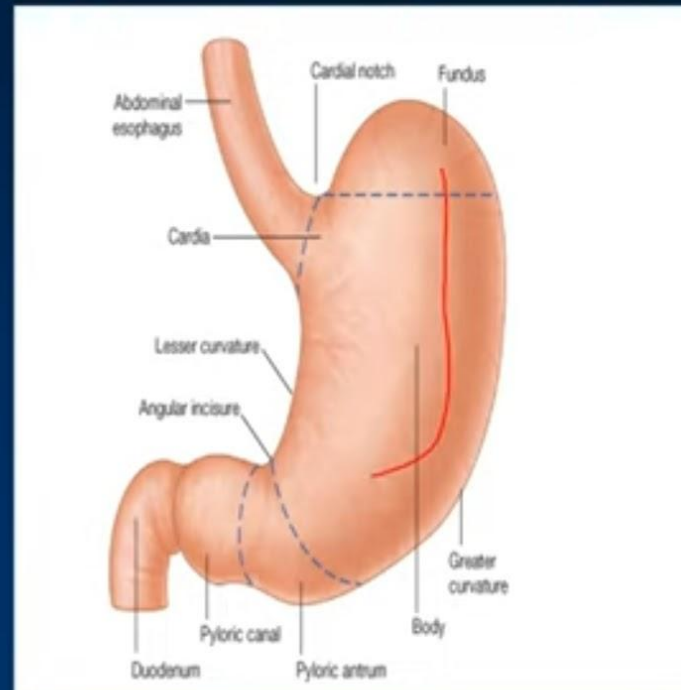
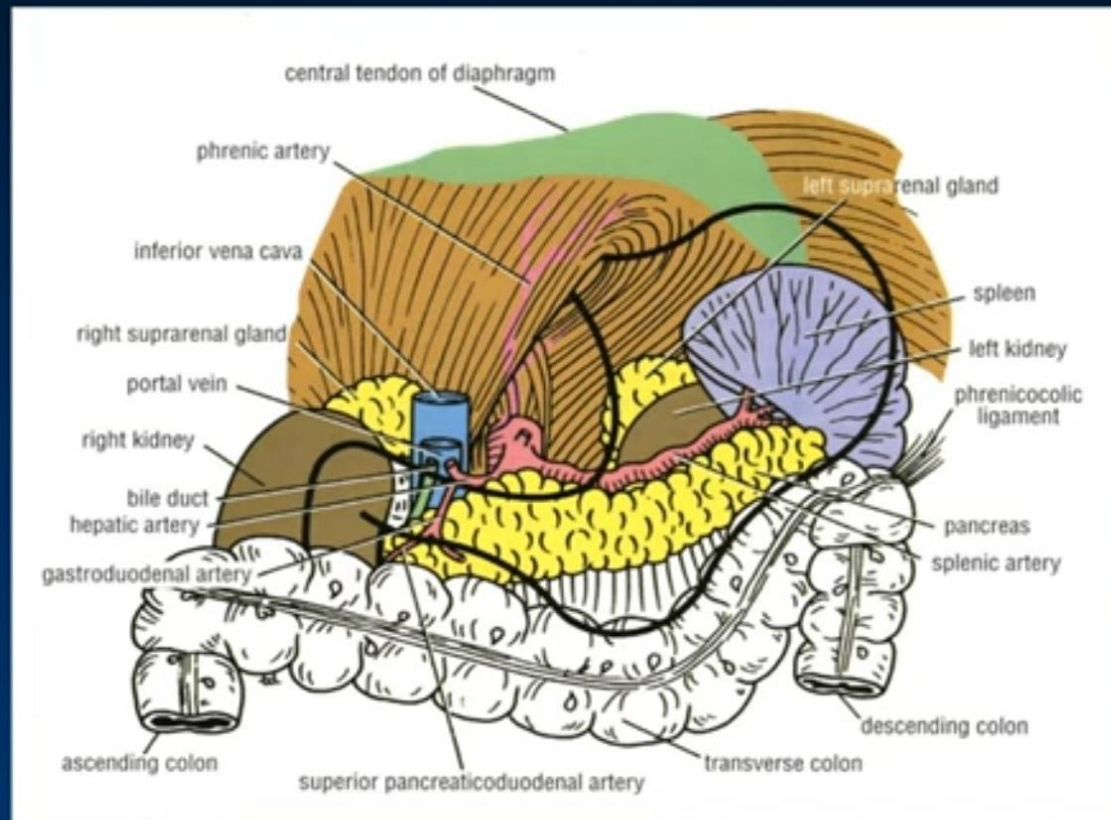


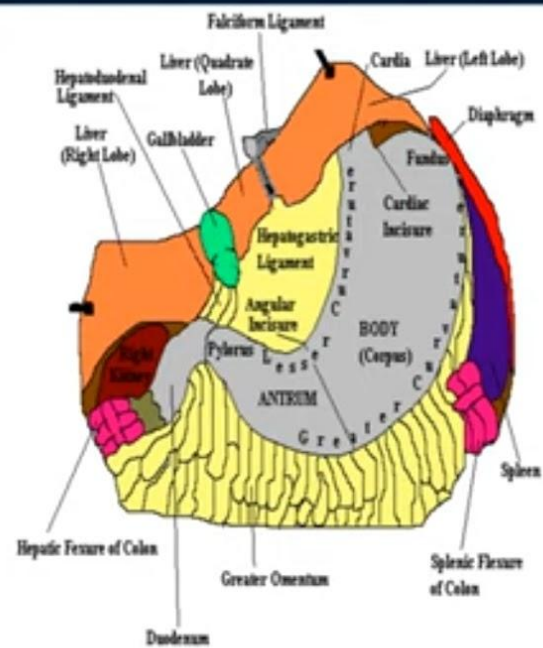
Dr. E. J. Arteen
F.R.C.S
General & Colorectal
Consultant Surgeon

STOMACH

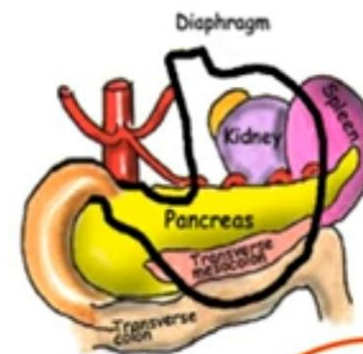
- It is roughly J shaped and has two openings, the cardiac and pyloric orifices.
- Two curvatures, the greater and lesser curvatures.
- Two surfaces, an anterior and a posterior surface.







