

## Current surgical indications and techniques in the treatment of peptic ulcer disease

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### Abstract

In last recent years the incidence of peptic ulcer disease has been decreased due to use of acid-decreasing drugs that are effectively used in healing most of the ulcers. As a result, the use of elective surgery have been declined, but it is indicated for some cases of undetermined diagnosis and refractory ulcers. The need for surgery has reduced due to development of alternative treatment methods such as endoscopy and angioembolization. In cases of gastric outlet obstruction and bleeding ulcers the treatment of endoscopy therapy resulted in high degree of success. For selected cases of bleeding ulcers angioembolization is preferred. When these procedures fail to heal the haemorrhages of peptic ulcer, surgery is recommended. As non-operative treatment cannot be considered as standard care, surgery is indicated in patients with perforated peptic ulcer. Eradication of *Helicobacter pylori* and avoidance of NSAIDs is enough for closure of perforation. Before deciding any conservative treatment the gastric ulcer must be biopsied to rule out malignancy.

**Keywords:** Surgical indications, peptic ulcer

### Introduction

The purpose of this study is to review the current status of surgery in the treatment of peptic ulcer disease including elective and emergency procedures.

Elective surgery is needed when endoscopic therapy fails in patients with refractory ulcers, uncertain diagnosis and gastric outlet obstruction. Emergency surgery is needed in many unsuccessfully treated cases of bleeding ulcers and perforated ulcers by endoscopic therapy.

Controversy exists with the addition of acid-decreasing procedures to simple techniques -

such as perforation closure or vessel ligation and also for procedure of resection versus vagotomy.

Due to development of acid-suppressive medications and recognition of *Helicobacter pylori* and NSAIDs on its pathophysiology, the number of urgent operations for ulcer complications has increased.

### Pathophysiologic features of peptic ulcer disease:

Peptic ulcer develops in those areas of gastrointestinal tract that are usually acidic.

Most ulcers are known to be associated with H.pylori, a spiral shaped bacteria that lives in the acidic environment of the stomach. The place where peptic ulcer may form are: stomach-gastric ulcer, duodenum-duodenal ulcer, esophagus:-esophageal ulcer. Major causative factor is chronic inflammation due to H.pylori, which inhibits antral mucosa and increases the gastrin production which in turn stimulates the production of gastric acid by parietal cells. Majority of duodenal and gastric ulcers are caused by NSAID intake and H.pylori infection. The pathogenic mechanism of the gastric or duodenal mucosal barrier is acid peptic damage. The clue for healing the ulcer and decrease recurrence of peptic disease is surgery or drugs which suppress the acid secretion.

Agents such as smoking, stress, alcohol and drugs such as aspirin, corticoids or cocaine have been involved in the development of ulcer disease and its recurrence. Ulcer can also be caused by some diseases such as Zollinger-ellison syndrome, systemic mastocytosis, trauma, burns and major physiological stress.

Currently, by avoiding consumption of NSAIDs, eradicating H.pylori many patients can be managed in non-operative way, including in case of bleeding by means of endoscopic treatment. But still surgery can be necessary for three main clinical scenarios such as drug-resistant ulcers, gastric outlet obstruction, uncertain diagnosis and ulcers complicated by bleeding or perforation.

### **ELECTIVE SURGERY**

#### **Drug resistant ulcer or refractory ulcer:**

The avoidance of NSAIDs intake, treatment with anti-secretory and antimicrobial drugs now-a-days providing better response to peptic ulcers in many patients. But in some patients, the treatment is not effective and disease may recur.

In refractory or recurrent ulcers, the first step is to confirm the real avoidance of NSAIDs with the patient and relatives. The persistence of H. pylori infection, continuation of NSAID intake, gastrinoma and other uncommon causes have to be ruled out [Data.1].

The second step is confirmation of true absence of H. pylori. Although a single positive test is enough to diagnose the infection, at least two negative tests are necessary to accept the negativity. Evaluation is done by culture or biopsy-samples taken by endoscopy-urea breath testing or serology for the presence of H.pylori.

