ROLE OF SURGERY IN CORROSIVE INJURY ESOPHAGUS

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SCIENTIA EST POTENTIA

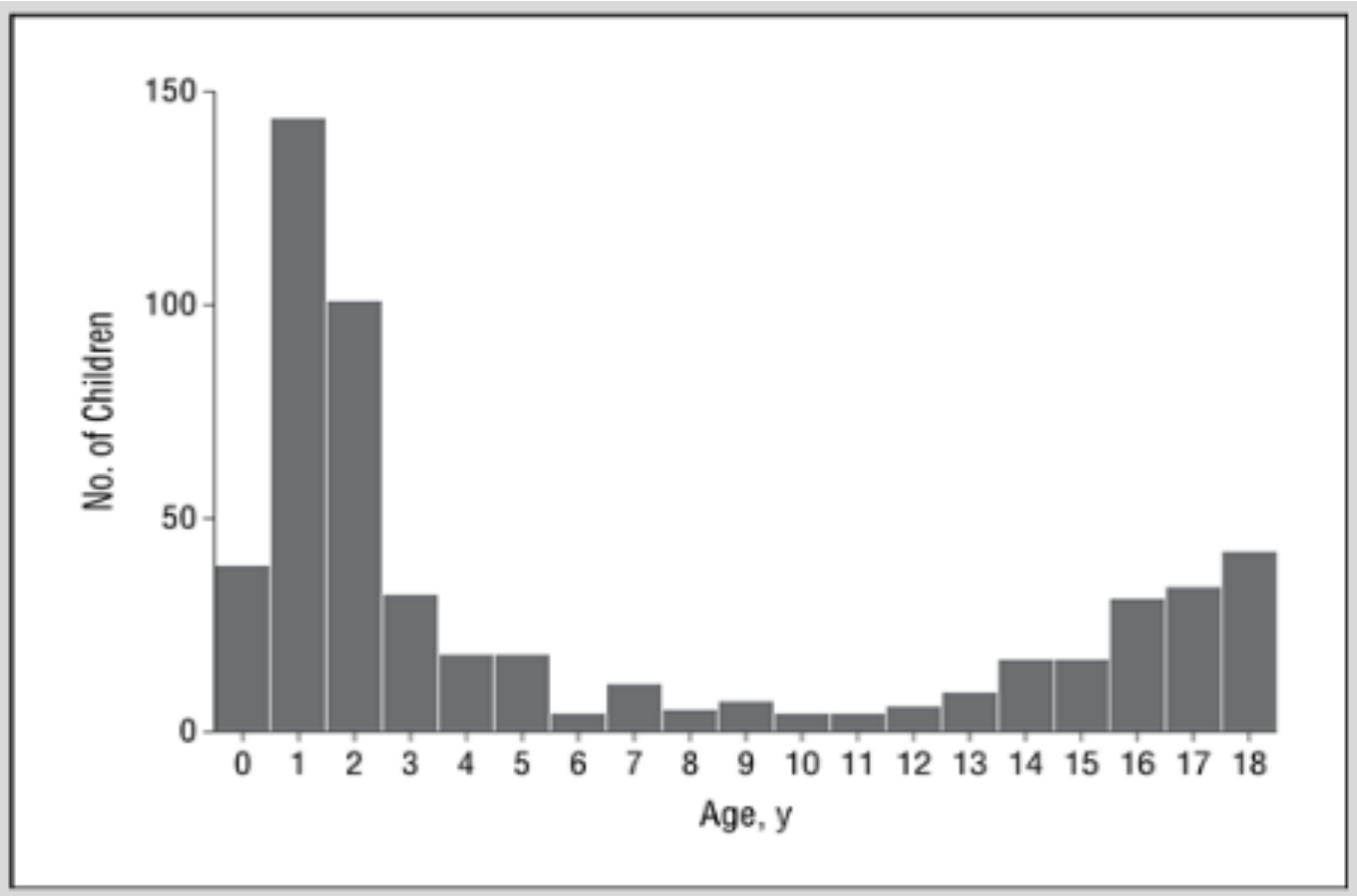
- Introduction
- Epidemiology
- Pathophysiology
- Consequences
- Clinical features
- Management

Introduction

- Corrosive or caustics are synonyms “something that eats away”
- Long term effects on GI tract
- An important public health issue
  - Easily available for household use & not subject to any regulatory control.

Epidemiology

- Global health problem
- Bimodal distribution
- 1st peak : children < 5years accidental
- 2nd peak : Age > 21years, suicidal.
- Male > female
  - 50% to 62%
- **<u>Indian data</u>**
  - Acids > Alkali



Characteristics

Acids

- Pungent odor
- Unpleasant taste
- Less viscous
- Consumes in smaller quantity

Alkali

- Colorless
- Relatively tasteless
- Less odor
- More viscous
- Consumes in larger quantity

Pathophysiology

Acids

↓

Reacts with tissue proteins

↓

Forms acid proteins

↓

Form eschar / coagulum

↓

COAGULATIVE NECROSIS

Alkali

↓

Reacts with proteins, fats

↓

Protein dissolution, Fat saponification

↓

Collagen destruction & submucosal vascular thrombosis

↓

LIQUEFACTIVE NECROSIS

Factors determining corrosiveness

- Physical form
- Duration of contact
- Concentration of agent
- Quantity of agent
- pH of agent
- Post prandial/fasting state

Consequence of corrosive injury

Caustic exposure

↓ **seconds**

Necrosis

Perforation - ↓ **24-72 hours**

Ulceration

↓ **14-21 days**

Fibrosis

↓ **Weeks-years**

Stricture

↓ **Decades**

Carcinoma

Specimen of total gastrectomy showing transmural necrosis of the gastric wall

Esophagogastrectomy specimen showing esophageal and gastric transmural necrosis

Clinical features

- Pain in oropharyngeal area, chest & abdomen
- Drooling of saliva
- Dysphagia & hematemesis
- S/S of GI perforation
- Cough
- Dyspnea
- Bronchoconstriction
- Pulmonary Edema & chemical pneumonitis

Complications

- **Immediate** :
  - Airway compromise
  - Shock
  - UGI bleed
  - Electrolyte abnormalities & ECG changes
  - Aspiration pneumonia
  - Mediastinitis
  - peritonitis

- **Late** :
  - Stricture
  - Obstruction
  - Fistula formation
- **Remote :**
  - Carcinoma

Management

INITIAL MANAGEMENT : DO'S

- Transfer patient to the hospital
- Airway protection
- NPO
- IV fluids
- PPI
- **Rule out perforation**
- CXR, AXR
- CT scan if warranted

Blood investigations

- Hct, TLC
- ABG & lactate levels
- RFT & LFT
- Serum Amylase

DONT’s

- **Absolute contraindications :**

➢Gastric lavage

➢Induction of emesis

- **Relative :**

➢Use of Neutralizing agents

Endoscopy

- Within 24 hours

- **Indications for endoscopy** :
  - Corrosive ingestion by small children
  - Symptomatic older children and adults
  - Patients with intentional ingestion
  - Patients with ingestion of large volumes
  - Patients with ingestion of concentrated products.

- **Contraindications for endoscopy** :

➢ Hemodynamic compromise

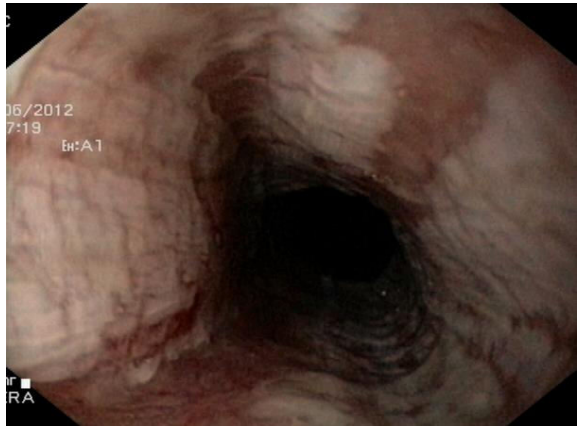
➢ Peritonitis and mediastinitis

➢ Mild ingestion (asymptomatic patients with normal oral/upper airway examination).

