Surgical options in GI Malignancies

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Esophagus
Stomach
Gall bladder
Pancreas
Liver
Disclaimer

I am a Surgical Oncologist

I am not related to any political party.
Clinical Anatomy

- Hollow muscular tube 25 cm in length which spans from the **cricopharyngeus** at the **cricoid cartilage** to **gastroesophageal junction** (Extends from C7-T10).

- Has 4 constrictions-
  - At starting (cricopharyngeal junction)
  - Crossed by aortic arch (9 inch)
  - Crossed by left bronchus (11 inch)
  - Pierces the diaphragm (15 inch)

- Histologically 4 layers: mucosa, submucosa, muscular & fibrous layer.

**FIGURE** Anatomy of the esophagus
Four regions of the esophagus:

- Cervical = cricoid cartilage to thoracic inlet (15–18 cm from the incisor).
- Upper thoracic = thoracic inlet to tracheal bifurcation (18–24 cm).
- Midthoracic = tracheal bifurcation to just above the GE junction (24–32 cm).
- Lower thoracic = GE junction (32–40 cm).

*Figure* Anatomy of the esophagus with landmarks and recorded distance from the incisors used to divide the esophagus into topographic compartments. GE, gastroesophageal.
Epidemiology

- 1% of all malignancy
- 6% of GI malignancy
- M:F – 3.5:1
- 6th leading cause of death from cancer
- 2-4% patients with head and neck cancer
- SCC M.C.
- Increase in incidence of Adenocarcinoma
Surgical Procedures for Esophageal Cancer

- **McKeown Transthoracic esophagectomy:**
  It includes a right thoracotomy with mobilisation of the thoracic part of esophagus, followed by gastric mobilization and cervical anastomosis in supine position.

- **Transhiatal esophagectomy:**
  It includes gastric mobilisation and cervical esophageal mobilisation in supine position through a laparotomy with blind mobilisation of thoracic esophagus through the hiatus and cervical anastomosis.
Surgical Procedures for Esophageal Cancer

• **Left Thoracoabdominal approach:**
  It includes lower esophageal and gastric mobilization through a single abdominothoracic incision and lower thoracic anastomosis.

• **Ivor Lewis esophagectomy:**
  It involves gastric mobilization and formation of gastric conduit in the supine position followed by right thoracotomy, infracranial thoracic esophageal mobilization and intrathoracic anastomosis.
Surgical Procedures for Esophageal Cancer

• *Minimally invasive esophagectomy:*
  It may be totally minimally invasive (thoracic-and abdominal – laparoscopic) or Hybrid (i.e., thoracoscopy with laparotomy or thoracotomy with laparoscopy) or Robotic – assisted.
Choice of Technique

• Decisions regarding surgical technique are routinely based on personal bias, comfort level of the surgeon, and a subjective view of tumor biology because solid evidence from scientifically designed trials have, until recently, been nonexistent.
Types of Lymph node dissection

Figure 52.10 Left to right: Standard, two-field, and three-field lymphadenectomy.
Indications for Surgical Treatment

- Upfront for early stage disease (T1/T2N0)

- Locally advanced disease (>T2N1) following neoadjuvant chemotherapy/ chemoradiotherapy.

- Residual/ recurrent disease following chemoradiation/ radiation.
Contraindications

- Invasion of surrounding structures by primary Tumor or nodal mass – aorta, vertebra, tracheobronchial tree, pulmonary parenchyma, liver, celiac axis, etc.
- Recurrent Laryngeal Nerve palsy.
- Patients unfit for major cancer surgery.
Transthoracic Esophagectomy: Steps

- Mediastinal Pleural cuts
- Complete circumferential mobilization of infracranial part of esophagus

Thoracic Mobilization
Transthoracic Esophagectomy: Steps

Azygous vein Ligation

Supracarinal esophagus mobilization
Transsthoracic Esophagectomy: Steps

- Thoracic Duct Ligation
- Lymphadenectomy along Right Recurrent Laryngeal Nerve
Transthoracic Esophagectomy: Steps

- Stomach with gastroepiploic arcade
- Left gastric pedicle dissection
Transthoracic Esophagectomy: Steps

- D2 lymphadenectomy bed
- Left side neck incision
Transthoracic Esophagectomy: Steps

- Cervical esophagus Mobilization
- Formation of Gastric Tube
Transthoracic Esophagectomy: Steps

- Dilatation of pylorus
- Stomach conduit delivered in neck and ready for anastomosis
Transthoracic Esophagectomy: Steps

- Stapled Gastro esophageal anastomosis
- Hand sewn Gastro esophageal anastomosis
**Post operative complications**

- **Hemorrhage:** common source include the azygous vein, bronchial artery, small direct branches from thoracic aorta and intercostal vessels.

