Peptic ulcer disease

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Peptic ulcer

- Definition
  - Breach in the mucosa of the GIT as a result of the action of gastrin on parietal cells leading to production of acid

- Types
  - Duodenal ulcer
  - Gastric ulcer
  - Small bowel ulcer e.g. meckel’s diverticulum
Classification – John’s criteria

- Types
  1. Lesser curve (body) ulcer
  2. Duodenal ulcer + lesser curve ulcer
  3. Prepyloric ulcer
  4. High lesser curve

Most common location: along the lesser curvature of the stomach !!

Causative factors

Most common causes
- Helicobacter pylori
  - WHO Class I carcinogen
- NSAIDS

Other factors
- Stress
- Smoking
- Caffeine
- Infection: CMV/HSV
- HyperPTH
- Chronic liver disease
- Chronic renal disease
- Zollinger Ellison disease
H. Pylori

**Gram-ve spiral shaped microaerophilic bacterium**

- Colonises gastric epithelium
- Direct contact

**Pathogensis**

- Not all patients with H. Pylori infection develop ulcers
- **Bacterial factors**
  - Many different strains of H. Pylori
  - Virulence different
  - Some cause gastritis and others ulcer
- **Host factors**
  - H. Pylori binds preferentially to Lewis antigen (part of complex determining blood group)
  - Infection in blood gp O
Mechanism of injury [1]

1. Local epithelial damage
   - Secretion of cytotoxins, urease, vacuolating cytotoxin, heat shock proteins
   - Damages mucosal layer and allows action of acid on epithelial cells
   - Leads to local inflammation exacerbating mucosal insults

Mechanism of injury [2]

2. Increase gastric acid production
   - Local inflammation inhibits secretion
   - Increased gastrin and pepsinogen release
   - Increase acid within duodenum => gastric metaplasia in duodenum => colonization in duodenum => inflammation and DU
**Methods of Dx [1]**

- Gold standard
  - **Endoscopic bx + histological examination**

- Rapid urease test
  - Test for urease activity
  - ↑pH of medium
**Methods of Dx [2]**

- **Urease breath test**
  - Measurement of 13CO₂/12CO₂ ratio in baseline and post-ingestion samples

- **Serology (IgG)** – antibody testing
  - Not useful for post treatment success

- **Stool antigen detection**

**Treatment – American college of gastroenterology guidelines**

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Duration (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Triple Therapy (STT) a</strong></td>
<td>10 to 14</td>
</tr>
<tr>
<td>Standard dose PPI twice a day* +</td>
<td></td>
</tr>
<tr>
<td>Clarithromycin 500 mg twice a day +</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin 1,000 mg twice a day</td>
<td></td>
</tr>
<tr>
<td><strong>Alternative Triple Therapy a,b</strong></td>
<td>10 to 14</td>
</tr>
<tr>
<td>Standard dose PPI twice a day* +</td>
<td></td>
</tr>
<tr>
<td>Clarithromycin 500 mg twice a day +</td>
<td></td>
</tr>
<tr>
<td>Metronidazole 500 mg twice a day</td>
<td></td>
</tr>
<tr>
<td><strong>Quadruple Therapy (BQT) b</strong></td>
<td>10 to 14</td>
</tr>
<tr>
<td>Standard dose PPI twice daily* OR ranitidine 150 mg twice a day</td>
<td></td>
</tr>
<tr>
<td>Bismuth subsalicylate 525 mg 4 times a day +</td>
<td></td>
</tr>
<tr>
<td>Metronidazole 500 mg 4 times a day +</td>
<td></td>
</tr>
<tr>
<td>Tetracycline 500 mg 4 times a day</td>
<td></td>
</tr>
</tbody>
</table>
Treatment of Uncomplicated ulcers

- Correct etiological agents
  - Eradication of *H. pylori*
  - Avoid NSAID and aspirin, or use protective agents with aspirin, or use COX-2 inhibitor
  - Treat underlying conditions

- Ulcer healing drugs
  - PPI 4-6/52

- Fu endoscopy
  - GU – risk of malignancy

Population-based estimates from US Nationwide Inpatients

Elective ulcer surgery almost extinct!!

