

Surgical options in GI Malignancies

Dr. Ritesh Pruthy

MCh. Surgical Oncology, Tata Memorial Hospital
Senior Consultant Max Hospital, Mohali

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.

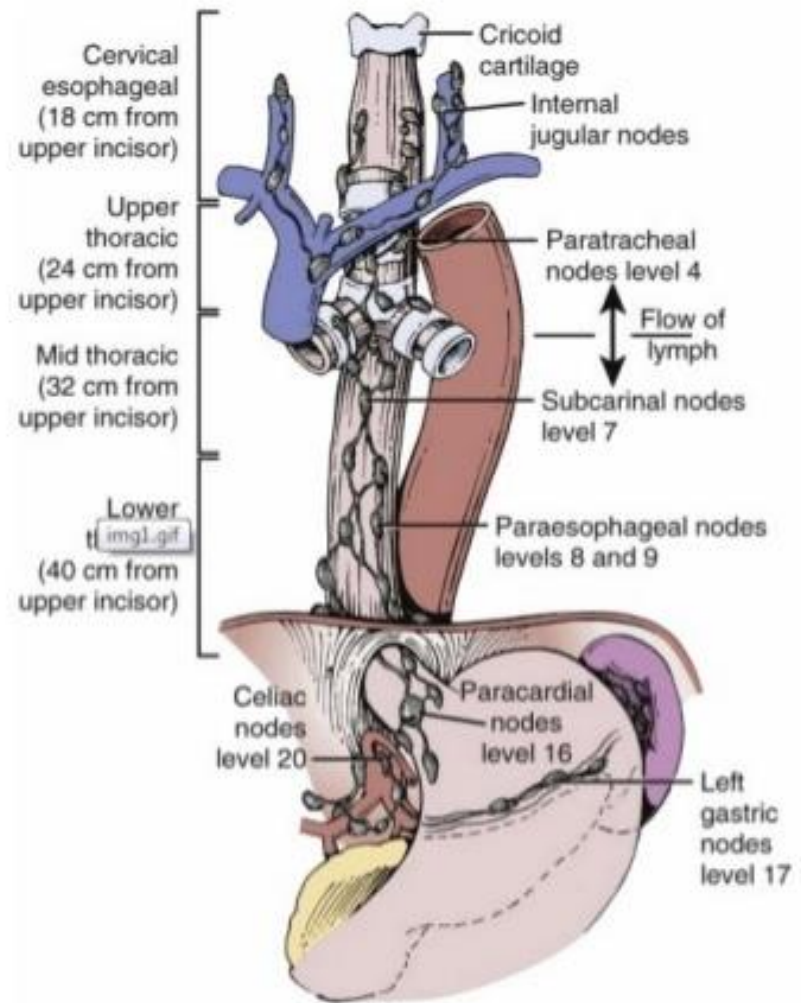


FIGURE Anatomy of the esophagus

Contd...

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).

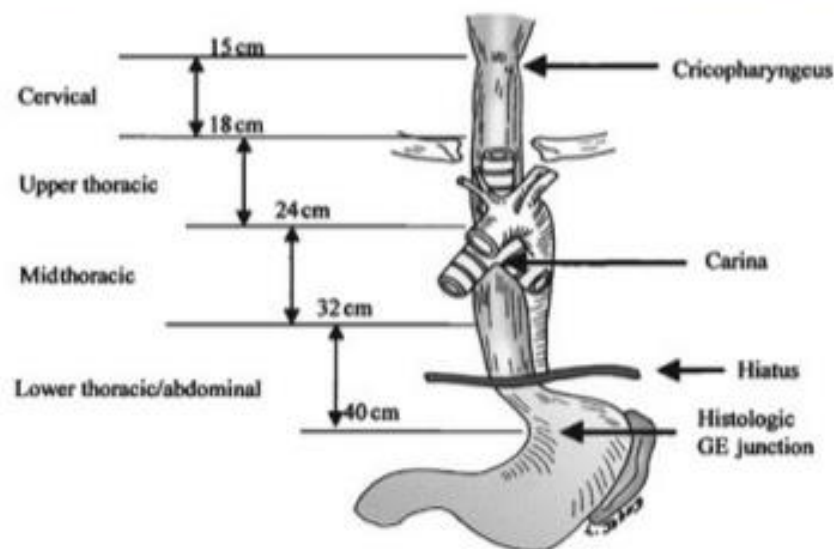


Figure Anatomy of the esophagus with landmarks and recorded distance from the incisors used to divide the esophagus into topographic compartments. GE, gastroesophageal.

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.

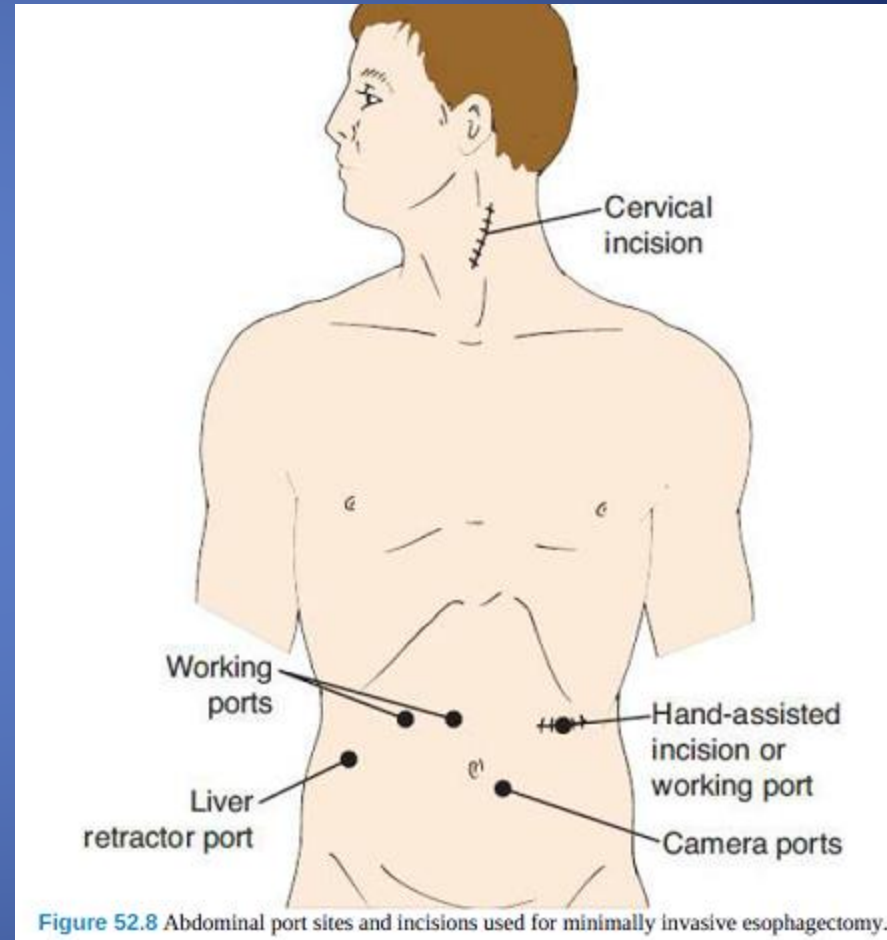
- ***Ivor Lewis esophagectomy:***

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

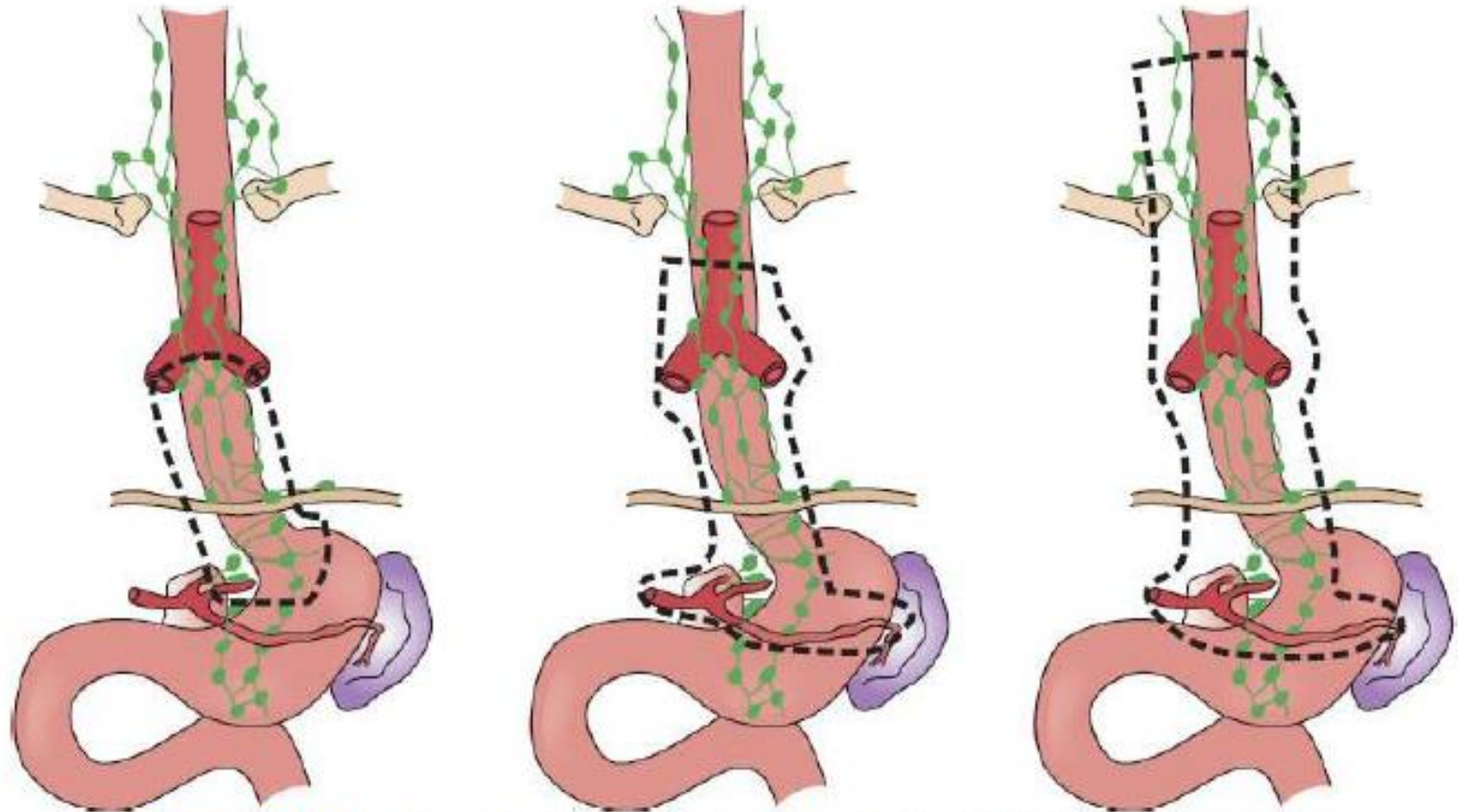


Figure 52.10 Left to right: Standard, two-field, and three-field lymphadenectomy.

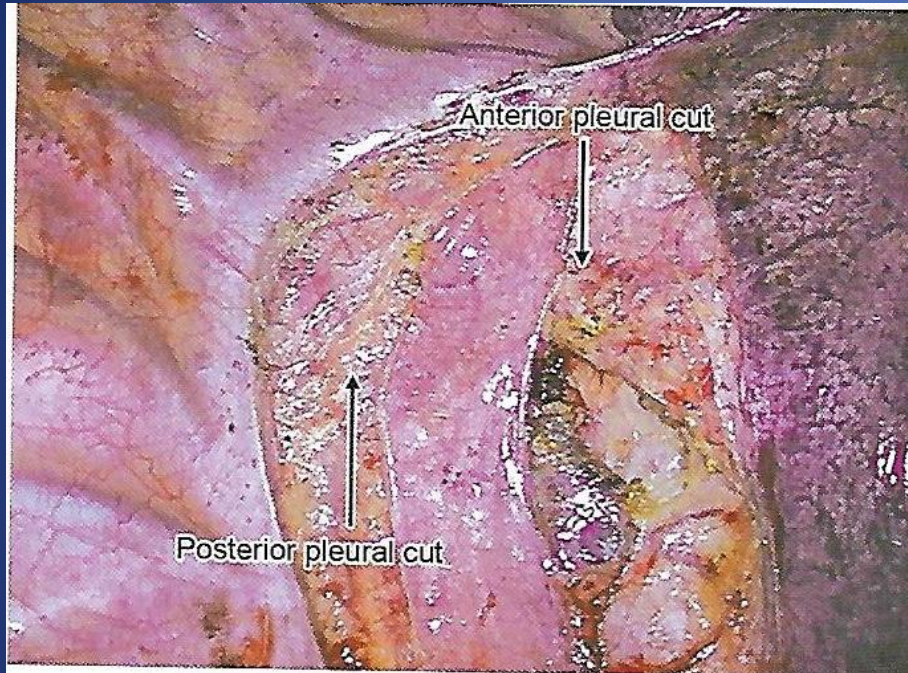
Indications for Surgical Treatment

- Upfront for early stage disease (T1/T2N0)
- Locally advanced disease (>T2N1) following neoadjuvant chemotherapy/ chemoradiotherapy.
- Residual/ recurrent disease following chemoradiation/ radiation.

