Differential diagnosis of gastric outlet obstruction

Carcinoma pyloric antrum (Table 23.8)

II. Tea-pot deformity—handbag stomach (Fig. 23.57)
- A long-standing lesser curve gastric ulcer causes shortening of the lesser curvature due to fibrosis. Such stomach resembles a tea-pot. As a result of this, the pylorus becomes nondependent. Hence, stasis occurs.
- Treatment: Partial gastrectomy followed by Billroth I anastomosis.

III. Hourglass contracture (Fig. 23.58)
- When a saddle-shaped ulcer in the lesser curvature gets cicatrised, it involves both surfaces of the stomach resulting in conversion of stomach into two compartments.
- Features of stasis such as fullness, distension and persistent vomiting are present.
- Females are affected more often.
- Weight loss is present. Appetite is decreased.
- It is treated by Billroth I partial gastrectomy with removal of 2nd pouch.

IV. Penetration into pancreas
Posterior gastric ulcer can penetrate into pancreas, resulting in severe referred pain to the back resembling pancreatic pathology. However, this type of pain is relieved on lying down.

CARCINOMA STOMACH

Introduction (Clinical notes and Key Box 23.19)
- Carcinoma stomach is more common (2 times) in men compared to women.
- Rare below 40. Average age is 63 years.
CARCINOMA PROXIMAL STOMACH (CARDIA)

- Incidence is increasing. Obesity and high socioeconomic group
- More aggressive
- Thin muscularis mucosa. Hence, submucosal invasion is seen early
- Diagnosis may also get delayed as endoscopy needs technical expertise
- Signet ring carcinoma is common here
- Surgical resection involves oesophageal anastomosis which is technically demanding. Leak rates are high
- Hence, prognosis is poor

Incidence of proximal gastric carcinoma is increased—may be due to obesity and in rich socioeconomic status patients.

Carcinoma distal stomach is more commonly associated with H. pylori.

Proximal carcinomas are more advanced at the time of presentation than distal carcinomas (Fig. 23.59).

- Overall 5-year survival after the diagnosis of gastric cancer is 10 to 20%.
- Those who undergo potentially curative resection (R-0) have a 5-year survival rate of 25–50%.

CLINICAL NOTES

A 32-year-old male was admitted with loss of appetite of 3 months duration. Endoscopy revealed a growth in the body of the stomach. At exploration, large para-aortic nodes were present. Subtotal gastrectomy was done. He died after 6 months due to extensive metastasis. No wonder, carcinoma of the stomach is called Captain of men of death.

Fig. 23.59: Site and incidence of gastric cancer

FOOD PRODUCTS WHICH MAY BE CARCINOGENIC

- Smoked food
- Spirits
- Smoking
- Salted food
- Cigarette
- Diet low in carbohydrate
- Animal protein
- High fat food
- High in complex carbohydrates
- H. pylori in contaminated water

PEARLS OF WISDOM

WHO recommends increased consumption of fruits and vegetables. Vitamin C is an antioxidant which is protective agent. Ascorbic acid prevents conversion of nitrates to nitrites.

2. Precancerous conditions

- Atrophic gastritis: This may be due to smoking, spicy food, continuous ingestion of drugs, reflux of bile into stomach, etc.
133. Ans. b. Hyperchlorhydria
134. Ans. b. Decreased mucus production
135. Ans. a. Lymphoma; b. Ménetrier's disease; c. Carcinoma; d. Eosinophilic gastritis (Ref: Chapman 4th/234; Harrison 18/e p2459)

136. Ans. A (Seen in Ménetrier's disease and ZES), C (It shows cerebriform rugosity in stomach), D (More in fundus and body)
137. Ans. A (Giant folds in the pyloric antrum)

**GASTRIC POLyps**

138. Ans. a. Adenoma (Ref: Sabiston 19/e p1206; Schwartz 9/e p938; Bailey 26/e p1042, 25/e p1066; Shackelford 7/e p769)

- There are five types of gastric epithelial polyps inflammatory, hamartomatous, heterotopic, hyperplastic and adenoma. The first three types have negligible malignant potential.
  - The most common gastric polyp is the hyperplastic or regenerative polyp, which frequently occurs in the setting of gastritis.
  - Polyps that are symptomatic, ≥2 cm or adenomatous should be removed.
  - Among patients with FAP, gastric polyps (33-50%) are more common as compared to gastric adenomas (15%).