*Bashinskaya et al. J Glob Infect Dis 2012*
Ulcer complications

- Haemorrhage
  - Most common among all ulcer complications
  - ~10% of peptic ulcers present with bleeding

- Perforation
  - Rapidly decreasing trend
  - Mean age of presentation becomes older, ?NSAID use

- Obstruction
  - Uncommon

- Penetration

What to do for ulcer complications

- As a surgeon...we want ...

- Control
  - Short term (Immediate, life saving)
  - Long term (Late, mainly to prevent recurrence)
Peptic ulcer bleeding

Presentation
- Blood in the form of
  - Tarry stool
  - Coffee ground vomiting
  - Haematemesis
- Anaemia
  - Exertional dyspnea
  - Malasie
  - PR: melaena
- Hypovolaemic shock

3 Essential Elements in the Management of GIB
- Short term control
  - Resuscitation
    - Crystalloid (First choice)
    - Plasma expander
    - Blood (in desperate situations)
  - Localisation
    - Endoscopy
    - Other Imagings
  - Haemostasis
    - Endoscopic intervention (First line)
    - Surgery
Resuscitation….. A, B, C

- Large bore IV cannula and fluid/Blood
- Closer monitoring of BP, pulse, SaO₂
- +/- Central venous pressure
- Urine output (Hourly) – Foley cath

### Hypovolumic shock signs

<table>
<thead>
<tr>
<th>Blood loss (ml)</th>
<th>&lt;750</th>
<th>750-1500</th>
<th>1500-2000</th>
<th>&gt;2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss (%)</td>
<td>&lt;15</td>
<td>15-30</td>
<td>30-40</td>
<td>&gt;40</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>&lt;100</td>
<td>&gt;100</td>
<td>&gt;120</td>
<td>&gt;140</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Pulse pressure</td>
<td>Normal or increased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>14-20</td>
<td>20-30</td>
<td>30-40</td>
<td>&gt;35</td>
</tr>
<tr>
<td>Urine output (ml)</td>
<td>&gt;30</td>
<td>20-30</td>
<td>5-15</td>
<td>Negligible</td>
</tr>
<tr>
<td>Mental status</td>
<td>Slightly anxious</td>
<td>Mildly anxious</td>
<td>Anxious and confused</td>
<td>Confused and lethargic</td>
</tr>
<tr>
<td>Fluid replacement</td>
<td>Crystalloid</td>
<td>Crystalloid</td>
<td>Crystalloid and blood</td>
<td>Crystalloid and blood</td>
</tr>
<tr>
<td>Admission risk markers</td>
<td>Score value</td>
<td>Admission risk markers</td>
<td>Score value</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------</td>
<td>---------------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Blood urea (mmol/L)</td>
<td></td>
<td>Systolic blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.5-7.9</td>
<td>2</td>
<td>100-109</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8.0-9.9</td>
<td>3</td>
<td>90-99</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10.0-24.9</td>
<td>4</td>
<td>&lt;90</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>≥25</td>
<td>6</td>
<td>Other markers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemoglobin for men (g/L)</td>
<td></td>
<td>Pulse ≥ 100/min</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>≤120</td>
<td>1</td>
<td>Presentation with melaena</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>100-119</td>
<td>3</td>
<td>Presentation with syncope</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>6</td>
<td>Hepatic disease</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hemoglobin for women (g/L)</td>
<td></td>
<td>Cardiac failure</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>100-119</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GBS score**

- One of many scoring systems (CUHK scores, Rockhall score)
- Calculated based on admission criteria
- Accurately predicts need of intervention and death
- Score >8 = 41% mortality and a rebleeding rate of 42.1%.
- high risk patients
  - admitted to HDU
  - Consider urgent endoscopy
PPI infusion before endoscopy
Less patients with bleeding ulcers
Less endoscopic therapy
More clean based ulcers

Need of Urgent Endoscopy?