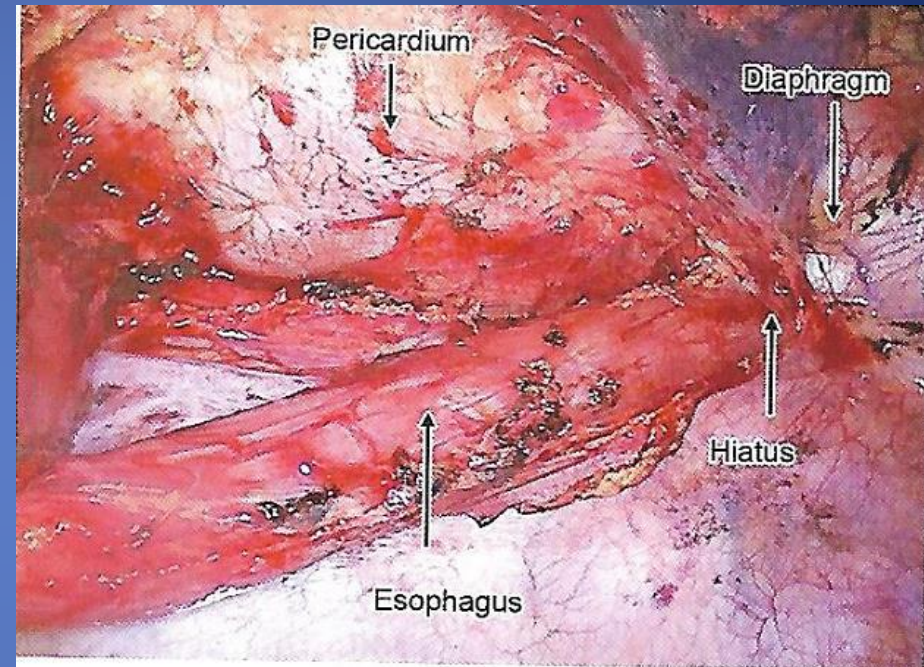
Contraindications

- 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

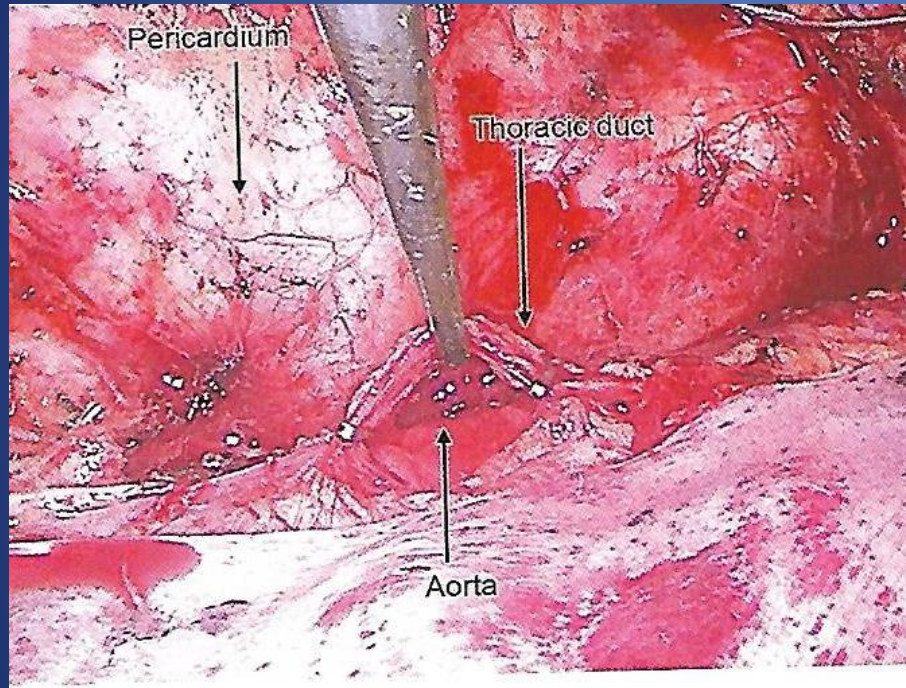


Azygous vein Ligation

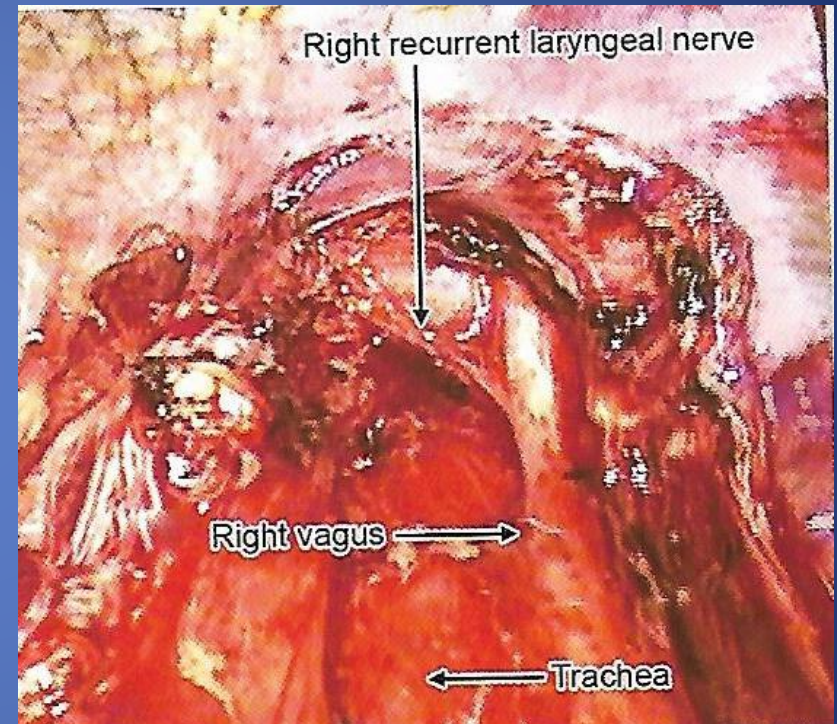


Supracarinal esophagus mobilization

Transthoracic Esophagectomy: Steps

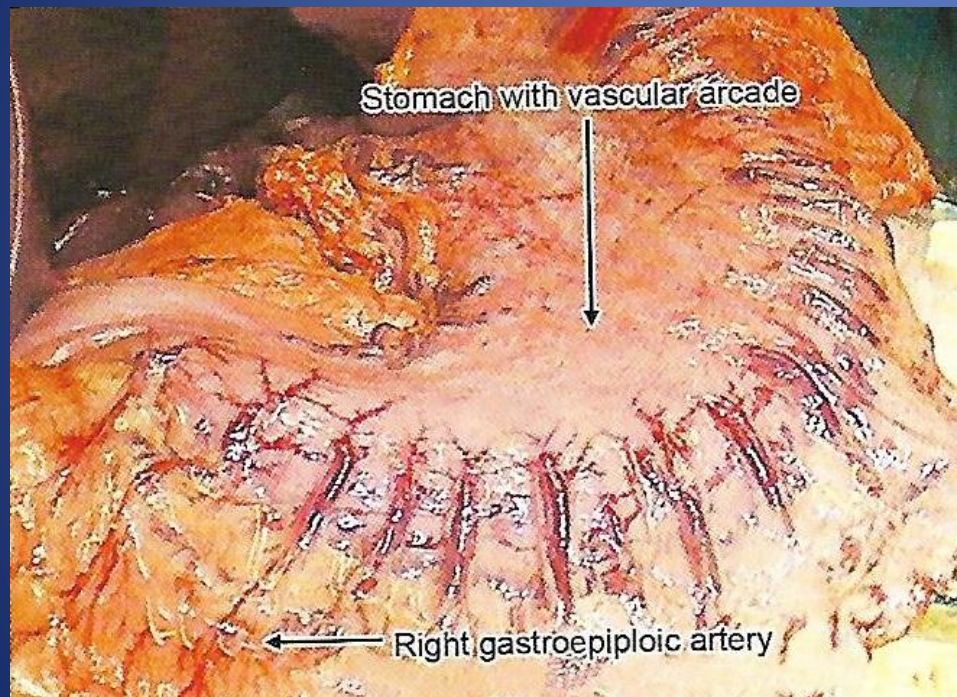


Thoracic Duct Ligation

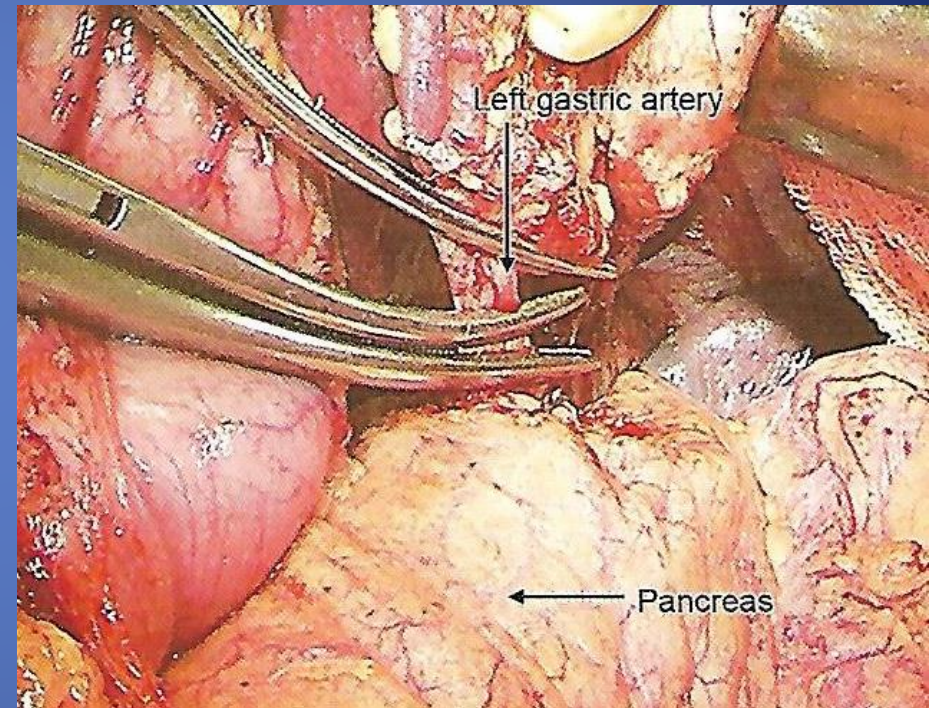


Lymphadenectomy along Right Recurrent Laryngeal Nerve

Transthoracic Esophagectomy: Steps

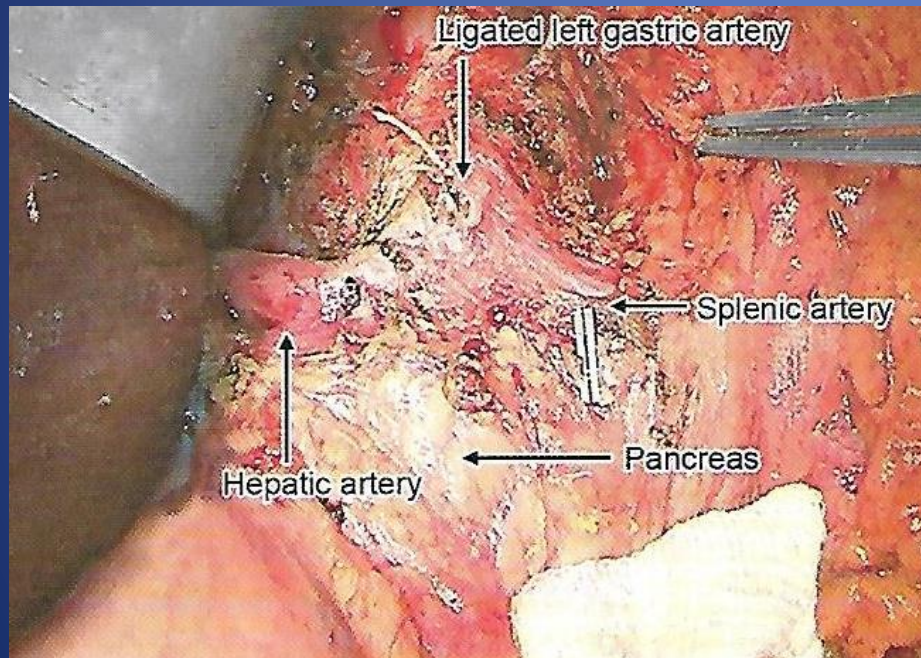


- Stomach with gastroepiploic arcade



- Left gastric pedicle dissection

Transthoracic Esophagectomy: Steps

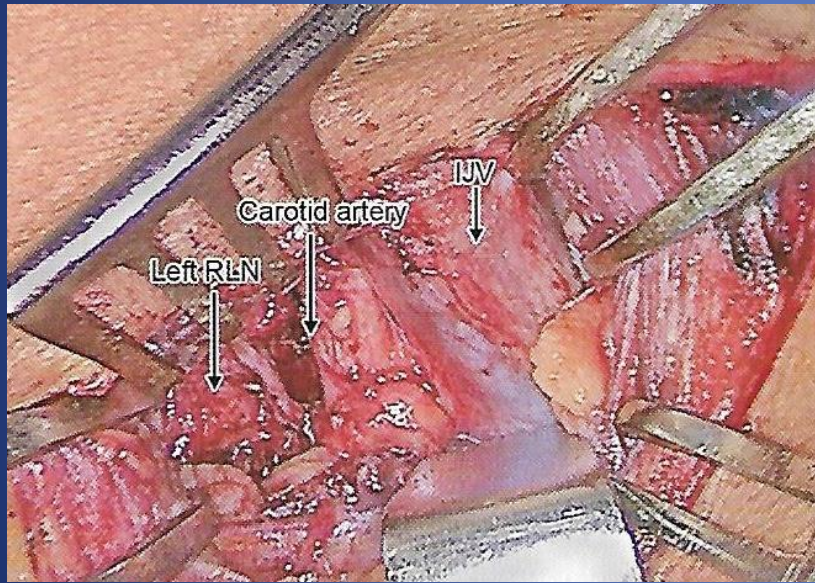


- D2 lymphadenectomy bed

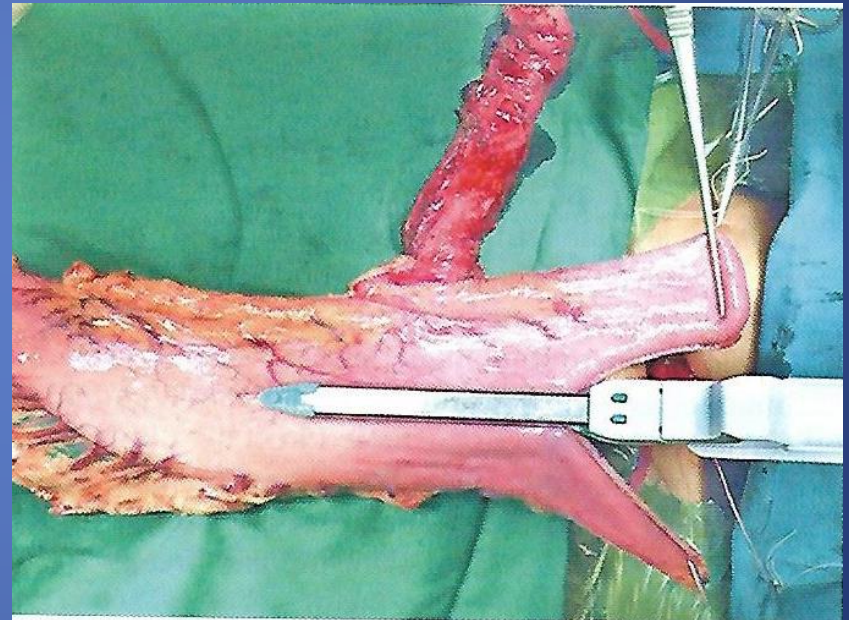


Left side neck incision

Transthoracic Esophagectomy: Steps

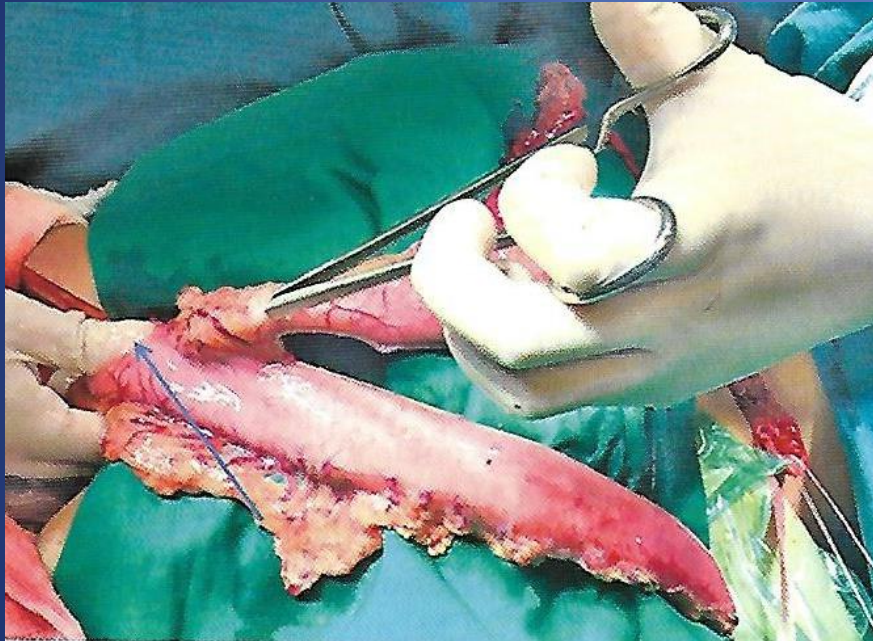


Cervical esophagus Mobilization

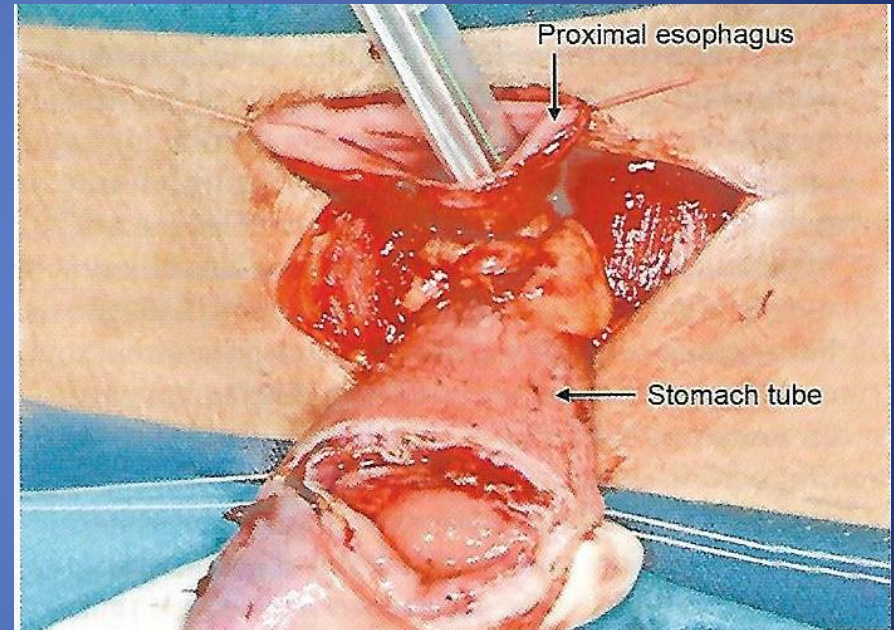


- Formation of Gastric Tube

Transthoracic Esophagectomy: Steps

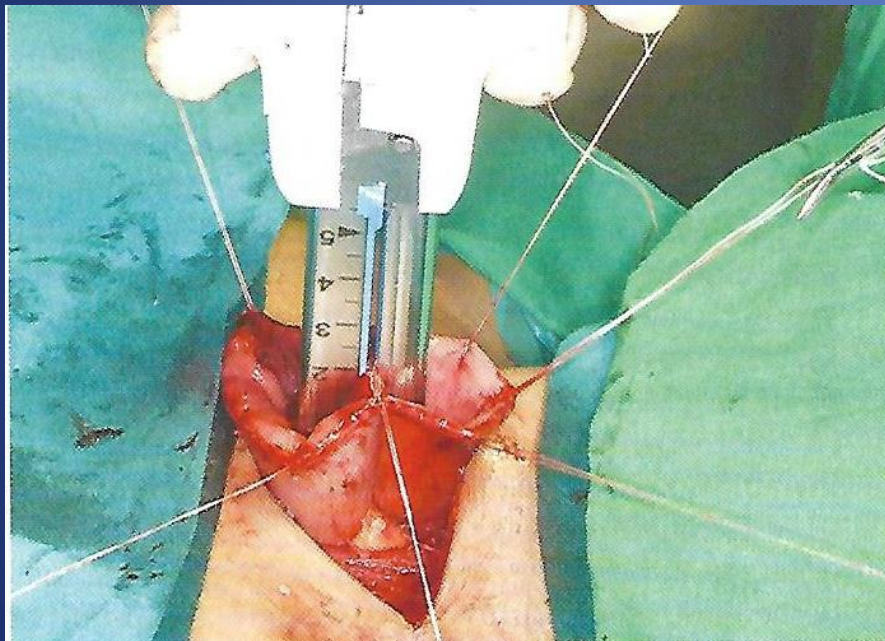


- Dilatation of pylorus

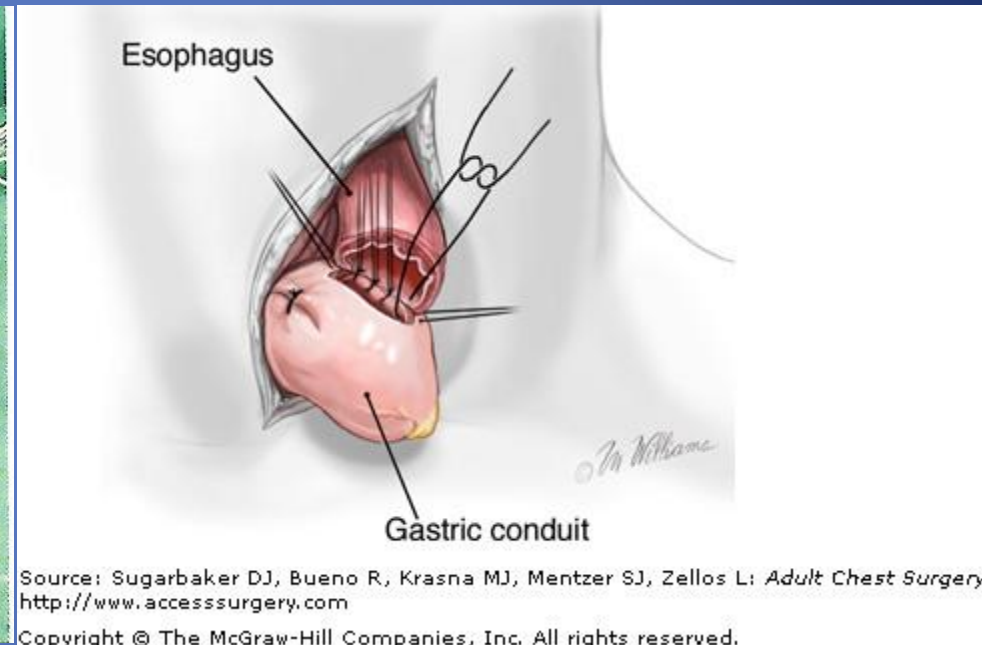


- Stomach conduit delivered in neck and ready for anastomosis

Transthoracic Esophagectomy: Steps



- Stapled Gastro esophageal anastomosis



Source: Sugarbaker DJ, Bueno R, Krasna MJ, Mentzer SJ, Zellos L: *Adult Chest Surgery*.
<http://www.accesssurgery.com>

Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

- 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.