Zargar grading

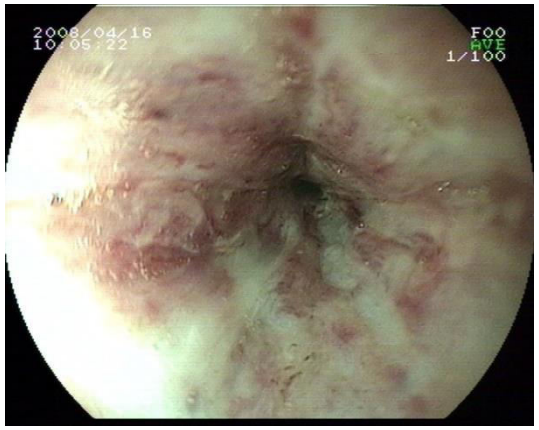
- 0 Normal
- 1 Edema / Hyperemia
- 2a Whitish **membranes/exudates superficial** **ulcers**
- 2b 2a + Deep discrete ulcers or circumferential **ulcers**
- 3a Scattered **necrosis**
- 3b Confluent / **Extensive** **necrosis**
- 4 Perforation

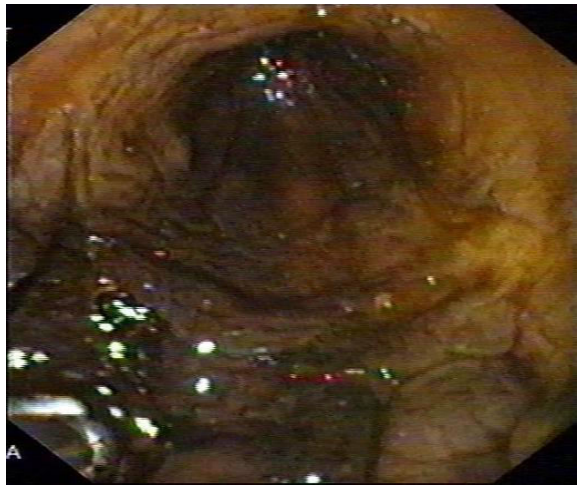
Grades of corrosive injury - Esophagus



Gr IIa

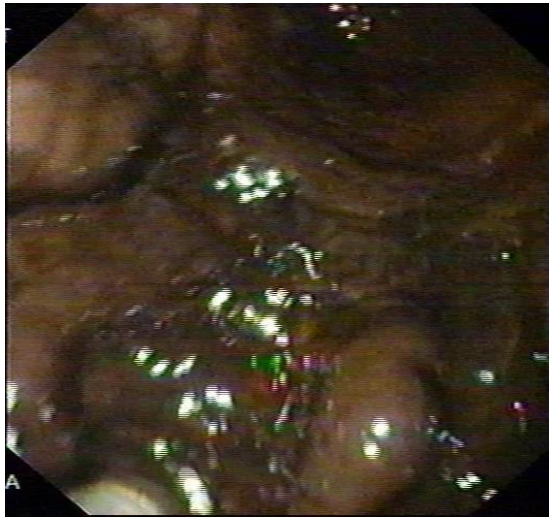
Gr IIb



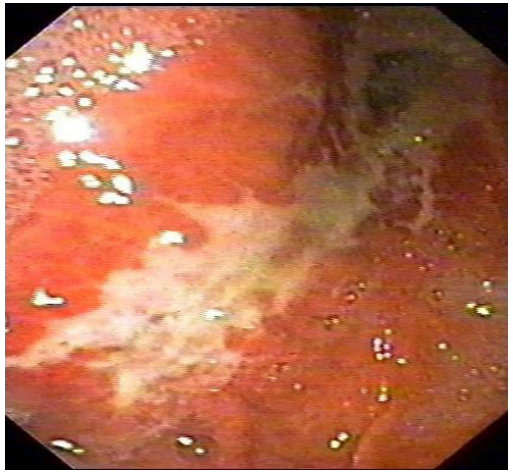


Gr IIIa

Gr IIIb



Grades of corrosive injury- Stomach



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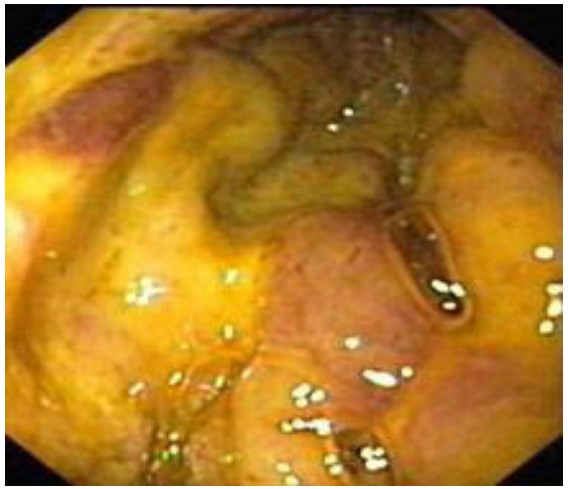
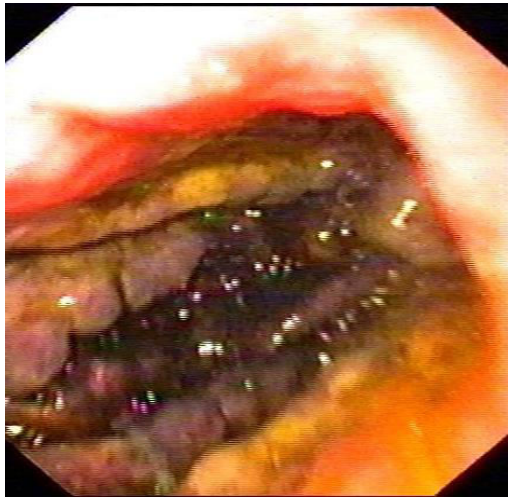
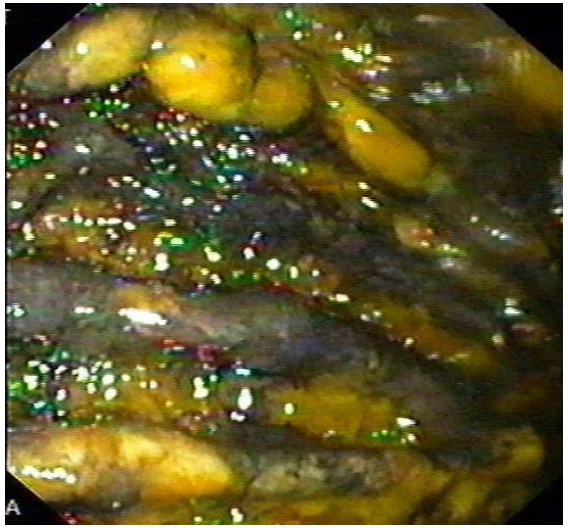