STOMACH - RELATIONS



ANTERIOR

Abdominal wall
Left costal margin
Diaphragm
Left lobe of liver

SUPERIOR

Left dome of diaphragm

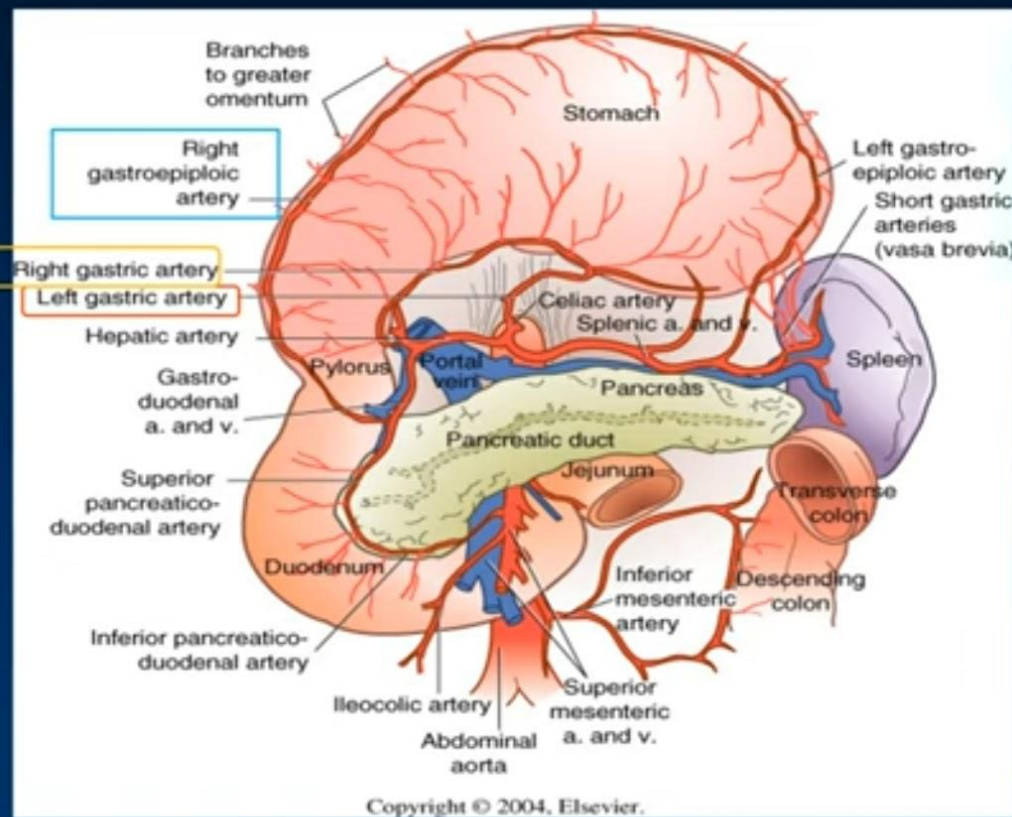
POSTERIOR

Lesser sac
Pancreas
Transverse mesocolon
Transverse colon
Left kidney/suprarenal gland
Spleen/splenic artery

BLOOD SUPPLY:

- a. The left gastric artery.
- b. Right gastric artery.
- c. Right gastro- epiploic artery.
- d. Left gastro- epiploic artery
- e. Short gastric arteries

The corresponding veins drain into portal system. The lymphatic drainage of the stomach corresponding its blood supply.



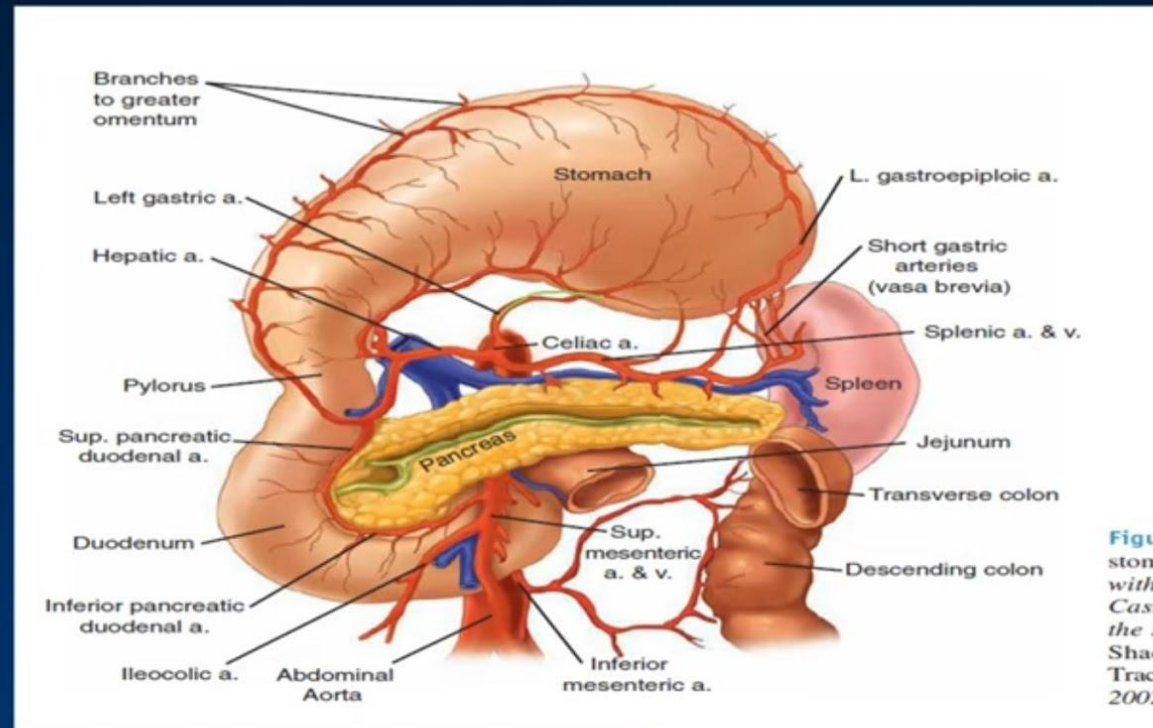
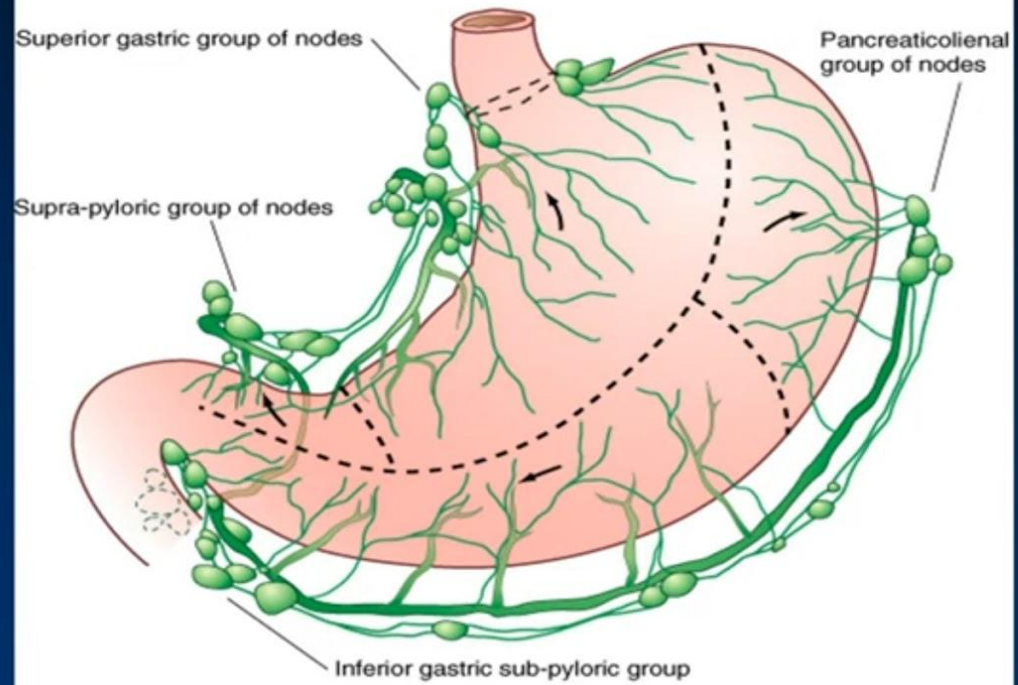
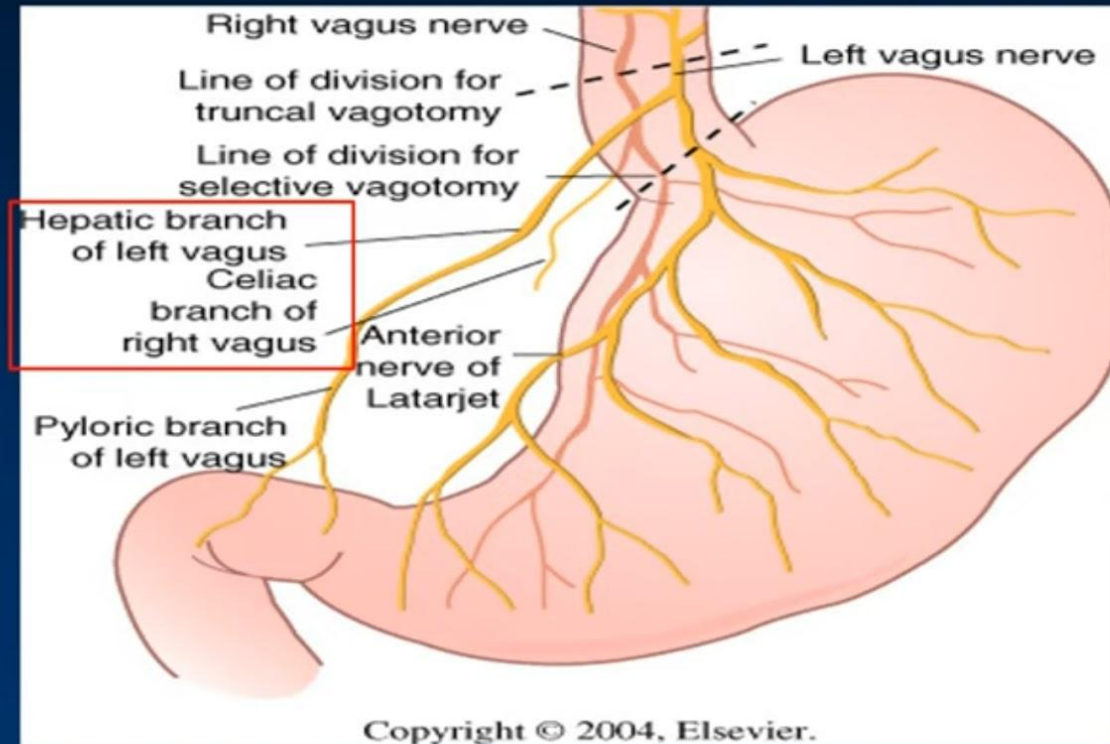