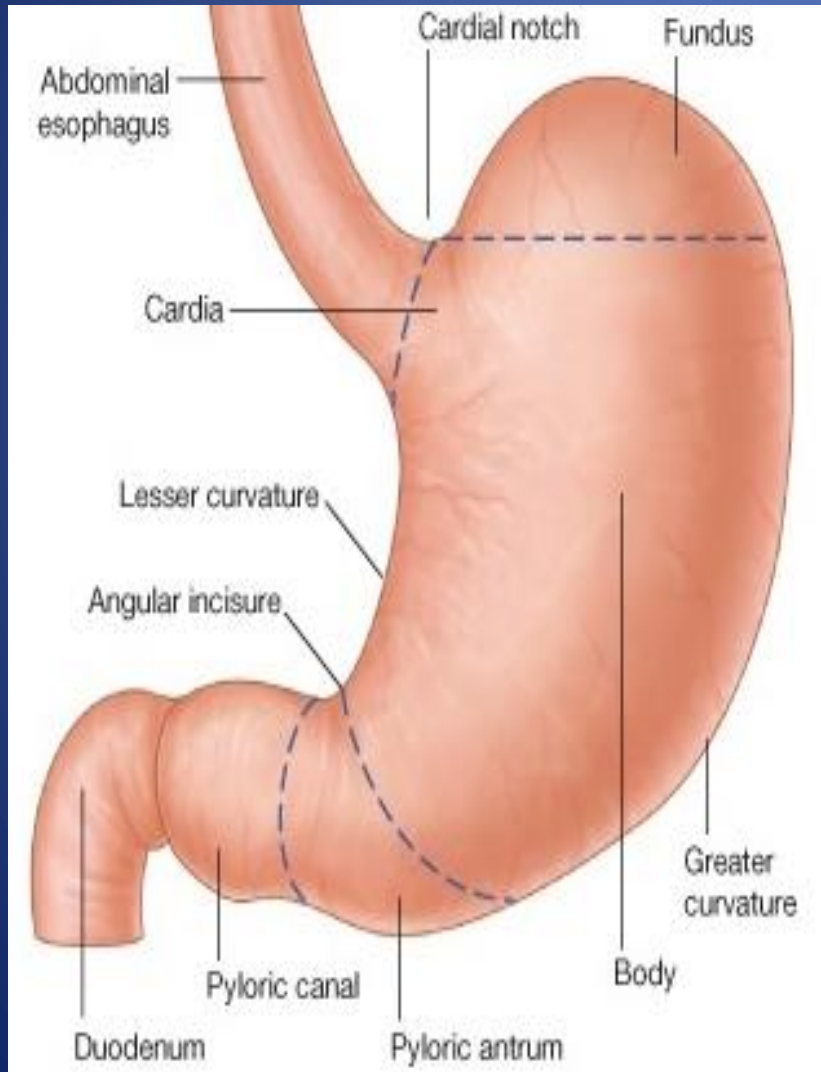


Stomach Cancer

Introduction

- Stomach cancer is second most leading cause of death world wide 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.

Anatomy



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 station 4 (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.

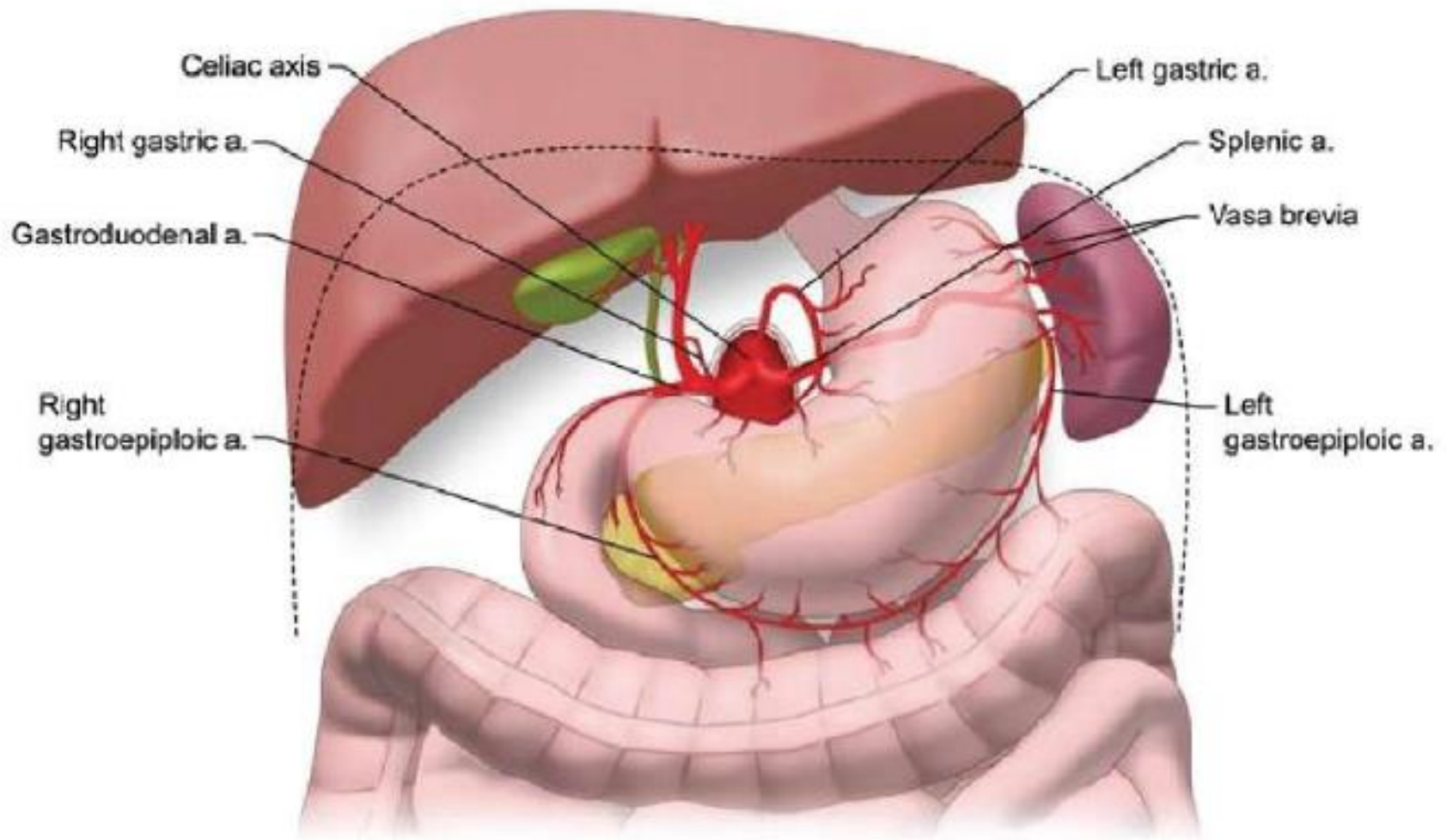
Stomach Cancer

- 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%

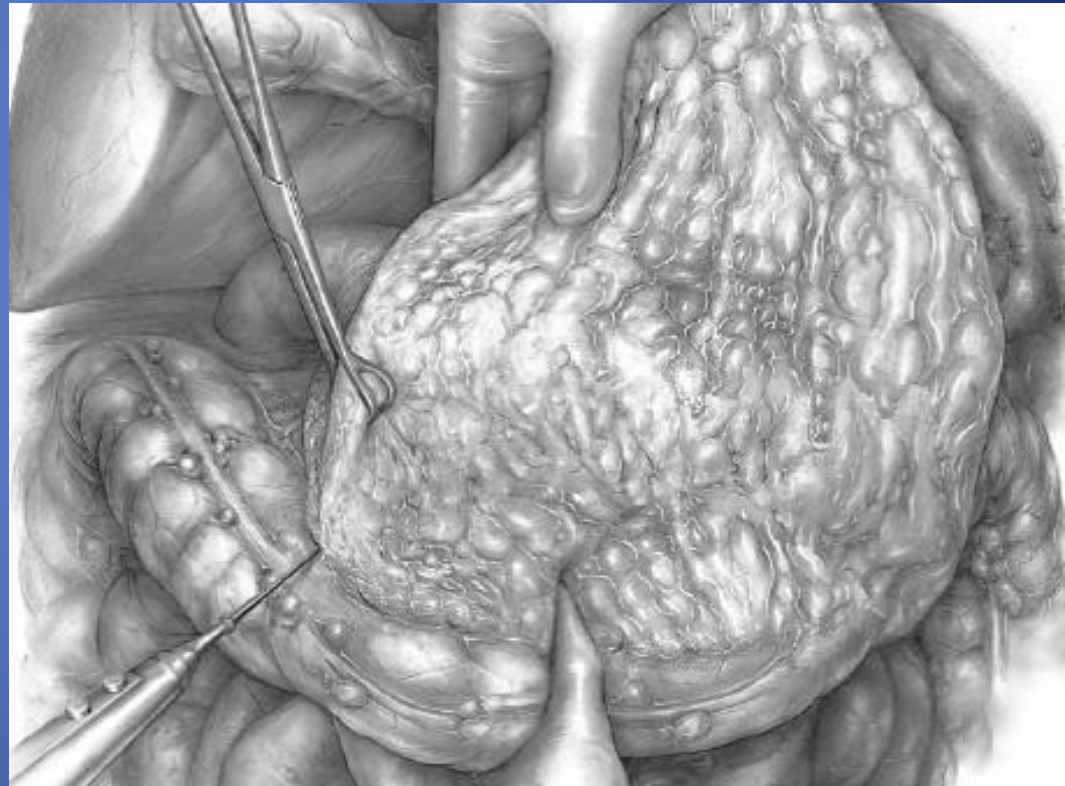
Margin of resection

- Proximal gross 2 cm oesophageal gross margin is require- 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)