**Hyperplastic or Regenerative Polyp**
- MC gastric polyp
  - Contains an overgrowth of histologically normal appearing gastric epithelium.
  - Size of the polyp does not appear to be an important factor.
  - Usually single; incidence is high in the gastric remnant after partial gastrectomy, mostly asymptomatic and stationary.

**Hamartomatous Polyps**
- Encountered most commonly in association with hereditary gastrointestinal polyposis syndromes; including generalized juvenile polyposis (15%); Peutz-Jeghers syndrome (25-50%); FAP and related Gardner's syndrome.

**Inflammatory Polyp**
- A polyp made of inflammatory tissue can be called an inflammatory pseudopolyp because glandular tissue is either lost or absent.
- Inflammatory fibroid polyp: occurs most commonly in the stomach, mainly in the distal region and pylorus
- An inflammatory polyp with prominent cystic glands is called a retention polyp because of dilated glands that are filled with retained mucus.
- Polyps associated with Cronkhite-canada syndrome is of retention type.

**Fundic gland Polyp**
- Present as multiple 2-3 mm sessile lesions in the body and fundus, most commonly in healthy gastric mucosa
- Have no malignant potential
- Most cases are sporadic but can occur in 53% of patients with FAP or Gardner's syndrome.
Adenomatous Polyp
- Most commonly antral, sessile, solitary and eroded.
- Malignant transformation in 10-20%.
- Presence is a marker indicating an increased risk for development of cancer in remainder gastric mucosa.
- Types: Flat (tubular) and papillary (villous and tubulovillous)

<table>
<thead>
<tr>
<th>Flat (tubular)</th>
<th>Papillary (villous and tubulovillous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most common form of adenomas, especially in Japan.</td>
<td>Papillary adenomas are sausage or broad-based nodular lesions with a lobulated epiptour and deep crevices.</td>
</tr>
<tr>
<td>Two layer architecture and relative indolence of immature epithelial cells are hallmarks of flat adenoma distinguishing from papillary adenoma.</td>
<td>Papillary adenoma has velvety appearance on endoscopy and soap bubble or paint brush appearance on barium meal.</td>
</tr>
</tbody>
</table>

- Gastric flat adenomas have a lower incidence of malignant changes, the incidence increases with the grade of dysplasia, the papillary pattern and size of the lesion.

139. Ans. a. Hyperplastic polyp

CARCINOMA STOMACH PREDISPOSING FACTORS

140. Ans. a. Benign ulcer (Ref: Sabiston 19, p1204-1206; Schwartz 9/e p926; Bailey 24/e p1046, 25/e p1067; Shackelford 7/e p774)

Factors Associated with Increased Risk of Developing Stomach Cancer

<table>
<thead>
<tr>
<th>Nutritional</th>
<th>Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low fat or protein consumption</td>
<td>Prior gastric surgery</td>
</tr>
<tr>
<td>Salted meat</td>
<td>H. pylori infection</td>
</tr>
<tr>
<td>High nitrate consumption</td>
<td>Epstein-Barr virus</td>
</tr>
<tr>
<td>High complex-carbohydrate consumption</td>
<td>Gastric atrophy and gastritis</td>
</tr>
<tr>
<td></td>
<td>Adenomatous polyps</td>
</tr>
<tr>
<td></td>
<td>Male gender</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social</th>
<th>Occupational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low social class</td>
<td>Rubber workers</td>
</tr>
<tr>
<td></td>
<td>Coal workers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental</th>
<th>Genetic factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor food preparation (smoked, salted)</td>
<td>Blood group 'A'</td>
</tr>
<tr>
<td>Lack of refrigeration</td>
<td>Pernicious anemia</td>
</tr>
<tr>
<td>Poor drinking water (well water)</td>
<td>Family history</td>
</tr>
<tr>
<td>Smoking</td>
<td>Hereditary nonpolyposis colon cancer</td>
</tr>
<tr>
<td></td>
<td>Li-Fraumeni syndrome</td>
</tr>
</tbody>
</table>

- Decrease risk of carcinoma stomach: Aspirin, Diet (high fresh fruit and vegetable intake), Vitamin A and C, calcium, selenium, zinc and iron.
- Alcohol is not a risk factor for CA stomach.