Most (90%) bleeding stopped spontaneously

Urgent OGD is indicated when there are signs of ongoing bleeding:

- Fresh Haematemesis
- Unstable Haemodynamics despite resuscitation
- Repeated fresh melaena and drop in Hb
Role of Endoscopy

- Identify the source of bleeding
- Assess risk of re-bleeding
- Endoscopic hemostasis

Forrest’s Classification of SRH

Ia  Ib
Ia  Ib
IIa  IIb  IIc
SRH: Significance?

Haemostasis

- Endoscopic
  - Injection therapy
  - Coaptive coagulation (Thermocoagulation)
  - Laser coagulation
  - Mechanical devices
    - e.g. clips

- Surgery
Injection Therapy

- **Agents used**
  - Adrenaline solution
    - local tamponade
    - vasoconstriction
    - platelet aggregation
  - Sclerosants
    - Polidocanols, absolute alcohol, or STD
  - Saline

Coaptive coagulation

- **Direct pressure + heat energy**
  - heat probe
  - bipolar probe
Laser Coagulation

- Nd: YAG laser
- Non-contact thermal method
- Laser energy transferred to heat when interacts with tissue around the bleeding vessel
- Less preferred
Mechanical Devices

- Haemoclips
Efficacy & risk of rebleeding

- All achieve initial haemostasis > 90%
- Rebleeding occurs in 15%-20%
- Patients prone to rebleeding if:
  - Shock on admission
  - SRH: Forrest Ia>Ib>IIa>IIb
  - Large ulcer
- ? How to secure haemostasis

To enhance haemostasis

- Combined therapy
  - Adrenaline injection
  - Heater probe
- Reduce gastric acidity
  - To stabilise the coagulum
  - Intravenous high dose PPI
- Eradication of HP during acute stage: no role
PPI infusion reduces rate of recurrent bleeding but not mortality

After successful endoscopic haemostasis

- Close monitoring
- Transfuse if indicated
- Acid suppression therapy
- Early refeeding

- Highest risk of rebleeding: first 72 hours (~94%)

- HP eradication for infected patients when discharged
Surgery is indicated only if:

- Failed primary endoscopic haemostasis
- Rebleeding in-hospital
  - After repeated endoscopic treatment
- Ongoing transfusion > defined value, eg, 8 units
Surgical Options For Bleeding DU

- **Small**
  - Plication (Suture) of bleeding vessel
  - Exclusion of ulcer (Pull surrounding mucosa to cover the ulcer)

- **Large**
  - Distal partial gastrectomy

Bleeding GU

- **Distal ulcer**
  - Distal gastrectomy

- **Proximal ulcer**
  - Ulcer excision + acid reduction procedure

- **Unstable patient**
  - Ulcer excision alone
The goal

- To stop bleeding (To save life)
- To rescue with minimal morbidity and mortality
- +/- To control ulcer diathesis
- Lengthy definitive acid reduction surgery may not be necessary

Perforated Peptic Ulcer

Sudden epigastric pain
Rapidly generalised
Board-like rigidity

First 4-6 hrs: Chemical peritonitis
> 6 hours: Bacterial peritonitis

CXR: free gas under diaphragm
(50%-70%)
Prognosis worse if:
- Delay presentation (>24 hours)
- Old age
- Hypotension
- Associated medical illness

Boey et al, BJS 1985

APACHE II score (less practical)
Lee et al, BJS 2001

DU: 80-90%
- Mostly related to Helicobacter pylori

GU: 10-20%
- More related to NSAID use
- Half also got H. pylori infection
Perforated peptic ulcers

- Remains a common surgical emergency in some places like Hong Kong and China
  - Annual number of new cases in HK and Mortality
    - 2008 447 12.3%
    - 2009 492 11%
    - 2010 494 8.5%

- Acute management
  - Immediate resuscitation
  - Antibiotics
  - Timely surgery to seal the perforation and cleanse the peritoneal cavity

Management of PPU

Resuscitation
- Fluid replacement, correct electrolytes
- Nasogastric tube
- IV antibiotics
- IV acid suppression
- Close monitoring

