass measuring 1 to 3 cm

Smooth or lobulated margins

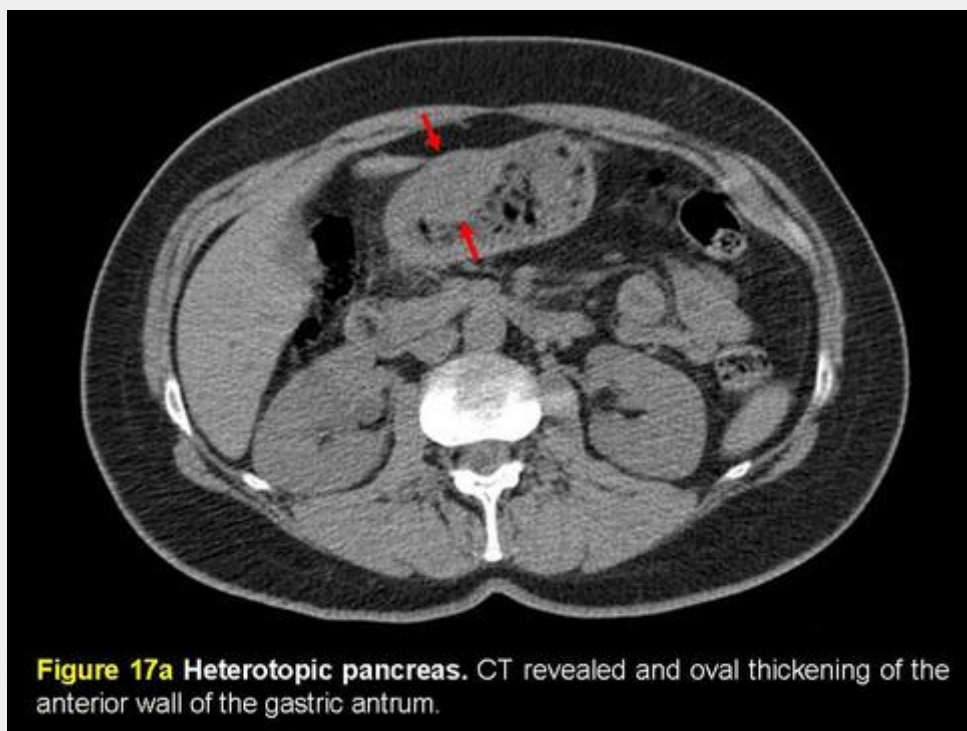
Central umbilication (20 to 40%)

May present with cystic areas

After IV contrast

Intense enhancement \approx pancreas

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diapositivo85.jpg

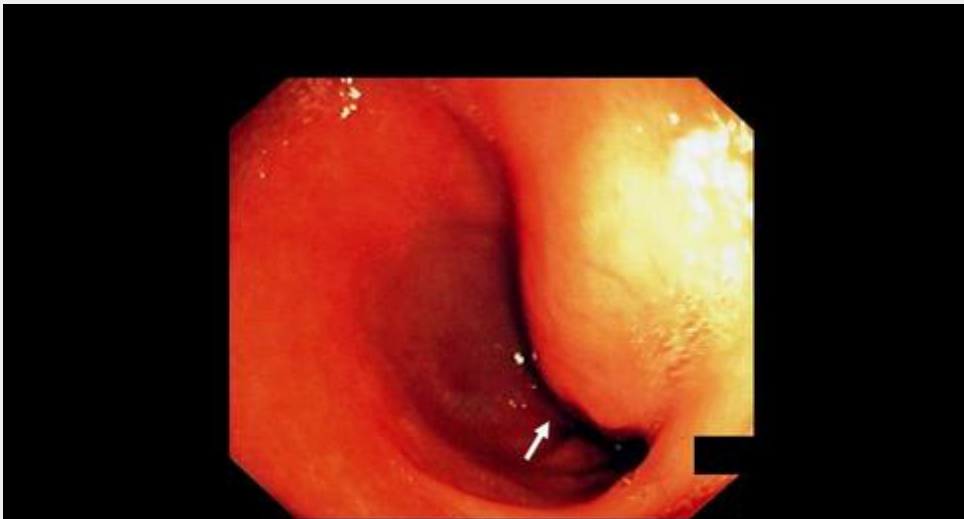


Figure 17c Heterotopic pancreas. Endoscopy showed an oval deformity of the anterior surface of the gastric antrum overlaid with normal looking mucosa except for a small depression at its apex (→) which could correspond to an ulceration or to the draining orifice of a rudimentary pancreatic duct.

