Incidence

- 9th commonest cancer in males and 8th in females in the Jordan.
- 145 new cases each year.
- Male to female ratio 5:3.
- Occurs mainly in elderly. Less than 8% of cases below age 55.
- Steadily increases with age and peaks 7th decade.
- Major geographical difference: Incidence high in Japan and some parts of Asia.

Risk factors

- Wide international variations in incidence and the dramatic falls seen across the developed world suggest that environmental factors are very important in gastric carcinogenesis.
- Carcinoma of the distal stomach and body of the stomach is most common in low socioeconomic groups, whereas the increase in proximal gastric cancer seems to affect principally higher socioeconomic groups.
- Proximal gastric cancer does not seem to be associated with H. pylori infection, in contrast with carcinoma of the body and distal stomach.

H. pylori infection, gastric atrophy, and gastritis

- ***H. pylori is the most important risk factor***
- **Most cases of gastric cancer are associated with the presence of *H. pylori in the stomach.***
- ***H. pylori infection is a common bacterial infection with a high prevalence in the developing* world**.
  Poor hygiene
  crowded living conditions
  low socio-economic status
- **The precancerous lesion severe chronic atrophic gastritis can be induced by *H. pylori* infection. This is a premalignant condition that increases the risk of gastric cancer by 6 fold**
- **Risk increases with the severity of gastric atrophy such that those with multifocal gastric atrophy have more than 90 times increased risk of gastric cancer**

Nutritional

- Smoking
- Alcohol
- Low fat/protein diet
- High salt intake
- Heavily salted foods are high in N-nitroso compounds
- Processed meat (especially bacon, ham, and sausages)
- Frying and grilling food

Medical conditions

- ***Obesity***

  2-fold increased risk
- ***Pernicious anaemia***

  2–3 times increased risk
- **Previous gastric surgery**

Pathology

- **WHO classification 1990**

  Morphology
- **Five types**

  Adenocarcinoma

  Adenosquamous cell carcinoma

  Squamous cell carcinoma

  Undifferentiated carcinoma

  Unclassified carcinoma.
- **Adenocarcinoma**

  growth pattern papillary

  tubular

  mucinous

  signet ring.

  Each type further subdivided by degree of differentiation.

- **Widely used system, but offers little in terms of patient management.**

Borrmann's classification

- Developed in 1926.
- **Divides gastric cancer into five types based on macroscopic appearance of the lesion:**

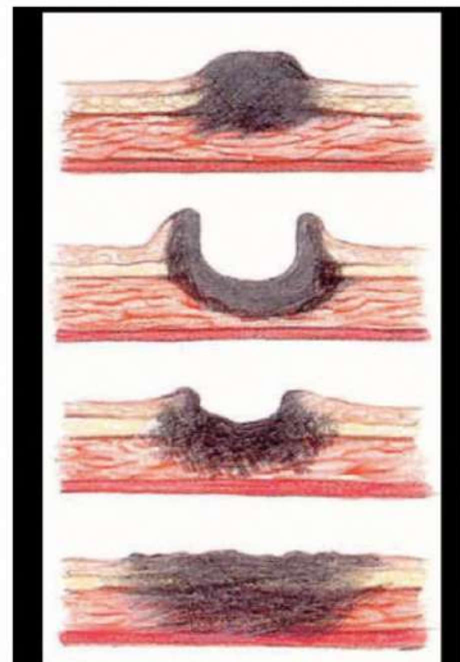
  • Type 1: polypoid or fungating lesion;

  • Type 2: ulcerated lesion surrounded by raised borders

  • Type 3: ulcerated lesion with infiltration to the gastric wall;

  • Type 4: diffusely infiltrating lesion (Linitis *plastica when it involves whole stomach);*

  • Type 5: lesions that do not fit to any of the above.



