

Surgery of The Stomach (4)

By

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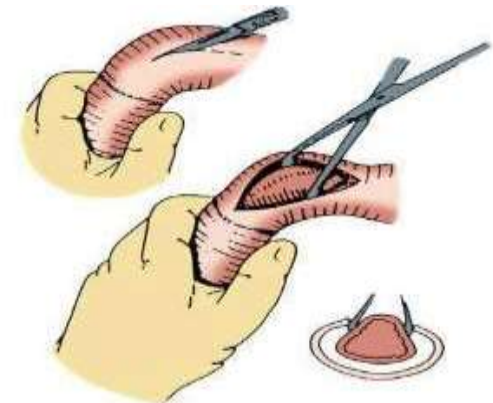
Prof. of Surgery & Laparoendoscopy



(الدَّهْرُ يَوْمَانِ ذَا أَمْنٍ وَذَا خَطَرٍ *
* وَالْعَيْشُ عَيْشَانِ ذَا صَفْوٍ... وَذَا كَدَرٍ)
(أَمَا تَرَى الْبَحْرَ تَعْلُو فَوْقَهُ جَيْفٌ *
* وَتَسْتَقِرُّ بِأَفْصَى قَاعِهِ الدَّرَرُ)
(وَفِي السَّمَاءِ نَجُومٌ لَا عَدَادَ لَهَا *
* وَلَيْسَ يُكْتَسَفُ إِلَّا الشَّمْسُ وَالْقَمَرُ)
الشافعي

Congenital Hypertrophic pyloric stenosis (CHPS)

Congenital causes. (D.D.: Acquired causes)
Clinical picture, and main presentation
Complications
Diagnosis and investigations
Treatment:
- Medical treatment
- Surgical treatment (Ramstedt pyloromyotomy operation)





Source: Brunstad P, Andersen TK, Biller TB, Dunn JC, Hunter JE, Hall T, et al. *Zehrer's Principles of Surgery*. WA: Elsevier; 2010. Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Gastric diverticulum.

TABLE 25-14 Etiology of Gastroparesis

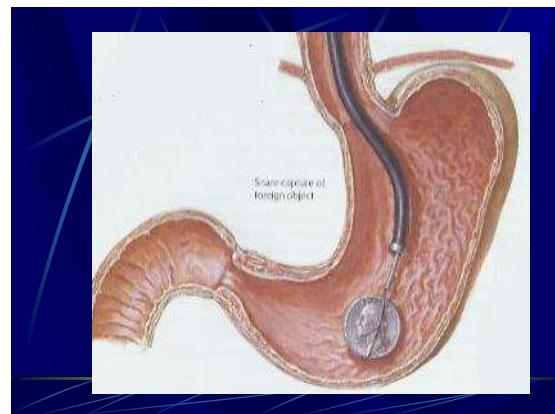
Idiopathic
Endocrine or metabolic
Diabetes mellitus
Thyroid disease
Renal insufficiency
After gastric surgery
After resection
After vagotomy
Central nervous system disorders
Brain stem lesions
Parkinson disease
Peripheral neuromuscular disorders
Myotonia dystrophica
Duchenne muscular dystrophy
Connective tissue disorders
Scleroderma
Polymyositis/dermatomyositis
Infiltrative disorders
Lymphoma
Amyloidosis
Diffuse gastrointestinal motility disorder
Chronic intestinal pseudo-obstruction
Medication-induced
Electrolyte imbalance
Potassium, calcium, magnesium
Miscellaneous conditions
Infections (especially viral)
Paraneoplastic syndrome
Ischemic conditions
Gastric ulcer