COX-2 Inhibitors are protective in:

| - Barrett’s esophagus | - Carcinoma stomach |
| - SCC and adenocarcinoma of esophagus | - Desmoid tumors |
| | - Small duodenal and rectal polyps in FAP |

141. Ans. d. Hyperplastic polyps

142. Ans. a. A

143. Ans. a. Pernicious anemia
CA STOMACH IN PERNICIOUS ANEMIA

- Carcinoma stomach in pernicious anemia differs from usual gastric cancer by:
  - Polypoid
  - Fundic or cardiac rather than being antral
  - Multicentric
  - Low average grade malignancy

144. Ans. a. Diffuse type of gastric cancer (Ref: Sabiston 19/e p1207; Schwartz 9/e p931; Shackelford 7/e p773; Bailey 25/e p1088)

Table: Lauren Classification System for Carcinoma Stomach

<table>
<thead>
<tr>
<th>Intestinal</th>
<th>Diffuse</th>
</tr>
</thead>
</table>
| Environmental
  - Gastric atrophy, intestinal metaplasia
  - Men< Women
  - Increasing incidence with age
  - Gh2nd formation
  - Hematogenous spread
  - Microsatellite instability
  - APC gene mutations
  - p53, p16 inactivation
  - Epidemic
  - Distal part of the stomach |
| Familial
  - Blood group 'A'<
  - Women< Men
  - Younger age group
  - Poorly differentiated signet ring cells
  - Transmural/Lymphatic spread
  - Decreased E-cadherin
  - p53, p16 inactivation
  - Endemic
  - Proximal part of the stomach |

145. Ans. a. Intestinal metaplasia; b. Polyphyperplastic or adenoma; c. (Atrophic gastritis

146. Ans. a. Pernicious anemia

147. Ans. d. Intestinal metaplasia type III

148. Ans. b. Hyperplastic polyp

149. Ans. c. Old peptic ulcer

150. Ans. b. Chronic gastric atrophy

151. Ans. b. Pernicious anemia and achlorhydria; d. Atrophic gastritis

152. Ans. a. Atrophic gastritis; c. Adenomatous polyp; d. Achlorhydria

153. Ans. c. Intestinal metaplasia

154. Ans. b. ‘O’ blood group

155. Ans. c. Atrophic gastritis

156. Ans. None

157. Ans. b. Most common at fundus

158. Ans. b. Intestinal metaplasia (Ref: Shackelford 7/e p773-774; Schwartz 9/e p928-929)
**Intestinal Metaplasia**
- Types: complete type I and incomplete types II and III.
- The risk for progression to gastric cancer is higher in type III metaplasia than in type I.
- The types differ based on the patterns of mucin core protein (MUC) expression as well as cell type composition.
  - Type I: Presence of absorptive cells, paneth cells and goblet cells secreting sialomucins
  - Incomplete types: Presence of columnar and goblet cells secreting sialomucins, sulfomucins or both.

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**CA STOMACH CLINICAL FEATURES AND TREATMENT**

159. Ans. a. Occurs at distal end (Sub:iston 19/e p1204-1218; Schwartz 9/e p926-935; Bailey 26/e p1045-1053, 25/e p1067-1074; Shackelford 7/e p774-778)

**Carcinoma Stomach**
- Incidence of gastric cancer, especially distal cancer is decreasing.
- Incidence of GE junction tumors is increasing.
- Approximately 90% of all tumors of the stomach are malignant, the vast majority of which are gastric adenocarcinoma.
- Tumor Markers: CEA, CA 19-9, CA 125, CA 72-4 and beta-HCG

**Clinical Features**
- Upper abdominal pain (62-91%) and weight loss (22-61%) are the MC symptoms.
- Typically, however, the pain is constant, nonradiating, and unrelied by food ingestion.
- Proximal tumors involving the gastroesophageal junction often present with dysphagia, whereas distal antral tumors may present as gastric outlet obstruction.
- Diffuse mural involvement by tumor, as occurs in lininitis plastica, leads to decreased distensibility of the stomach and complaints of early satiety.
- Ascites, jaundice or palpable mass indicate incurable disease.
- The transverse colon is a potential site for malignant fistulization and obstruction from gastric primary tumor.

**Lymph Node Metastasis**
- Patients may present with a palpable abdominal mass, a palpable supraclavicular (Virchow's) or periumbilical (Sister Mary Joseph's) lymph node, left axilla (Irish nodes) peritoneal metastasis palpable by rectal examination (Blummer's shelf), or a palpable ovarian mass (Krukenberg's tumor).
- Paraneoplastic syndromes include thrombophlebitis (Trousseau's syndrome), neuropathies, nephrotic syndrome, and DIC.