Conservative vs treatment operative

Crofts NEJM 1989
Surgical treatment of PPU

Two components

1. Graham’ Patch repair (≤ 2cm in size)

2. Peritoneal lavage
   - > 6L of normal saline
   - Antiseptic solution no longer used

Patch repair of PPU

- Conventionally done by open surgery
- Require a laparotomy wound
- High chance of wound infection
- Postop wound pain
- Delay recovery
**Patch Repair of PPU**

- Now can be performed under laparoscopy
  - Safe with ulcer less than 1 cm in diameter
  - Leakage rate less than 5%

- Less postop wound pain

- Less analgesic requirement

**% patients receiving lap patch repair in PWH**

![Graph showing percentage of patients receiving laparoscopic patch repair in PWH over years](image)
Role of open surgery in the current era

- Patients at high risk of mortality and morbidity
  - ASA score
  - Boey score
  - Large ulcers
  - Need of inotropes

Teoh et al 2013

Types of open surgery

- 2 principles
  1. Control of perforation
     - PDU
       - <2cm patch repair + peritoneal lavage
       - >2cm partial gastrectomy + closure of duodenal stump
       - Vagotomy + pyloroplasty may be difficult due to scarring
     - PGU
       - Benign vs malignant
       - Ulcer bx + patch repair + acid control
       - Excision of ulcer + acid control
       - Gastrectomy
What about the long term outcome?

**Before 90’s**

- Definitive operations such as highly selective vagotomy or gastrectomy were advocated by most surgeons as the treatment of choice for PPU.
- Because long term FU of simple patch repair is associated with high risk of ulcer relapse.
- Estimated recurrent ulcer rate at one year: 40%.

**RCT of Hp eradication in PPU**

*Ng et al, Ann Surg 1999*
Is there need to control ulcer diathesis?

- Control ulcer diathesis (pre PPI years)
- TV + drainage procedure
- HSV

- life-long PPI and HP eradicated, risk of rebleeding is low
Summary

- For PPU
  - Life saving First
  - Simple repair whenever possible
  - Thorough peritoneal toileting

- Control ulcer diathesis
  - Eradication of H. pylori
  - Withdraw NSAID if possible
  - Definitive surgery only if giant perforation not amenable to repair

Zollinger Ellison’s disease

- Gastrinoma
- Gastrinoma triangle: CBD & CHD junction, D2/3 junction, neck & body of pancreas
- 2/3 multifocal in pancreas
- 2/3 malignant
- Dx: fasting serum gastrin levels, (false +ve: causes of achlorhydria), secretin provocation test
**Treatment**

- Control acid: PPI
- Surgery
  - Localisation
    - CT, EUS, somatostatin receptor scintigraphy (SRS) – 80% sensitivity, can detect distant mets
    - Failure to localize: Controversial to explore
- Excision
  - Endoscopic
  - Surgery

**Gastric outlet obstruction**

- Long history of peptic ulcer / dyspepsia
- Wax and wane
- Change of periodicity
- Repeated vomiting
  - Undigested, non-bile-stained food
- Dehydration and weight loss
Gastric outlet obstruction

- Metabolic disturbance
  - Dehydration
  - Hypokalaemia
  - Hypochloriaemia
  - Metabolic alkalosis
  - Paradoxical aciduria

Initial management

- Decompression
  - NPO
  - NG tube

- Rehydration
  - Isotonic crystalloid
  - K replacement
  - No need to adjust the alkalosis

- Further investigation
  - Need to rule out malignancy!
**Investigation**

- Water soluble contrast meal
- Don’t perform Barium study
- Endoscopy +/- biopsy to exclude malignancy
- CT Abdomen + pelvis with contrast

**Treatment [1]**

- **Endoscopic**
  - Balloon dilatation
  - Long-term result not satisfactory, with half of the patients developing recurrence
  - Reserved for poor risk patients
+ **Treatment [2]**

**Surgical**
- Drainage of the stomach into small bowel
- Abolish the ulcer diathesis - vagotomy
- Can be done under laparoscope

+ **Ulcer penetration**
Peptic ulcer disease is an endemic disease in HK
Associated with potentially life-threatening complications
Prompt treatment is necessary to improve outcomes