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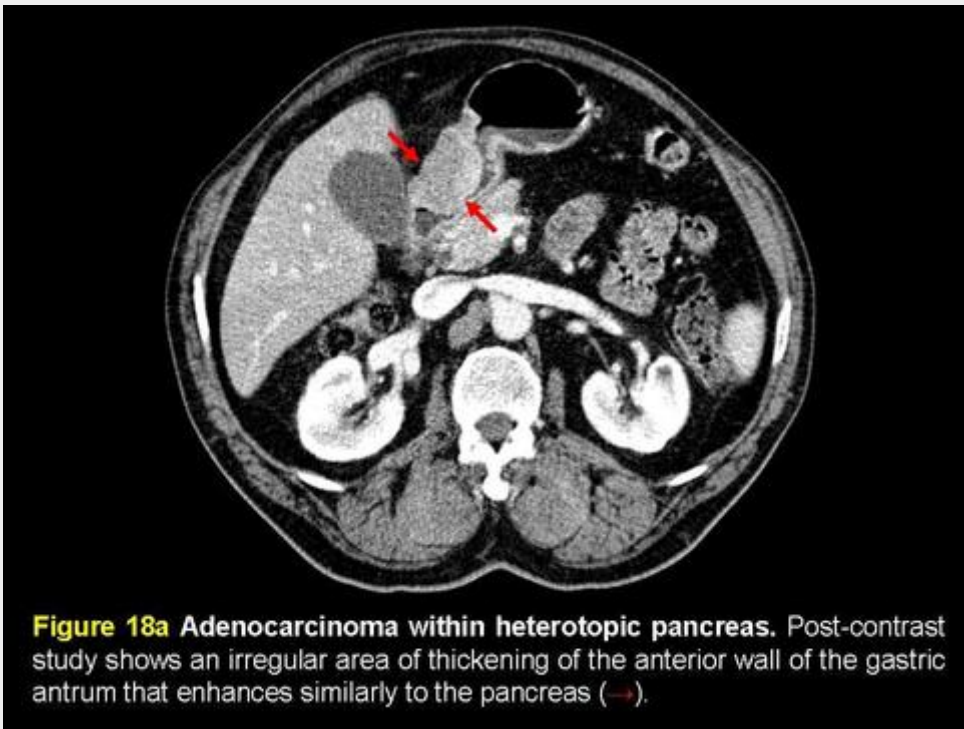


Figure 18a Adenocarcinoma within heterotopic pancreas. Post-contrast study shows an irregular area of thickening of the anterior wall of the gastric antrum that enhances similarly to the pancreas (→).

diapositivo88.jpg

INFLAMMATORY FIBROID POLYP

Origin

Pseudotumor with an allergic or inflammatory origin

Epidemiology

Rare

80% of all gastrointestinal fibroid inflammatory polyps are located in the stomach

diapositivo89.jpg

INFLAMMATORY FIBROID POLYP

Preferential location

Antrum

Clinical presentation

Most are asymptomatic

May cause anemia, gastrointestinal bleeding, abdominal pain, vomiting, weight loss, obstruction or intussusception