Lauren classification

- **1965**
- ***The intestinal type:***

typically arises in the presence of a precancerous condition gastric atrophy or intestinal metaplasia,

more common in men

incidence increases with age

dominant type in areas in which gastric cancer is epidemic

well differentiated

spread haematogenously to distant organs.

Lauren classification

- ***The diffuse type:***
- Poorly differentiated
- Composed of signet ring cells metastasizes early by transmural extension and via lymphatics
- Poor prognosis
- More common in women and younger age groups
- Associated with blood type A and familial cases suggesting genetic aetiology

Symptoms

- Gastric adenocarcinoma lacks specific symptoms early in its course.
- Vague symptoms of epigastric discomfort and indigestion – often ignored by patients mistaking it for gastritis.
- Pain tends to be constant and unrelieved by food or antacid therapy.
- More advanced cancer presents with weight loss, dysphagia, loss of appetite, early satiety, or vomiting.

Physical signs

- **Develop late.**
- **Most commonly associated with locally advanced or metastatic disease.**
- **Findings may include:**

  palpable abdominal mass
  palpable supraclavicular (Virchow's)
  periumbicular(sister Mary Joseph's) nodule
  jaundice
  ascites
  cachexia.

Clinical evaluation and staging

- Flexible upper endoscopy
- Blood test
- Double-contrast barium swallow
- Endoscopic ultrasound scan (EUS)
- CT (computed tomography)
- Diagnostic laparoscopy

Flexible upper endoscopy

- Modality of choice once gastric cancer is suspected.
- Multiple biopsies (seven or more required) from ulcer edges.
- Avoid biopsying ulcer crater (may reveal necrotic debris only).
- Note the size, location, and morphology of the tumour.

Blood test

- ***Full blood count:***

  anaemia

- ***Liver function test:***

  abnormal in advanced disease and sign of liver metastasis

- ***Coagulation:***

  abnormal in advanced disease

Endoscopic ultrasound scan (EUS)

- Can assess the extent of gastric wall invasion and nodal status.
- Better accuracy for T1 and T3 lesions, but poor for T2 (cannot assess invasion of the muscularis propria).
- Superior to CT for T1 and T3 tumours.
- Cannot reliably distinguish tumour from fibrosis, thus not suitable for evaluating response to therapy.
- Good for evaluating lymph nodes and have added advantage of fine-needle aspiration.
- Overall staging accuracy is about 80%.
- Complimentary to CT and not a replacement.

CT (computed tomography)

- Chest, abdomen, and pelvis
- Cannot distinguish T1 and T2 tumour (i.e. early gastric cancers)
- Cannot detect small (<5mm) metastasis in the liver or on peritoneal disease.
- Nodal detection relies on size and is a poor predictor of involvement particularly in the chest.
- *PET-CT may improve the detection of distant metastasis. Not a routine exam Mainly* used in follow-up and where there is a suspicion of progression.
- Overall accuracy of 80–85%.