Endoscopic biopsy must perform to exclude the malignancies, if malignancy is suspected, surgery is needed irrespective of biopsy result. If a biochemical diagnosis of gastrinoma has been made, anatomical location must be searched by means of CT, MRI or intra-operative ultra sound and treated according to location.

### **DATA: 1-COMMON FACTORS THAT CAUSING PEPTIC ULCER DISEASE**

#### **A. Drugs other than NSAIDs:**

- Acetaminophen
- Bisphosphonates
- Clopidogrel
- Chemotherapy
- Cocaine
- Glucocorticoids
- Sirolimus
- Spironolactone
- SSRIs

#### **B. Hormonal or mediator-induced, including secondary acid hypersecretory states**

- Antral G cell hyperfunction
- Basophilia in myeloproliferative disorders
- Carcinoid syndrome
- Gastrinoma

- **Systemic mastocytosis**

**C. Recurrent ulcerative following gastrectomy for peptic ulcer disease**

**D. Infections non H. pylori**

- **Cytomegalovirus**
- **Herpes simplex virus type 1**
- **Other infections**

**E. Mechanical causes:**

- **Duodenal obstruction**

**F. Radiation therapy**

**G. Inflammatory and infiltrating diseases**

- **Crohn's disease**
- **sarcoidosis**
- **Others**

**H. Idiopathic**

- **Idiopathic hypersecretory duodenal ulcer**

After ruling out all these known causes, elective surgery can be indicated.

**Uncertain diagnosis:**

Some features of gastric and duodenal ulcers suggests that it is not a peptic ulcer. Gastric ulcers can be caused by gastric carcinoma or lymphoma whereas duodenum by pancreatic or duodenal carcinoma. So they must be biopsied by endoscopy, as refractory ulcers, if malignancy is suspected surgery is needed irrespective of biopsy result.

**Gastric outlet obstruction:**

Now-a-days, due to improvement of medical care and endoscopic procedures, outlet gastric obstruction due to peptic ulcer disease is exceptional. In the history of peptic ulcer disease, symptoms such as vomiting and weight loss is very common but in advanced cases dehydration and

malnutrition typically occurs. Before undergoing any treatment, emptying stomach with a nasogastric tube, as well as correction of electrolyte disorders and nutritional abnormalities is necessary.

In order to resolve the obstacle, endoscopic balloon dilation should be followed after taking multiple biopsies to rule out malignancy. Balloon dilation is only recommended for high risk patients.

After many investigations comparison for three operations of obstructing duodenal ulcer is done: 1. Highly selective vagotomy (HSV) and gastrojejunostomy 2. HSV and Jaboulay gastroduodenostomy 3. Selective vagotomy and antrectomy. Among these first procedure is recommended as treatment of choice for patients with gastric outlet obstruction and duodenal ulcer.

If all the endoscopic procedures fail for outlet gastric obstruction due to peptic ulcer disease, then surgical treatment would be indicated.

**Surgical techniques for elective operations:**

Understanding the role of H. pylori and NSAIDs in physiology of ulcer disease, reduced the number of surgical procedures. Today, elective surgery for peptic ulcer is very uncommon. Surgical procedures in case of refractory or recurrence ulcers are less invasive and have few side effects.

In duodenal ulcers, acid secretion can be reduced by dissecting the vagus nerve branches (truncal vagotomy, selective vagotomy, highly-selective vagotomy) or by reducing gastrin stimulation (antrectomy) or decreasing the number of acid producing parietal cells (subtotal gastrectomy).

In gastric ulcers gastric resection is recommended (antrectomy or subtotal gastrectomy).

**Vagotomy:**

Previously vagotomy was performed to treat and prevent peptic ulcer disease. Now-a-days need for surgical management has decreased with the availability of PPIs and H2 receptor antagonists which controls acid secretions. Three types of vagotomy techniques are-

**Truncal vagotomy(TV):** Consists of denervation of main trunk divisions of vagus in which a procedure of pyloric drainage is needed. This procedure also denervates liver, biliary tree, pancreas, small and large bowel, there exists a few side effects with this technique.