Gr IIIa

Gr IIIb



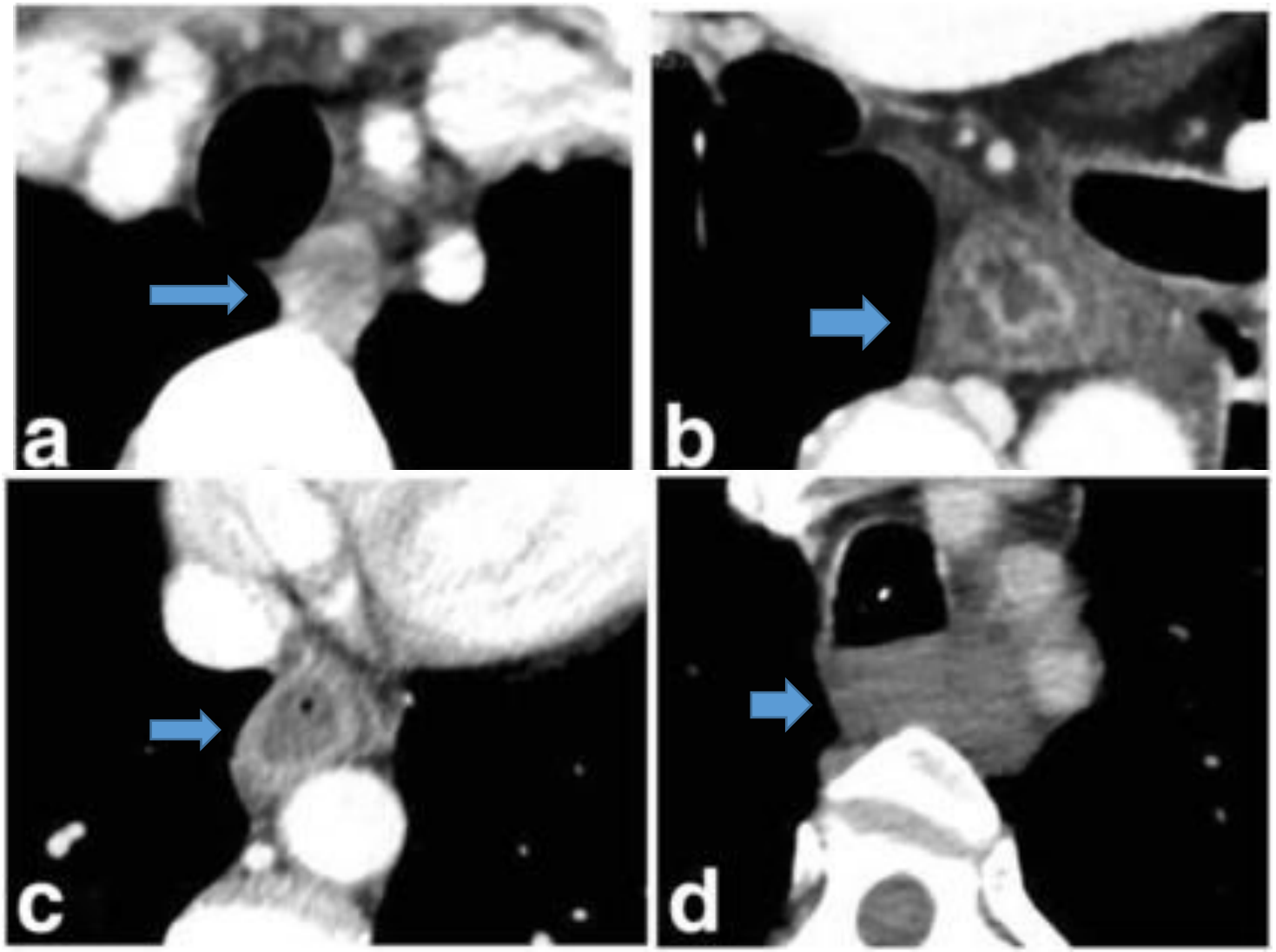
Implications in management

- Gr 1, 2a
  - Early discharge
- Gr 2b,3a
  - Conservative management
  - Naso enteral feeding

- **Gr 3b**
  - **CECT: Consider early surgery**

CT grading

CT grade	Features
Grade 1	No definite swelling of esophageal wall
Grade 2	Edematous wall thickening without peri-esophageal soft tissue involvement
Grade 3	Edematous wall thickening with peri-esophageal soft tissue infiltration, plus well-demarcated tissue interface
Grade 4	Edematous wall thickening with peri-esophageal soft tissue infiltration plus blurring of tissue interface or localized fluid collection around the esophagus or descending aorta


a
b
c
d

MANAGEMENT OF SEVERE INJURIES

- Indication for early surgery
  - Hemodynamic instability
  - Extensive injury/ perforation on endoscopy
  - Acidosis (PH <7.22)

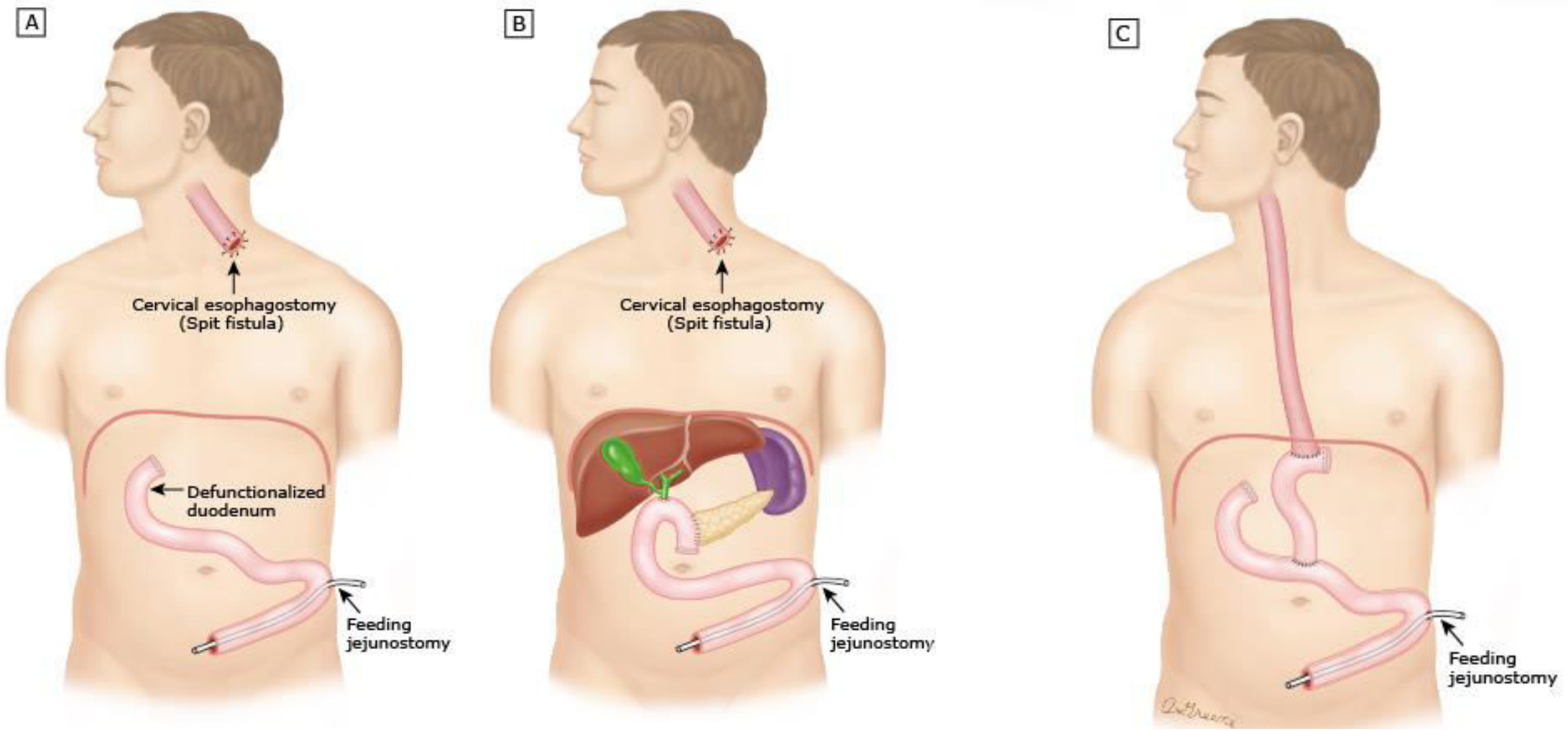
- Mortality and morbidity are reduced by aggressive surgical approach

Surgery

- Perforation or full thickness necrosis of the esophagus or stomach

Esophagogastrectomy through a combined abdominal cervical approach with resection of all damaged tissues

- With/ without venting gastrostomy
- Cervical esophagostomy
- Feeding jejunostomy