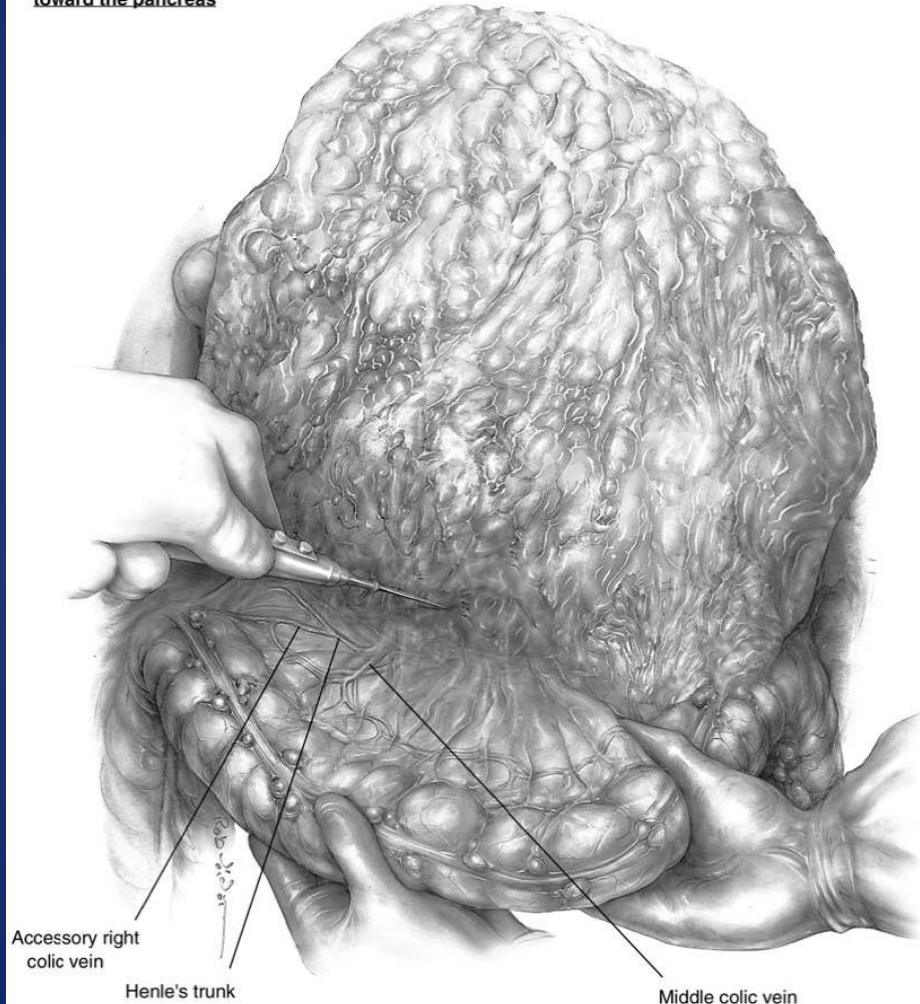
Omentectomy & bursectomy

- 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

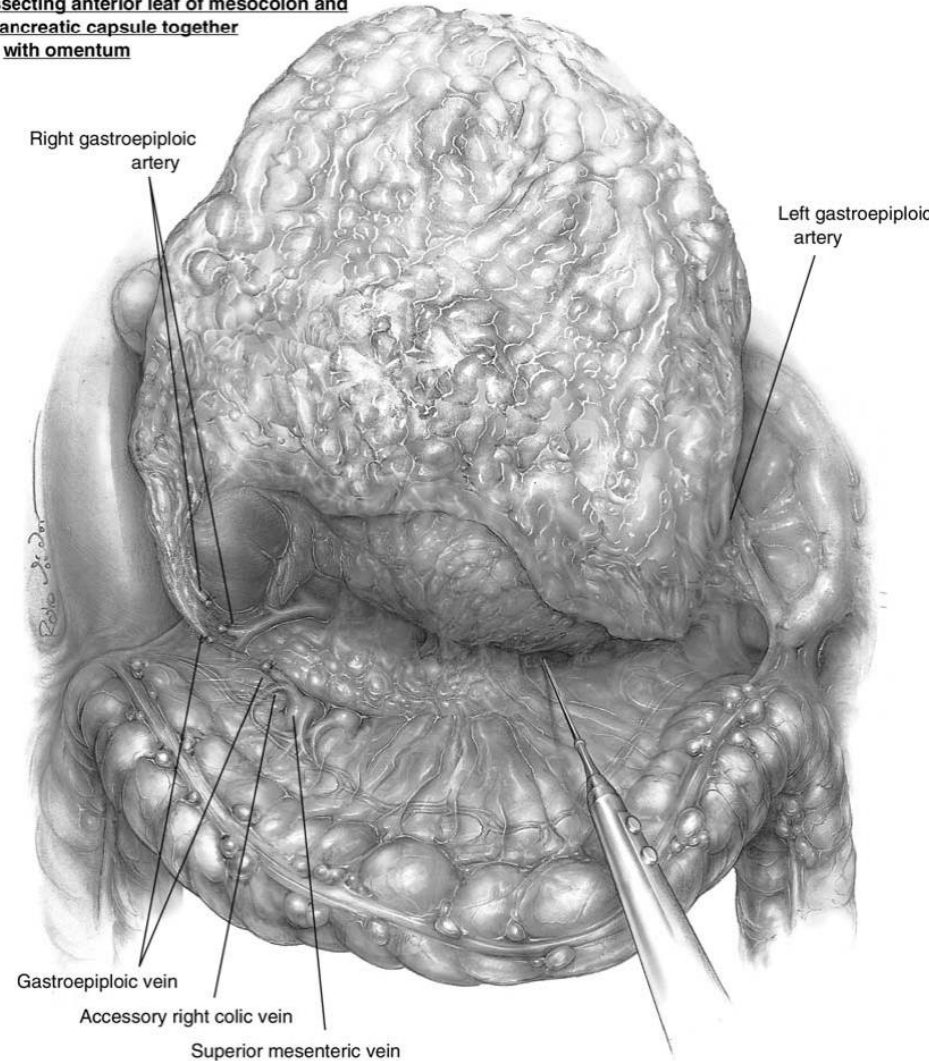


Omentectomy & bursectomy

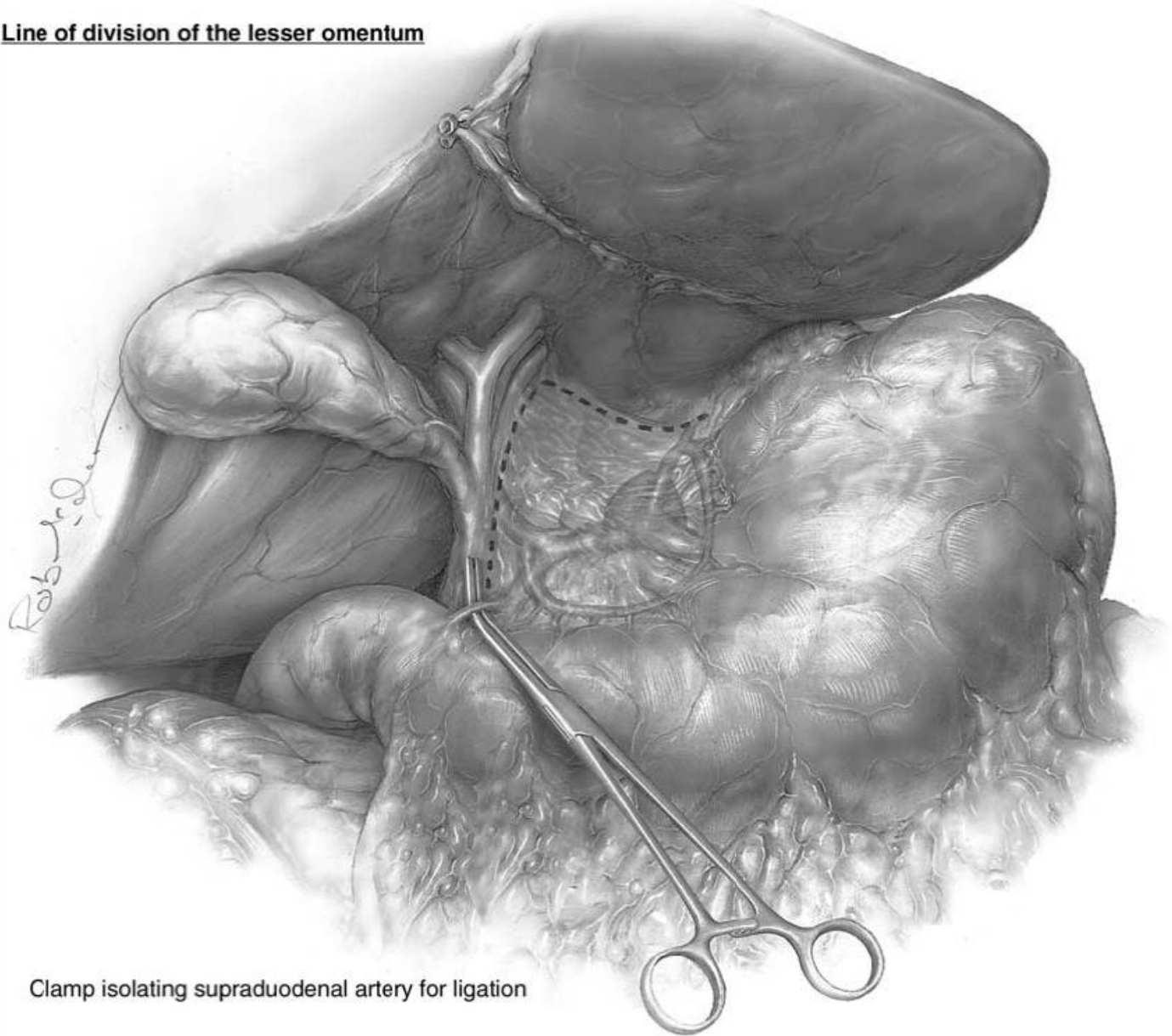
Dissection of the anterior leaf of mesocolon with omentum toward the pancreas



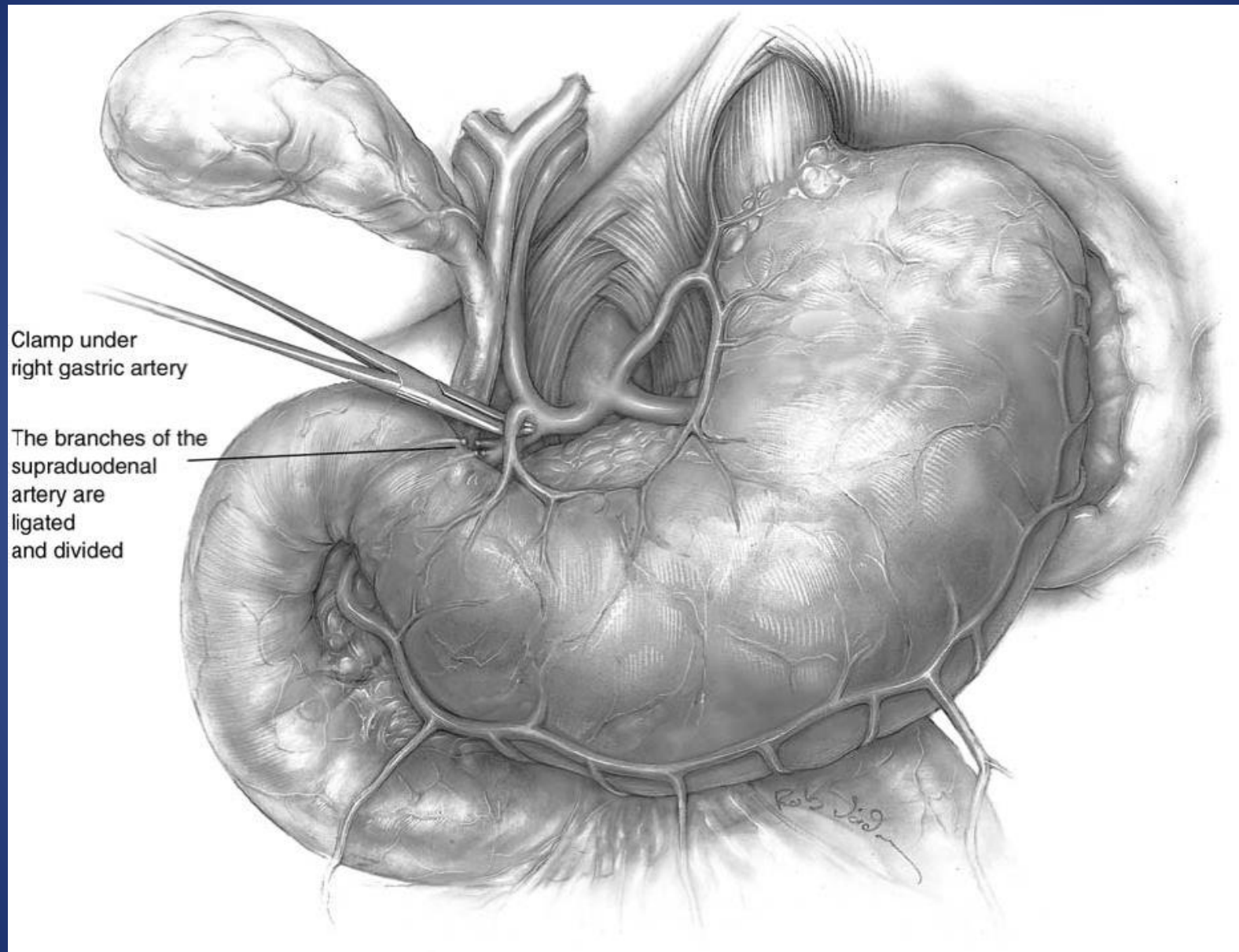
Dissecting anterior leaf of mesocolon and pancreatic capsule together with omentum