diapositivo90.jpg

INFLAMMATORY FIBROID POLYP

CT findings

Solid, soft tissue density, submucosal mass

May be sessile or pedunculated, resembling mucosal masses on precontrast study

After IV contrast

May present peripheral and central scattered areas of enhancement

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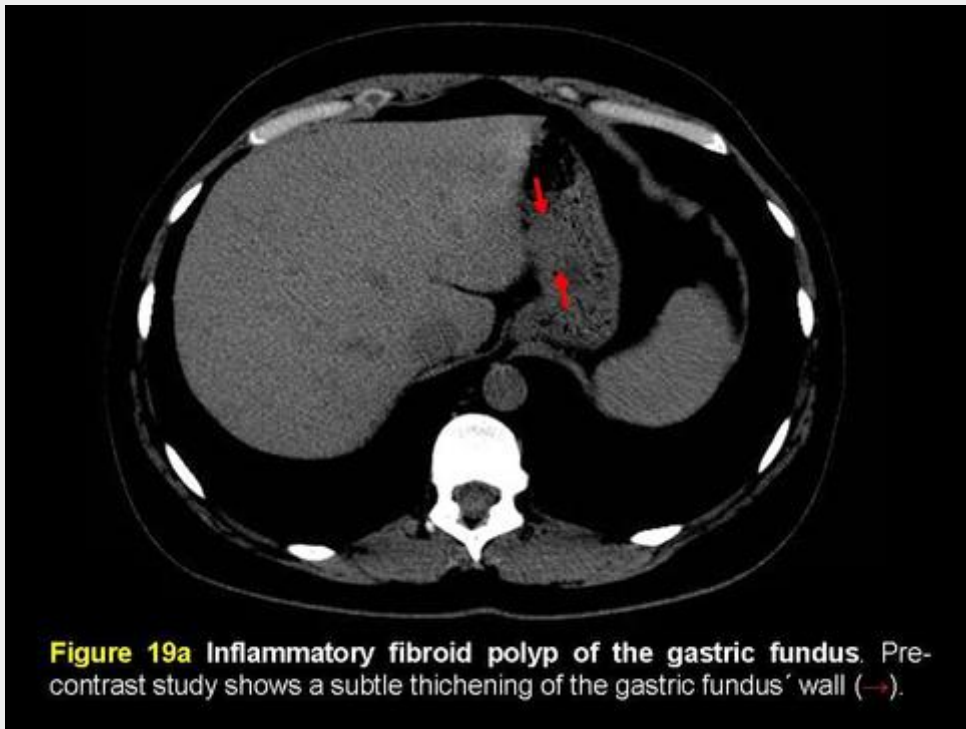
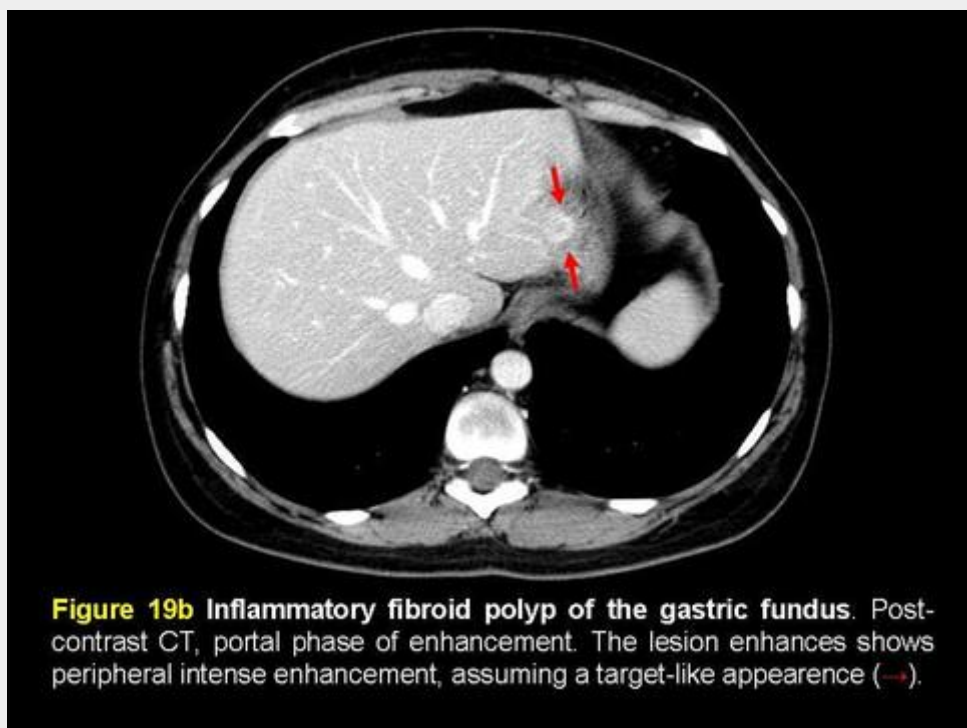
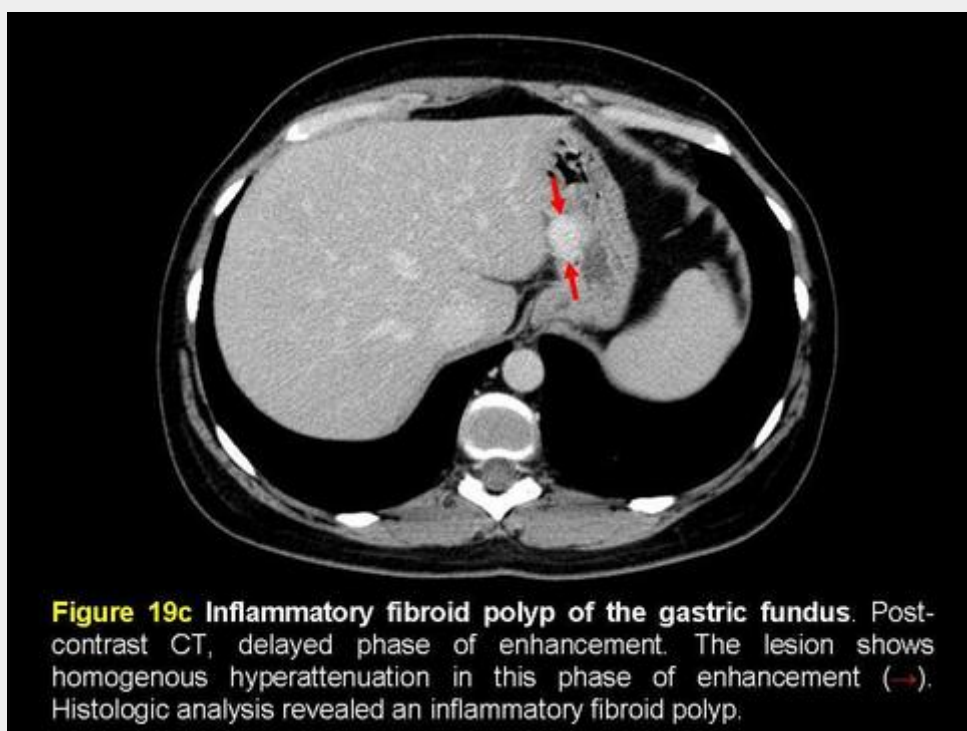