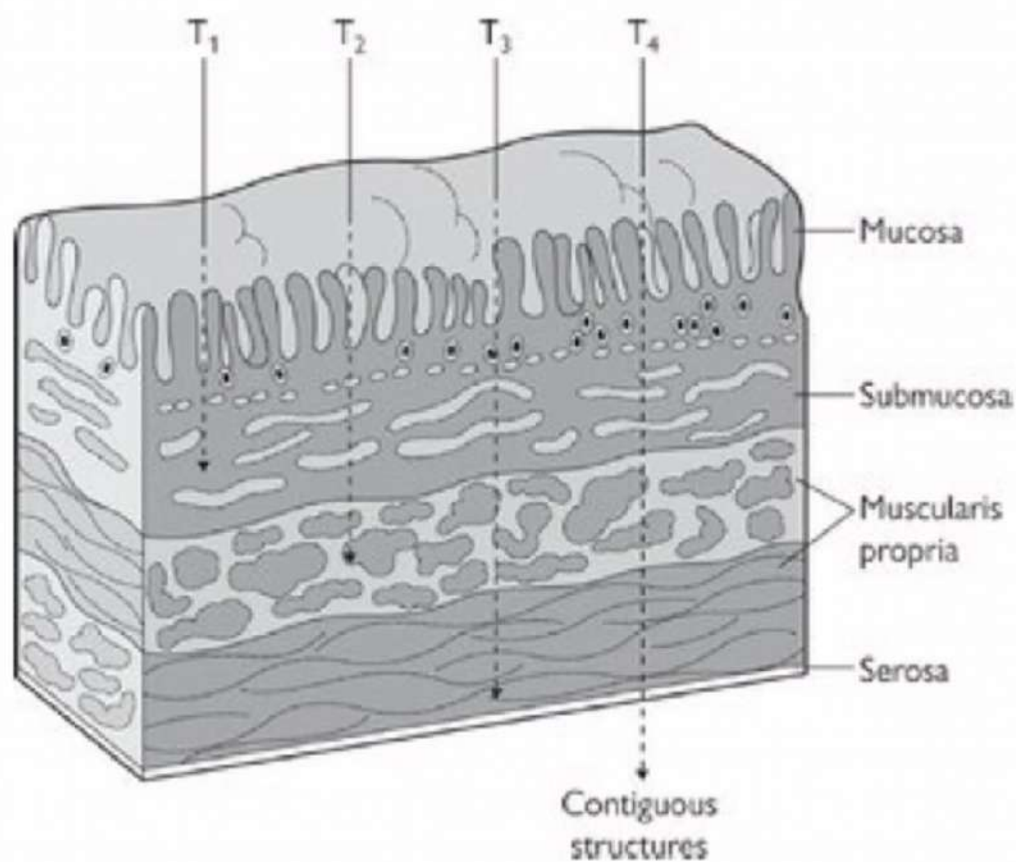
Diagnostic laparoscopy

- **Due to the inherent inaccuracies of CT and EUS, laparoscopy is indicated for evaluation of patients with locoregional disease**
- **Can detect metastatic disease in 30% of patients who are judged to be resectable on CT and EUS.**
- **Addition of laparoscopic ultrasound may improve detection of liver and peritoneal metastasis**
- ***Cytology of peritoneal fluid obtained at laparoscopy may reveal the presence of free*** **intraperitoneal gastric cells**

Double-contrast barium swallow

- Cost effective and 90% diagnostic accuracy
- However, unable to distinguish benign from malignant lesions
- Endoscopy preferable

Staging systems



- ***Regional lymph nodes (N)***

  NX: nodes cannot be assessed

  N0: no lymph node metastasis.

  N1: 1–6 positive nodes.

  N2: 7–15 positive nodes.