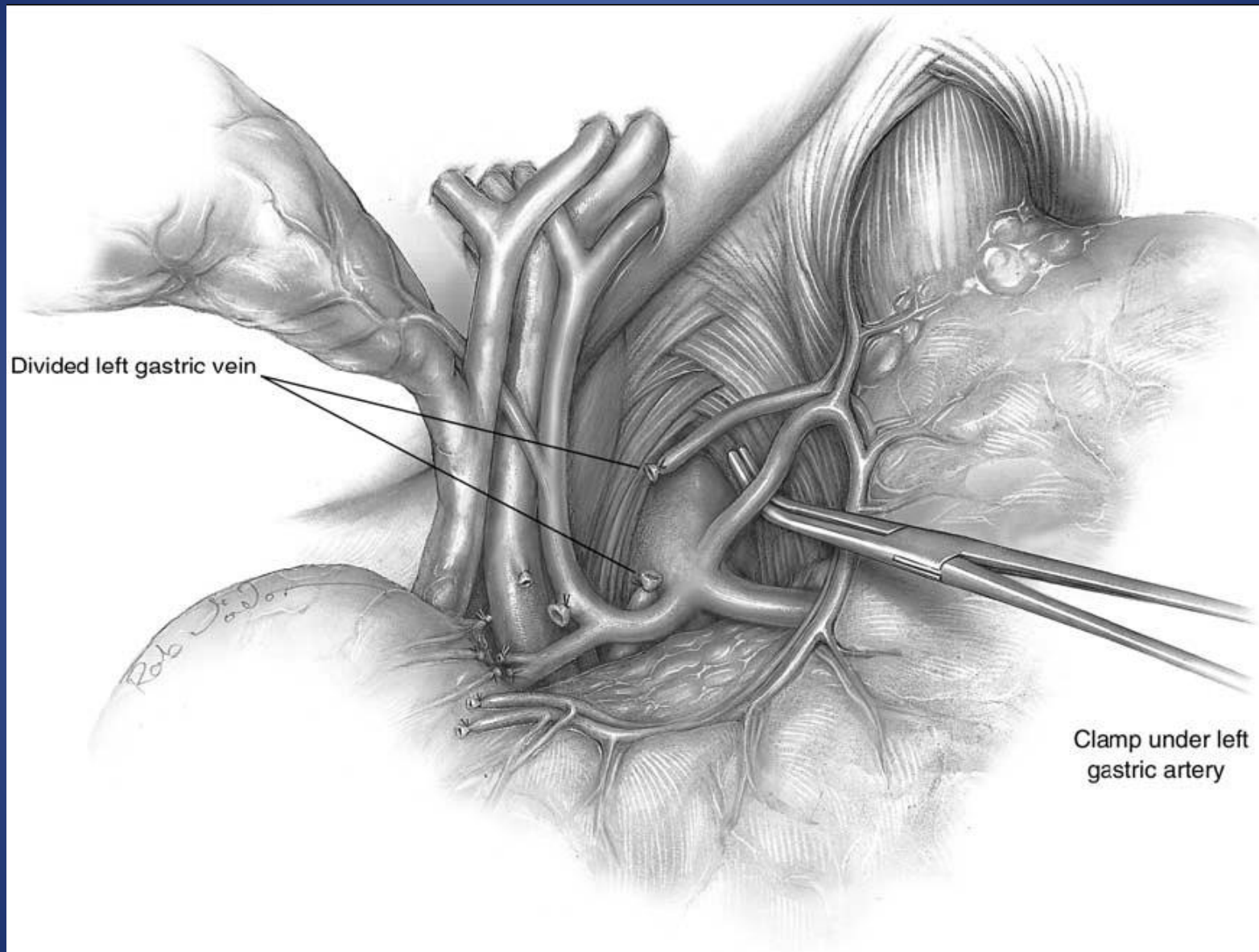


Line of division of the lesser omentum



Clamp isolating supraduodenal artery for ligation





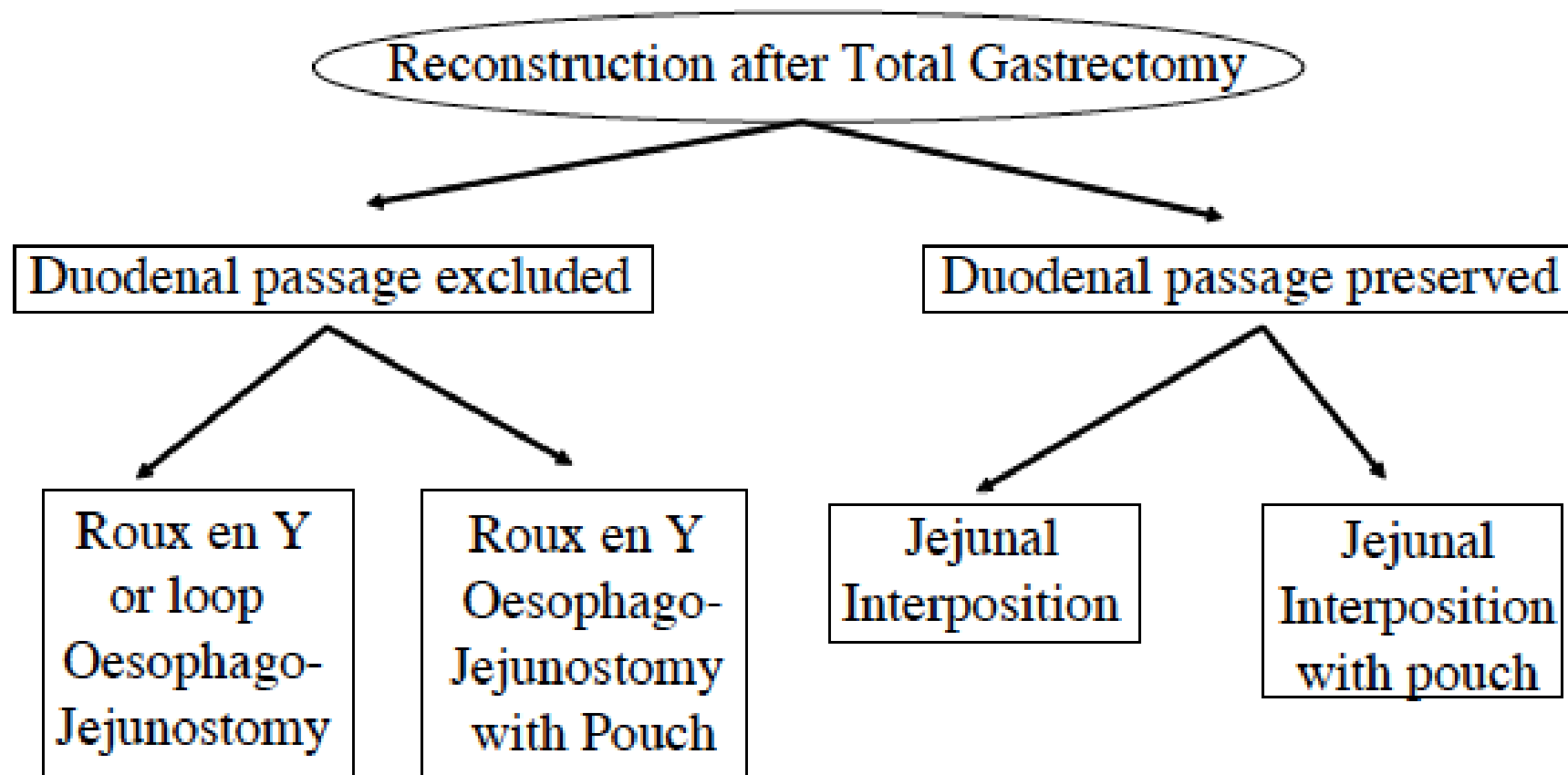
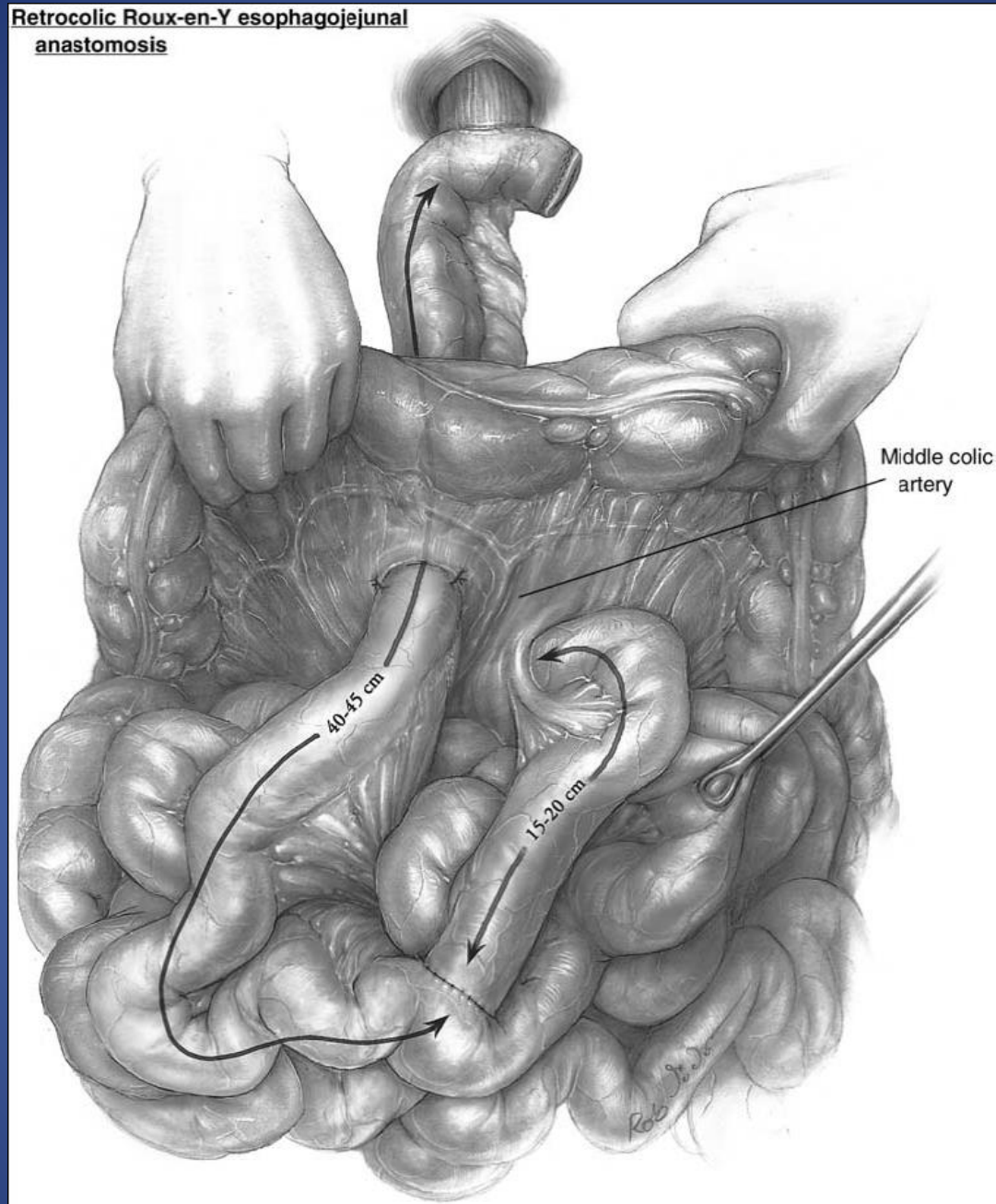
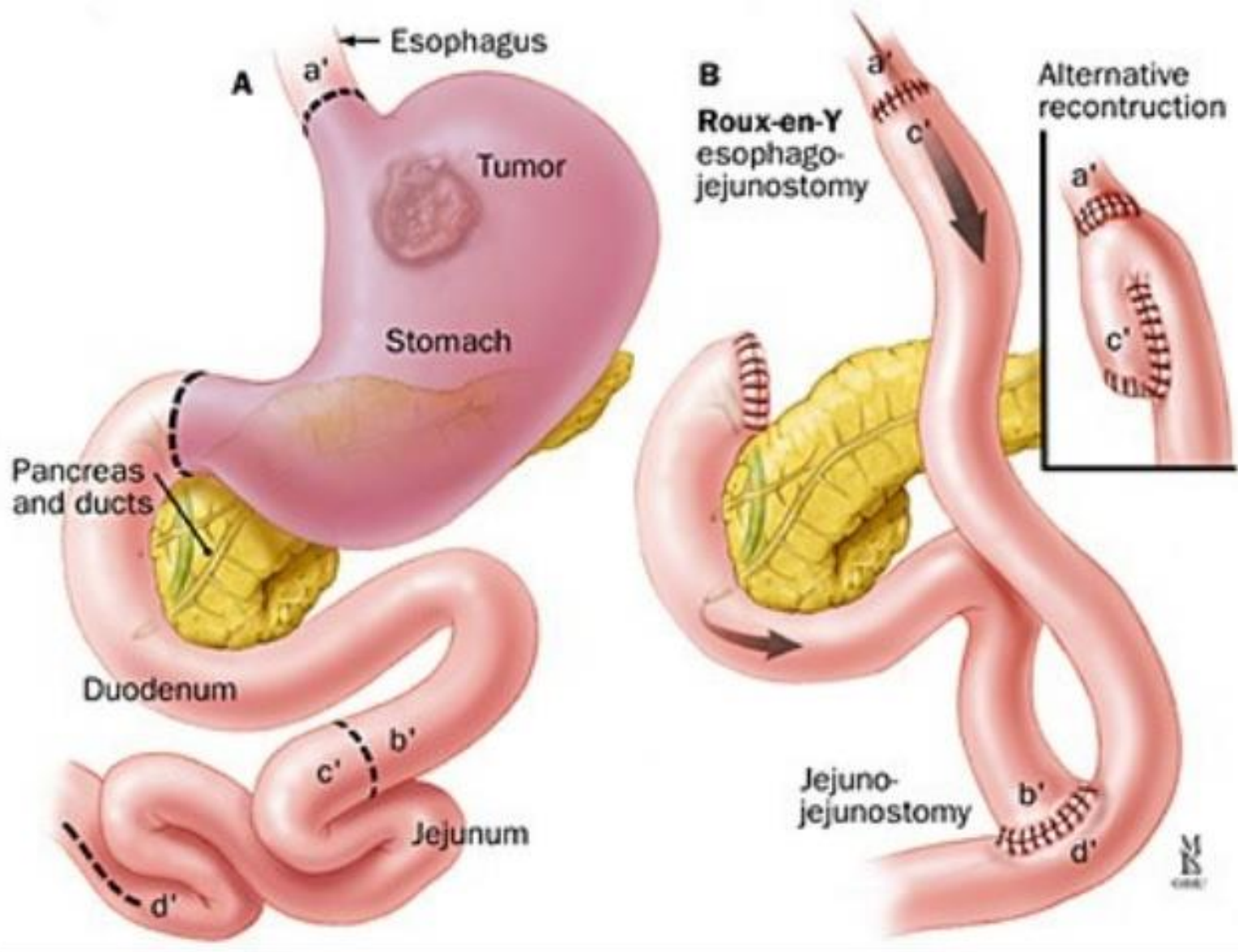


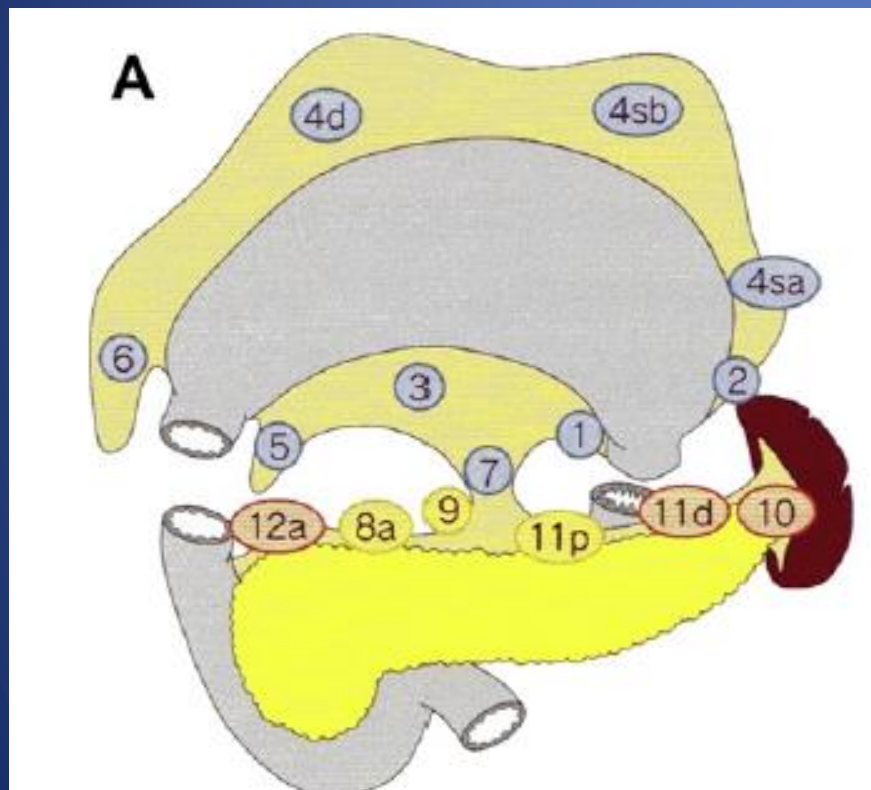
Figure 2: Classification of reconstructive procedures after total gastrectomy

**Retrocolic Roux-en-Y esophagojejunal
anastomosis**





Lymphadenectomy



**Total
Gastrectomy**

D1 (1–7)

**D1 plus (D1 and
8a, 9, 11p)**

**D2 (D1 plus and
10, 11d, 12a)**

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

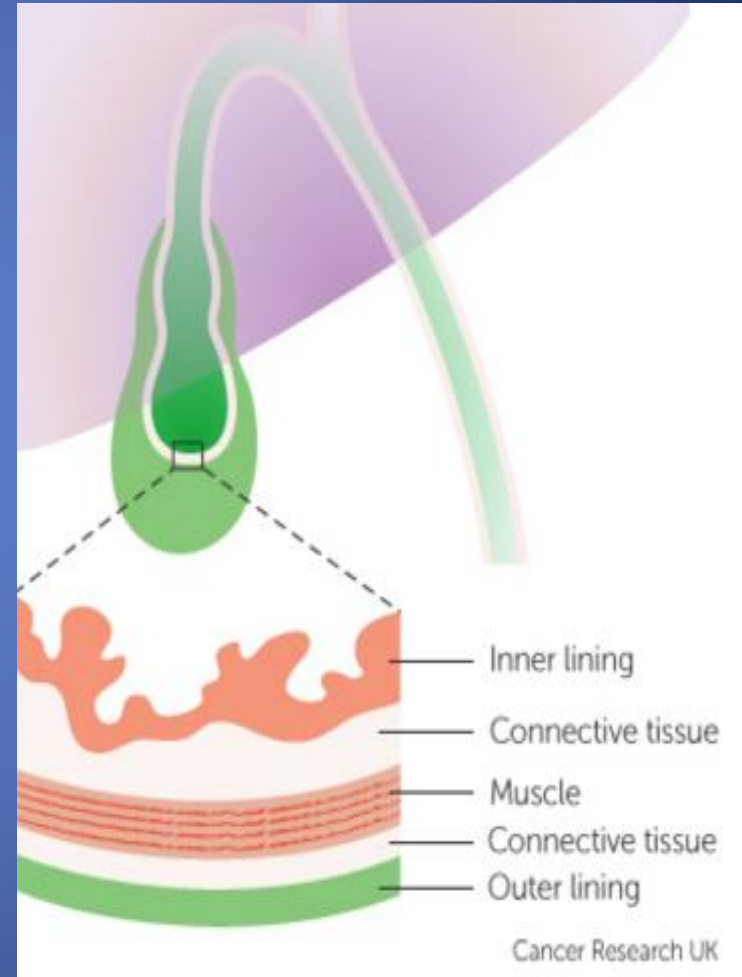
- “In malignancy of the gallbladder, when a diagnosis can be made without exploration, no operation should be performed, in as much as it only shortens the patient’s life.”
 - Blalock

Introduction

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

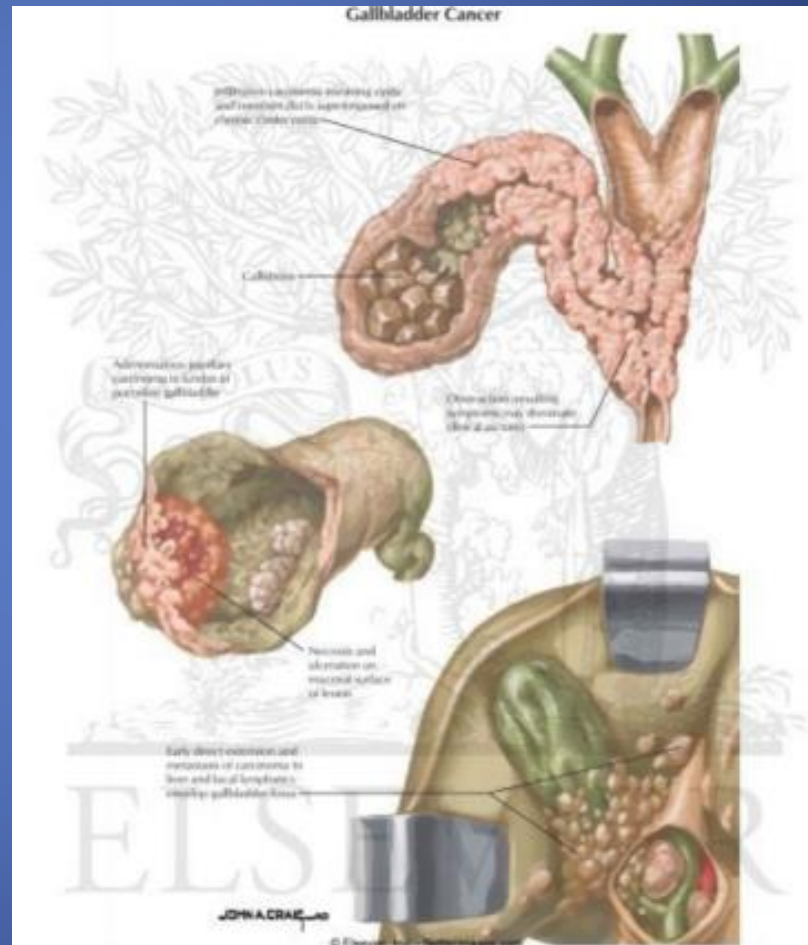
Anatomic consideration

- 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.