Figure 19a Inflammatory fibroid polyp of the gastric fundus. Pre-contrast study shows a subtle thickening of the gastric fundus' wall (→).

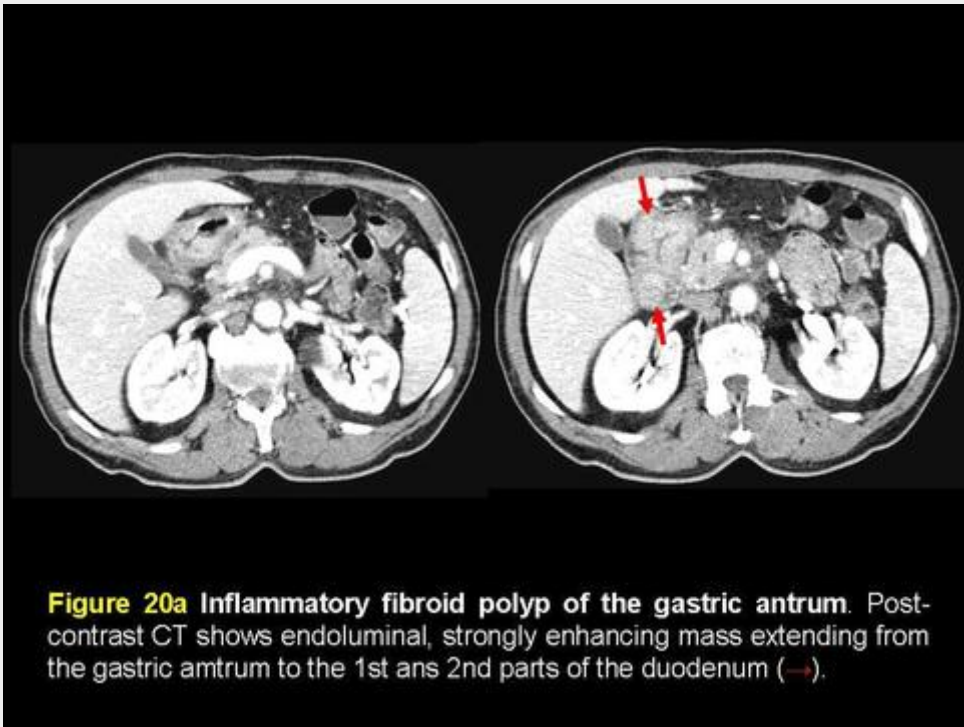
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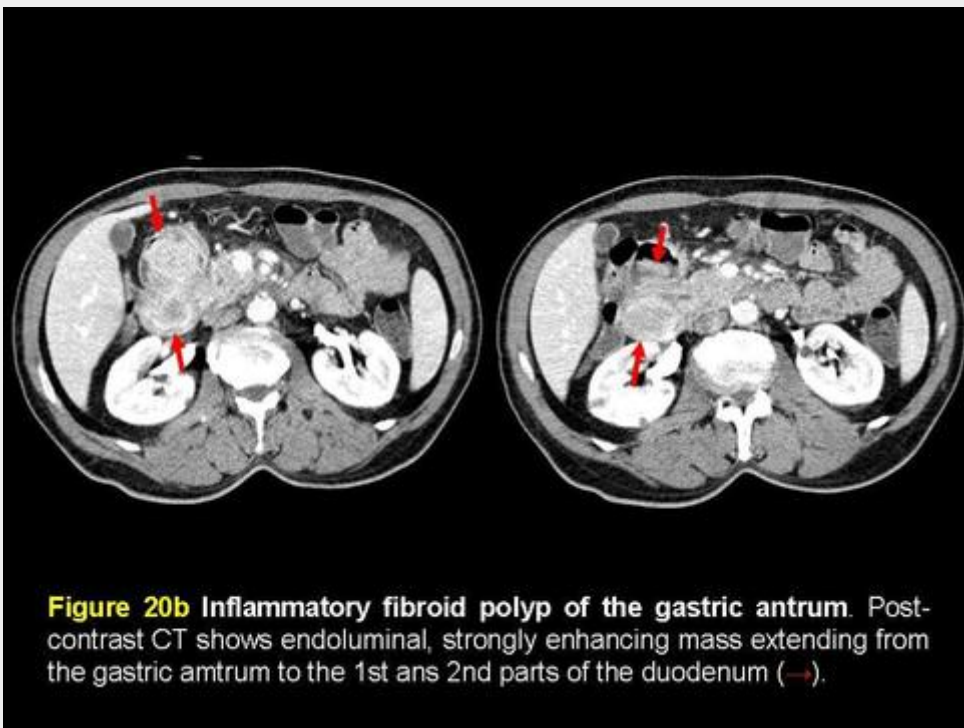
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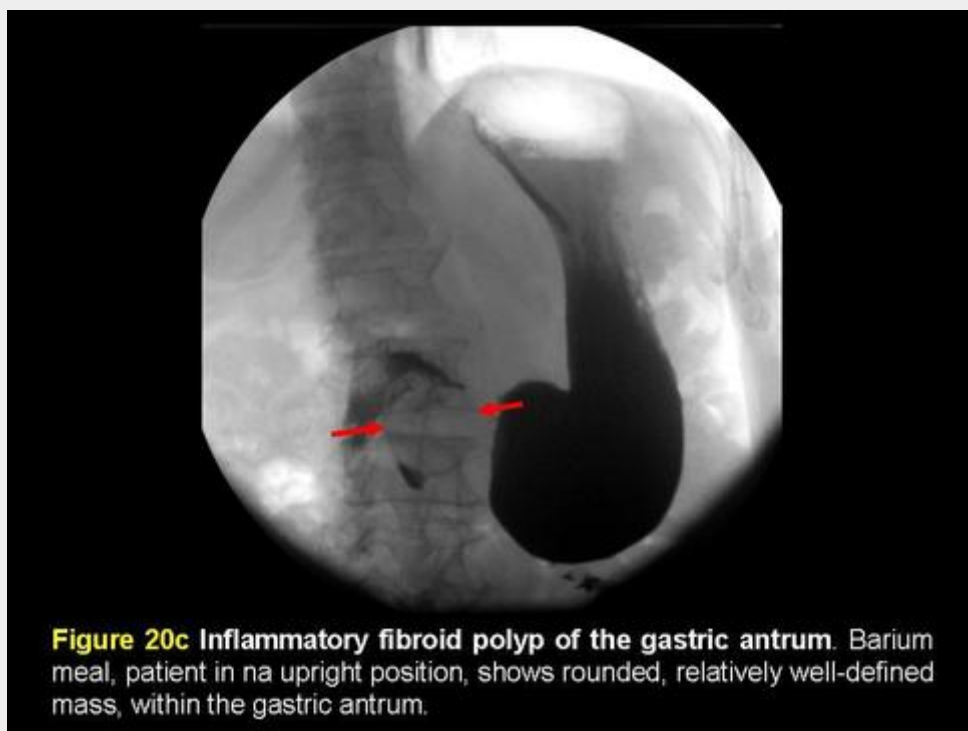