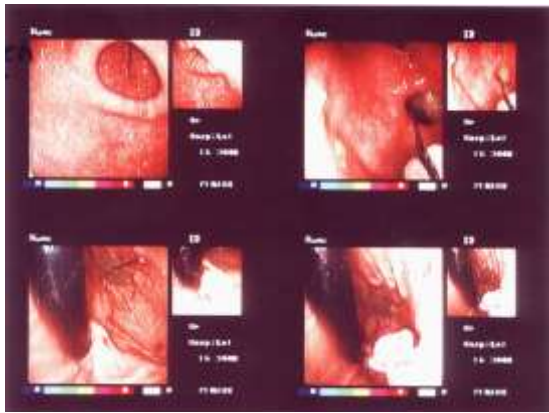
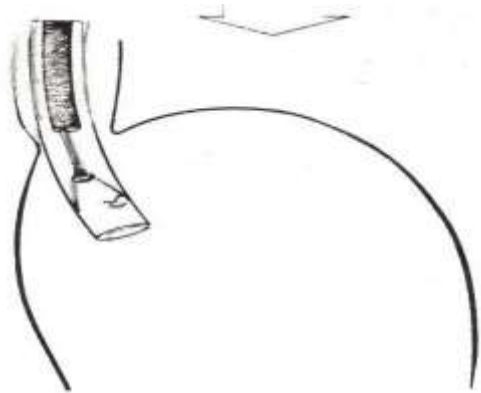
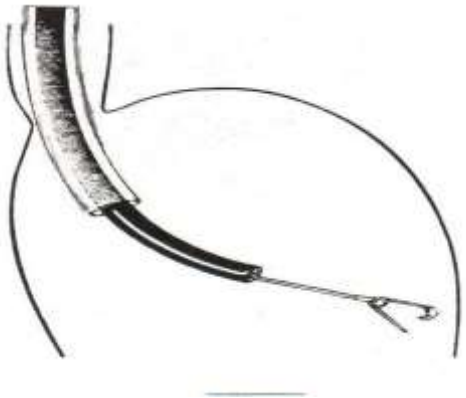
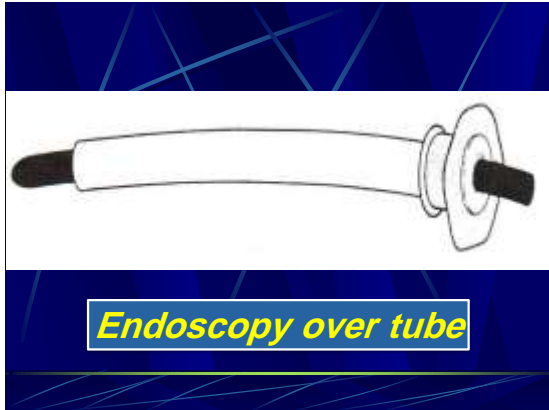
Gastric foreign bodies

I-Swallowed FB

Single: - Smooth FB
 - Irregular FB
 - Sharp FB

Multiple FB



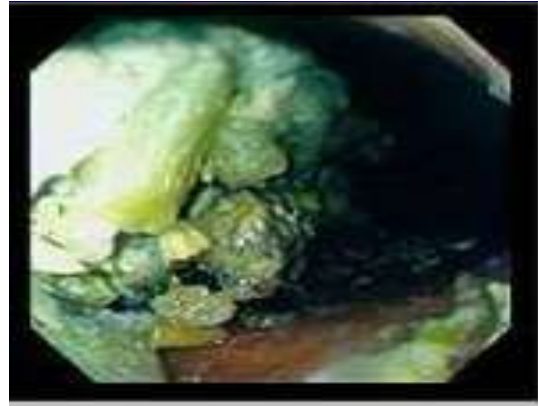


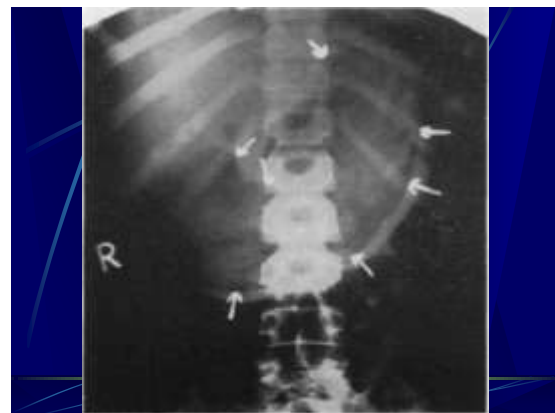
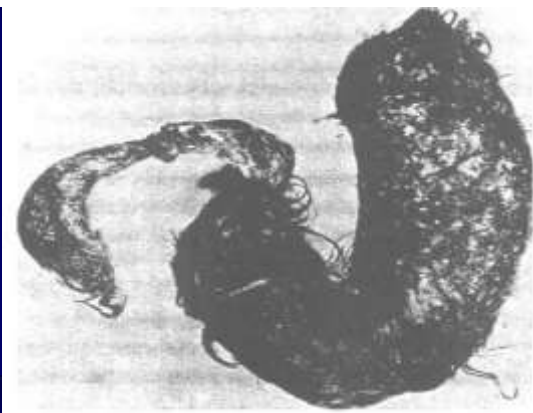
II- Locally formed FB
(Bezoars)

Tricho-bezoars

Phyto-bezoars

Shellac-bezoars





Gastric volvulus
Organo-axial
Mesentrio-axial

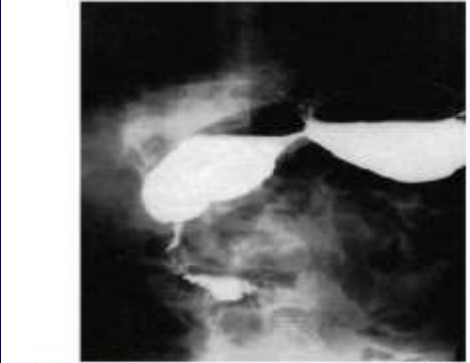
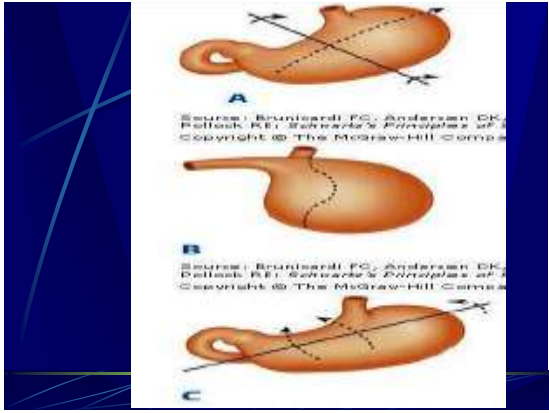


Figure: 60-37. Barium meal showing organoaxial volvulus of the stomach associated with eventration of the diaphragm.