- **Gastric tube ischemia:** May manifest as persistent hypotension, arrhythmias, respiratory insufficiency or persistent acidosis with high lactate levels and/or hyperkalemia.

- **Early anastomotic leak:** usually a technical failure. It may be confined to neck or associated with mediastinal collection. A combination of nil by mouth, adequate mediastinal or neck drainage and antibiotics will successfully manage in most cases. Hemodynamic decompensation should warrant anastomotic disconnection.

- **Respiratory insufficiency and aspiration:** CO2 retention and hypoxemia on ABG. Elective tracheostomy and chest physiotherapy.
Post operative complications

- **Recurrent Laryngeal Nerve palsy**: unilateral or bilateral. More common with three field lymphadenectomy. Early Tracheostomy should be considered.

- **Pulmonary complications**: in 15-40%. Early identification and physiotherapy. Tracheostomy for frequent tracheobronchial toileting.

- **Chyle leak**: Fat free feeds if low output. Thoracoscopic Ligation of chyle duct if conservative treatment fails.
Introduction

• Stomach cancer is second most leading cause of death worldwide after lung.
• Fourth common cancer in incidence after lung, breast, colon cancer.
• Incidence of distal stomach cancer is decreasing
• Proximal stomach (cardia) and OG junction cancer increasing worldwide.
The number of newly diagnosed cases of proximal gastric and esophagogastric junction (EGJ) adenocarcinomas has increased six-fold since the mid-1980s.
Types of Gastrectomy

• **Total Gastrectomy:**

• Disease involving the mid body.

• Proximal Gastric cancers not amenable for proximal gastrectomy, i.e., the distal gastric remnant is not suitable for esophagogastric anastomosis, lesser curve involvement till incisura, anterior and posterior wall involvement precluding formation of a functional gastric tube.

• Significant station4 (greater curvature) nodes

• Persistent margin positive following subtotal/proximal gastrectomy.

• Linitis plastica

• Isolated local recurrence following subtotal/proximal gastrectomy in a patient with good performance status.
Types of Gastrectomy

Subtotal Gastrectomy:
• Involves removal of pylorus, antrum, entire lesser curve till GE junction and variable portions of gastric body.
• At a minimum, the cardia and fundus need to be preserved.

Proximal Gastrectomy:
• Removal of GE junction, cardia, fundus, the lesser curve till incisura angularis and variable portion of body.
Stomach Cancer

- Best chance for long-term survival - complete surgical eradication of a tumor with resection of adjacent nodes
- 6 factors determine the extent of gastric resection
  - Tumor stage
  - Tumor histology or type
  - Tumor location
  - Nodal drainage
  - Peri-operative morbidity
  - Long-term gastro-intestinal function
Operative procedure-
Total gastrectomy
• Stomach cancer is associated with poor prognosis.

• Surgery is the main curative modality of treatment.
Arterial supply
Method of surgical resection

- Open surgery
- Laparoscopic surgery
- Robotic surgery
Staging Laparoscopy

- Whether or not all patients or just those with advanced disease, is controversial.
- Avoids unnecessary laparotomy by 25%
Margin of resection

- Proximal gross 2 cm oesophageal gross margin is required for T1 lesions.
- $\geq$ T2 -- 3 cm gross margin required.
- Frozen guidance is helpful.
- Distally - divided at D1.

Japanese gastric cancer treatment guidelines 2014 (ver. 4)
Omentectomy & bursectomy

- Started from middle of colon proceed to hepatic & splenic flexures.
- Dissection is continued cranially toward the pancreatic body & tail
- Stops at inferior border of the pancreas
Omentectomy & bursectomy

Dissection of the anterior leaf of mesocolon with omentum toward the pancreas

Dissecting anterior leaf of mesocolon and pancreatic capsule together with omentum

Labelled structures:
- Right gastroepiploic artery
- Left gastroepiploic artery
- Gastroepiploic vein
- Accessory right colic vein
- Superior mesenteric vein
- Henle's trunk
- Middle colic vein
Line of division of the lesser omentum

Clamp isolating supraduodenal artery for ligation
Clamp under right gastric artery

The branches of the supraduodenal artery are ligated and divided
Reconstruction after Total Gastrectomy

Duodenal passage excluded
- Roux en Y or loop Oesophago-Jejunostomy

Duodenal passage preserved
- Roux en Y Oesophago-Jejunostomy with Pouch
- Jejunal Interposition
- Jejunal Interposition with pouch

Figure 2: Classification of reconstructive procedures after total gastrectomy
Lymphadenectomy

Japanese gastric cancer treatment guidelines 2014 (ver. 4)
D1 vs D2

- Subgroup analysis of patients without splenectomy and/or pancreatectomy has a trend for OS much more benefiting D2 compared to D1 patients, with a HR of 0.65 (95% CI: 0.52–0.80, P < 0.0001)