Figure 20c Inflammatory fibroid polyp of the gastric antrum. Barium meal, patient in an upright position, shows rounded, relatively well-defined mass, within the gastric antrum.

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Figure 20d Inflammatory fibroid polyp of the gastric fundus. Barium meal, supine position, showing prolapse of the antral mass into the 1st and 2nd parts of the duodenum.

diapositivo99.jpg

DUPLICATION CYST

Origin

Congenital malformation than may involve any segment of the gastrointestinal tract

Epidemiology

Rare

Higher incidence in children (mean age – 3 Yo)

Higher incidence in the small bowel

4% located in the stomach

diapositivo100.jpg

DUPLICATION CYST

Preferential location

Greater curve, particularly the antrum

Clinical presentation

Most are asymptomatic

May cause abdominal pain, vomiting, weight loss

Rarely, recurrent pancreatitis, intracystic bleeding, infection or neoplasm may occur.

diapositivo101.jpg

DUPLICATION CYST

CT findings

Homogeneous, water-attenuation, well-defined lesion

Thick, regular wall

After IV contrast

Enhancement of the wall

diapositivo107.jpg

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diapositivo109.jpg

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epithelial and submucosal lesions of the stomach - versao final.jpg

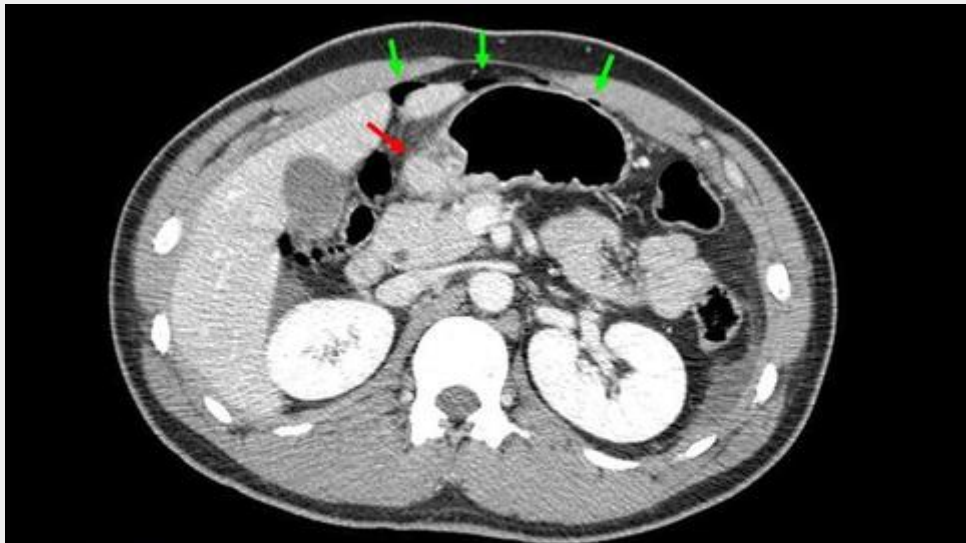


Figure 5b Gastric ulcer perforation. Abdominal CT shows focal hyperenhancing asymmetrical thickening of the gastric antrum (→) suggestive of malignancy. There was a small amount of free intraperitoneal air (→) compatible with perforation. There were, however, no signs of malignancy on the surgical biopsy's histologic analysis.

imaging findings.jpg

IMAGING FINDINGS

In this presentation, we will discuss and illustrate the CT imaging findings of gastric epithelial lesions, namely adenocarcinoma, and submucosal lesions, namely lymphoma, GIST, leiomyoma, lipoma, leiomyosarcoma, heterotopic pancreas, fibroid inflammatory polyp, hematoma and duplication cyst.

lipoma21.jpg

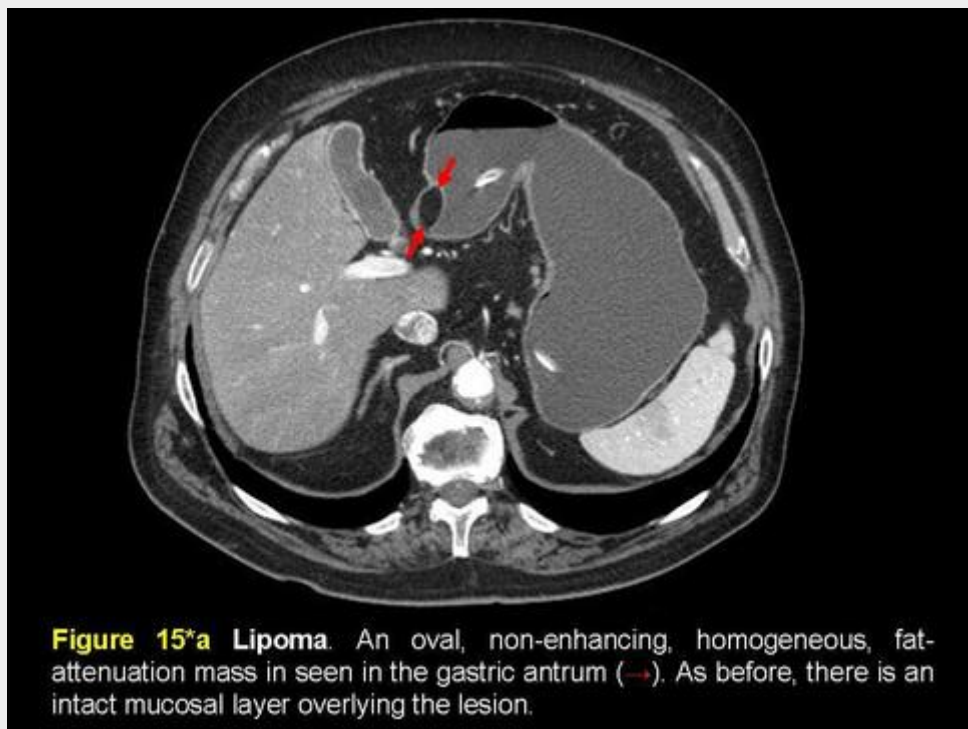


Figure 15*a Lipoma. An oval, non-enhancing, homogeneous, fat-attenuation mass is seen in the gastric antrum (→). As before, there is an intact mucosal layer overlying the lesion.