Gastric neoplasms

Benigne neoplasms:
As leiomyoma, sub mucous lipoma,etc.

Malignant neoplasms:
As carcinoma, non Hodgkin lymphoma, GIST (gastro intestinal stromal tumor), and rarely sarcoma





Gastric Carcinoma

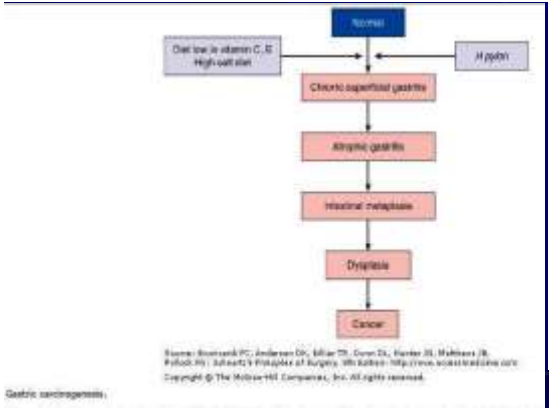


TABLE 25-11 Genetic Abnormalities in Gastric Cancer

Abnormalities	Gene	Approximate frequency (%)
Deletion/suppression	p-53	60-70
	FHIT	60
	APC	50
	DCC	50
	E-cadherin	<5
Amplification/overexpression	COX-2	70
	HGF/SF	60
	VEGF	50
	c-met	45
	AIB-1	40
	β -catenin	25
	k-sam	20
	ras	10-15
Microsatellite instability		5-7
		25-40
DNA aneuploidy		60-75

Source: Reproduced with permission from Koh TJ, Wang TC in Sleisenger & Fordtran's *Gastrointestinal and Liver Diseases*, 7th ed. Philadelphia: Saunders, 2002.

- Several factors, mostly dietary, have been implicated, but in general any factor that causes gastritis can cause carcinoma. Examples are tobacco, alcohol, spices, an increased salt intake.
- Factors that cause achlorhydria such as pernicious anaemia can cause cancer. The presence of nitrates in food leads to the production of N-nitrosamines by the action of bacteria in the achlorhydric stomach. N-nitroso compounds are carcinogenic animals.
- The risk of gastric cancer in patients who have chronic H. pylori infection increased about 3 times.
- A genetic predisposition. Persons with blood group A are more susceptible.
- Benign gastric ulcers very rarely turn malignant (see before).
- Benign gastric neoplasms as gastric polyps.
- Following gastrectomy. Twenty years after partial or subtotal gastrectomy, remaining gastric stump is more susceptible to the development of carcinoma. This is due to biliary reflux gastritis.

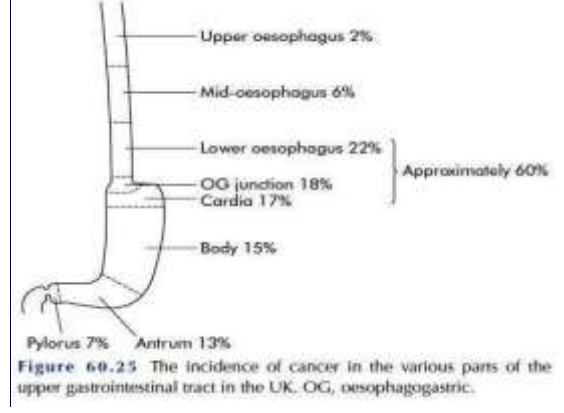
1900 Cases		
Precancerous lesion	Number of cases	%
Hyperplastic polyp	10	0.53
Adenoma	47	2.47
Chronic ulcer	13	0.68
Atrophic gastritis	1502	94.64
Verrucous gastritis	20	1.37
Stomach remnant	2	0.11
Absent pancreas	0	0
	Total 1900	100