Figure 1
 Stomach
 with jejunum
 Castro
 the stomach
 Shack
 Tract,
 2002,

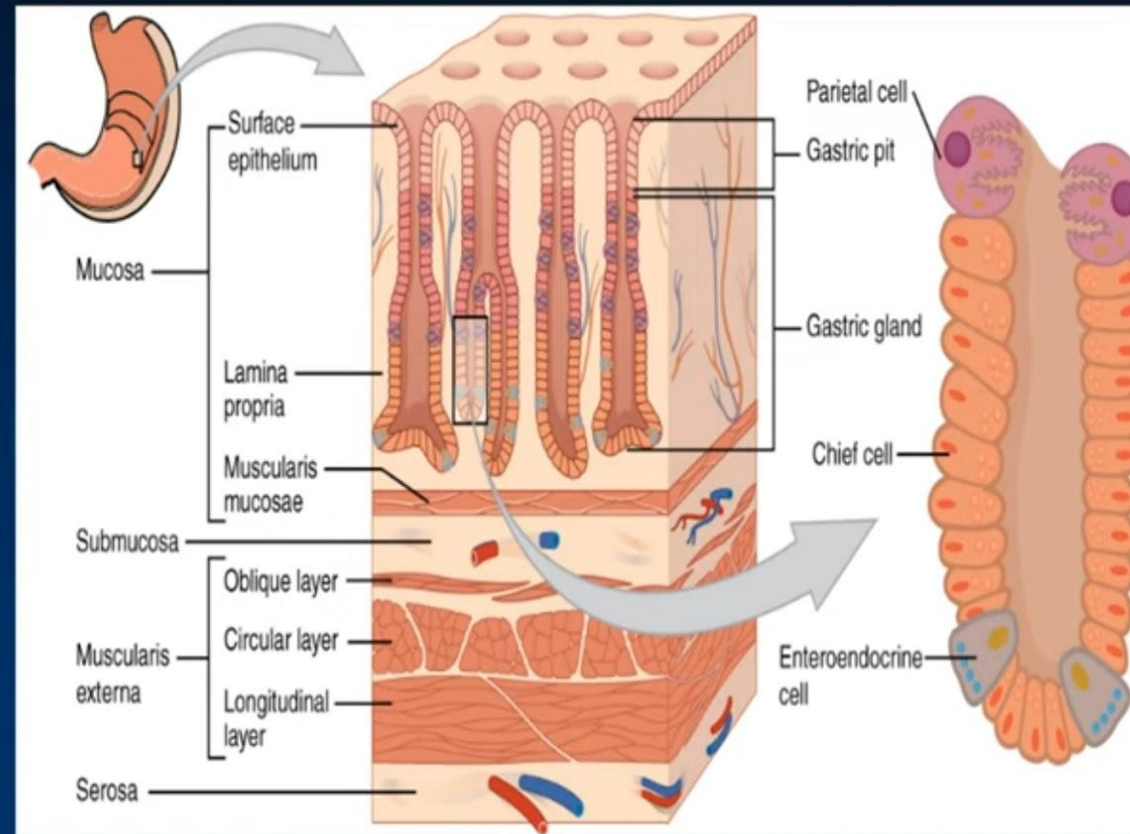


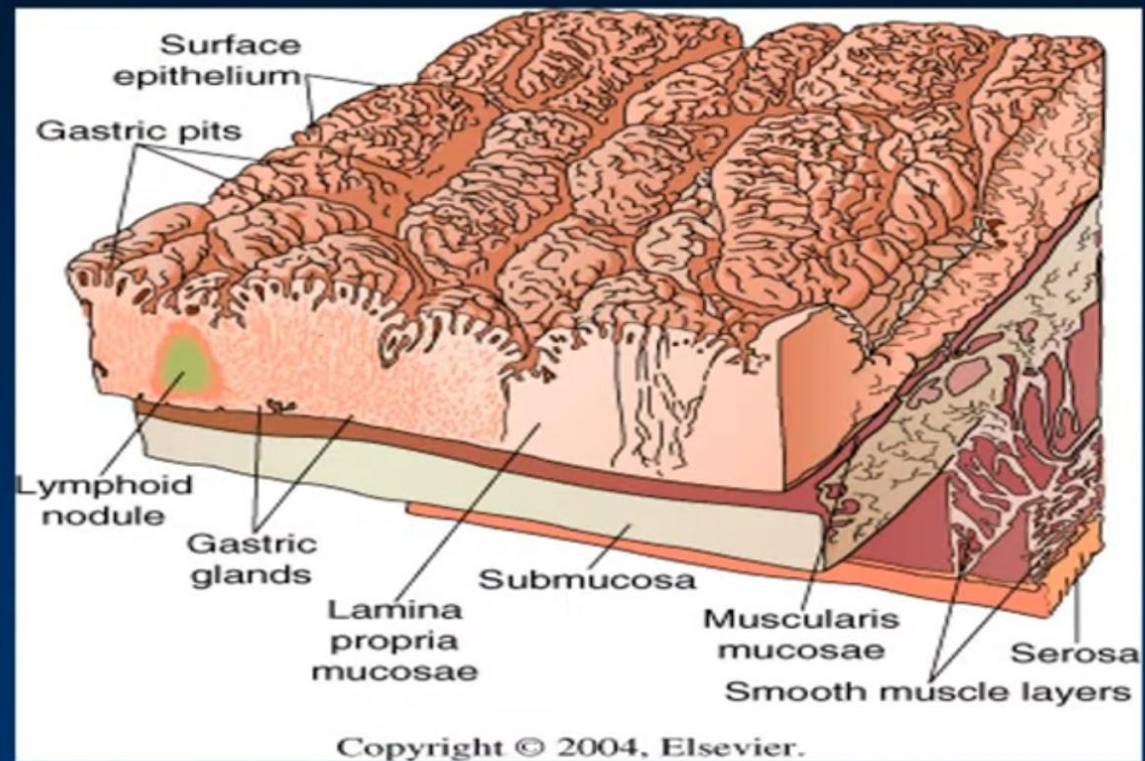
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Anatomy

- ***Stomach has five layers:***
 - **Mucosa:** Epithelium, Lamina propria, and Muscularis Mucosae.
 - Submucosa
 - Smooth muscle layer
 - Subserosa
 - Serosa





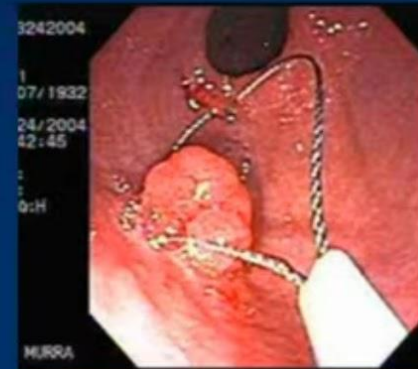
Gastric polyps

- Fundic gland polyps Most Common.
(Associated with long use of PPIs, FAP syndrome).
 - Metaplastic polyp (Hyperplastic) .
(Associated with H. pylori infection)
 - Inflammatory polyps.
 - Hamartomatous polyps.
 - Familial polyposis syndrome.
- Premalignant polyps
- Adenoma (10% of polypoid lesions.)
 - All G polyps should be Bx.
 - All polyps above 1cm should be removed.

Gastric polyps



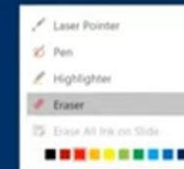
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Carcinoma of the stomach

Epidemiology

- Stomach cancer is the Fifth most common cancer worldwide .
- Peak incidence in 70 s ,5% of stomach cancers occur in people less than 40 years .
- It is a disease with a high death rate.
- It is the leading cancer type in Japan ,Korea.
- Carcinoma of the distal stomach & body is most common in low socio-economic groups.



H.Pylori infection

Superficial gastritis

Atrophic gastritis

Intestinal metaplasia

Dysplasia

Cancer



Carcinoma of the stomach

Aetiology

- *H. pylori is the main risk factor in 65–80% of Gastric Cancers , EB virus.*