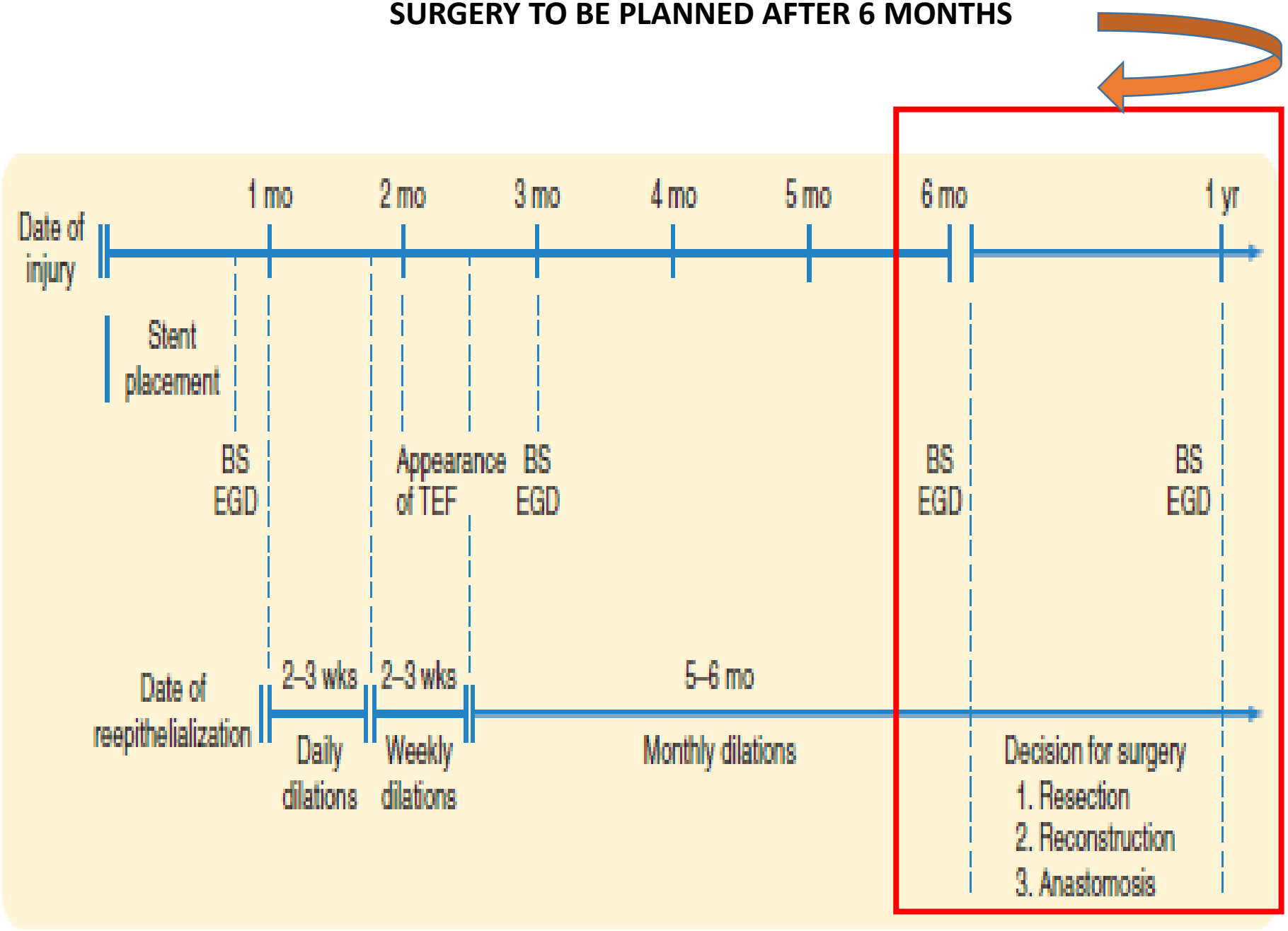

A
Cervical esophagostomy
(Spit fistula)
Defunctionalized
duodenum
Feeding
jejunostomy
B
Cervical esophagostomy
(Spit fistula)
Feeding
jejunostomy
C
Feeding
jejunostomy

Late complications

- Complex strictures
  - Fibrosis can occur till 6 months following ingestion

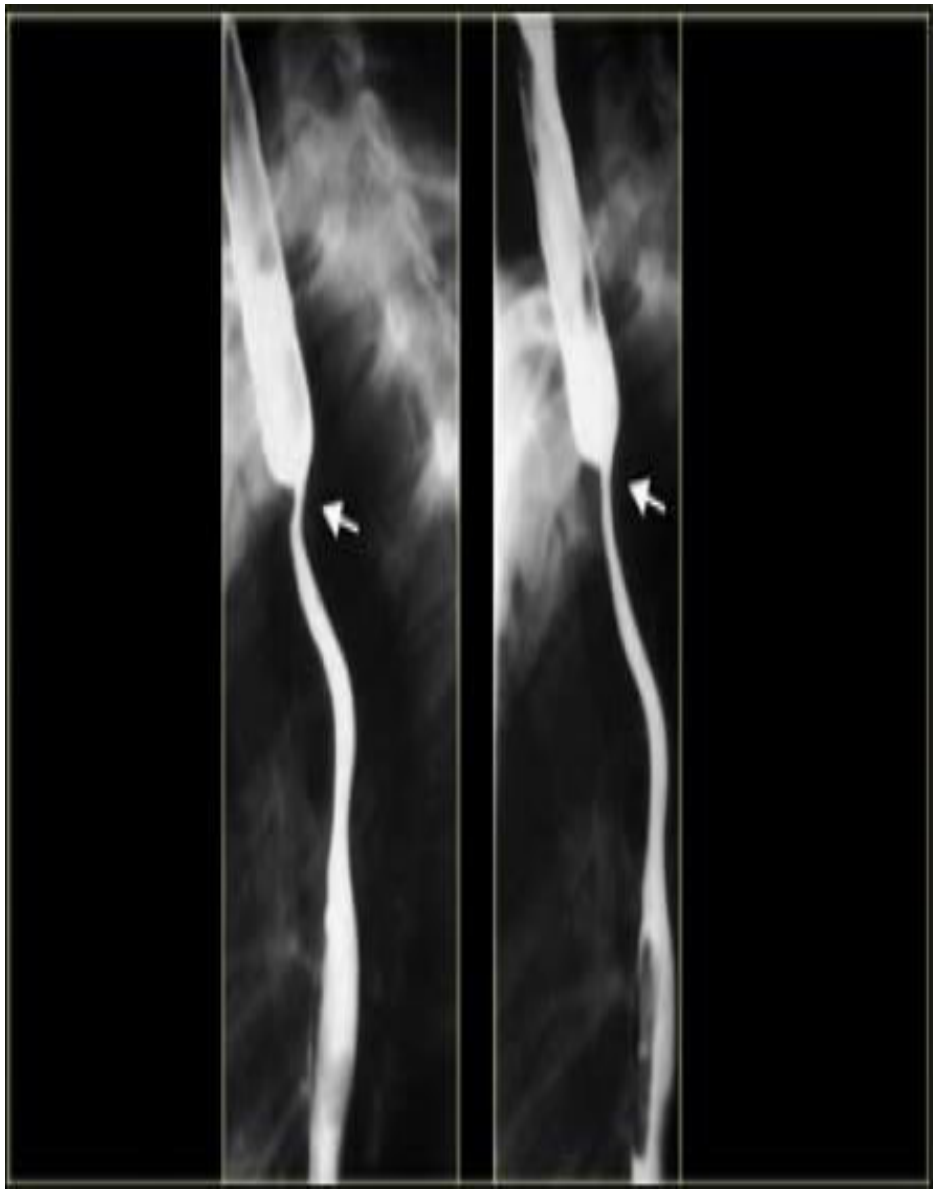
Definitive management is planned after this period