**Diagnosis**
- Endoscopy with biopsy is the best method to diagnose gastric cancer.

**Treatment of Carcinoma Stomach according to site**
- Proximal-third: Extended gastrectomy, including the distal esophagus.
- Middle-third: Total gastrectomy and D2 LN dissection.
- Distal-third: Intestinal-type: Subtotal gastrectomy with D2 LN dissection; Diffuse-type: Total gastrectomy with D2 LN dissection.
Fig. 23.63: Bormann's classification (refer to advanced gastric cancer macroscopic type)

- **Type 1** represents polypoid or fungating lesions
- **Type 2** ulcerating lesions surrounded by elevated borders
- **Type 3** ulcerating lesions with infiltration into the gastric wall
- **Type 4** diffusely infiltrating lesions
- **Type 5** lesions that do not fit into any of the other categories.

**Linitis plastica** is the term to describe type 4 carcinoma when it involves the entire stomach (Key Box 23.24 and Figs 23.64 to 23.66).

**KEY BOX 23.24**

**THE DIFFUSE FORM OF GASTRIC ADENOCARCINOMA—LINITIS PLASTICA**

- Poorly differentiated
- Lacks gland formation
- Composed of **signet ring cells**
- Consists of tiny clusters of small uniform cells
- Tends to spread submucosally
- Has less inflammatory infiltration
- **Metastases early**
- Route of spread is generally by transmural extension and through lymphatic invasion
- **Does not generally arise in the setting of prior gastritis**
- **More common in women**
- Affects a slightly younger age group
- Association with blood type A and familial occurrences, suggesting a **genetic aetiology**
- **Intrapitoneal metastases are frequent**
- **The prognosis is less favourable for patients with diffuse-sous-type histology.**

Fig. 23.64: Localised linitis plastica

Fig. 23.65: Diffuse variety of carcinoma stomach

Fig. 23.66: Linitis plastica—opened specimen

- The original histologic classification system was developed by Borders in 1942.
- Borders classified gastric carcinomas according to the degree of cellular differentiation, independent of morphology, and ranged from 1 (well-differentiated) to 4 (anaplastic).
WHO CLASSIFICATION—five main categories

1. Adenocarcinoma 95%
   - Papillary, tubular
   - Mucinous
   - Signet ring
2. Adenosquamous cell carcinoma
3. Squamous cell carcinoma
4. Undifferentiated carcinoma
5. Undiagnosed carcinoma

Clinical features of carcinoma stomach (SOLID)

- Very often patients would have vague symptoms—early satiety, flatulence, discomfort, pain in the upper abdomen.
- Early satiety is due to decreased distensibility of the stomach (Fig. 23.67).
- Anaemia is due to many factors (Key Box 23.25).
  - Silent: Growth is silent but manifests as secondaries in the liver, ascites, Virchow’s node, rectovesical deposits, Blumer’s shelf, umbilical nodule (Sister Mary Joseph’s node), left axillary nodes (Irish nodes), palpable ovarian mass (Krukenberg tumour) (Figs 23.67 to 23.72).
  - Obstruction at pylorus (pyloric antrum) producing pyloric obstruction with features of vomiting with/without blood. Visible gastric peristalsis can also be present. Obstruction at cardio-oesophageal junction produces dysphagia.
  - Lump in the abdomen which is hard and irregular. Clinically, stomach mass is differentiated from liver mass by features mentioned below.
  - Insidious in onset: Anaemia, anorexia and asthenia of short duration.
  - Dyspepsia in a man over the age of 40: Carcinoma stomach should be ruled out. Early gastric cancer presents as dyspepsia. Non-metastatic conditions such as thrombophlebitis (Trousseau’s sign) and deep venous thrombosis can occur due to change in thrombotic and haemostatic mechanisms.

KEY BOX 23.25

ANAEMIA IN CARCINOMA

- This is one of the common presentations. Often patients get investigated for anaemia by the physician only to discover carcinoma stomach.
- Achlorhydria results in poor conversion of ferrous to ferric which causes anaemia.
- 15-20% of patients may also develop haematemeses as in ulcerative lesions or proliferative lesions. GI blood loss also accounts for anaemia.
- Early satiety, loss of appetite and poor intake also contribute to anaemia (minor role).
- 40% of carcinoma stomach patients have anaemia.