Risk is increased with

- Autoimmune atrophic gastritis(Achlorhydria).
- Intestinal metaplasia.
- Gastric polyps.
- Smoking increase the risk nearly twice , alcohol.
- Diet : Smoked food , Salted fish , Meat & Pickled vegetables.
- Gastric remnants.
- Blood group A ,Family history 10% ,Race.

Gastric Carcinoma:

Risk Factors

Predisposing :

1. Pernicious anemia & atrophic gastritis (achlorhydra)
2. Previous gastric resection
3. Chronic peptic ulcer (give rise to 1%)
4. Smoking.
5. Alcohol.

Environmental:

1. H.pylori infection
Sero(+)patients have 6-9 folds risk
2. low socioeconomic Status
3. Nationality (JAPAN)
4. Diet (prevention)

Genetic:

1. Blood group A
2. HNPCC:
Hereditary non-polyposis colon cancer.



Pathology

- Stomach cancers are overwhelmingly adenocarcinomas (95%).
- Aggressively invade the gastric wall .
- Around 4% of gastric malignancies are lymphomas.
- Carcinoids and Stromal Tumors GIST 1% .
- Proximal stomach is now the Most Common Site for Ca. in the west .
- Distal cancer Japan, still predominates, as it does in most of the rest of the world .

Pathology continue

■ Two Lauren Histology types

- Intestinal type

- M:F 2-1
- HLO infection
- Well differentiated
- Glandular muc origin
- Older people
- Distal tumors
- Early blood spread
- 5 y survival 20%

- Diffuse type

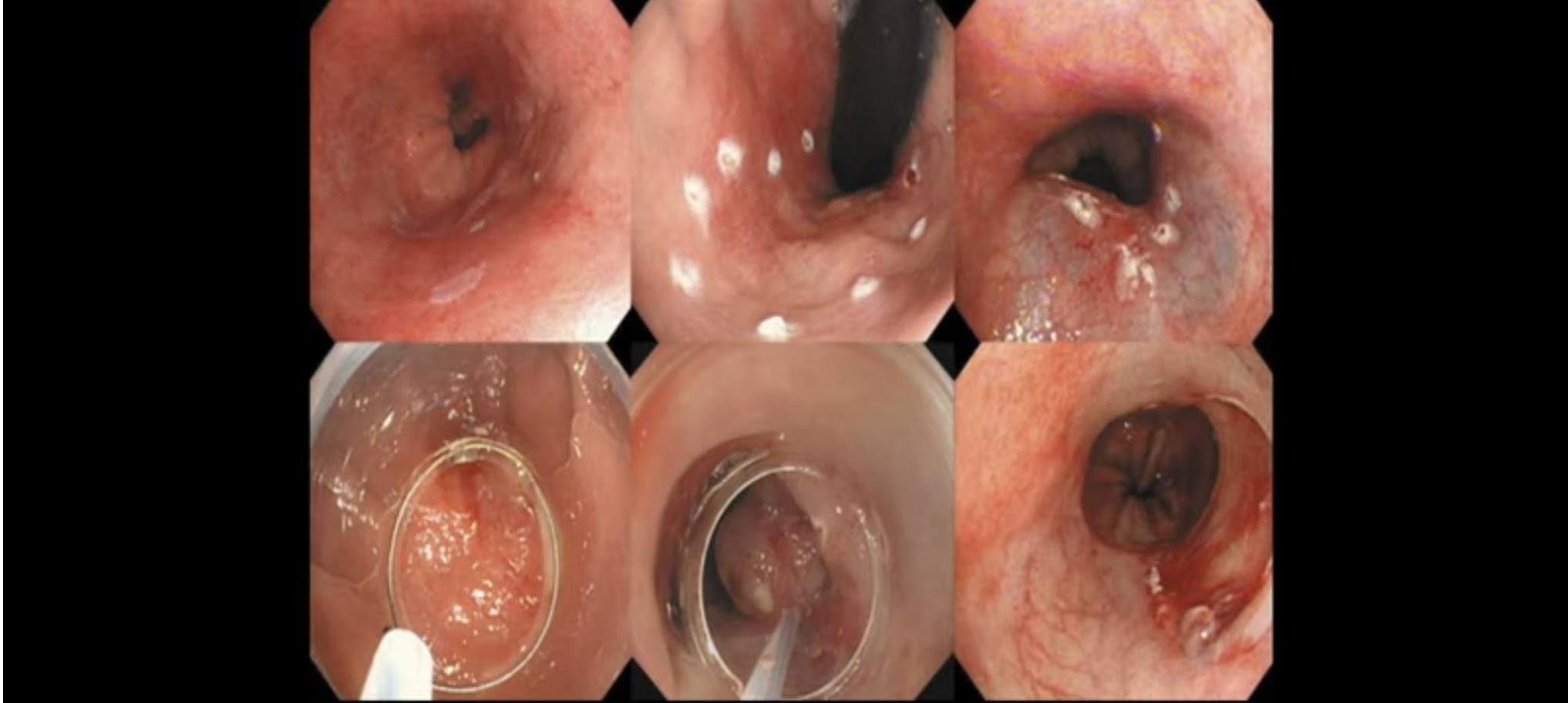
- More in women
- Blood group A
- Poorly differentiated
- lamina propria origin
- Younger people ,familial
- Proximal tumor
- Transmural extension and L I
- 10%