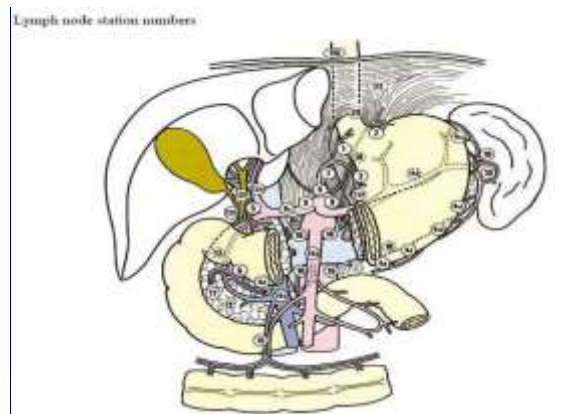
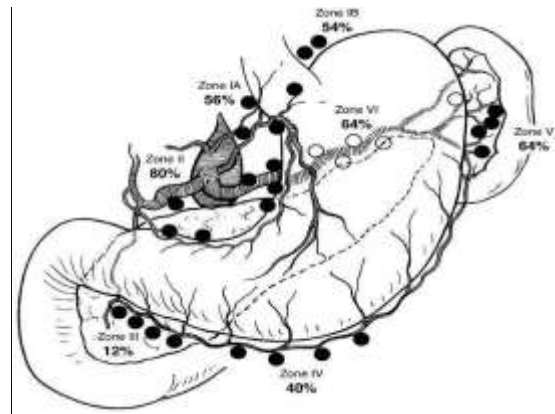
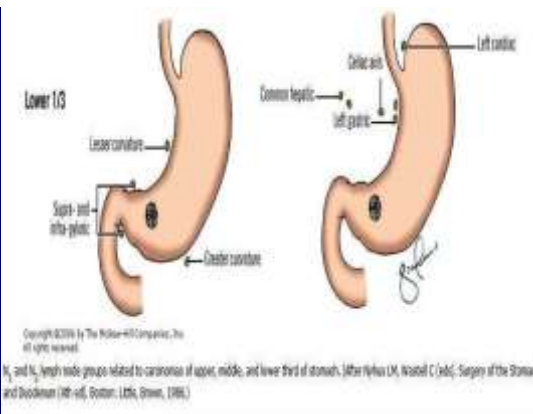
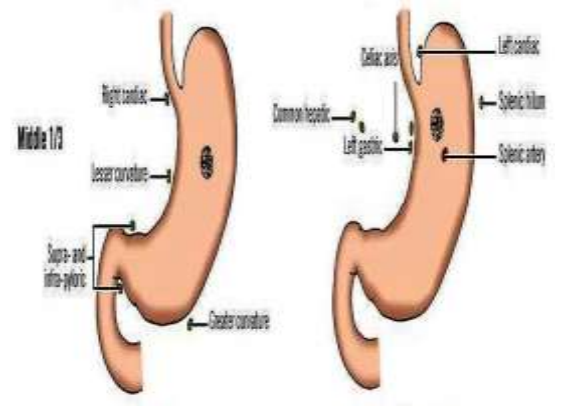
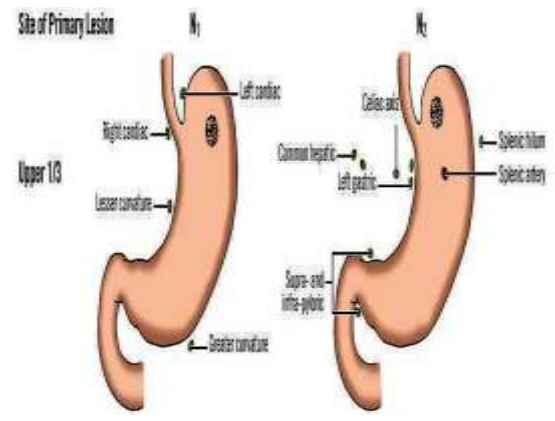
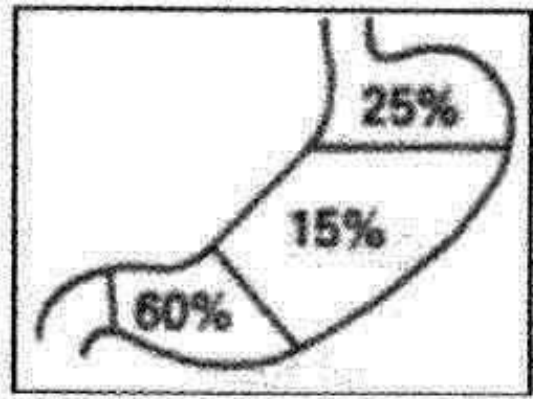
N.C.C.H., Tokyo April 1968

Macroscopic types

Pathologists now classify gastric cancer into two types:

- Early gastric cancer**, where only the mucosa or submucosa is infiltrated (Fig. 30.37). This type is only diagnosed if screening programs by endoscopy are performed. Early gastric cancer may be protruding, superficial, or excavating (penetrating).
- Advanced gastric cancer**. This is the usually diagnosed type in clinical practice. It may take the form of
 - A fungating cauliflower-like mass (Figs. 30.38).
 - An ulcer with raised indurated edges and usually surrounded by smaller ulcers.
 - Colloid carcinoma. All layers of the stomach are infiltrated by a necrotic tissue containing transparent gelatinous substance.
 - The diffusely infiltrating variety, "Linitis plastica" in which the wall of the stomach is greatly thickened and indurated while the lumen is greatly reduced (Fig. 30.39). This may occur only in the antrum or may affect the stomach more diffusely. The mucous membrane is intact and the lesion may be missed by endoscopy.