**Selective vagotomy(SV):** It was developed in order to avoid these side effects. It includes division of anterior and posterior gastric nerves of latarjet only but it does require drainage procedures. When SV was compared with TV there exists similar rate of side effects.

**Highly-selective vagotomy(HSV):** It also called as parietal cell vagotomy as it includes denervation of proximal two-third of stomach. It is considered as safe procedure with low mortality rate which causes minimum side effects. Today it is only indicated in few cases as it has higher recurrence rate to reduce the rate of recurrence vagotomy is combined with partial gastrectomy, usually antrectomy.

**Vagotomy and drainage-** This procedure can be performed safely but have 10% of recurrence rate and side effects (dumping syndrome and diarrhoea). If an incomplete is performed then a marginal ulceration can appear. This technique is currently indicated in emergencies requiring surgery (perforation and bleeding) but uncommonly in elective surgery.

**Vagotomy and antrectomy-** Number of gastrin producing cells and acid producing parietal cells is reduced by removing the antrum. This procedure can be safely performed through a laproscopic approach with some technical modifications.

The combination of section of posterior vagus branch with anterior serosal myotomy-taylor procedure and combination of posterior truncal vagotomy with anterior linear gastrectomy with a stapler-gomez-ferrer technique are preferred to avoid TV. These two procedures are proved to be efficient in prevention of recurrence and providing satisfactory functional patient status. In case of stenosis, laproscopy can be performed by bilateral truncal vagotomy with stapled gastrojejunostomy.

**Gastric resection:**

If vagotomy is not sufficient, then in such cases partial gastrectomy is necessary. Recurrence of ulcer can result from incomplete vagotomy or continuation on NSAID treatment. Reconstruction is performed with gastroduodenostomy or gastrojejunostomy or by means of Roux-en-Y technique which are also performed by laproscopy.

**Choices of techniques for refractory ulcers:**

**Duodenal ulcer-** Acid reduction and preservation of pyloric function can be maintained by combination of highly-selective anterior vagotomy with posterior truncal vagotomy, or seromyotomy combined with TV. If stenosis is present, any type of pyloroplasty must be added.

**Gastric ulcer-** Treatment is based on Johnson classification of gastric ulcers.

**Type-1:** Decreased acid secretion, located in the lesser curvature. A low recurrence rate can be provided by distal gastrectomy, also with HSV.

**Type-2:** Ulceration in duodenum or pyloric channel with increased acid secretion. Antrectomy with vagotomy is better preferred.

Type-3: A pre-pyloric ulcer with increased acid secretion, where antrectomy and vagotomy are recommended.

Type-4: Subtotal gastrectomy is most preferred as it is located highly in the lesser curvature, associated with decreased acid secretion.

## **MANAGEMENT OF COMPLICATIONS OF PEPTIC ULCER DISEASE**

Generally, patients with uncontrolled haemorrhage and perforated ulcer with continuous leakage, are recommended for urgent surgery.

### **Bleeding ulcer:**

Endoscopic techniques, acid suppression, fluid and blood resuscitation along with medical therapy can be helpful in managing most of the patients. The rate of rebleeding can be reduced by avoidance of NSAIDs, smoking, with IV PPIs and endoscopic procedures.

Need of operation, mortality rate, rebleeding rates can be reduced by endoscopic treatment in patients with bleeding peptic ulcers. Thermal contact coagulation and injection of epinephrine are the most effective and less risky endoscopic procedures. Hypotension and ulcers larger than 2cm are the factors that predict the failure of endoscopic therapy.

Surgery for peptic ulcer haemorrhage is indicated in following cases:

- 1) Failure of endoscopic techniques to control the haemorrhage
- 2) Hemodynamic instability despite strong resuscitation with uncontrolled bleeding.
- 3) Recurrent haemorrhage after second attempt at endoscopy: when compared to surgery, second attempt has lower risk and reasonable chance of success. If two attempts have failed then

additional attempts unlikely to be successful.