SURGERY TO BE PLANNED AFTER 6 MONTHS



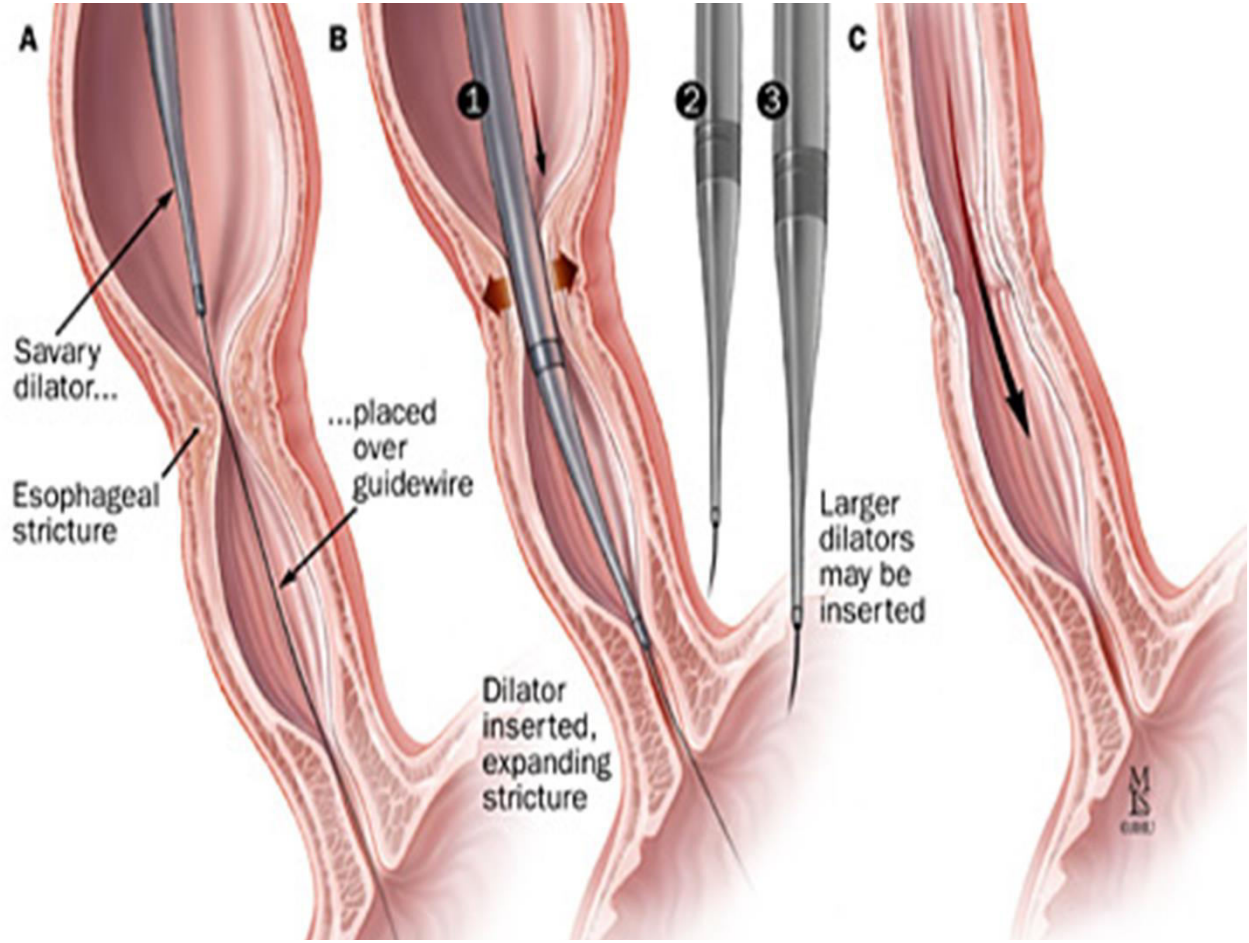
RESTORATION OF FUNCTION

- Managed by
  - Endoscopy
  - **Surgery**



- ***Endoscopic management*** is by

  - Dilatation by Savary Guilliard or balloon dilators
  - Protocol is for dilatation to a lumen size of 15 mm
  - Dilatation is repeated whenever dysphagia recurs



Surgical management

- **Indications** :

➢Failed endoscopic therapy

➢Refractory stricture

- **Types** :
  - Esophageal bypass with esophagus left in situ
  - Esophagectomy and replacement with a conduit

Resection or bypass :

- Whether to resect or bypass is an ongoing debate.
- A proponent of resection believe that leaving scarred esophagus in situ is associated with complication such as malignancy, mucocele, and gastroesophageal reflux make it essential that the scarred esophagus to be removed.
- However, the risk of malignancy in the scarred esophagus is 1.3-1.9%.
- Proponents of the bypass, on the other hand, suggest that the scarred esophagus is associated with dense periesophageal adhesions and its removal is difficult with an increased risk of bleeding and damage to adjacent structures

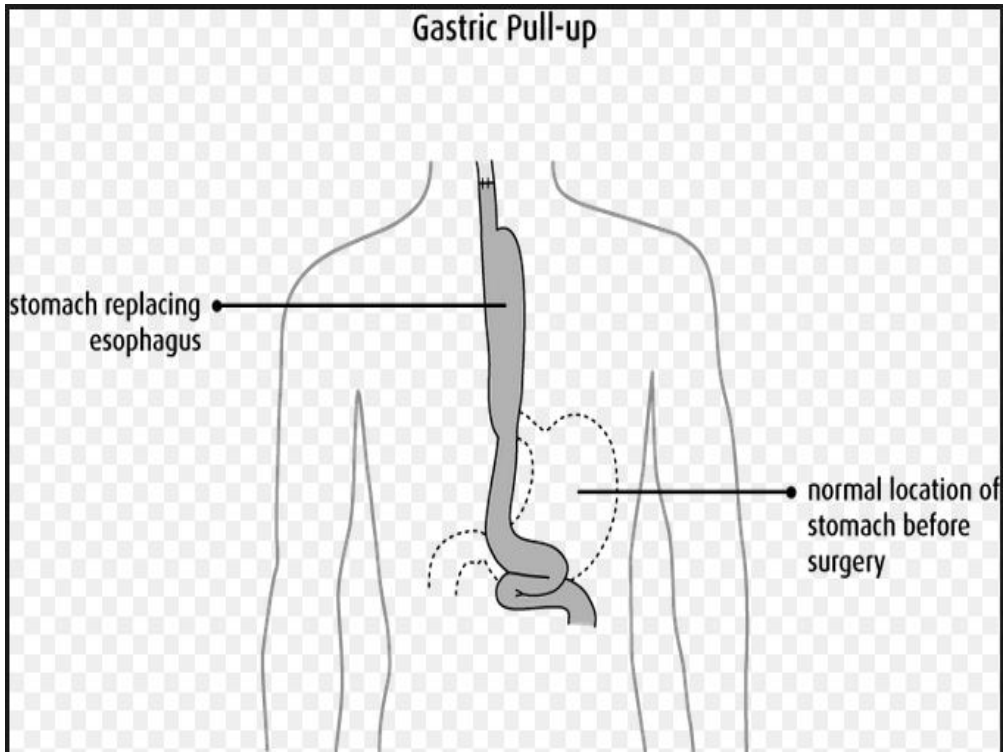
Conduits

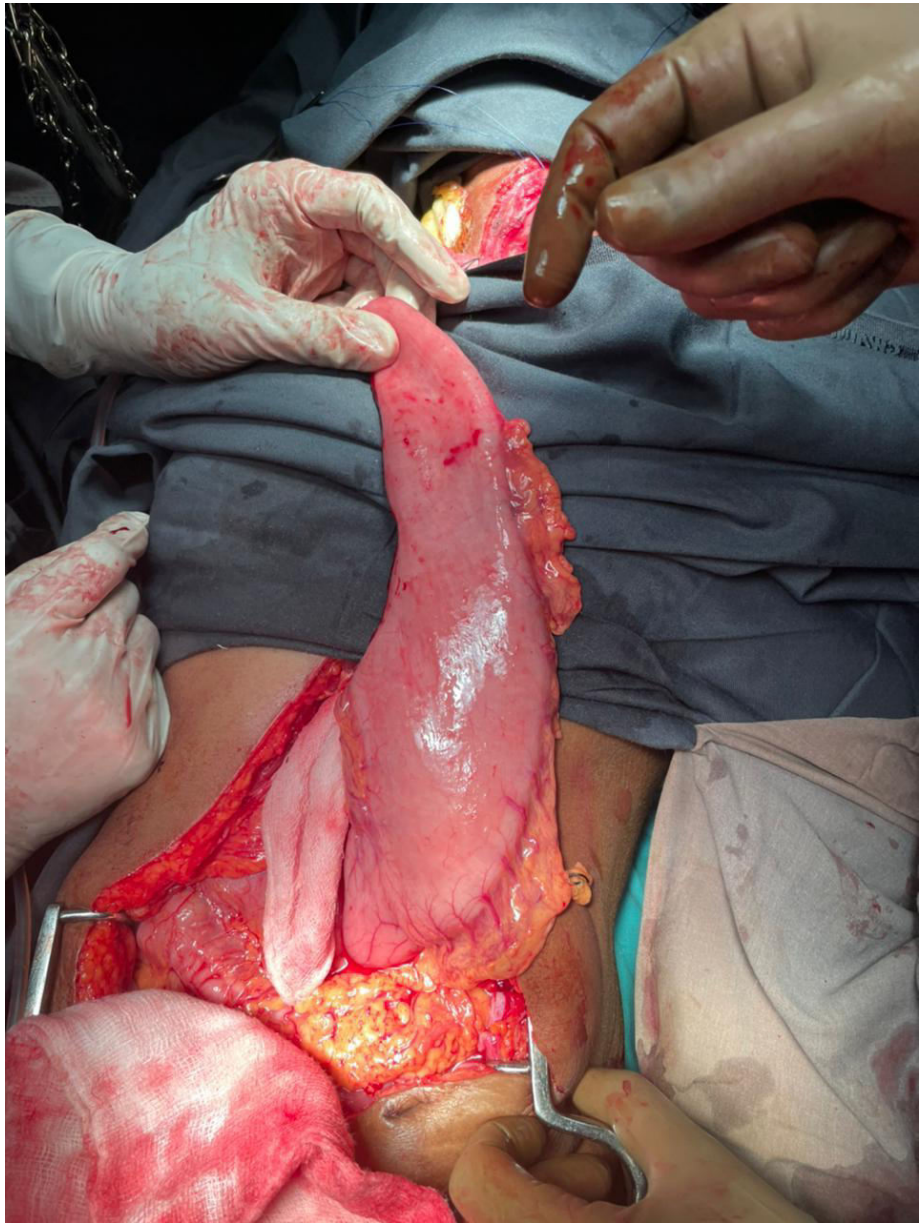
Conduit	Artery
Stomach	Right gastric & right gastroepiploic
Left colon	Isoperistaltic- Ascending branch of left colic Antiperistaltic- middle colic
Right colon	Middle colic
Jejunum	Jejunal branches of SMA