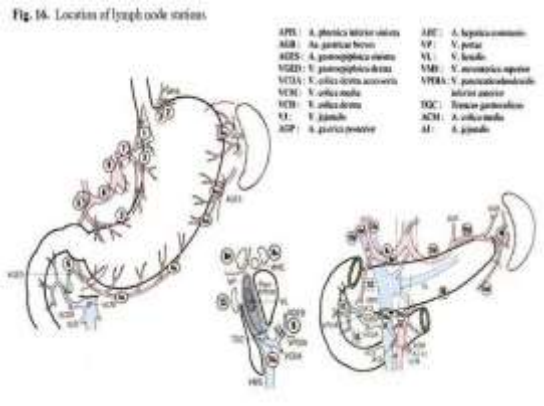


Table 2. Regional lymph nodes

75a. 1	Right paracardial LN
75a. 2	Left paracardial LN
75a. 3	LN along the lesser curvature
75a. 4a	LN along the short gastric vessels
75a. 4b	LN along the left gastroepiploic vessels
75a. 4c	LN along the right gastroepiploic vessels
75a. 5	Suprapyloric LN
75a. 6	LN along the left gastric artery
75a. 7	LN along the common hepatic artery (Gastroduodenal group)
75a. 8a	LN along the common hepatic artery (Posterior paracardial LN)
75a. 8b	LN along the common hepatic artery (Posterior paracardial LN)
75a. 9	LN around the celiac artery
75a. 10	LN of the splenic hilum
75a. 11	LN along the proximal splenic artery
75a. 12	LN along the distal splenic artery
75a. 13a	LN in the hepatocolic ligament (along the hepatic artery)
75a. 13b	LN in the hepatocolic ligament (along the hepatic vein)
75a. 13c	LN in the hepatocolic ligament (along the portal vein)
75a. 14	LN on the posterior surface of the gastroduodenal artery
75a. 14a	LN along the superior mesenteric artery
75a. 15	LN along the middle colic vessels
75a. 16a1	LN on the mesic flexure
75a. 16a2	LN around the abdominal aorta (from the upper margin of the celiac trunk to the lower margin of the left renal vein)
75a. 16b1	LN around the abdominal aorta (from the lower margin of the left renal vein to the upper margin of the inferior mesenteric artery)
75a. 16b2	LN around the abdominal aorta (from the upper margin of the inferior mesenteric artery to the mesic bifurcation)
75a. 17	LN on the anterior surface of the gastroduodenal artery
75a. 18	LN along the inferior margin of the pancreas
75a. 19	LN on the mesogastric ligament of the duodenum
75a. 20	LN on the mesogastric ligament of the duodenum
75a. 21	LN on the lesser curvature
75a. 22	LN on the lesser curvature
75a. 23	LN on the lesser curvature

Methods of spread of gastric cancer

- (1) Local spread (proximal vs. distal, direct infiltration of the wall, spread to surrounding tissues and organs)
- (2) Lymphatic spread
- (3) Hematogenous spread
- (4) Trans-peritoneal spread

- 1. Dyspepsia group.** Dyspepsia above 40 A person above 40 years who starts to complain of dyspepsia should be fully investigated for the possibility of stomach cancer. The patient has anorexia and has a vague sense of discomfort after meals. Epigastric pain may occur and in late cases may be severe. Nausea may be in evidence and early satiety is common.
 - 2. Insidious group (Anorexia, Asthenia, Anaemia).** Listlessness, easy fatigue and unexplained weight loss may be pronounced and the patient is found to be anaemic. Unfortunately a large number of these patients will disregard these vague symptoms and will try tonics and digestives while their disease inexorably progresses to an advanced stage.
 - 3. Mass group.** An epigastric mass. About 30% of patients presenting in this way will be found to harbour an inoperable carcinoma on exploration.
 - 4. Obstructive group.** Carcinoma occurring at one end of the stomach causes obstructive symptoms and will therefore usually present earlier than the more common variety occurring in the antrum or body. At the cardia it will lead to dysphagia while at the pylorus it causes vomiting (see pyloric stenosis).
 - 5. Metastatic group.** A hard irregular liver due to secondaries, jaundice, malignant ascites, or an enlarged left supraclavicular lymph node "Troisier's sign", all of which are signs of inoperability.
- Haematemesis and melæna are uncommon presentations while perforation is still rare. A patient known to have a gastric peptic ulcer who becomes refractory to treatment should be viewed with suspicion.

Investigations of gastric carcinoma



Figure 26.1 Hydro-helical CT showing gastric carcinoma.