Diffuse type grow in infiltrative sub mucosal pattern.

Pathology

Early gastric cancer

- Cancer limited to the mucosa and sub mucosa regardless of lymph node status(T1, any N)
- Curable, and even early with lymph node involvement .
- 5-year survival rates around 90%.
- 30% of cases in Japan diagnosed early.

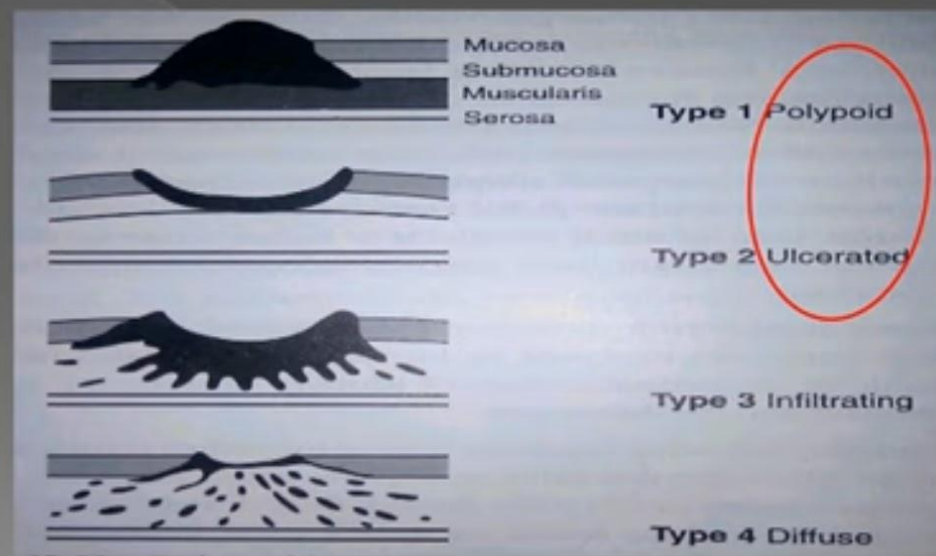


Pathology

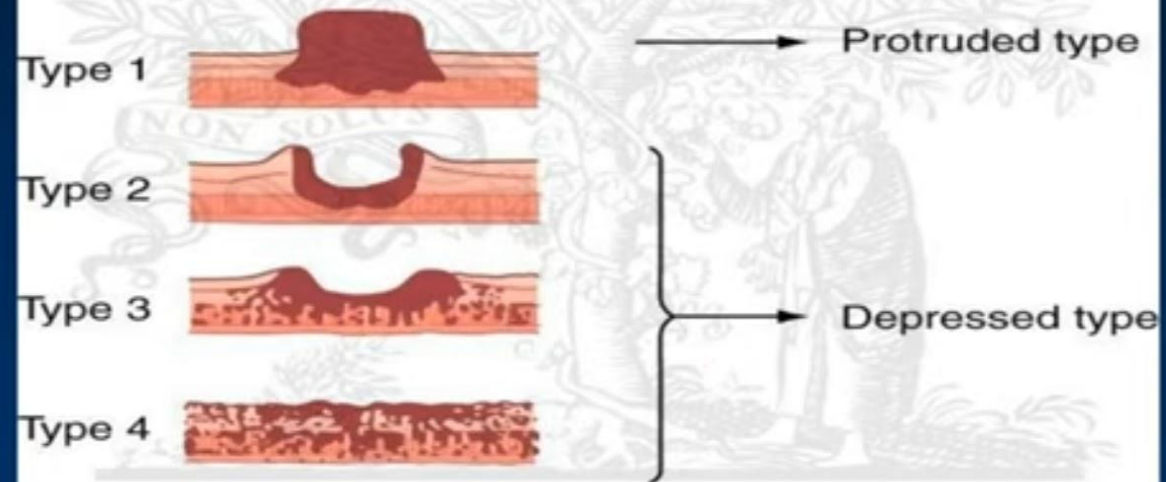
Advanced gastric

- Cancer involves the muscularis.
- Its macroscopic appearances have been classified by Bormann into four types
Types III and IV are commonly incurable.