  N3: more than 15 positive nodes.
- ***Distant metastasis (M)***

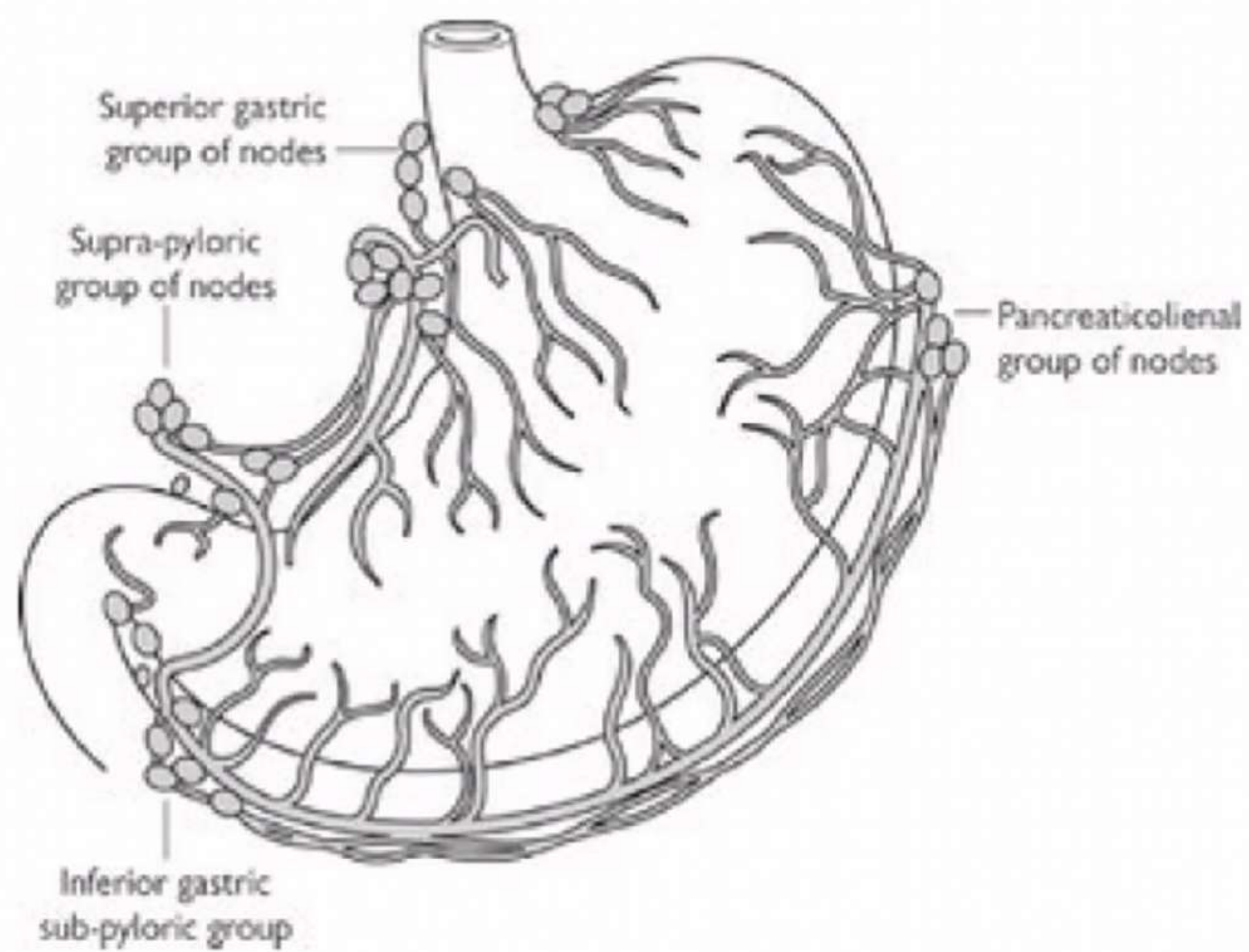
- ***Stage IV disease (M1):*** palliation therapy.
- All other stages if medically fit consider for diagnostic laparoscopy for further staging.

After laparoscopy

- Stage M1 palliation only.
- Stage M0, but medically unfit either palliation only or radiotherapy and 5-FU radiosensitization.
- Stage M0 and medically fit, T1 or less. For surgery.
- Stage M0 and medically fit, T2 or higher. Neoadjuvant chemotherapy with ECF (MAGIC trial protocol) followed by surgery.

Adjuvant chemoradiotherapy

M1	**Palliative therapy**
R0 resection and T1, NO	Observe
R0 and T2 and higher	ECF chemotherapy
R1 resection	Radiotherapy plus concurrent 5-FU sensitization followed up by ECF chemotherapy if T2 and higher
R2 resection	5-FU based radiosensitization or ECF chemotherapy or best supportive care if unfit
Primary palliative chemotherapy	Reassess and if good response consider surgery


Superior gastric
group of nodes
Supra-pyloric
group of nodes
Pancreaticolienal
group of nodes
Inferior gastric
sub-pyloric group

Stage 0	Tis, N0, M0
Stage 1A	T1, N0, M0
Stage 1B	T1, N1, M0 T2a/b, N0, M0
Stage II	T1, N2, M0 T2a/b, N1, M0 T3, N0, M0
Stage IIIA	T2a/b, 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

Surgical management

- Primary treatment for gastric carcinoma.
- Less than 50% of patients at presentation currently are resectable.
- Extent of gastric resection is determined by the need to obtain R0 margin.
- 6cm clearance from edge tumour is required in order to decrease risk of local recurrence.