lipoma22.jpg

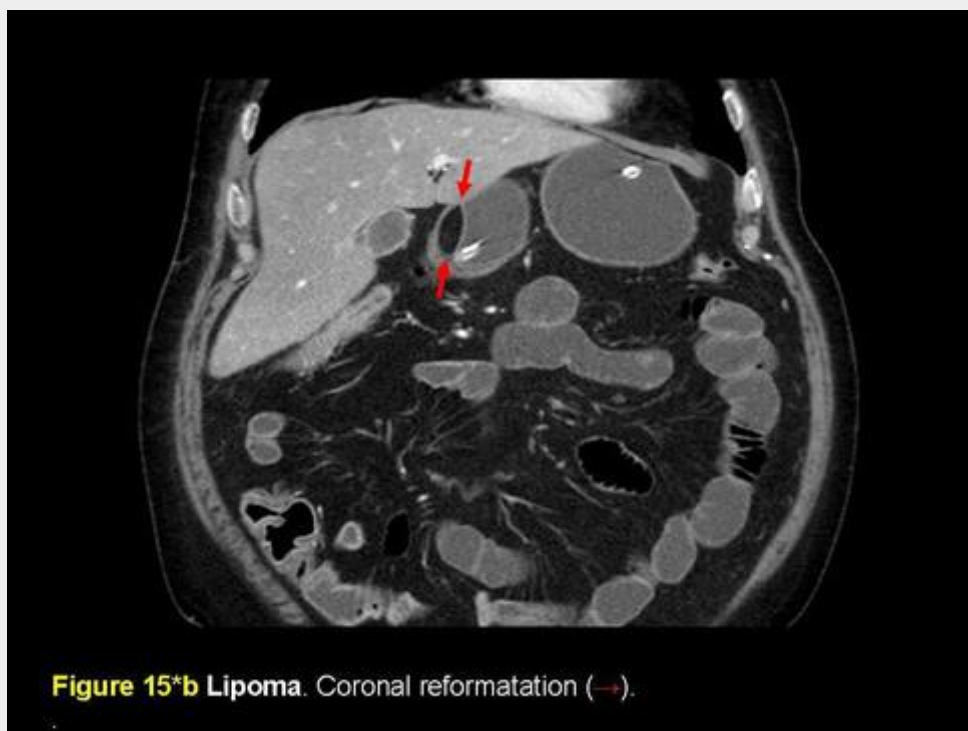
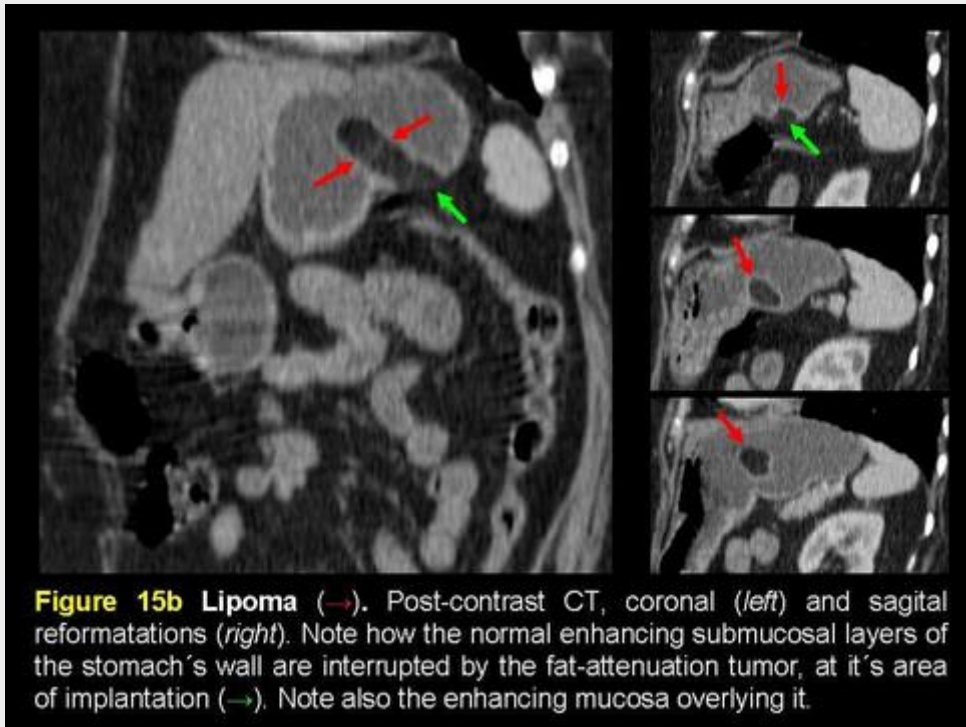
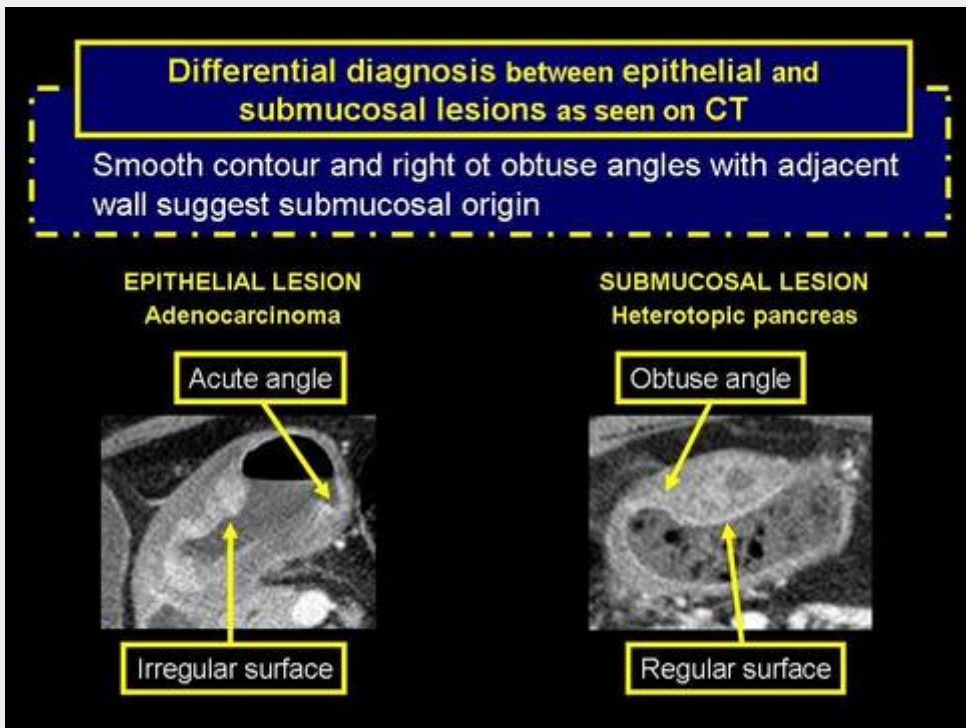