Borrmann Classification



Borrmann's classification

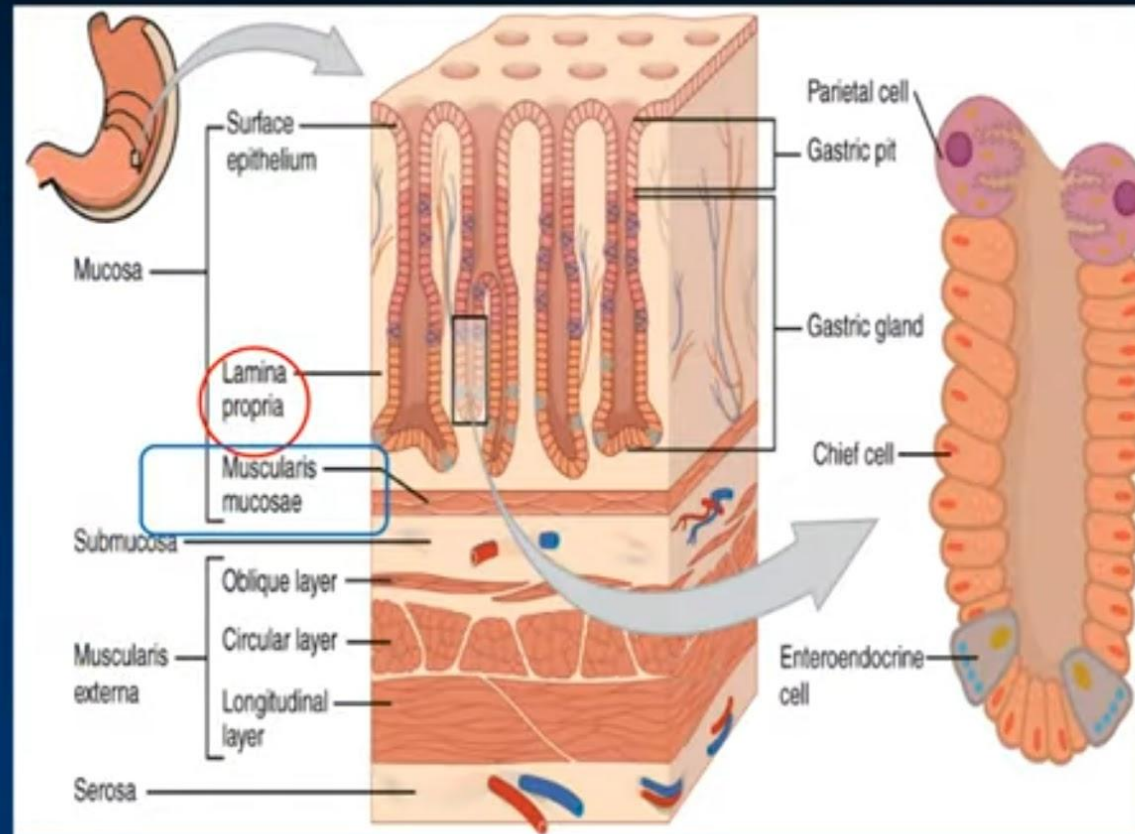


(Linitis Plastica), “Leather Bottle Stomach”



(UICC) staging of gastric cancer Union international cancer

- **T1** Tumor involves lamina propria
- **T2** Tumor invades Muscularis or Subserosa.
- **T3** Tumor involves serosa.
- **T4** Tumor invades adjacent organs.
- **N0** No lymph nodes.
- **N1** Metastasis in 1–2 regional nodes.
- **N2** Metastasis in 3–6 regional nodes.
- **N3** Metastasis in more than 7 LN.
- **M0** No distant metastasis.
- **M1** Distant metastasis (perit and distant LN).



Staging of gastric carcinoma

- Stage IA T1 N0 M0
- Stage IB T1 N1 M0 , T2 N0 M0
- Stage II T1 N2 M0
T2 N1 M0 , T3 N0 M0
- Stage IIIA T2 N2 M0
T3 N1 M0, T4 N0 M0
- Stage IIIB T3 N2 M0
- Stage IV T4 N1-3 M0
T1-3 N3 M0, Any T Any N M1

The 2002 AJCC TNM staging of gastric carcinoma

➤ Primary tumor (T)



- TX - Primary tumor (T) cannot be assessed
- T0 - No evidence of primary tumor
- Tis - Carcinoma in situ, intraepithelial tumor without invasion of lamina propria
- T1 - Tumor invades lamina propria or submucosa
- T2 - Tumor invades muscularis propria or subserosa
- T3 - Tumor penetrates serosa (ie, visceral peritoneum) without invasion of adjacent structures
- T4 - Tumor invades adjacent structures



TNM Staging Classification

T

(Tumor size and penetration)

N

(Cancer spread to nearby lymph nodes)

M

(Spread to other parts of the body—metastasis)

Tis: Tumor "in situ;" caught very early and has not grown beyond stomach lining.

T1: Tumor has grown through lining and into connective tissue.

T2: Tumor has grown into thick inner muscle.

T3: Tumor has spread through outer lining but not to any nearby organs or tissues.

T4: Tumor has spread into nearby tissues or organs.

N0: Cancer has not spread to nodes.

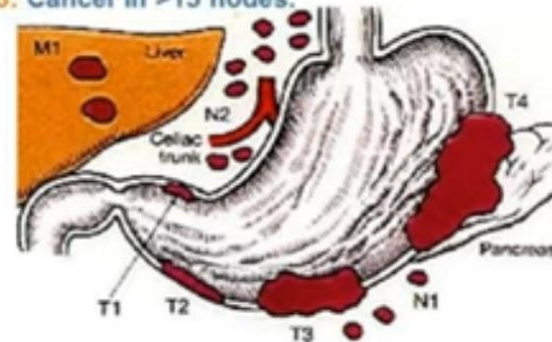
N1: Cancer in 1 to 6 nodes.

N2: Cancer in 7 to 15 nodes.

N3: Cancer in >15 nodes.

M0: No metastasis

M1: Metastasis



PROGNOSTIC FEATURES

2 important factors influencing survival in resectable gastric cancer:

- ❖ **depth of cancer invasion** ★
- ❖ **presence or absence of regional LN involvement**
- **5yrs survival rate:**
 - 10% in USA**
 - 50% in Japan**

Table 18.6 Examples of stages of gastric cancer and their prognosis

Stage	5-yr survival (%)
T ₁ N ₀ M ₀	95+
T ₁ N ₁ M ₀	70-80
T ₂ N ₁ M ₀	45-50
T ₃ N ₂ M ₀	15-25
M ₁	0-10

Pathology

Spread of Gastric Tumors

■ Direct Spread

The tumor penetrates the muscularis, → serosa adjacent organs such as the pancreas, colon and liver.

■ Lymphatic spread: permeation and emboli.

■ Blood-borne metastases: first to the liver

Then lungs & bone (usually after LN mets)

■ Trans-peritoneal spread Indicates Incurability

Tumor shelf, Krukenberg's tumors, Sister Joseph's nodule, Ascites.

Clinical features

- Stomach cancer is often Asymptomatic.
- May cause only Nonspecific Symptoms.
- Early: Dyspepsia , Heartburn , Loss of appetite, especially for meat, post prandial fullness.
- Late Cases: Upper abdo pain, nausea ,occasional vomiting, diarrhea or constipation ,Wt. loss, anemia & dysphagia , jaundice
- Virchow's node.
- Thrombophlebitis Trousseau's Syndrome.
- Sister Mary Josef's nodule.
- Irish nodule.

**Trousseau's syndrome
(Thrombophlebitis)**





- Positive **Trousseau sign** i.e. thrombophlebitis migrans.



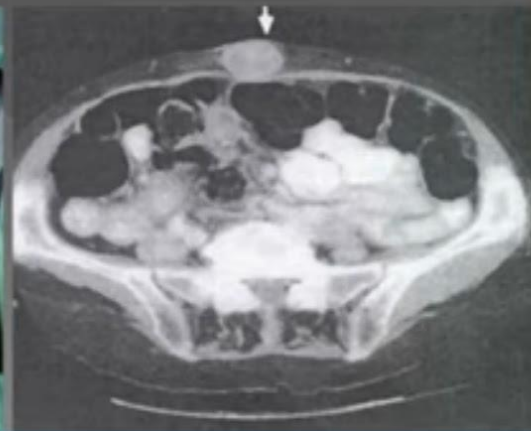
- Enlarged Left anterior axillary lymph nodes or **Irish nodes**.