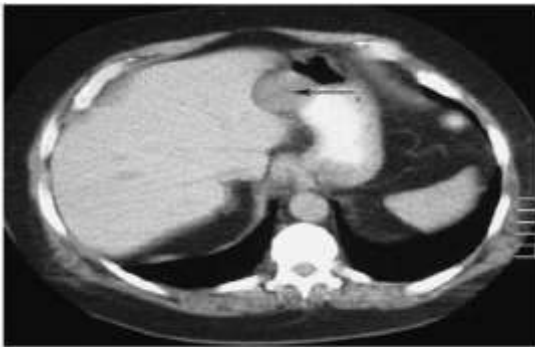
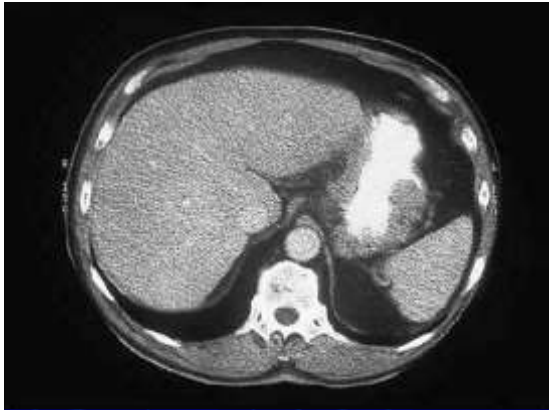
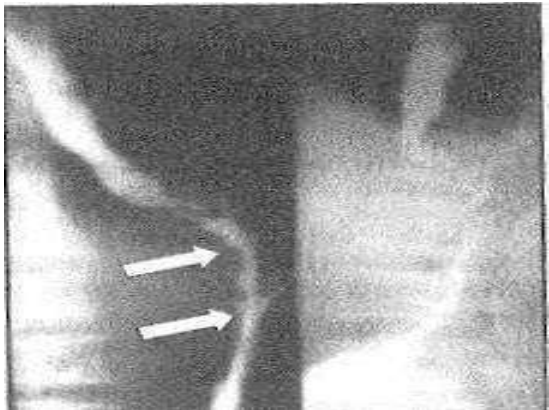


Figure 60.33 Computerised tomography (CT) of the upper abdomen showing a 3.5 cm gastrointestinal stromal tumour (GIST) arising from the gastric wall.



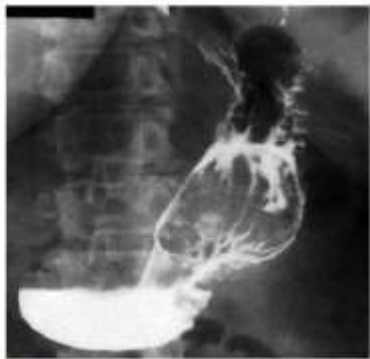