Figure 15*b Lipoma. Coronal reformatation (→).

lipomadiap2.jpg



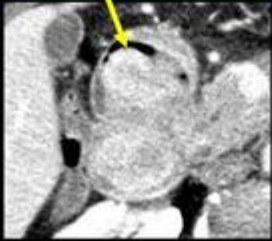
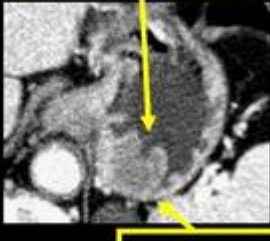
sÓ slides erradoslol.jpg



sÓ slides erradosloooool.jpg

Differential diagnosis between epithelial and submucosal lesions as seen on CT

There are many exceptions!

<p>SUBMUCOSAL LESION Inflammatory fibroid polyp</p> <p style="text-align: center;">Endophytic growth</p> 	<p>SUBMUCOSAL LESION Small GIST</p> <p style="text-align: center;">Endophytic growth</p> <p style="text-align: center;">Acute angle</p> 
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sÓ slides erradosloooooool.jpg

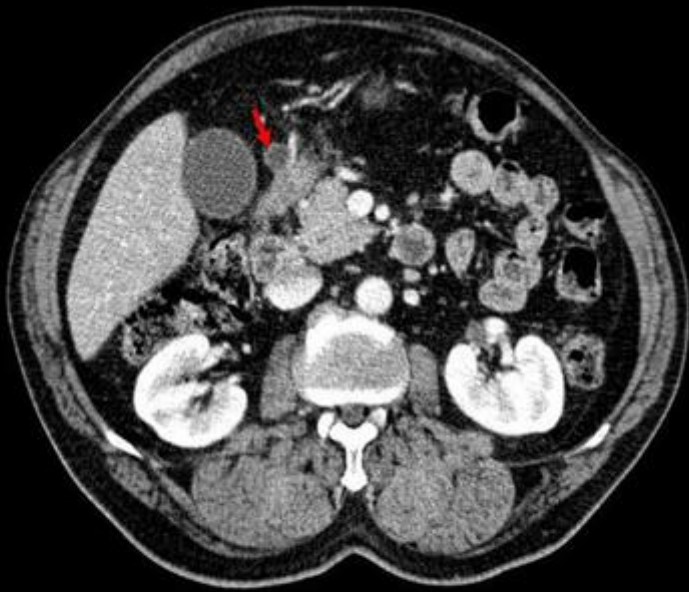


Figure 18b Adenocarcinoma within heterotopic pancreas. There was a peri-lesional lymphadenopathy (→). Histopathologic analysis revealed an adenocarcinoma within an ectopic pancreas.