- **Acanthosis nigricans**



Sister Mary Joseph's node







Acanthosis Nigracans

Virchow nodes



Investigations

- Full blood count.
- LFT, RFT.
- Serum tumor markers (CA 72-4 , CEA , CA 19-9) not specific.
- Stool examination for occult blood.
- CXR ,Bone scan.

Specific

- Gastroscopy (OGD)
- Ba Meal
- C-T , MRI ,US,EUS
- PET CT
- Diagnostic laparoscopy.

Prompt upper endoscopy if ...

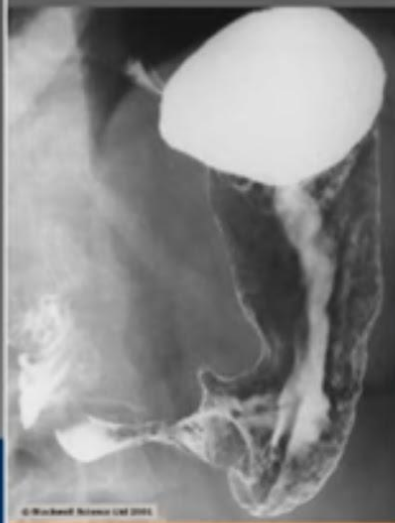
- New onset of dyspepsia > 45 years
- Dyspepsia with alarm symptoms (weight loss, anemia, recurrent vomiting, bleeding).
- Dyspepsia & family H/o gastric carcinoma.
- Gold standard for Diagnosis.





« Radiologic diagnosis

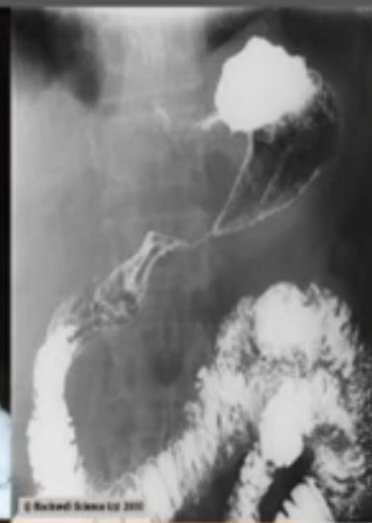
Distal GC

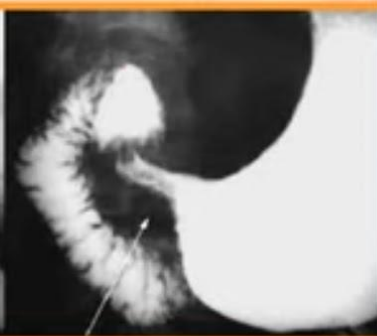
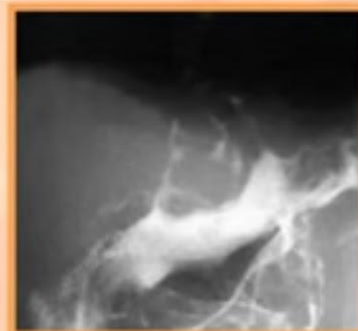
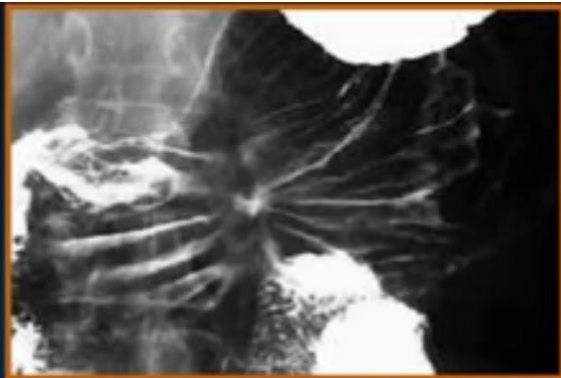


Proximal GC



Linitis plastica



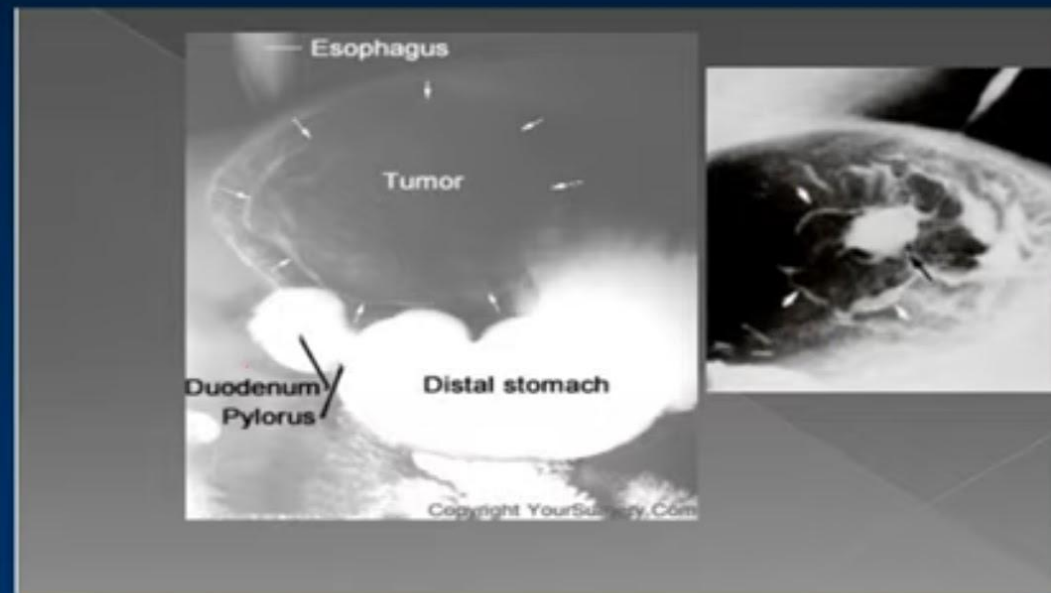


Gastric cancer

Stomach

← Duodenum

Barium x-ray



Preoperative Staging

- Abdominal / pelvic CT scanning.
- PET CT scan.
- Endoscopic ultrasound (EUS).
 - ◆ Depth of the Tumor
 - ◆ Enlarged perigastric/coeliac lymph nodes.
- Diagnostic laparoscopy.

Treatment

- Radical surgery for early disease.
(Curative Resection)
- Palliative surgery for *Incurable Disease.*
 - Hematogenous metastasis.
 - Involvement of the distant peritoneum.
 - N4 nodal disease .
 - Fixation to structures that *Cannot* be removed.