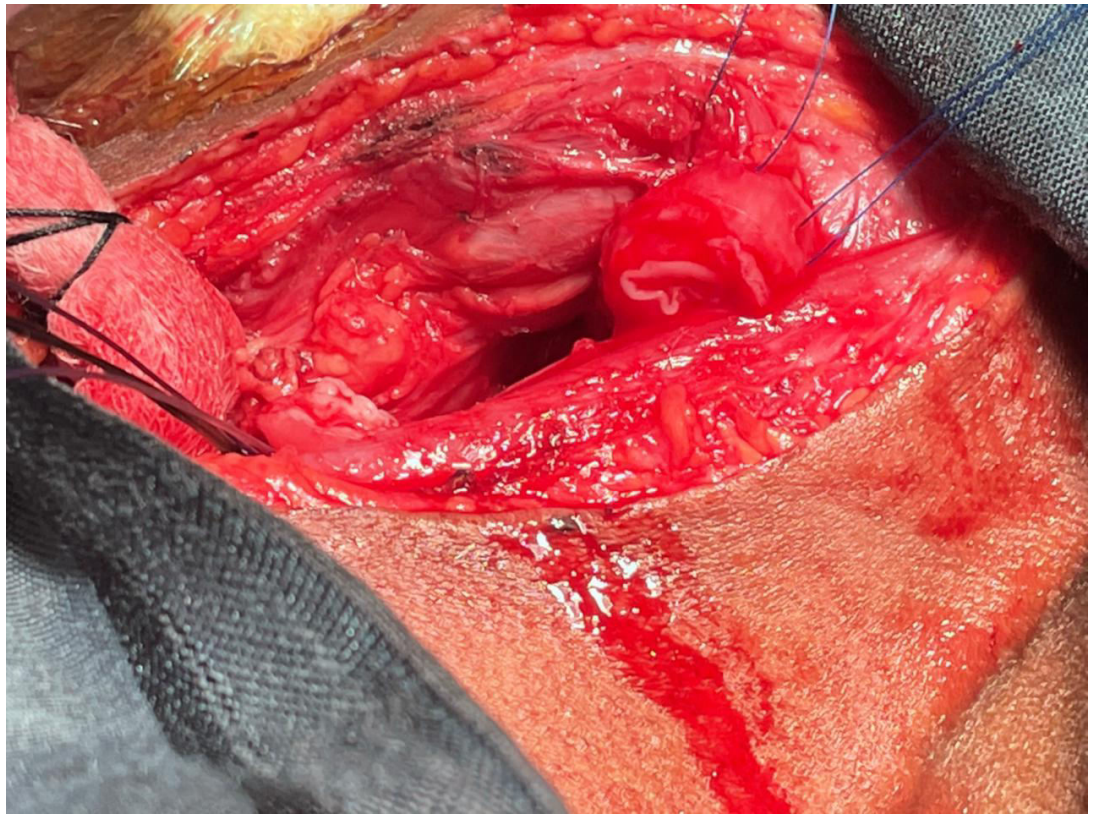
CHOICE OF ESOPHAGEAL SUBSTITUTE

- ***Gastric pull-up***
  - Requires only one anastomosis
  - Generally quicker
  - Increasingly performed laparoscopically

- Long-term functional outcome decrease with complications
  - recurrence of stricture
  - bothersome reflux
  - subsequent metaplasia over the anastomotic site

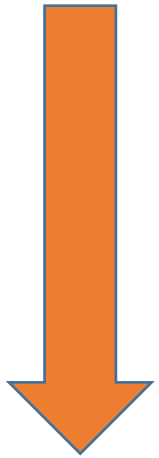






GASTRIC PULL UP

MOST OF CASES HAVE CONCOMITTANT GASTRIC INJURY



COLONIC INTERPOSITION PREFERRED

COLONIC CONDUIT

Colonic interposition :

- More complex procedure requiring 3 anastomoses.
- More stable long-term functional outcome
- Lower incidence of stricture than gastric pull-up
- Our unit protocol
- Associated with:
  - **lower incidence of stricture**

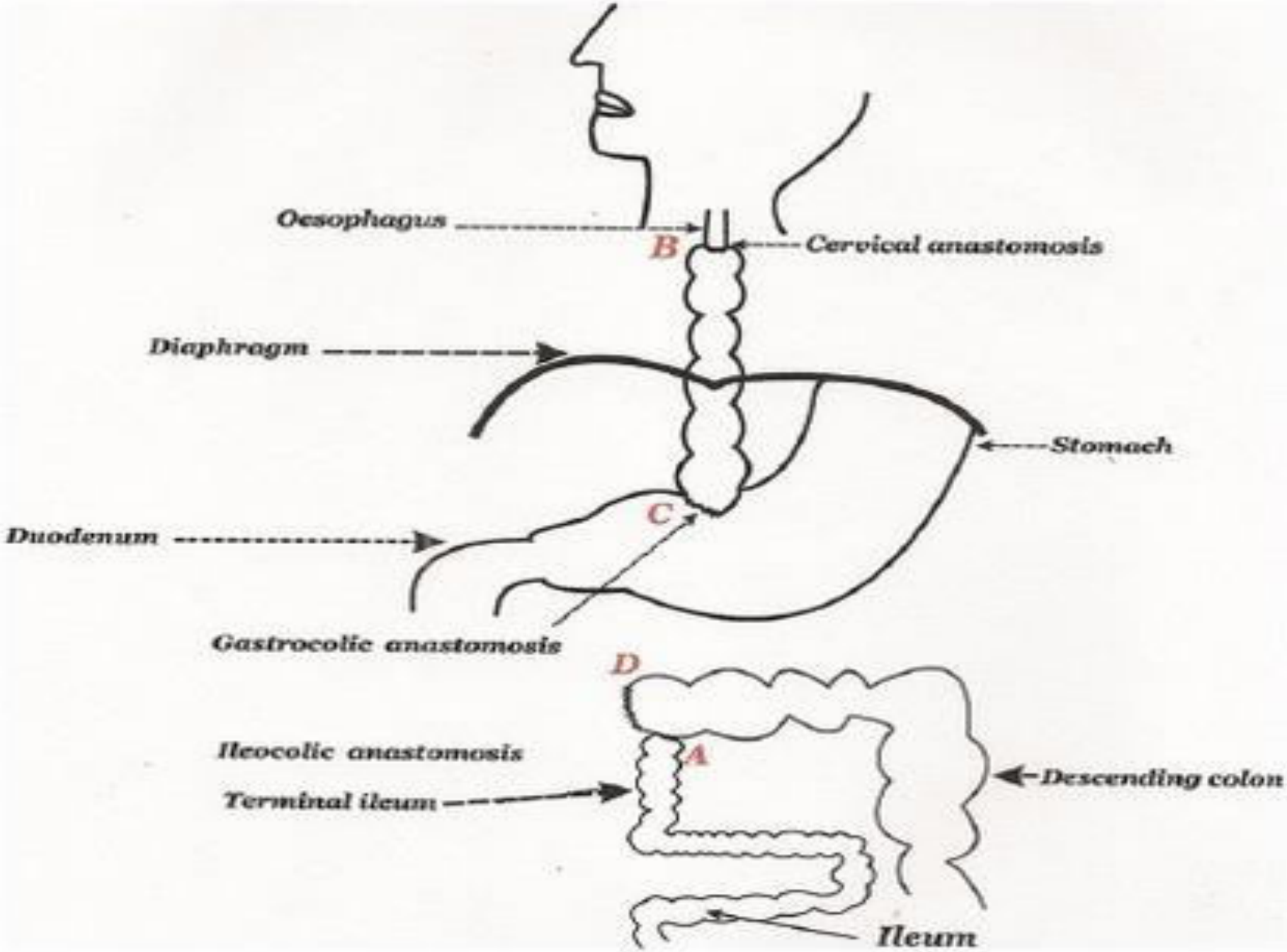
Right colon vs Left colon

	•RIGHT COLON	•LEFT COLON
Advantages	•Close match in the diameters of the esophagus •Ease of ileocolic anastomosis	•More reliable blood supply •Adequate length for reconstruction •Smaller diameter
Disadvantages	•High variation in blood vessels •Larger diameter, bulky cecum	•Possible atherosclerosis of the IMA

Angiography -when to do??