- Without splenectomy and pancreatectomy D2 lymphadenectomy appear to have the greatest OS benefit compared with D1 lymphadenectomy.
POST OPERATIVE MANAGEMENT

Post operative nutrition

Early ambulation

DVT prophylaxis
Post operative nutrition

• Enteral nutrition better than TPN

• Early enteral feeding is preferred (started from POD1)

• Options of Enteral nutrition
  Nasojejunal tube feeding
  Feeding jejunostomy
COMPLICATIONS RELATED TO ANASTOMOSIS

- Leak
- Duodenal stump leak
- Stricture
- Obstruction
- Afferent and efferent loop syndrome
- Jejunal intussusception
- Internal hernia
Carcinoma gallbladder Surgery
Nihilism . . . . .

• “In malignancy of the gallbladder, when a diagnosis can be made without exploration, no operation should be performed, in as much as it only shortens the patient’s life.”
  • Blalock
Introduction

• Most common biliary system malignancy
• Poor prognosis and usually advanced at presentation
• Overall prognosis – 5% 5 year survival
Anatomic consideration

• Cancers of the gallbladder - early invasion and metastases

• Anatomy of the gallbladder
  – Thin wall and narrow lamina propria
  – Single muscular layer
  – No serosal covering between it and the liver

• Modes of spread
  – Via lymphatics
  – Hematogenously
  – Peritoneal cavity carcinomatosis
  – Biopsy or surgical wound tracts.
Site of origin

- 60% - fundus
- 30% - body
- 10% - neck
Lymphatic drainage
Gallbladder Cancer

Multi-disciplinary Discussion

- Resectable
  - Adjuvant Therapy
    - 5-y survival 15%-60%

- Unresectable (Intrahepatic Only)
  - Consider Chemoradiation
  - Gemcitabine + Cisplatin or Clinical Trial*
    - 5-y survival <5%

- Metastatic/Extrahepatic
  - Gemcitabine + Cisplatin or Clinical Trial*
    - 5-y survival <5%
Management

• Three clinical scenarios are common for gallbladder cancer:
  1. After routine cholecystectomy
  2. Intraoperatively
  3. Gallbladder cancer is suspected before surgery
GBC discovered after pathology report
Why re resection?

- A multiinstitutional study of 115 patients reported residual disease at any site in the abdomen during re-resection for:
  - 38% of T1,
  - 57% of T2,
  - 77% of T3 tumors

- Residual invasion of the liver parenchyma in the gallbladder bed was found in:
  - 0% of T1
  - 10% of T2
  - 36% of T3

  - Pawlik et al, 2007
Extent of Surgery

• Guided by T stage & calculated risk of liver & lymph node metastasis
• Aim to have R0 resection
  – “Radical cholecystectomy”
    • includes removal of GB with liver resection, dissection of hepatic pedicle & retropancreatic lymph nodes
  – Extent of liver resection is controversial
    • Ranges from non-anatomical (wedge resection) to anatomical resections including segments IVB & V, segments IV,V, VIII, Extended Rt hepatectomy (IV,V,VI,VII,VIII) with no diff in OS*

Evolution of radical surgery for gall bladder and nomenclature

- **Extended cholecystectomy**
  - Cholecystectomy + liver wedge resection

- **Radical cholecystectomy**
  - Glenn’s procedure
  - Introduced portal lymphadenectomy

- **Extended radical cholecystectomy**
  - Modified Glenn’s procedure
Radical / extended cholecystectomy

Port Site Resection

• OS benefit is not supported by data *

- Was GB ruptured
  - Was GB retrieved in bag
    - Yes: Resect all port sites
    - No: No resection of port sites

Survival

• The overall 5-year survival is consistently less than 5%, with a median survival of 5 to 8 months.

• *Median overall survival for the entire patient cohort
  – Stage la - stage III disease - median survival was 12.9 months (95% CI, 11.7 to 15.8 months)
  – Stage IV - 5.8 months (95% CI, 4.5 to 6.7 months)

• *Survival results from MSKCC for patients treated from 1995 to 2005
PERIAMPULLARY & PANCREATIC CANCER
Within 2 cm of major papilla in duodenum
- Head of pancreas
- Ampulla
- Distal common bile duct
- Duodenum

India 14,000 cases

30% of all malignant tumors of pancreatic head

Mohandas KM. Ind J Gastroenterol 2001
ETIOLOGY

Cigarette smoking
High fat & protein, low fruit & vegetable
Coffee
Alcohol
Diabetes mellitus
Chronic pancreatitis
Pernicious anemia
Cholelithiasis
Previous gastric surgery
PRESENTATION