Rare blood types, refusal of transfusion, giant ulcers are co-morbid disease, slow bleeding with transfusion requirements exceeding 3 units per day are also other indications for early surgery. Patients with prohibitive risk at operation, rebleeding after operation and with uncertain endoscopic diagnosis can be treated with embolization of the blood vessel.

When all these non-surgical therapies fail, the surgeon should decide two main questions-when to operate and which operation to perform among the three used for bleeding peptic ulcer: oversewing alone or ligation of the bleeding point, oversewing or ligation with definitive non-resective ulcer operation-HSV or TV plus drainage or gastric resection.

### **Bleeding duodenal ulcer:**

Due to effective endoscopic therapy and medication number of operations for bleeding duodenal ulcers has decreased. The common techniques are vagotomy with drainage combined with oversewing of ulcer or vagotomy and antrectomy. As a result of many studies, the current trend is to perform oversewing alone with H.pylori eradication treatment or long-term use of PPIs.

Non-resective procedures are recommended in patients with shock by performing only ligation or suture of bleeding vessel in order to reduce operative time and mortality. When the bleeding is very difficult, ligation of gastroduodenal artery can be necessary.

### **Bleeding gastric ulcer:**

Endoscopic is effective in 80% of cases due to different behaviour of bleeding gastric ulcer where smaller sub mucosal vessels are involved, bleeding can stop spontaneously and in most of the cases the size of bleeding vessel is less than 1mm. A bleeding gastric ulcer is best treated by ulcer excision and repairing of the resulting defect. In the

ulcers located near the gastro-esophageal junction, biopsy and oversewing can be enough.

**Perforated ulcer:**

Less than one-third of patients have antecedents of peptic ulcer disease before perforation. Perforation of peptic ulcer is one of the most severe events since it is associated with considerable morbidity and mortality.

**Duodenal ulcer:**

The current stand of care for perforation in chronic peptic ulcer disease patients is surgery. Surgical treatment can be limited to closure of the perforation, or a definitive treatment of ulcer disease can be performed. The treatment of choice in the management of perforated duodenal ulcers is simple closure. Simple closure can be performed laproscopically.

Taylor's method is the conservative treatment for duodenal perforation which includes measures such as PPIs, acid suppressives, nasogastric aspiration, antibiotics and close monitoring.

**Gastric ulcer:**

The theoretical procedure of choice for gastric ulcer is partial gastrectomy. In case of patients in shock biopsy of the ulcer margins and simple closure is an acceptable procedure.

If the perforation clearly located in a tumoral area the options are emergency gastrectomy-doubtfully oncologic or simple closure and at later stages oncologic gastrectomy is to be performed.

**Conclusion**

In summary, it is necessary to choose the best operation for peptic ulcer disease by considering the features and clinical status of the patients, surgeons experience and also published evidence. The main

recommendations of PUD are summarised below:

**1) REFRACTORY ULCER**

Duodenal -- Highly-selective anterior vagotomy combined with posterior truncal vagotomy or seromyotomy combined with posterior truncal vagotomy.

Gastric -- Type I: Distal gastrectomy  
Type II: Antrectomy with vagotomy

Type III: Antrectomy with vagotomy

Type IV: Subtotal gastrectomy

**2) UNCERTAIN DIAGNOSIS**

The same as that of refractory ulcer

**3) GASTRIC OUTLET OBSTRUCTION**

Highly-selective vagotomy with gastrojejunostomy

**Bleeding duodenal ulcer:**

Partial gastrectomy (less rebleeding rate)

Suture over sewing (less long term side effects)

**Bleeding gastric ulcer:**

Ulcer excision

**Perforated duodenal ulcer:**

Simple closure

Acid secretion reduction procedures if continuation of NSAIDs is predictable

**Perforated gastric ulcer:**

Partial gastrectomy Biopsy and simple closure.

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