Indications of angiography-

- Previous abdominal surgery with potential involvement of the colonic vessels
- Previous surgery of the abdominal aorta
- Lower extremity claudication
- Age >50 yrs (risk of atherosclerosis)


Oesophagus
B
Cervical anastomosis
Diaphragm
Stomach
C
Duodenum
Gastrocolic anastomosis
D
Ileocolic anastomosis
A
Terminal ileum
Descending colon
Ileum

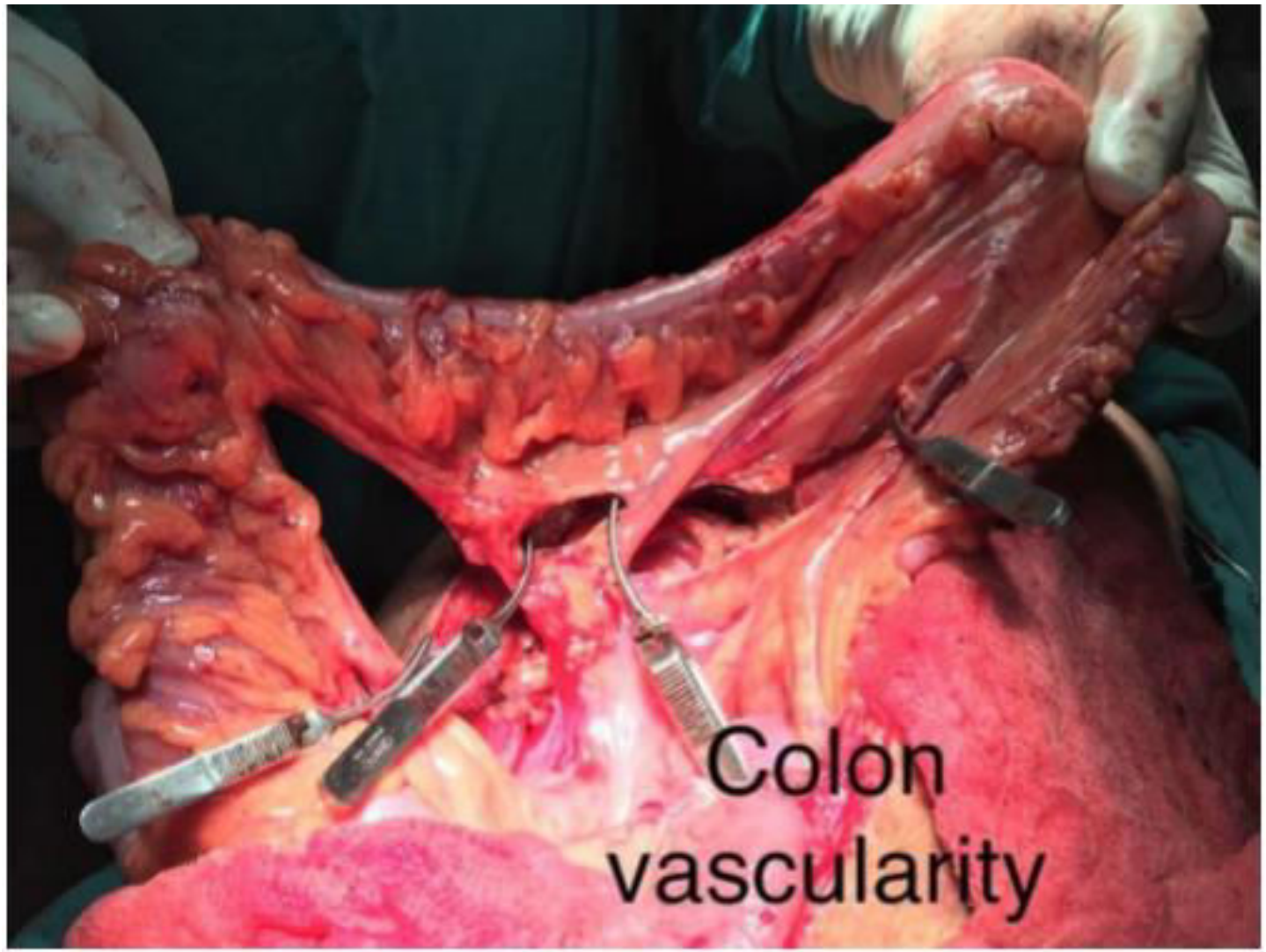
Routes of replacement

Route	Advantages	Disadvantages
Posterior mediastinum /orthotopic route	Shortest	Not available when Mediastinal inflammation/Fibrosis
Anterior mediastinum /Retrosternal-	Ease of dissection	Long route Angulation at level of xyphoid and neck Previous cardiac surgery may block access
Subcutaneous/pre-sternal	Ease of dissection	Cosmetically disturbing
Lateral trans pleural route	Useful when Prior median sternotomy done	Easily allowed the conduit for dilatation

Important Steps

- **Identification of vascular arcade**
- **Vascular test**
- **Measuring the length**
- **Route**
  - Retrosternal
  - Subcutaneous
  - Mediastinal

IDENTIFICATION OF VASCULAR ARCADE:


Colon
vascularity

MEASURING THE LENGTH:

RETROSTERNAL ROUTE

Contraindications

- Tumour
- IBD
- Aortic aneurysm
- Abdominal aortic surgery with loss of inferior mesenteric or left colic arteries
- Atherosclerosis affecting left, right or middle colic arteries
- Partial/total colectomy
- Diverticulosis
- Multiple polyps
- Dense fibrous adhesions

Complications:

1. **Anastomotic leak** (0-15%)

2. **Graft necrosis** – 5.1 (0-13%)

3. **Anastomotic stricture** (0-40%)

   - Usually managed conservatively with endoscopic dilatation

4. **Bulging of its supraclavicular portion-**

   - Causes dysphagia in long term - requires pushing down of food bolus manually
   - May necessitate revision surgery by excising the protruded part

5. **Graft redundancy** – (Upto 25%)
   - Dysphagia, obstruction, regurgitation and bacterial overgrowth.
   - Measures to avoid: Accurate measurement of conduit to have straight course
   - Surgical corrections may be needed in severe cases

6. **Reflux -** (8-15%)
   - Responds well to proton pump inhibitors.