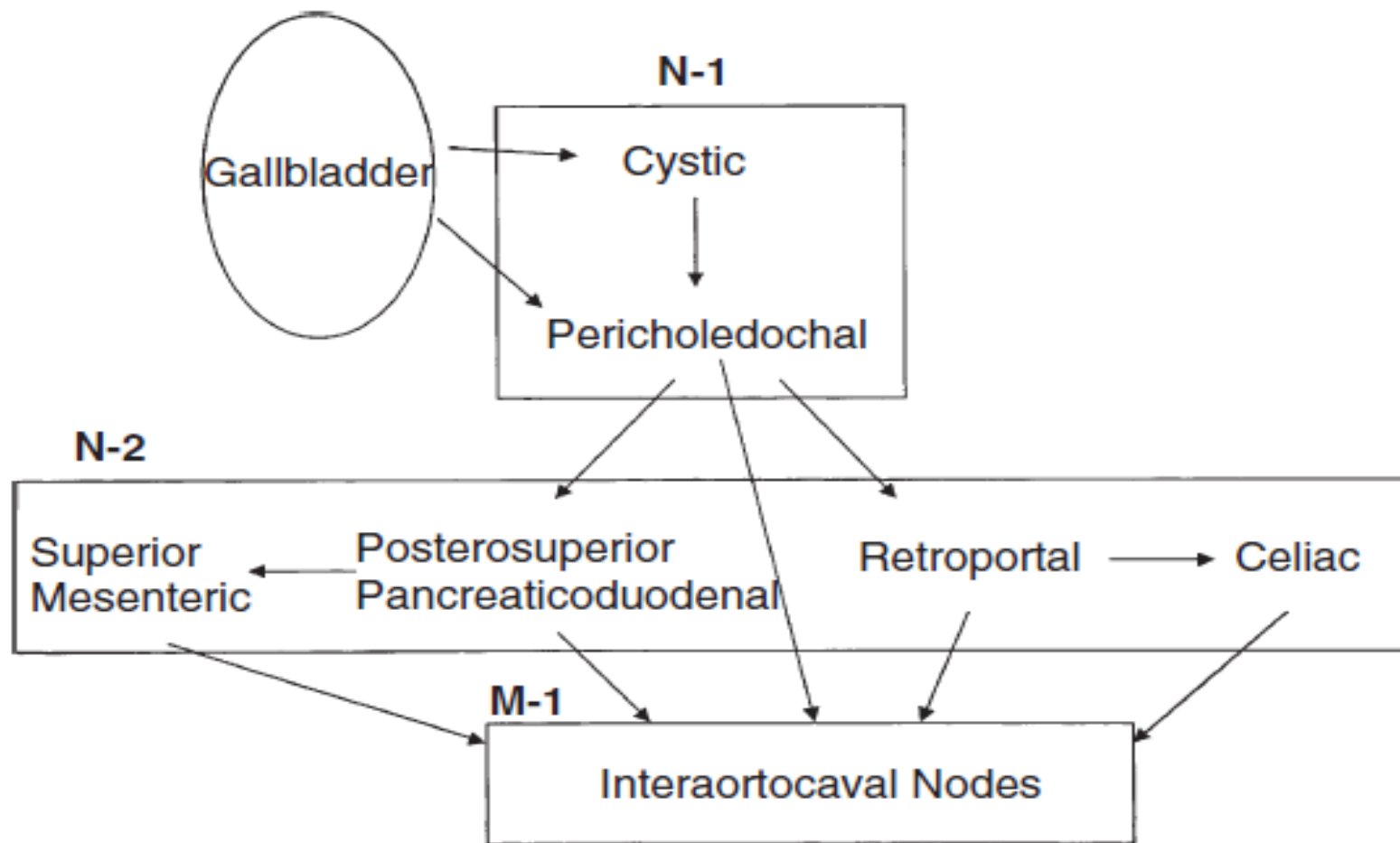


Site of origin

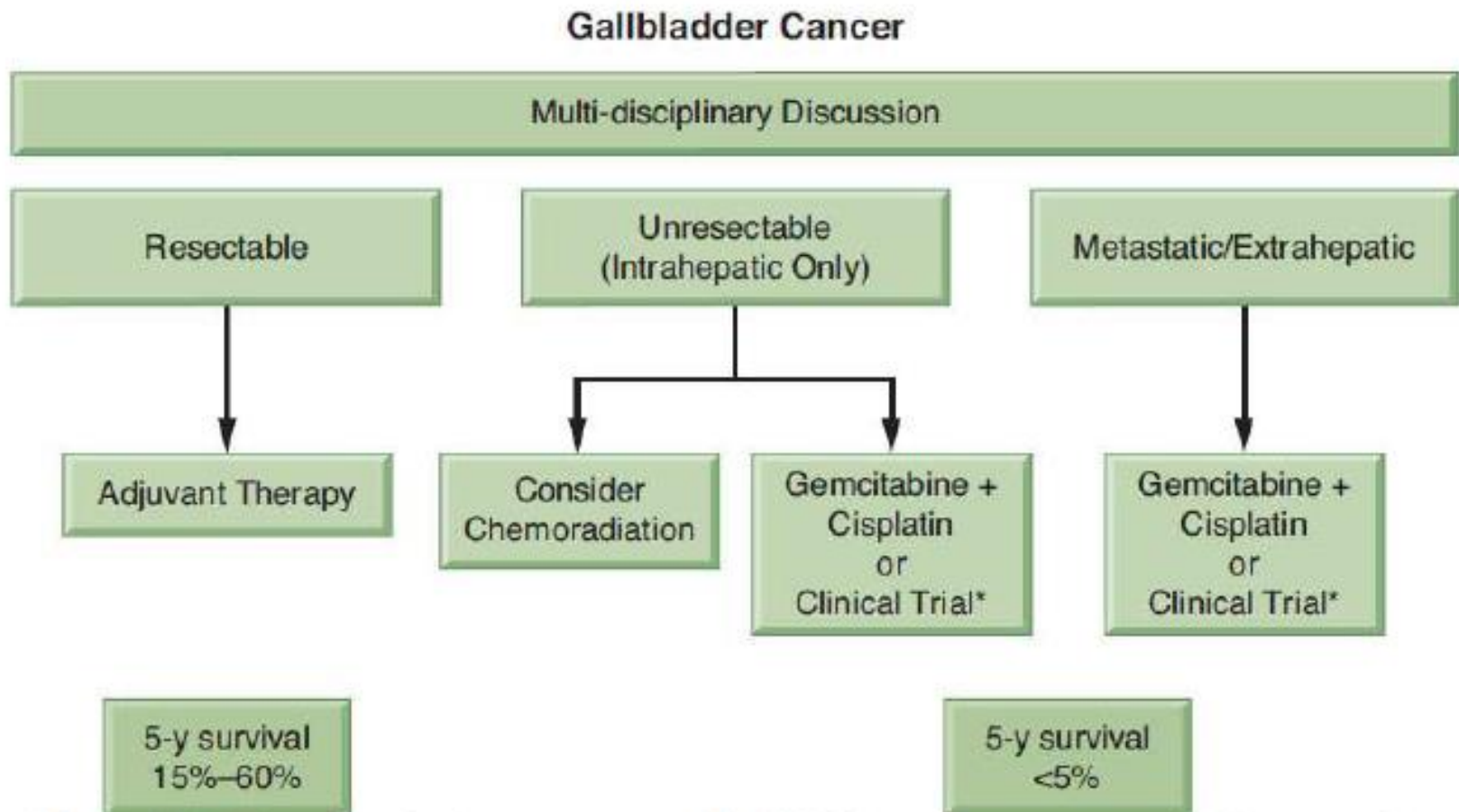
- 60% - fundus
- 30% - body
- 10% - neck



Lymphatic drainage



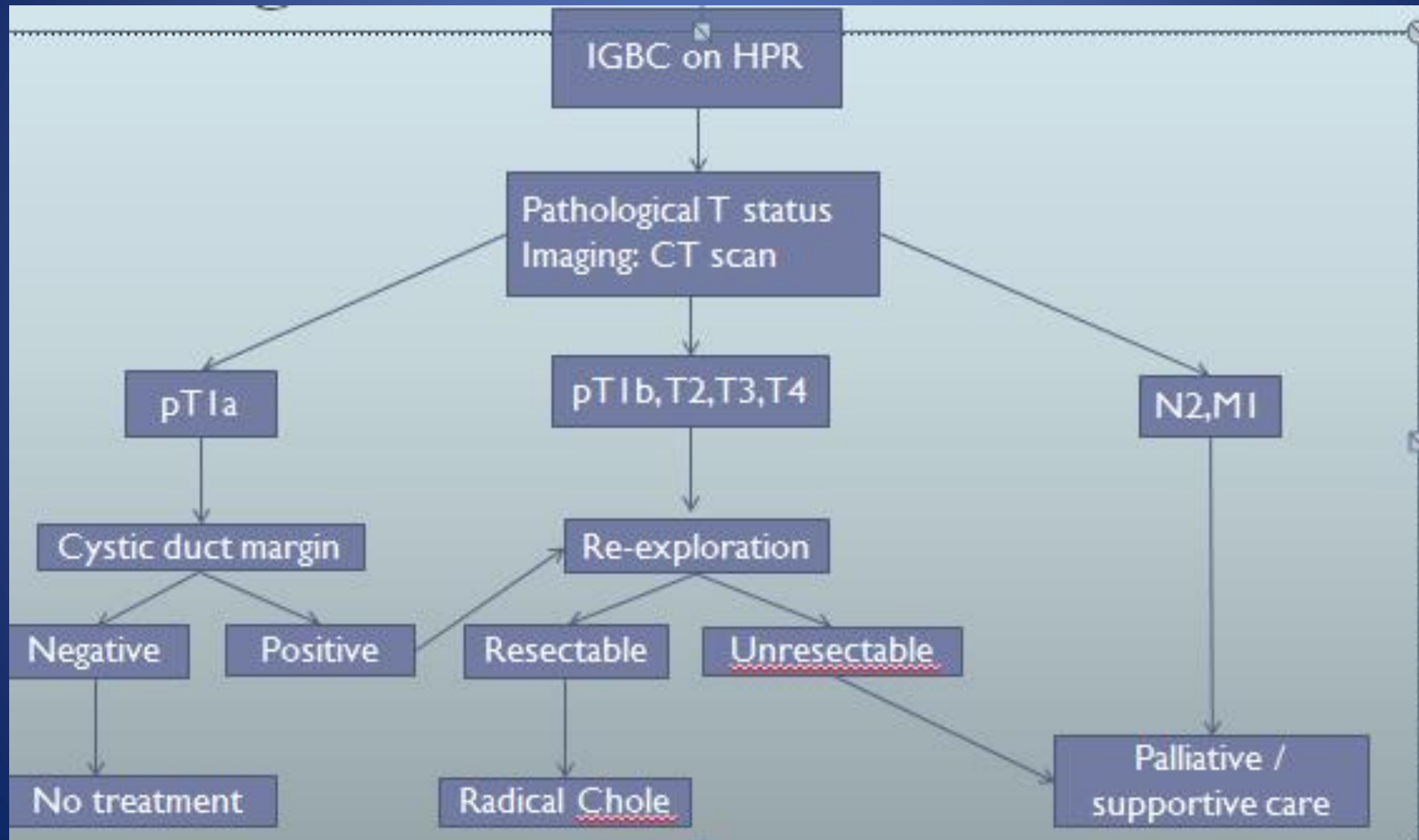
Gallbladder Cancer



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

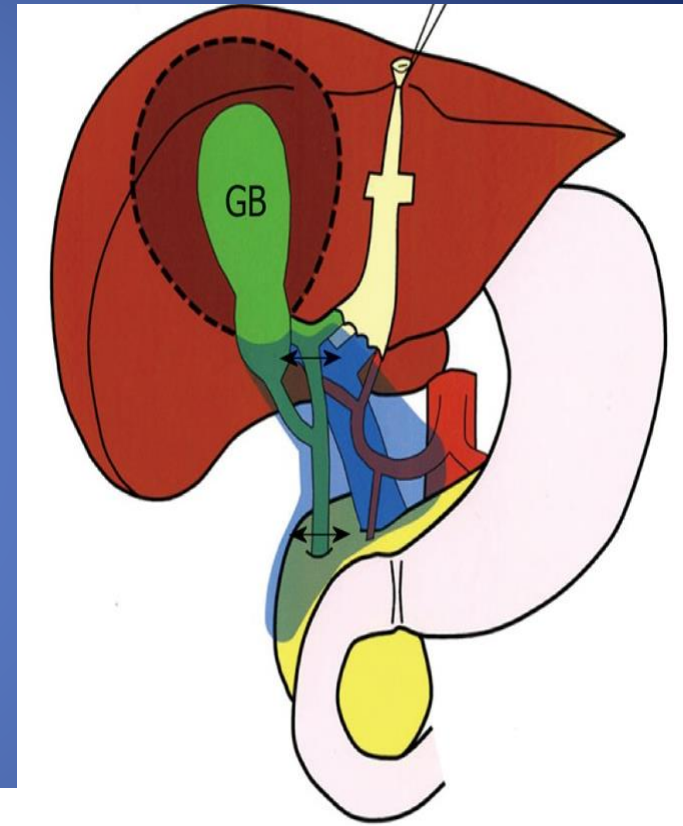
Extent of Surgery

- 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*

* Goetze TO, Paolucci V (2010) Adequate extent in radical reresection of incidental gallbladder carcinoma: analysis of the German Registry. Surg Endosc 24:2156–2164

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



Journal List > World J Gastroenterol > v.18(34); 2012 Sep 14 > PMC3442212



World Journal of
Gastroenterology

World J Gastroenterol. 2012 Sep 14; 18(34): 4736–4743.
Published online 2012 Sep 14. doi: [10.3748/wjg.v18.i34.4736](https://doi.org/10.3748/wjg.v18.i34.4736)

PMCID: PMC3442212

"Extended" radical cholecystectomy for gallbladder cancer: Long-term outcomes, indications and limitations

[Yoshio Shirai](#), [Jun Sakata](#), [Toshifumi Wakai](#), [Taku Ohashi](#), and [Katsuyoshi Hatakeyama](#)

Radical / extended cholecystectomy

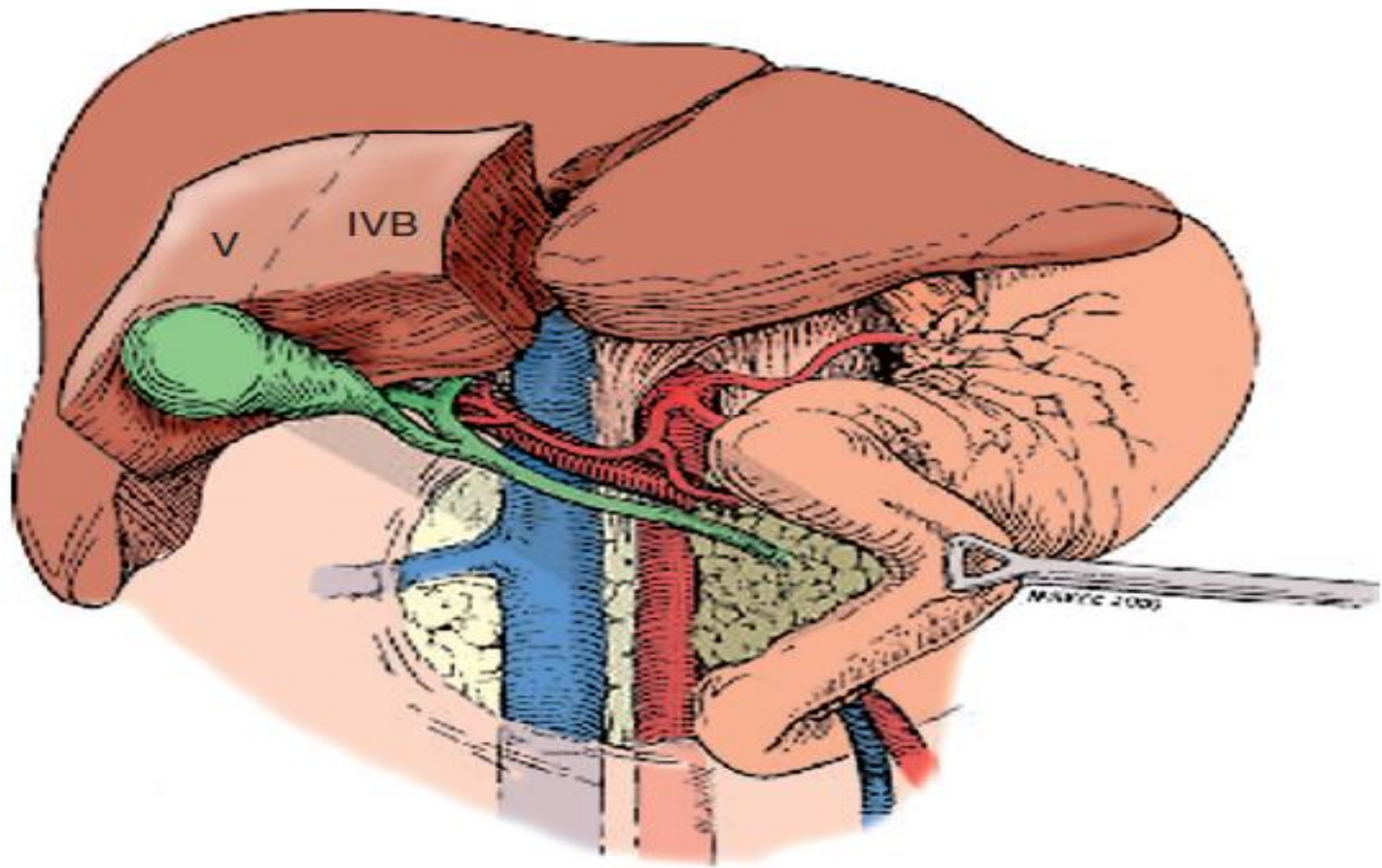
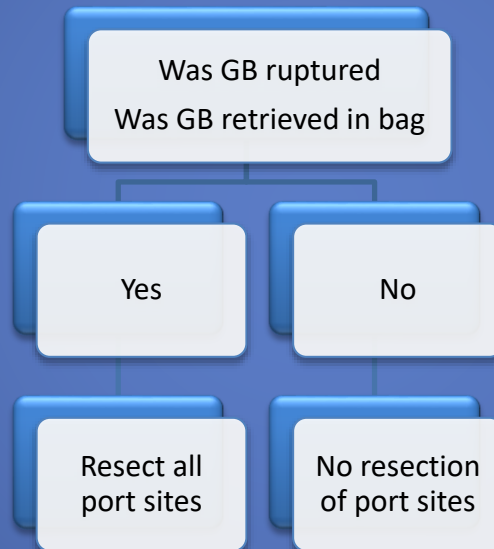


FIGURE 108-2 Portal lymphadenectomy and radical cholecystectomy with en bloc segment IVB/V hepatic resection for gallbladder cancer. (From Bartlett DL, Fong Y: Gallbladder cancer. In Blumgart LH, et al, editors: *Hepatobiliary cancer*. Hamilton, Ontario, 2001, BC Decker, p 216.)

Port Site Resection

- OS benefit is not supported by data *



- Giuliante F, Ardito F, Vellone M et al. Port-sites excision for gallbladder cancer incidentally found after laparoscopic cholecystectomy. Am J Surg 2006;191:114 –116.
- *Steinert R, Nestler G, Sagynaliev E et al. Laparoscopic cholecystectomy and GBC ol 2006;93:682– 689.