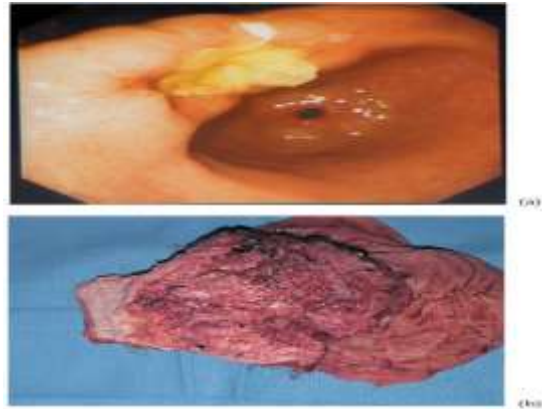
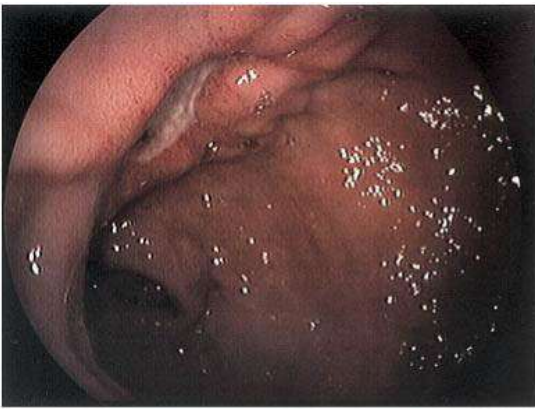
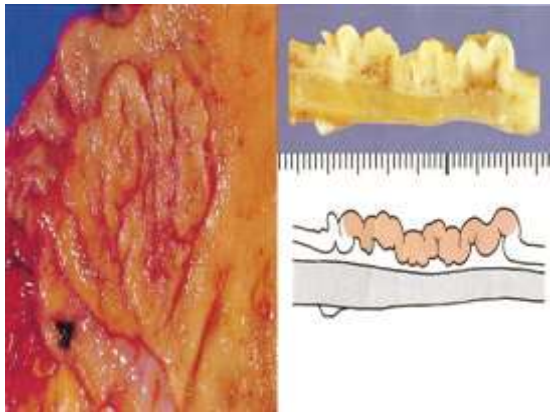
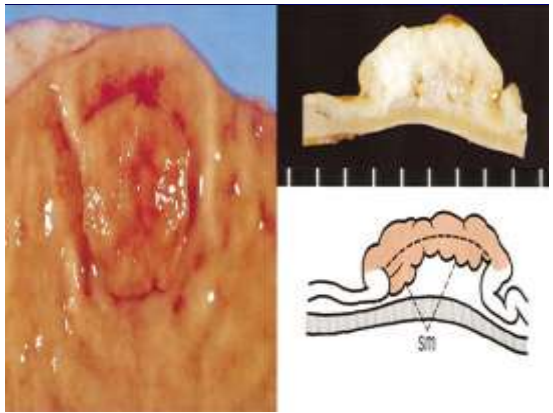
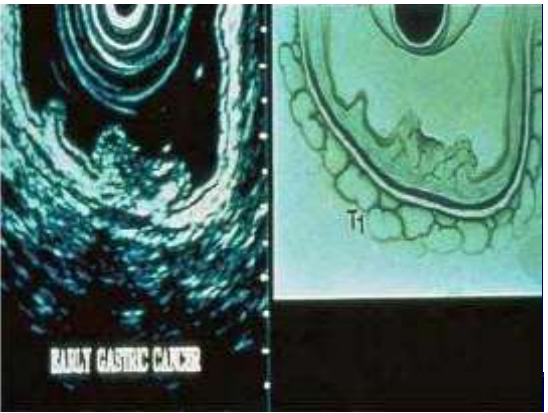
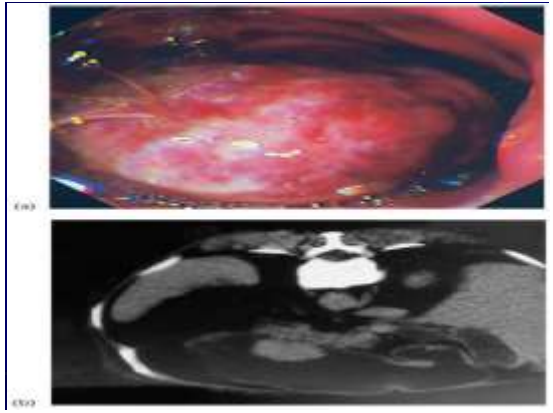
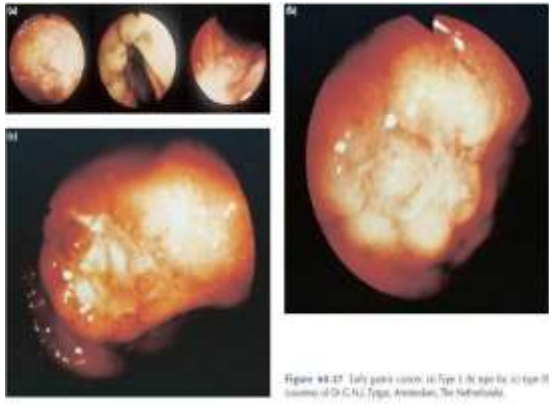
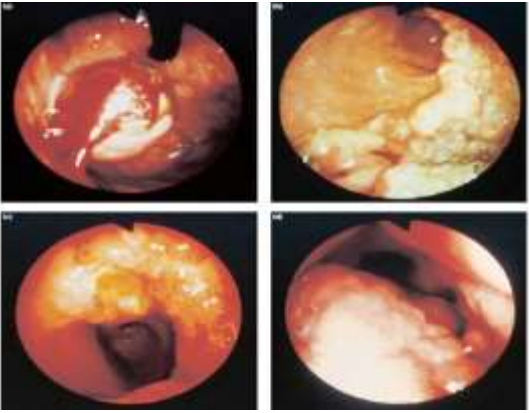