Jaundice – waxing and waning
Biliary colic
Bleeding
Pancreatitis
Abdominal pain
Weight loss
DIAGNOSIS

Clinical features
Laboratory tests
  Liver function tests
  CA 19-9
Side viewing upper GI endoscopy
EUS
Radiology
  Disease staging
  Resectability
Accurately predicts resectability in 80 – 90 % cases

Lesion Confined to the Pancreas
No Extra pancreatic spread
Lymph node involvement limited to the peripancreatic nodes
Lesion free from SMV-PV, and SMA
Borderline operable

- SMV segmental occlusion
- Abutting the SMA < $180^\circ$
- Encasing Short segment of hepatic artery
Non Resectable – Locally Advanced

- Significant occlusion of SMA $> 180^\circ$
- Venous occlusion too extensive to remove enbloc safely
Ca GB infiltrating porta

Hilar Cholangio Carcinoma

Ca HOP

Periampullary Ca
Indications
Definitive surgery to be delayed by > 10 days
  in which case defer subsequent surgery by 3 – 6 weeks
to allow jaundice to resolve & liver functions improve
Hyperbilirubinemia > 20mg%
Borderline operable tumors.

In preoperative stenting
  Only plastic stent
  No use of self expanding stents
  Should be inserted endoscopically

NO ROLE FOR PREOP EXTERNAL BILIARY DRAINAGE
Biliary / Pancreatic symptoms

USG / CT scan

Pancreatobiliary pathology

MR / ERCP

Periampullary carcinoma

Surgery

Uncertain Operability

EUS / Laparoscopy / Lap. USG
Tissue diagnosis

Biopsy only when non-operative treatment is planned

FNAC?

High false negative
Peritoneal seeding

Guidelines for management of patients with pancreatic cancer, periampullary and ampullary carcinomas. Gut 2005

“FAILURE TO OBTAIN HISTOLOGICAL CONFIRMATION OF A SUSPECTED DIAGNOSIS OF MALIGNANCY DOES NOT EXCLUDE PRESENCE OF A TUMOUR AND SHOULD NOT DELAY APPROPRIATE SURGICAL TREATMENT”
TREATMENT OPTIONS

Resectional surgery - curative intent

Palliative surgery - relieve symptoms

Endoscopic or percutaneous biliary stenting
- relieve jaundice

Palliative / Adjuvant therapies

Chemotherapy and radiotherapy

Palliative care – relief of pain
Pancreaticoduodenectomy

Structures removed
- Head of pancreas
- Duodenum
- Regional lymph nodes
- Gallbladder with distal CBD

Advantages of pylorus preservation
- Technically easier and faster
- Better quality of life
- Prevents occurrence of post gastrectomy syndromes
## Pancreatic resections

<table>
<thead>
<tr>
<th>Complications</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatic fistula</td>
<td>23.4%</td>
</tr>
<tr>
<td>Fluid Collections</td>
<td>8.8%</td>
</tr>
<tr>
<td>Anastomotic failure</td>
<td>4.0%</td>
</tr>
<tr>
<td>Bleeding</td>
<td>4.3%</td>
</tr>
<tr>
<td>Intra-abdominal abscess</td>
<td>3.1%</td>
</tr>
<tr>
<td>Post-operative pancreatitis</td>
<td>2.9%</td>
</tr>
</tbody>
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Rosenberg L et al. J Gastrointest Surg 1999
Hepatic Resection Techniques
Introduction

- Liver resection is the most effective treatment of HCC and Colorectal liver metastases
- No. of resections have increased
- Major hepatectomies
- Decreased morbidity & mortality
Non Anatomic Resection

• Increased blood loss
• Increased positive surgical margins
• Increased recurrence
• Decreased survival

• DeMatteo RP. Anatomic segmental hepatic resection is superior to wedge resection as an oncologic operation for colorectal liver metastases. Journal of Gastrointestinal Surgery 2000; 4:178-184
• Kokudo N. Anatomical Major resection versus nonanatomical limited resection for liver metastases from colorectal carcinoma. American Journal of Surgery; 181:153-159
Anatomy
• Rex and Cantlie in 1887 challenged anatomic division of liver by falciform ligament

• Healey, Couinaud, Hrojtso described segmental anatomy based on blood supply in 1950s.
Brisbane 2000 Terminology of Liver Resections
IOUS

- Better definition of relationship of tumour to surrounding structures
- Changes surgical Strategy in over 40% of cases
- CT scans had a sensitivity of 72.8% overall, but decreases to 34.6% for tumours less than 1cm.
- Sensitivity: 98%

Complications
Complications

- Hemorrhage
- Bile Leak
- Hepatic Dysfunction
Mission Accomplished
Thank you
your VOTE is your VOICE