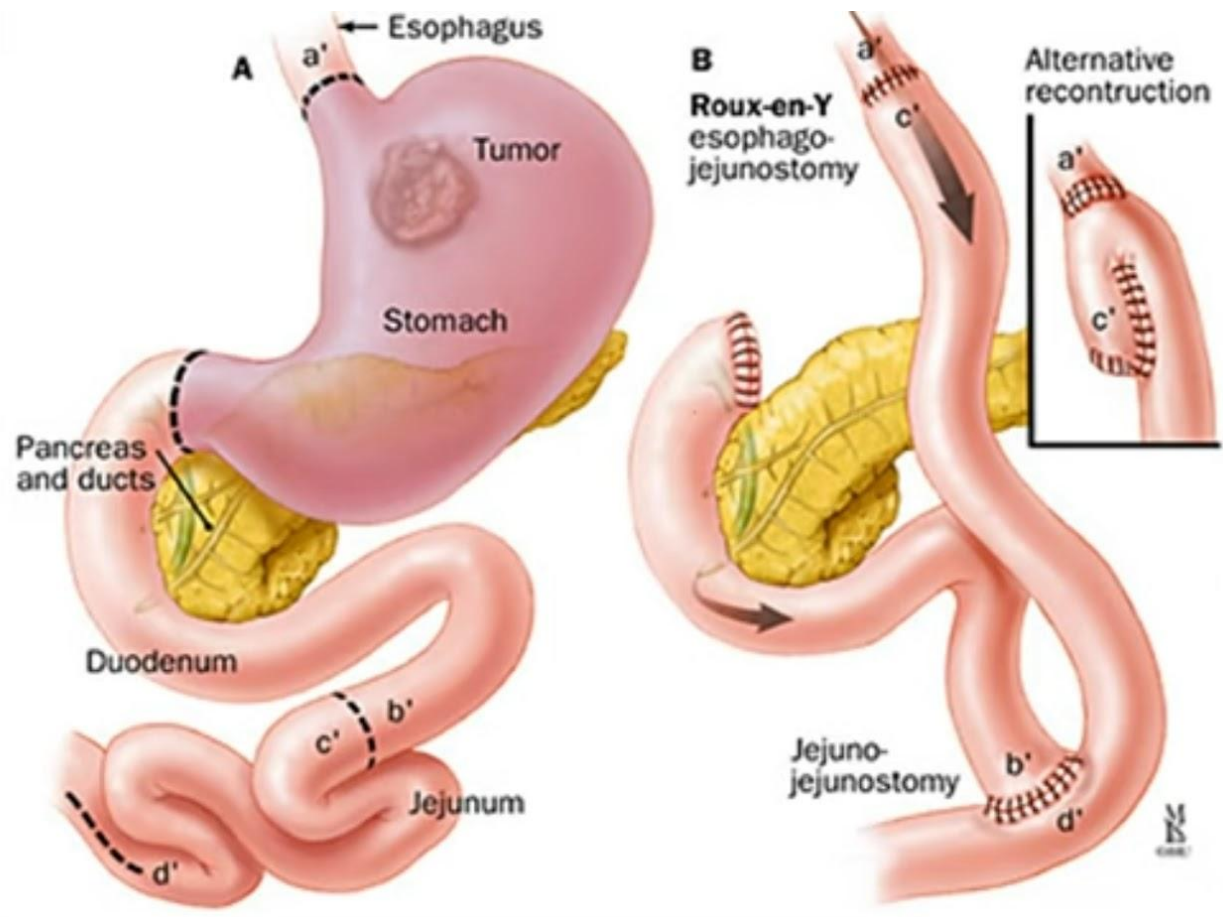
Treatment

Surgical treatment

Total gastrectomy

The stomach is removed *en bloc*, including the tissues of the entire greater omentum and lesser omentum

- Oesophagojejunostomy is reconstituted by means of a Roux loop (50 cm long)
- LN dissection : D1 ,D2 ,D3, D4
- 5-year survival rate post op. is 25–30%

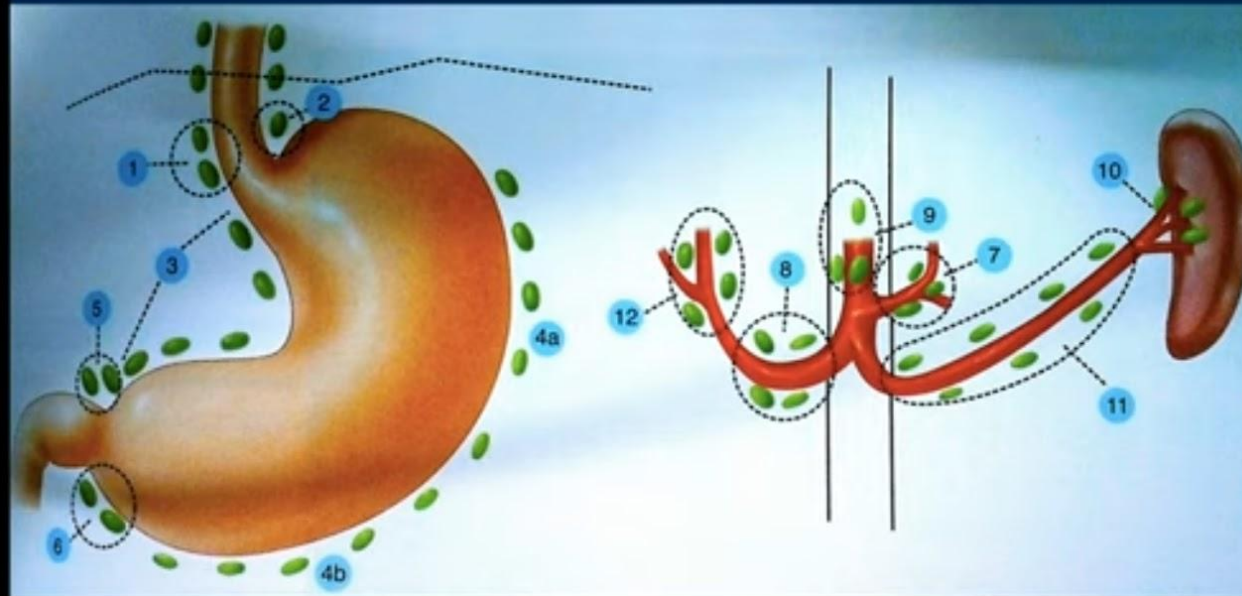


Treatment

Subtotal gastrectomy

- Indicated for distal disease
 - Proximal stomach is preserved.
 - Reconstruction is either by
 - **1. BillrothII- Pólya-type** gastrectomy,
(Entero-gastric reflux and bile reflux esophagitis)
- OR
- Roux loop.
 - No difference in prognosis and 5 y survival for Distal tumors between Total or Subtotal resection

- **D1:** stations 1-6
- **D2:** stations 7,8 ,9 ,10, 11
- **D3:** stations 12,16.



GASTROINTESTINAL STROMAL TUMOURS (GISTs)

- Common but remain unnoticed, over 70y.
- Arise from mesenchymal cells ICOC.
- Due to mutation in the tyrosine kinase *c-kit* oncogene.
- Noticed incidentally at endoscopy.
- Mucosa over may ulcerate & bleed.
- Peritoneal and liver metastases are most common , LN mets is very rare.
- Size and Mitotic count
- Treatment : ___endoscopic removal
- Large T → surgery Imatinib (tyrosine kinase antagonist).

GASTRIC LYMPHOMA

Pathology

95% are Non-Hodgkin's B lymphoma

- Cell-derived, the tumor arising from the mucosa-associated lymphoid tissue (MALT).
- Early stage, the disease takes the form of a diffuse mucosal thickening, ? Ulcerate
- Remains in the stomach for a prolonged period before involving the lymph nodes

Diagnosis

Endoscopy & Bx , CBC & CT

GASTRIC LYMPHOMA

Treatment

- Surgery alone for the localized disease
- Chemotherapy alone is appropriate for patients with systemic disease.
- Treatment of Diffuse lymphoma
- Chemotherapy, sometimes with dramatic & rapid response.
- Surgery for complications bleeding and perforation,