Figure 60.24 Gastric gastrointestinal stromal tumour with ulceration.





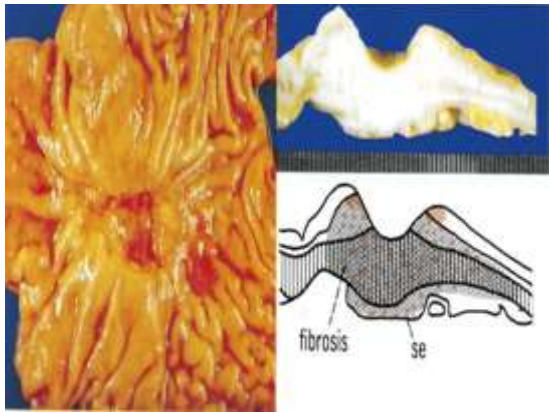
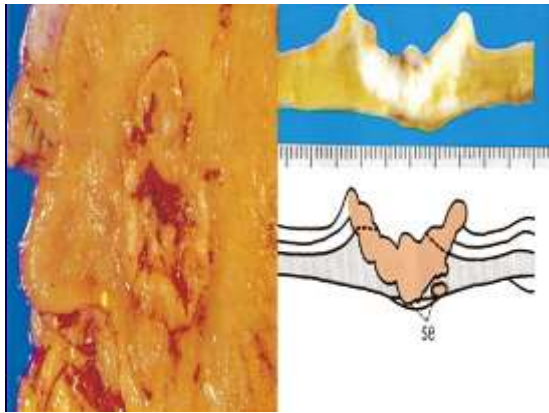
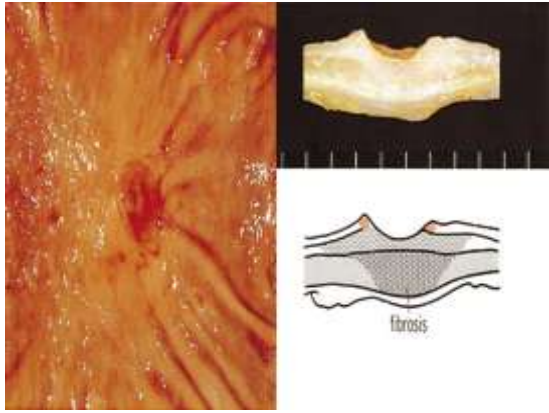
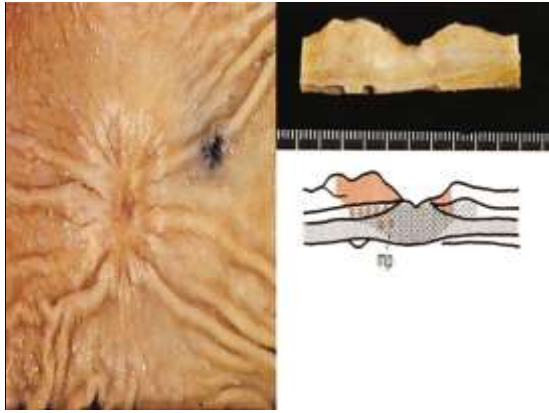
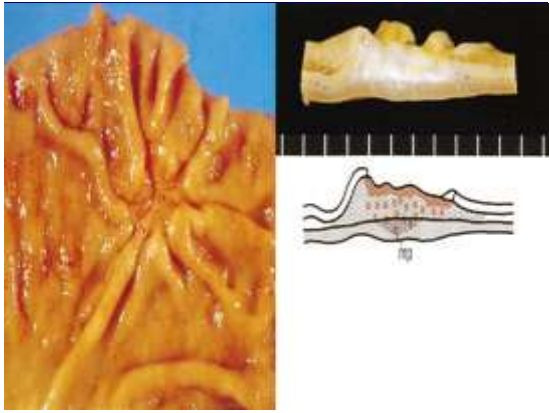




TABLE 25-12 TNM Staging of Gastric Cancer by the International Union Against Cancer and American Joint Committee on Cancer

T: 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 (visceral peritoneum) without invasion of adjacent structures
- T4 Tumor invades adjacent structures

N: Regional lymph node

- N0 No regional lymph node metastasis
- N1 Metastasis in 1 to 6 regional lymph nodes
- N2 Metastasis in 7 to 15 lymph nodes
- N3 Metastasis in more than 15 regional lymph nodes

M: Distant metastasis

- M0 No distant metastasis
- M1 Distant metastasis

Stage grouping	T	N	M
0	Tis	N0	M0
IA	T1	N0	M0
IB	T1	N1	M0
II	T2	N0	M0
	T2	N1	M0
IIIA	T3	N0	M0
	T3	N1	M0
IIIB	T4	N0	M0
	T4	N1-3	M0
IV	T1-3 Any T	N3 Any N	M1

SOURCE: Adapted and with permission from Sobin CH, Fleming IS. AJCC Cancer Staging Manual, 8th ed. New York: Springer-Verlag, 2002.

Staging of gastric cancer

Surgical stage grouping is based on T, N, P, H and M with each of these components being defined as follows:

T - Primary tumor

- T₁ Tumor limited to the mucosa and submucosa
- T₂ Tumor invades the muscularis propria or subserosa
- T₃ Tumor penetrates the serosa
- T₄ Tumor invades contiguous structures

N - Regional lymph nodes

- N₀ No metastasis to the regional lymph nodes
- N₁ Involvement of the perigastric lymph nodes within 3 cm of the primary tumor
- N₂ Involvement of the regional lymph nodes more than 3 cm from the primary including those located along the left gastric, common hepatic, splenic and celiac arteries

P - Peritoneal metastases

- P₀ No peritoneal metastases
- P₁ Peritoneal metastases in adjacent but not distant peritoneum
- P₂ A few metastases to the distant peritoneum
- P₃ Numerous metastases to distant peritoneum

H - Hepatic metastases

- H₀ No hepatic metastases
- H₁ Metastases limited to one lobe
- H₂ A few metastases to both lobes
- H₃ Numerous metastases to both lobes

M - Distant metastases

- M₀ No evidence of distant metastases
- M₁ Evidence of distant metastases

N & M: Involvement of lymph nodes beyond N₂, i.e. N₃, M₁ is regarded as distant metastases according to the new classification.

On the basis of the above, the surgical grouping is:

T ₁ N ₀ M ₀	P ₀ H ₀ M ₀			N ₃	T ₄ N ₂ M _{1,2,3}
	N ₁	N ₂	M ₀		
T ₁	IA	IB	II	IIIA	IIIB
T ₂	II	II	IIIA	IIIB	IIIC
T ₃	II	IIIA	IIIB	IIIC	IIIC
T ₄	IIIA	IIIB	IIIC	IIIC	IIIC
P ₀ H ₀ T _{1,2,3}	IIIA				