If you remember SOLID, you will get solid marks.
**Fig. 23.71: Krukenberg tumours**

- Hard irregular stomach mass
- Omented deposits
- Ascites
- Secondaries in the liver (nodular liver)

**Fig. 23.72: Diagrammatic representation of secondaries in adenoma stomach**

**Spread**

1. **Penetration of gastric serosa:** This is the most important prognostic indicator. When serosa is NOT penetrated, 50% survive for 5 years after resection. When serosa is penetrated, this figure drops to 20%.
   - Once serosa is involved, adjacent organs such as liver, pancreas, spleen, omentum, transverse colon get involved.

2. **Lymphatic spread:** 420 lymph nodes have been identified
   - Lymph node involvement is a poor prognostic indicator.
   - Involvement of 4 or more nodes is less favourable.

*Staging refer TNM staging*

**Lymphatic zones**

Lymphatic drainage from the stomach has been classified into four zones:

1. **Zone 1:** In the gastrocolic omentum along the right gastroepiploic vessels. This drains the pyloric antrum and lower half of greater curvature.

2. **Zone 2:** It lies in the gastroepiploic and gastrosplenic ligament along the left gastroepiploic vessels. This drains upper half of the greater curvature.

3. **Zone 3:** It lies in the lesser omentum draining proximal two-thirds of the stomach. From here, lymph drains into periesophageal lymph nodes.

4. **Zone 4:** It is from distal portion of the lesser curve and pylorus along hepatic artery and right gastric artery into para-aortic nodes.

**Blood spread:** Most common sites are liver and lungs. It produces extensive secondaries. They are signs of inoperability.

**Transcoelomic spread** results in ascites, Krukenberg tumour—bilateral bulky ovarian deposits and rectovesical deposits (Blumer’s shelf).
Investigations

1. Complete blood picture: 20% of early gastric cancer patients have iron deficiency (microcytic, hypochromic) anaemia. Preoperative blood transfusion may be necessary.
2. Routine examination, fasting and postprandial sugars, ECG, renal function for fitness before surgery.
3. Flexible oesophagogastroduodenoscopy (Figs 23.73 to 23.76)

**Laparoscopy** is an ideal investigation. Almost 20 to 30% of so-called operable cases become inoperable. Laparoscopic peritoneal lavage for cytology is best test.

Barium meal may show intrinsic, persistent, irregular, filling defect. Double contrast air-barium study is used for mass screening in Japan to detect early cases (Figs 23.77 to 23.79).

Barium meal study is useful in cases of *limitis plastica* wherein mucosa may appear to be normal in early cases. Today use of barium has become almost nil with the availability of endoscopy.

8. CEA: Carcinoembryonic antigen is elevated in about 60–70% patients. It indicates extensive spread of the disease.

Histopathology

- It is an adenocarcinoma of the stomach. There are basically two types of gastric carcinomas as per Lauren’s classification.
- Disease is more common in young females and carries poor prognosis. The leather-bottle stomach or *limitis plastica* is poorly differentiated with anaplastic cells.
- Intestinal is more common in elderly males. It shows signs of intestinal metaplasia. It has better prognosis.

Ultrasound and CT scan
- To rule out secondaries, in the liver.
- To look for enlarged coeliac nodes.
- Can detect ascites—guided fluid tap and cell cytology.
- To detect Krukenberg tumour (pelvic CT).
- Useful in detecting metastatic disease.

5. **Endoscopic ultrasonography** can differentiate early gastric cancer from advanced tumours in 80% of patients. Overall staging accuracy is about 75%.

**Laparoscopy** cannot detect liver or peritoneal metastasis (small < 5 mm) and small lymph nodes.

**Fig. 23.73:** Endoscopy showing superficial ulceration

**Fig. 23.74:** Endoscopy showing ulceroproliferative growth

**Fig. 23.75:** Friable granular tissue—*antral carcinoma* detected by J manoeuvre in endoscopy

**Fig. 23.76:** Fundal carcinoma

**Fig. 23.77:** Barium meal study showing filling defect

**Fig. 23.78:** Carcinoma stomach—Barium meal showing a large irregular filling defect along the greater curvature
**Treatment of carcinoma stomach**

- Surgery is the main modality of the treatment. Adjuvant chemotherapy has been found to be beneficial in a few patients only.
- Resectable means the growth can be removed.
- Inoperable means there are no chances of cure but growth may be resectable. Operable means cure is possible.