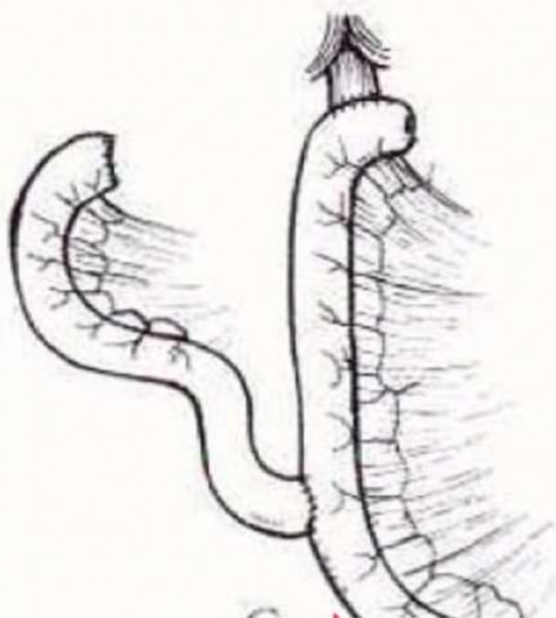
- **Proximal tumours**

  total gastrectomy

- **Distal tumours**

  subtotal gastrectomy

Roux-en-Y reconstruction



Complications of gastric surgery

- **Early complications**
  - Bleeding
  - Infection
  - Anastomotic leak
- **General complications**
  - Cardio-respiratory complications
  - Deep vein thrombosis
  - pulmonary embolism

Late complications

- ***Early dumping***
- 20–30min after ingestion of a meal
- Autonomic response
- serotonin, bradykinin-like ,substances, neurotensin, and enteroglucagon
- **GI symptoms:** nausea and vomiting, sense of fullness, belching, abdominal cramps, and explosive diarrhoea.
- **Cardiac symptoms:** palpitations, tachycardia, sweating, fainting, dizziness, flushing, and visual disturbance
- Symptoms usually subside with time

Lymph node dissection

- **controversial.**
- **The Japanese classification system is used to define extent lymphatic dissection performed**

  Group 1 nodes (N1): perigastric lymph nodes *lesser curvature*
  greater curvature

  Group 2 (N2): nodes *left gastric artery*
  common hepatic artery
  coeliac artery
  splenic artery

  Group 3 (N3): more distant nodes
  para-aortic nodes

- **D1 D2 D3**

- **D1 vs. D2**

  Higher morbidity and mortality for D2 compared to D1 gastrectomy.
  No difference in overall survival between D1 and D2.

Late complications

- Late dumping
- 2–3h after ingestion of a meal
- **large amount of carbohydrates to the proximal small intestine**

  quickly absorbed

  sudden hyperglycaemia

  large amount of insulin

  profound hypoglycaemia

  catecholamines from the adrenal gland

  tachycardia, sweating, confusion, and dizziness
- **Symptoms similar to hypoglycaemic shock**

Surveillance

- First 3 years follow-up should be intensive, since recurrence is most common at this stage
- Follow-up should be 4–6 months for first 3 years, thereafter annually
- History, physical examination, and routine blood profile should be conducted at each followup visit
- CT scan should be performed yearly for first 3 years or sooner if suspicious
- Yearly gastroscopy on patients who have undergone subtotal gastrectomy