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 Ia - 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

BACKGROUND

Within 2 cm of major papilla in duodenum

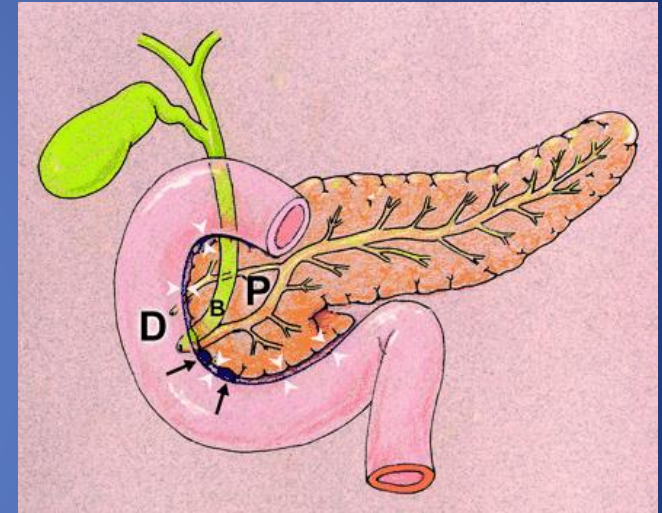
Head of pancreas

Ampulla

Distal common bile duct

Duodenum

India 14,000 cases



Mohandas KM. Ind J Gastroenterol 2001

30% of all malignant tumors of pancreatic head

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

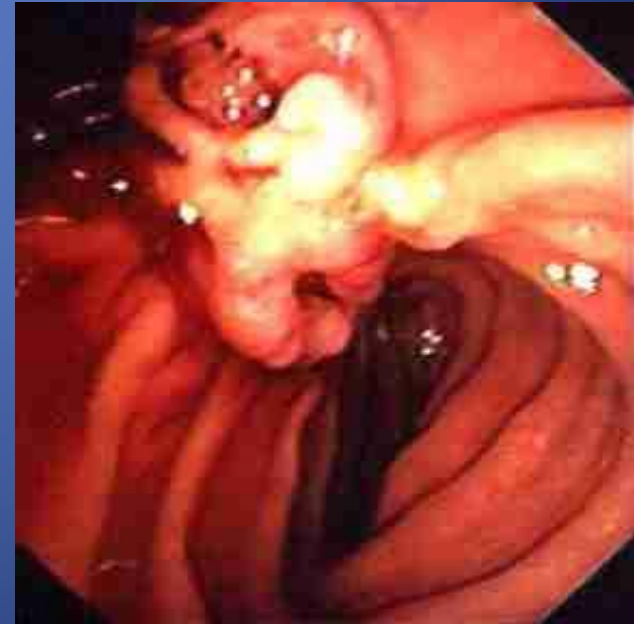
Side viewing upper GI endoscopy

EUS

Radiology

Disease staging

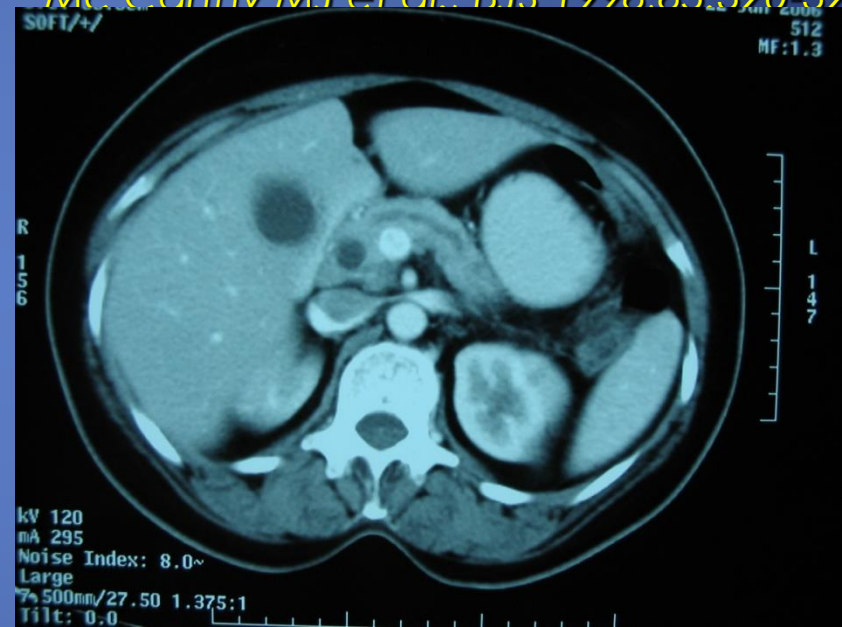
Resectability



HELICAL CT

Accurately predicts resectability in 80 – 90 % cases

McCarthy MJ et al. BIS 1998;85:320-325



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

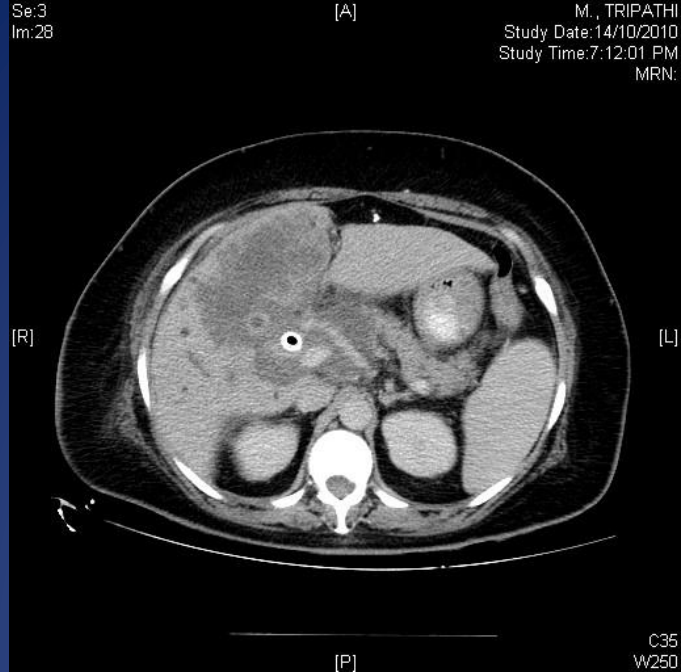


- SMV segmental occlusion
- Abutting the SMA $< 180^{\circ}$
- Encasing Short segment of hepatic artery

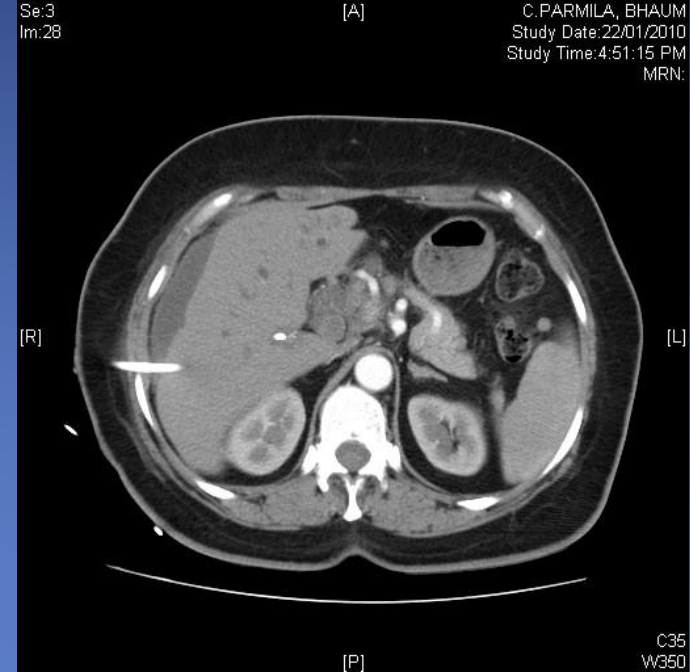
Non Resectable – Locally Advanced



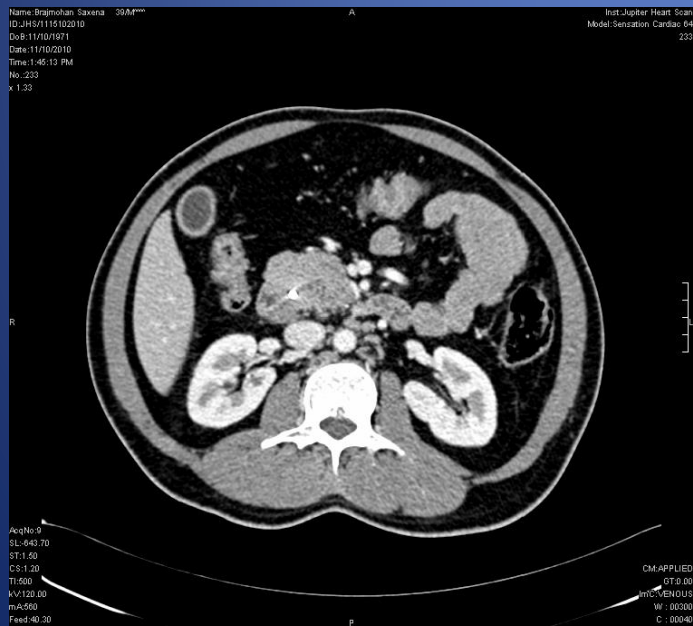
- Significant occlusion of SMA $> 180^{\circ}$
- Venous occlusion too extensive to remove enbloc safely