**Signs of inoperability**

- Growth fixed to pancreas or posterior abdominal wall
- Secondary in the liver, hard nodular liver
- Retroperitoneal deposits, due to peritoneal seeding which are felt during per rectal examination
- Enlarged fixed coeliac nodes, para-aortic nodes and left supraclavicular nodes
- Kurzkeberg tumour, malignant ascites
- Sister Mary Joseph’s nodule

**Aims of surgery**

1. Curative resection should be done whenever possible
2. Bypass procedure (GI) to relieve vomiting in advanced cases of pyloric obstruction.
3. Palliative gastrectomy can be done to remove a fungating ulcerative, bleeding mass. It gives better palliation.

**Extents of curative resection**

- The extent of the gastrectomy is site-dependent and focuses on complete removal of the gastric carcinoma with preferably a 6 cm margin from the gross edge of the tumour.

**Fig. 23.80: Perigastric nodes: (1) right pericardial; (2) left pericardial; (3) lesser curvature; (4) greater curvature; (5) suprapyloric; (6) intrapyloric**
### Table 23.9: Grouping of regional lymph nodes

<table>
<thead>
<tr>
<th>Lymph node station (number)</th>
<th>Description</th>
<th>Location of primary tumour in the stomach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Upper third</td>
</tr>
<tr>
<td>1</td>
<td>Right paracardial</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Left paracardial</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Lesser curvature</td>
<td>1</td>
</tr>
<tr>
<td>4sa</td>
<td>Short gastric</td>
<td>1</td>
</tr>
<tr>
<td>4sb</td>
<td>Left gastroepiploic</td>
<td>2</td>
</tr>
<tr>
<td>4d</td>
<td>Right gastroepiploic</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Suprapyloric</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Infrapyloric</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Left gastric artery</td>
<td>2</td>
</tr>
<tr>
<td>8a</td>
<td>Anterior common hepatic</td>
<td>2</td>
</tr>
<tr>
<td>8p</td>
<td>Posterior common hepatic</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Coeliac artery</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Splenic hilum</td>
<td>2</td>
</tr>
<tr>
<td>11p</td>
<td>Proximal splenic</td>
<td>2</td>
</tr>
<tr>
<td>11d</td>
<td>Distal splenic</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Hepatoduodenal</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Retropancreatic</td>
<td>M</td>
</tr>
<tr>
<td>14v</td>
<td>Superior mesenteric vein</td>
<td>M</td>
</tr>
<tr>
<td>14a</td>
<td>Superior mesenteric artery</td>
<td>M</td>
</tr>
<tr>
<td>15</td>
<td>Middle colic</td>
<td>M</td>
</tr>
<tr>
<td>16a1</td>
<td>Aortic hiatus</td>
<td>3</td>
</tr>
</tbody>
</table>

Numbers 1–3: Group number  
M = Lymph nodes regarded as distant metastasis

---

**Fig. 23.31:** Extent of D1 resection of tumour in distal one-third of stomach

**Fig. 23.32:** D2 resection of tumours of the proximal third of stomach

Clearly, anatomic limitations influence this margin because in antral lesions close to or involving the pylorus, only a limited portion of the duodenum can be removed. In patients with a distal lesion, essentially a distal subtotal gastrectomy is performed regardless of T stage.

For proximal gastric cancers (fundic), total gastrectomy is required. For multiple or more extensive lesions, total gastrectomy is required.
Fig. 23.83: Carcinoma stomach with involvement of serosa, endosonogram can detect this.

Fig. 23.84: Total gastrectomy—diffuse carcinoma of the stomach, known for transmural spread.

Fig. 23.85: Opened specimen—loss of rugae, nodular cancerous tissue.

Fig. 23.86: Subtotal gastrectomy for antral carcinoma stomach. They present with gastric outlet obstruction.

Fig. 23.87: Peritoneal metastasis from carcinoma stomach. Laparoscopy is the most ideal investigation to detect peritoneal metastasis.

Fig. 23.88: Intestinal type—gland formation present, similar to adenocarcinoma colon—good prognosis.
KEY BOX 23.26

PATHOLOGICAL BASIS FOR D2 DISSECTION

- Gastric cancer has a great propensity to spread through the rich plexus of lymphatics of the stomach to local or regional lymph nodes. Hence, the need to remove stomach and lymph nodes.

- Gastric cancer, unlike breast cancer, remains for a long time as a locoregional disease.
  It is striking too, that when gastric cancer recurs it often does so locoregionally rather than more wide-spread dissemination.

- It is very rare for gastric cancer to recur 5 years after surgery, whereas for breast cancer, disseminated micrometastases continue to take their toll some 10–20 years after surgery.