7. Development of **cancer**
8. **IBD** in the trans positioned colon

Other substitutes

- Jejenum
- Pedicled cervical skin flaps
- Myocutaneous flap harvested from the pectoralis major muscle

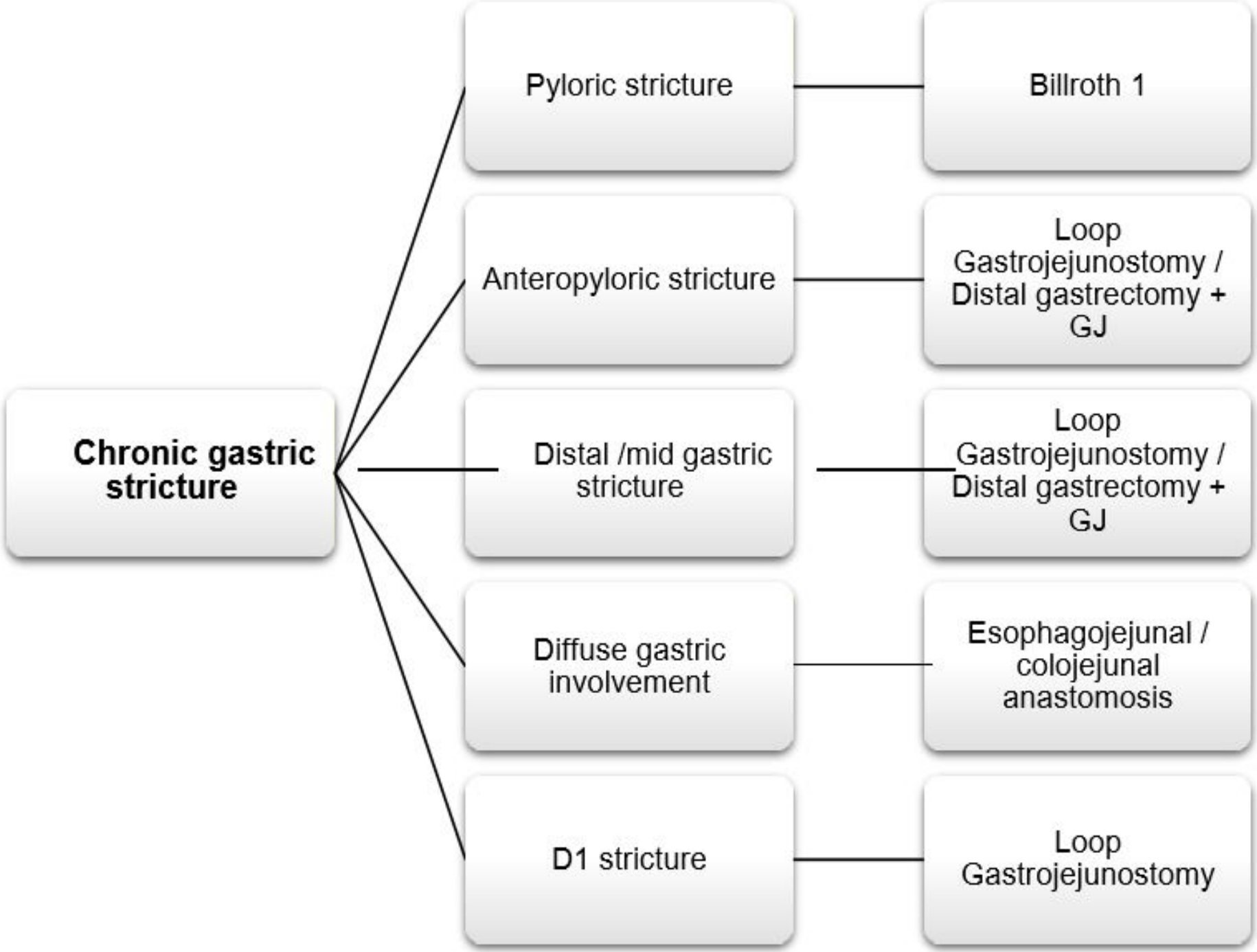
NOT PREFERRED

OROPHARYNGEAL STRICTURE

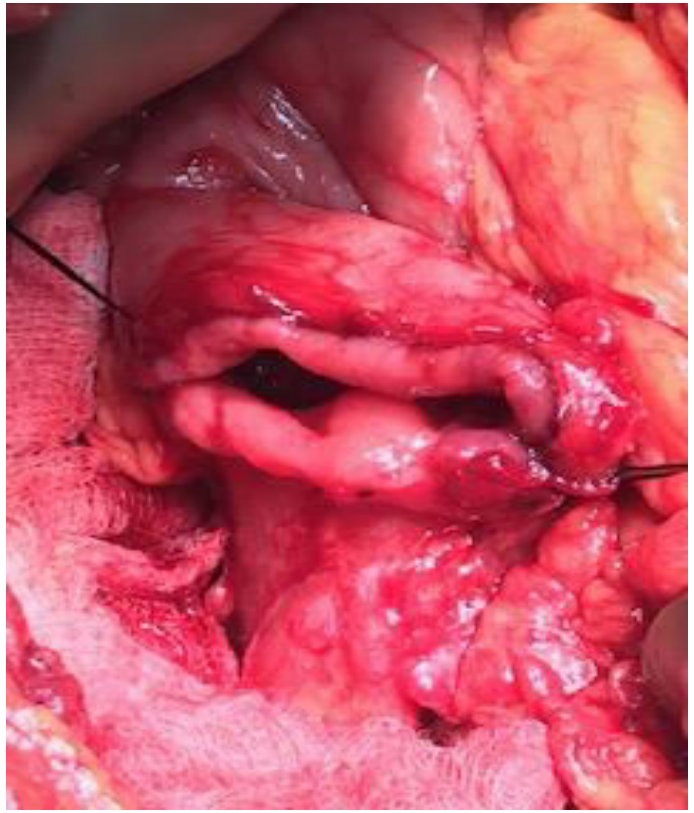
- Ultimate goal of therapy is the preservation of both swallowing and speech.
- Much harder to manage.
- Mandates tracheostomy.
- Colon interposition or gastric pull-up.
- If both piriform sinuses are open, the prognosis for safe swallowing is relatively good.

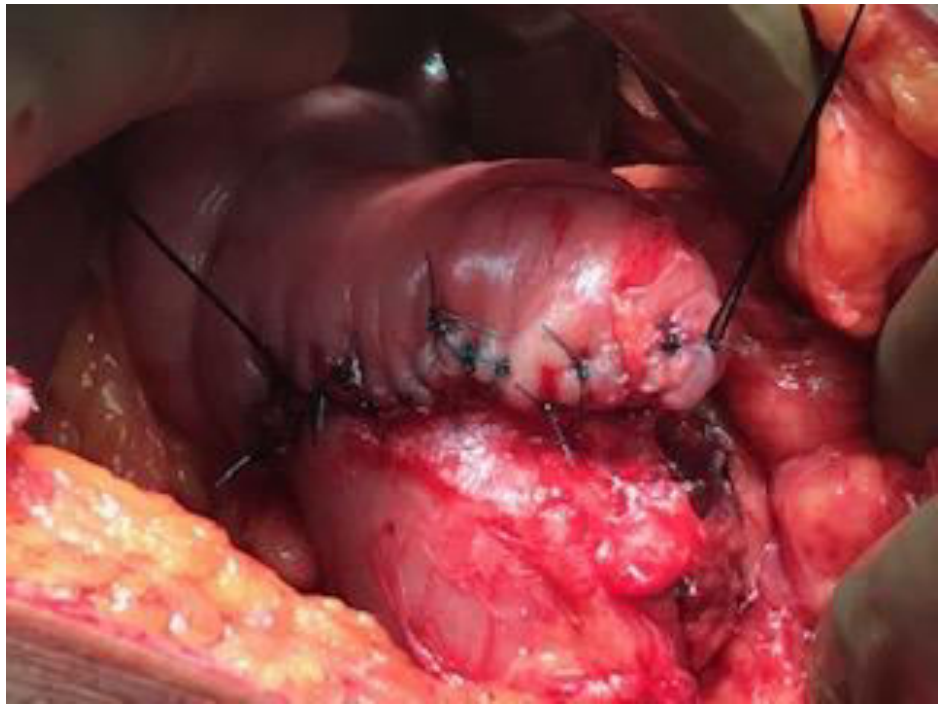
Management of gastric stricture :

- The preferred operation depends on several factors:
  - General condition of the patient
  - Need for a concomitant oesophageal reconstruction
  - Type of chronic gastric injury


Chronic gastric stricture
Pyloric stricture
Billroth 1
Anteropyloric stricture
Loop Gastrojejunostomy / Distal gastrectomy + GJ
Distal /mid gastric stricture
Loop Gastrojejunostomy / Distal gastrectomy + GJ
Diffuse gastric involvement
Esophagojejunal / colojejunal anastomosis
D1 stricture
Loop Gastrojejunostomy

BILLROTH I :





Cancer in stricture

- Risk is 1000 times
- Tends to present >30 years
- Increased mortality of attempted resection outweighs the theoretical advantage of reducing the cancer risk.

Summary

- Both acids and alkalis - equal damage to esophagus & stomach
- Endoscopic grading remains the best predictor
- CECT: in grade 3b - surgery
- At 6-8 weeks reassess and treat stricture
- Role of surgery
  - Early phase – Emergency surgery in unstable patients with necrosis
  - Intermediate phase – Feeding Jejunostomy
  - Chronic phase – Reconstruction (management of stricture)
- Colonic conduit is preferred over gastric conduit

Thank you