Ca GB infiltrating porta



Hilar Cholangio Carcinoma



Ca HOP



Periampullary Ca

PREOPERATIVE BILIARY DRAINAGE

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

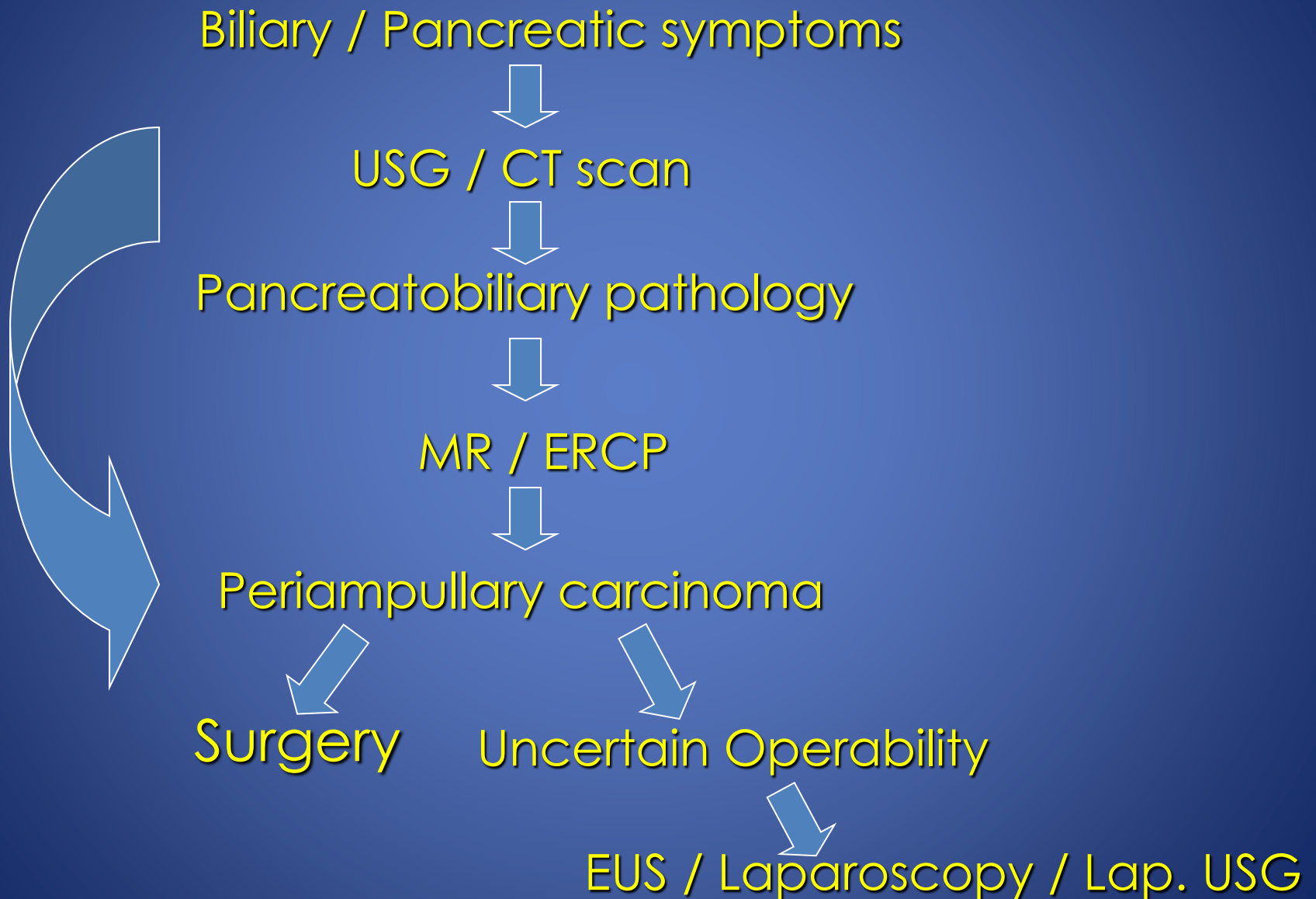
Only plastic stent

No use of self expanding stents

Should be inserted endoscopically

NO ROLE FOR PREOP EXTERNAL BILIARY DRAINAGE

APPROACH TO MANAGEMENT



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

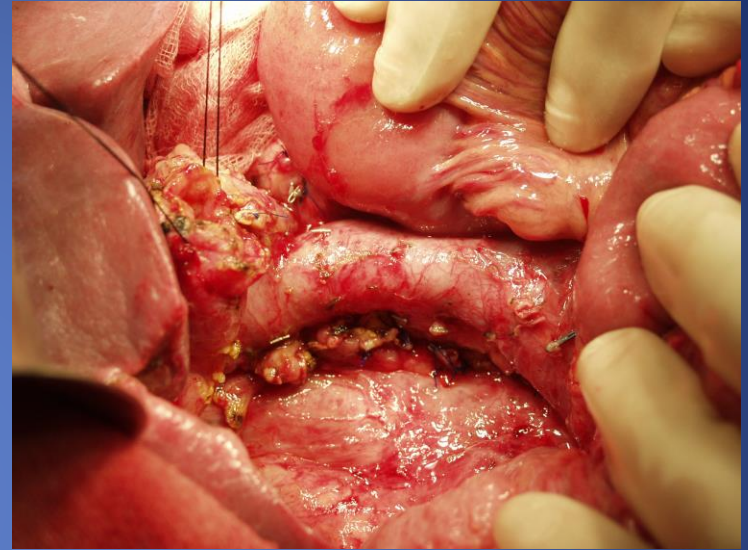
Structures removed

Head of pancreas

Duodenum

Regional lymph nodes

Gallbladder with distal CBD

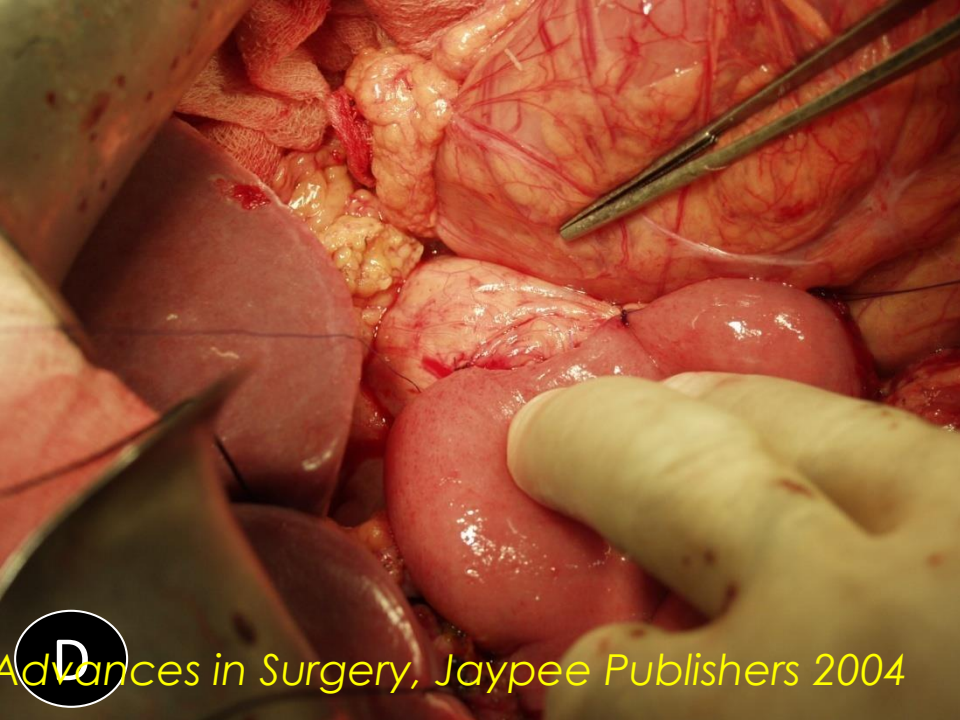
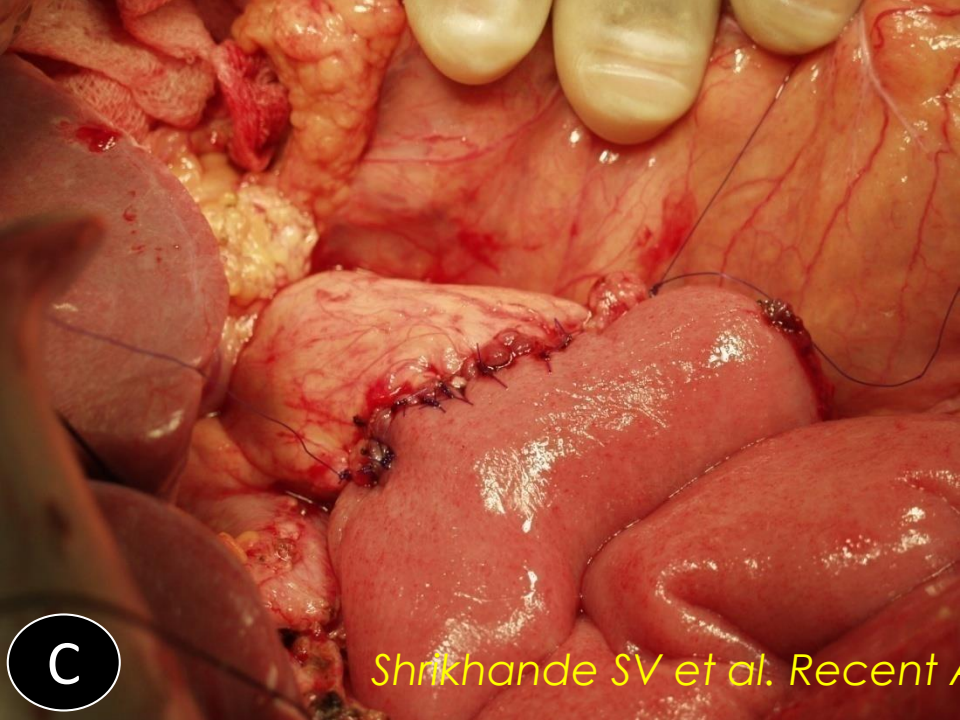
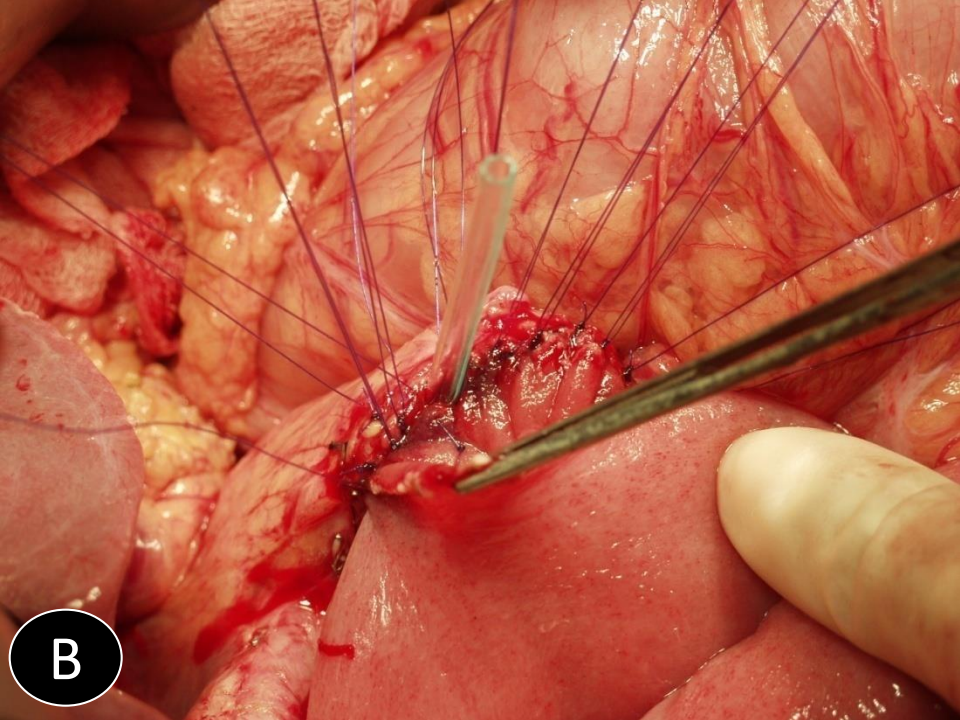
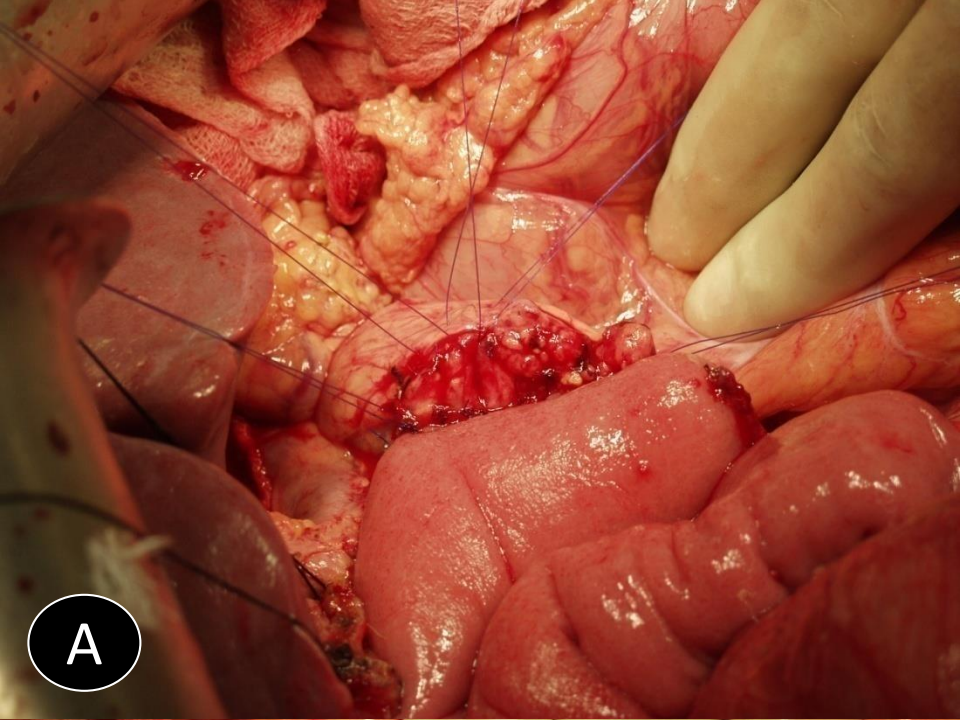


Advantages of pylorus preservation

Technically easier and faster

Better quality of life

Prevents occurrence of post gastrectomy syndromes



Pancreatic resections

Complications

Incidence

| | |
|-----------------------------|-------|
| Pancreatic fistula | 23.4% |
| Fluid Collections | 8.8% |
| Anastomotic failure | 4.0% |
| Bleeding | 4.3% |
| Intra-abdominal abscess | 3.1% |
| Post-operative pancreatitis | 2.9% |

Rosenberg L et al. J Gastrointest Surg 1999

ThePrint

PRIME MINISTER

Hepatic Resection Techniques

Introduction

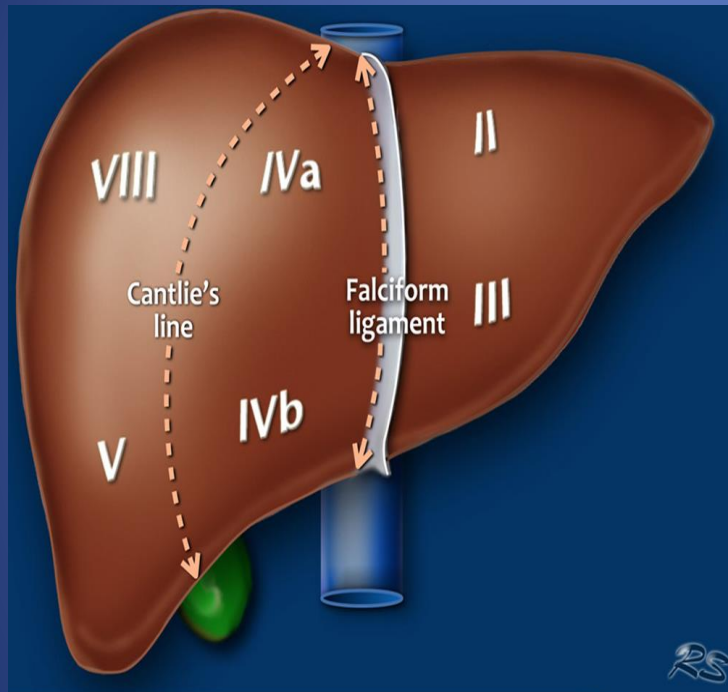
- Liver resection is the most effective treatment of HCC and Colorectal liver metastases
- No. of resections have increased
- Major hepatectomies
- Decreased morbidity & mortality

Non Anatomic Resection

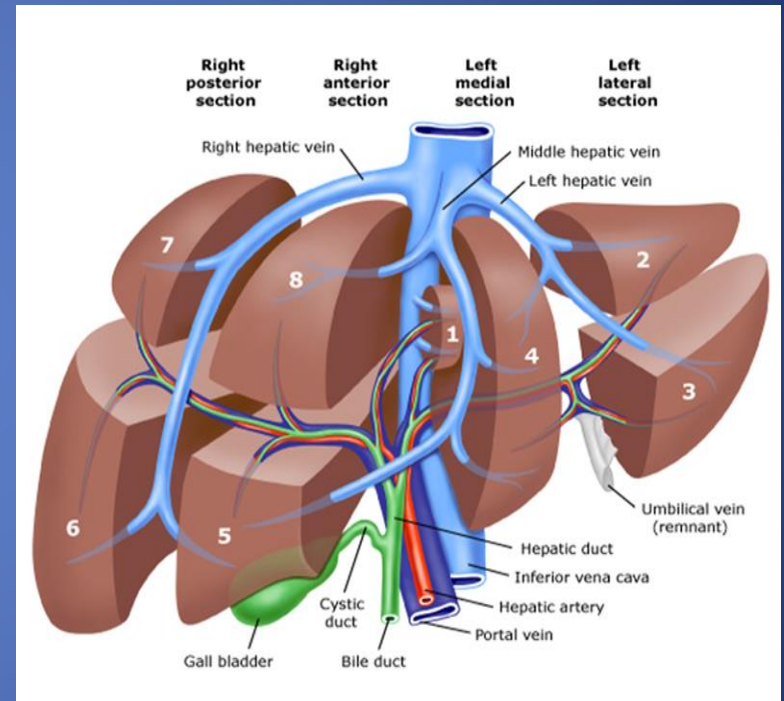
- Increased blood loss
 - Increased positive surgical margins
 - Increased recurrence
 - Decreased survival
-
- *DeMatteo RP. Anatomic segmental hepatic resection is superior to wedge resection as an oncologic operation for colorectal liver metastases. Journal of Gastrointestinal Surgery 2000; 4:178-184*
 - *Kokudo N. Anatomical Major resection versus nonanatomical limited resection for liver metastases from colorectal carcinoma. American Journal of Surgery; 181:153-159*

Anatomy

Anatomy

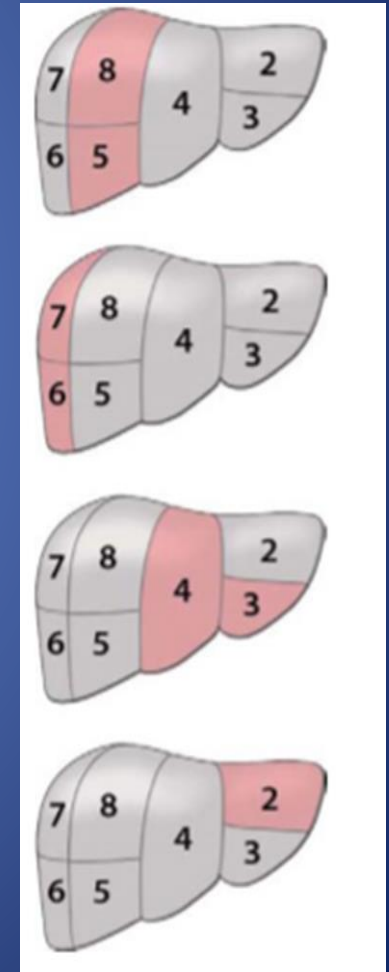
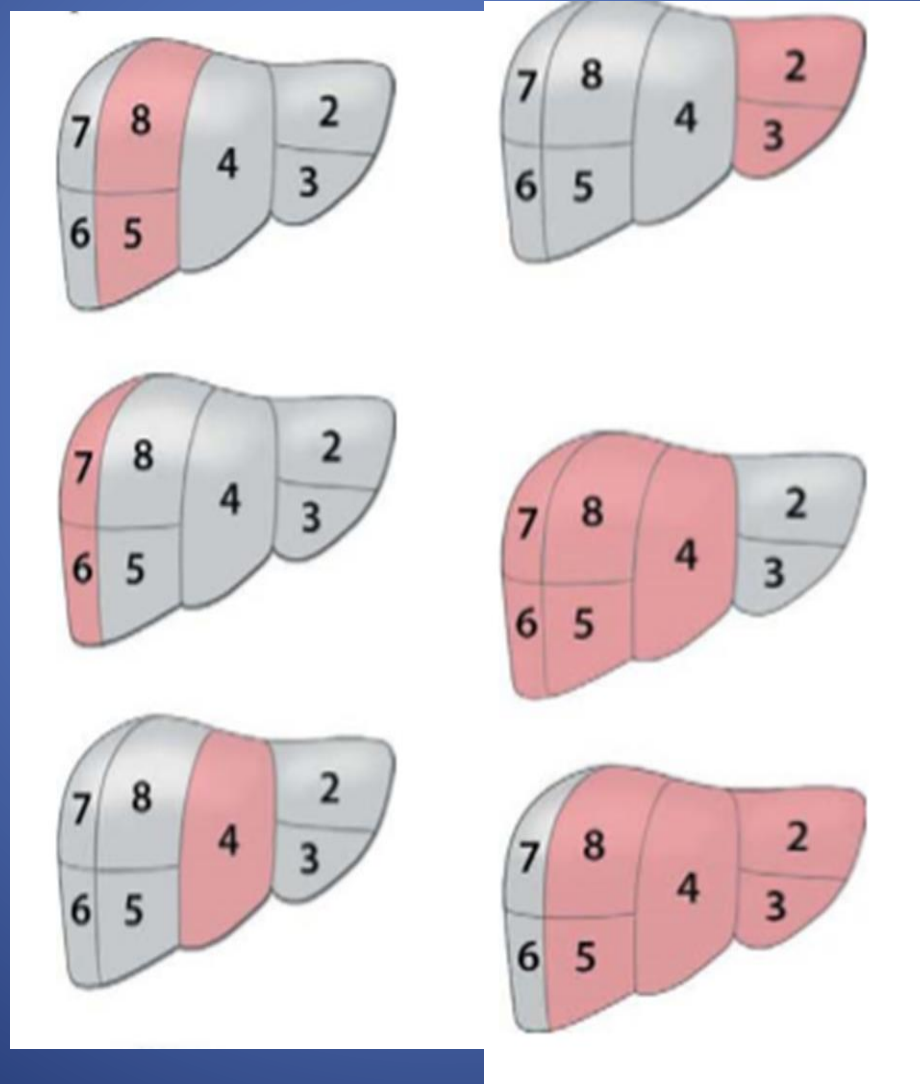
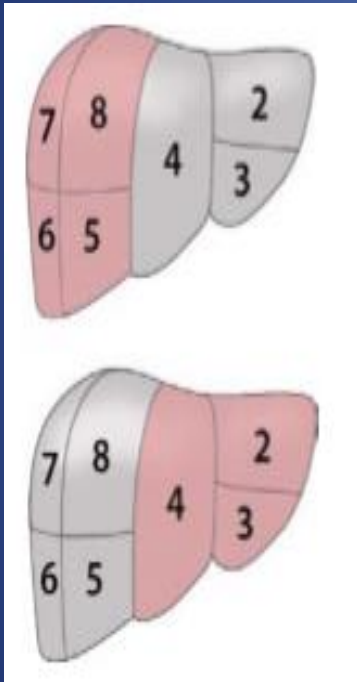


- Rex and Cantlie in 1887 challenged anatomic division of liver by falciform ligament



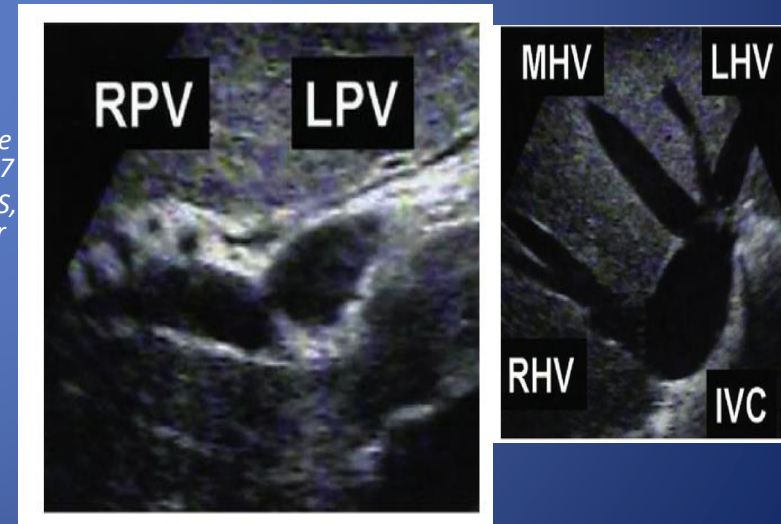
- Healey, Couinaud, Hrojtso described segmental anatomy based on blood supply in 1950s.

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%
- *Parker GA, Lawrence W Jr, Florsley JS et al. Intraoperative ultrasound of the liver affects operative decision making. Annals of Surgery 1989;209:569-577*
- *Shukla PJ, Pandey D, Rao PP, Shrinkhande SV, Thakur MH, Arya S, Ramani S, Mehta S, Mohandas KM. Impact of intra-operative ultrasonography in liver surgery. Indian J oumal of Gastroenterology 2005; 24(2):62-65*



Complications

Complications

```
graph LR; A[Complications] --- B[Hemorrhage]; A --- C[Bile Leak]; A --- D[Hepatic Dysfunction];
```

Hemorrhage

Bile Leak

Hepatic Dysfunction

Mission Accomplished



Thank you

your **VOTE**
is your **VOICE**