- For more distal lesions, a subtotal gastrectomy is the preferred approach.
  - Extended organ resection is reserved for patients with apparently node-negative T4 lesions, in which complete resection requires resection of the invaded portions of the diaphragm, pancreas, spleen, adrenal gland or colon.
  - These patients usually are pretreated with chemotherapy.

For more distal lesions, a subtotal gastrectomy is the preferred approach.

- Extended organ resection is reserved for patients with apparently node-negative T4 lesions, in which complete resection requires resection of the invaded portions of the diaphragm, pancreas, spleen, adrenal gland or colon.
  - These patients usually are pretreated with chemotherapy.

**R-selections** (Figs 23.89 to 23.91)

- The term R status was first described by Hermanek in 1994 and is used to describe the tumour status after resection (Key Box 23.27).

KEY BOX 23.27

**R-selections**

- **R0** describes a microscopically margin-negative resection, in which no gross or microscopic tumour remains in the tumour bed.
- **R1** indicates removal of all macroscopic disease but microscopic margins are positive for tumour.
- **R2** indicates gross residual disease. Since the extent of resection can influence survival, some authors include this R designation to complement the TNM system.

- Long-term survival can be expected only after a R0 resection; therefore, a significant effort should be made to avoid RT or R2 resections.

- If no disease is identified in the lymph nodes, (NO) nomenclature is used.

KEY POINTS AND SPECIAL NOTE TO STUDENTS

- Endoscopy has revolutionised the diagnosis of carcinoma stomach. Early diagnosis should be the aim since early carcinoma stomach is curable.
- Ultrasound/CT scan are the investigations to detect intra-abdominal metastasis.
- Endoscopy detects various layers of the stomach which are involved by the tumour.
- Diagnostic laparoscopy—it detects peritoneal metastasis—the role for radical surgery.
- Resection is the best line of treatment which can be curative in a few patients.

- App radical surgery will involve wide excision of the tumour with lymph nodes and omentum.

- Because of added morbidity and a very small survival advantage of D2 resections over D1 resections, many still consider D1 resection as adequate.

- As far as we are concerned, an understanding of these various terminologies and their concepts may enable you to score better marks in theory papers.

- A simple summary of surgical procedures (what everyone should know) has been given here.
Summary of treatment of carcinoma stomach

1. Carcinoma of pyloric antrum and distal body of the stomach

Radical subtotal gastrectomy which includes the removal of 60-70% of the stomach, greater omentum along with enlarged lymph nodes (N1) followed by gastrojejunal anastomosis is the treatment of choice (Figs 23.92 and 23.93).

2. Carcinoma of proximal stomach and diffuse carcinoma

Oesophagogastrectomy (Figs 23.94 and 23.95): Removal of the entire stomach, lower end of oesophagus, with regional lymph nodes, followed by oesophagojejunal anastomosis.

3. Palliative surgery (Fig. 23.96)

1. Carcinoma pyloric antrum (inoperable): Palliative anterior GJ is done to relieve vomiting, by anastomosing a jejunal loop to the stomach in the prepyloric region. If posterior GJ is done, the growth may involve the 1st stump early resulting in stomal obstruction. With anterior GJ gastroenterostomy can be added to prevent bile refluxing.

2. Palliative gastrectomy to get rid of ulcerated necrotic bleeding lesion.

Endoscopic mucosal resection

This is indicated in early gastric cancer confined to mucosa. The cancer should be less than 2 cm and there should not be node enlargement.
Paraneoplastic syndromes associated with carcinoma stomach

- **Trousseau’s syndrome**—Thrombophlebitis
- **Cutaneous migrans**—Hyperpigmentation of the axilla and groin.
- Peripheral neuropathy.

THE ADJUVANT TREATMENT

- Now it is understood that gastric cancers partially respond to chemotherapy—in about 30% of cases given at advanced stage (results are better than cancer colon). Injection 5-FU (fluorouracil) 500 mg IV daily for five days, every 28 days. It can be given by IV infusion or IV bolus over 15 minutes.
- **Mechanism of action:** It is an antimetabolite and acts by interfering with DNA synthesis. Side-effects are myelosuppression, mucositis, excessive lacrimation, nausea, vomiting, etc.
- Combination of 5-FU with adriamycin, mitomycin and cisplatin has also been tried. However, toxicity is more. With these drugs, FAM (5-fluorouracil, adriamycin and mitomycin C) and ECF (epirubicin, cisplatin and 5-FU) are popular agents.
- Intraperitoneal mitomycin and mitomycin C—impregnated charcoal have also been used (target the recurrence site—gastric bed).

1. Postoperative chemotherapy: Depends on the type of resection done
   - **R0 resection** (free margins): Any tumour greater than T2 including selected T2 cases should be considered for adjuvant therapy that includes 1 cycle of 5-FU+/−leucovorin OR capecitabine chemotherapy followed by 5-FU+/−leucovorin OR capecitabine-based chemoradiation 3–4 more cycles of 5-FU+/−leucovorin OR capecitabine chemotherapy.
   - **R1 (microscopic margin positive) and R2 (grossly positive margins)** regardless of the TMN stage, should receive chemoradiation followed by further cycles of adjuvant chemotherapy.

2. If the patient has received prophylactic chemotherapy/chemoradiation then:
   - Adjuvant treatment is usually recommended beyond T2N0M0 which is usually 5-FU+/−leucovorin OR capecitabine-based.
   - If patient has received ONLY preoperative chemotherapy and the resection was R1/R2, then postoperative chemoradiation is advised.

**Neoadjuvant chemoradiation**

It is advised in medically fit unresectable—locally advanced disease, which generally includes concurrent 5-FU/capecitabine-based chemotherapy.

**KEY POINTS ON SURGERY FOR CARCINOMA STOMACH**

1. **Carcinoma antrum and body**—radical subtotal gastrectomy
2. **Carcinoma proximal stomach**—radical total gastrectomy
3. **Inoperable carcinoma distal stomach**—palliative anterior GJ.
4. **Radical** refers to removal of lymph nodes, fat, fascia greater and lesser omentum.
5. When level 1 to 6 (N1) nodes are removed along with stomach, it is D1 gastrectomy.
6. When level 7–11 (N2) lymph nodes are also removed along with 1–6 nodes and stomach, it is called D2 gastrectomy.
7. Early gastric cancer without lymph nodes can be treated with endoscopic mucosal resection or endoluminal gastric resection.
8. Partial gastrectomy (subtotal) is worth considering in appropriate cases of obstruction/bleeding.
International North-South Corridor aims to connect Mumbai and Moscow, through multimodal (road, sea, rail) pathway.

- **Significance for India**
  - Energy security through bypassing the Pakistan and Afghanistan. By utilizing oil and gas from the CAR can be transported. Also, Iran's connectivity would also be enhanced again boost it.
  - Through the path, India could effectively connect to Afghanistan and with the help of Iran, could play a role in stabilisation.
  - It can act as a counterbalance to India’s perceived closeness to USA as Russia is closely related to this project.

**Prospects**
- Entry to markets of CAR
- Entry to resources of CAR and Russia
Spinal Injuries

Types:
- Flexion injury
- Flexion distraction injury
- Vertical compression
- Extension
- Flexion distraction injury
- Direct injury
- Indirect injury
- Pain in back
- Neuro deficit

On Examination:
- Inv.:
  - XR
  - CT
- MRI best
Broad principles of treatment of spinal injury

1/ It divided in three phases

I - Emergency care at the scene or emergency department.

→ Acute pain in back - To be taken as Spinal Injury
→ Also all Spinal Injury → To be taken as unstable
→ Avoid any movement of spine, keep the Neck in Neutral (For Cervical Injury)
→ Whole body is to move in one piece

II - Definitive care

Cure of JT = Prevent deterioration of injury

For Cervical Injury = Often also T Head Injury

→ Re-exam
→ Reduction by Skull traction through Stereotactic Tongs

Keep close watch on Neuro signs and Prevent Over traction
If confirmed x-ray say that proper reduction has been achieved then
ight traction for 6 weeks
than
Immobilization by plaster collar for 8-9 months
Sx may be required foe
(i) Disc reparable subluxation
(ii) Persistent instability
Sx consists of Intervertebral fusion (Ant. fusion or fusion of Spinous processes (Post. fusion)

Special types of Cervical
(i) Wedge compression = From flexion force
- Post. ligament unit act so stable
- Tilt Reduction Not needed
- Immobilise with skull traction
- Cervical collar support

(ii) Burst = Vertical compression force
- Post. ligament unit act still unstable
- Tilt If No Nerve deficit - Tilt on wedge
- If Sx then see whether aligned

(iii) Uncommon

* ORIF+Decom