**The Procedures**

Based on concepts of gastric restriction and intestinal malabsorption (“controlled short gut syndrome”)
Malabsorptive procedures tend to have the highest overall success rates
Can be done open or laparscopically

Restrictive procedures
- **Vertical Banded Gastroplasty**
  - Creates a small, vertically oriented pouch with a narrow gastric outlet
  - Initial weight loss but weight gain occurs after 2 years
  - Up to half of patients go on to malabsorptive procedure later

Restrictive procedures
- **Laparoscopic Adjustable Gastric Banding**
  - Placement of a small silastic band near the GE junction
  - Band may be adjustable (more common now) or not adjustable

Malabsorptive procedures
- **Roux-en-Y Gastric Bypass**
  - Restrictive and malabsorptive
  - Most common procedure performed in the U.S. (up to 70% of weight loss surgeries)
  - Roux limb bypasses the distal stomach, duodenum and upper jejunum – leave
defunctionalized small intestine
  - Small gastric pouch also created

Malabsorptive procedures
- **Biliopancreatic Diversion**
  - Two-component procedure: Limited gastrectomy and long-limb Roux-en-Y with short,
 50 cm alimentary channel
  - Leaves no defunctionalized small intestine

**The Surgical Complications**

Early surgical complications – within 30 days of surgery

Anastamotic breakdown (Roux-en-Y and biliopancreatic diversion)
- Most common cause of death after bariatric surgery
- Occurs in 1.2% of open procedures and 3% of laparoscopic cases
- Usually diagnosed within 10 days after surgery
- May not present with classic peritoneal signs
  - May be subtle: Fever, increasing abdominal pain, back pain, pelvic pressure, hiccups,
  unexplained tachycardia, restlessness
  - Pulse rate > 120 bpm associated with gastric dilatation and leak
- UGI / radiological contrast studies vital to aid diagnosis
  - HOWEVER, they can be non-diagnostic and are not very sensitive
- Early surgical consultation warranted in virtually all cases as many cases need exploration

Acute gastric distention
- Usually after Roux-en-Y procedure
- Due to edema or obstruction of the enteroenterostomy site
- Diagnosed within first few post-op days
- Present with nausea, vomiting (dry heaves), LUQ bloating, hiccups
- Plain films can be helpful
- Treatment may be either percutaneous decompression or re-operation
- NG tube use very controversial and will not decompress the remnant stomach

Band migration – can occur acutely or later
Vomiting immediately post procedure may indicate edema or migrated band
Plain films may identify misplaced / migrated band
    Should be at a 30- to 45-degree angle from horizontal at GE junction
May need swallow study with fluoroscopy to determine band position
If patient presents with symptoms consistent with gastroesophageal obstruction band should be
deflated as soon as possible
This form of band migration can occur even years after the procedure
May lead to gastric necrosis and death
To deflate
    Lidocaine infiltration into skin over port
    Stabilize port between two fingers
    Access port with large-bore needle; aspirate at least 5 mL
May cause outlet obstruction – severe gastroesophageal reflux, esophagitis
May need to convert to gastric bypass – surgical consultation

Late surgical complications - more than 30 days after surgery

**Staple line disruption (Roux-en-Y and biliopancreatic diversion)**
    May occur early, but usually > 4 months after surgery
    Excluded stomach communicated with gastric pouch
    Not really a complication but rather a failure to achieve goal of weight loss

**Incisional hernias (open procedures)**
    Seen in 15-20% of patients after open procedures
    May be hard to palpate depending on patient’s body habitus
    CT scan may be needed to make diagnosis
    Incarcerated hernias at port sites may also occur; difficult to appreciate on exam

**Stomal stenosis (all surgical procedures)**
    Up to 12% of cases
    Typically occur more than one month after surgery
    Present with post-prandial epigastric pain and vomiting, dysphagia
    Diagnostic studies include UGI, upper endoscopy
    Treatment is with endoscopic dilatation

**Band erosion**
    Occurs in from 0.3 to 1.9% of patients with banding procedures (one study quotes 6.8%)
    Progressive LUQ pain or pain in left lower chest (may mimic angina)
    May have intraabdominal sepsis with or without abscess
    May develop gastrocutaneous fistulas
    Surgical consultation, antibiotics

**Internal Hernia (Roux-en-Y)**
    Can occur in up to 6% of patients – more frequent with laparoscopic procedures?
    Present with intermittent, crampy abdominal pain; pain out of proportion to exam highly
        Concerning (bowel ischemia)
    Exam may be relatively benign
    Diagnostic studies (CT scan, UGI series) may be nondiagnostic
    Surgical consultation needed; may need surgical visualization and intervention

**Marginal Ulcer**
    Occur in up to 15%
    Usually present within first 90 days after surgery
    Present with epigastric abdominal pain, dyspepsia
Diagnostic studies is upper endoscopy
Treatment - Acid suppression therapy

/ Bleeding from Roux-en-Y gastric bypass limb
May require aggressive resuscitation
Note: Any volume depletion state in post-bariatric surgery patients may need significant hydration
Decreased oral intake caused by bypass surgery itself may cause volume depletion state

Reflux
Present with dyspepsia, new-onset asthma / worsening of preexisting pulmonary disease
Diagnosed with upper endoscopy
Treatment is acid suppression therapy, surgical consultation

<table>
<thead>
<tr>
<th>Complication</th>
<th>Presentation</th>
<th>Diagnosis</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARLY (within 30 days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anastomotic breakdown</td>
<td>Fever</td>
<td>UGI *</td>
<td>Surgical consultation</td>
</tr>
<tr>
<td></td>
<td>Abdominal / back pain</td>
<td>CT with oral contrast *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pelvic pressure</td>
<td>*May be nondiagnostic; not very sensitive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hiccups</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unexplained tachycardia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restlessness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute gastric distention</td>
<td>Nausea</td>
<td>Plain films</td>
<td>Percutaneous decompression</td>
</tr>
<tr>
<td></td>
<td>Vomiting (dry heaves)</td>
<td></td>
<td>Open procedure</td>
</tr>
<tr>
<td></td>
<td>LUQ bloating</td>
<td></td>
<td>NO NG TUBE until surgical consultation</td>
</tr>
<tr>
<td></td>
<td>Hiccups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute band migration</td>
<td>Vomiting</td>
<td>Plain films</td>
<td>Decompress band if inflated</td>
</tr>
<tr>
<td></td>
<td>Abdominal pain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LATE (more than 30 days)  | Abdominal pain                        | May be hard to palpate | Surgical consultation                           |
| Incisional hernias       | Nausea, vomiting                      | CT scan may be needed |                                                 |
| Internal hernias         | Intermittent crampy AP                | CT, UGI (may be nondiagnostic) | Surgical consultation May cause ischemic bowel |
|                           | May see pain out of proportion to exam|                      |                                                 |
| Stomal stenosis          | Poor PO tolerance                     | UGI, upper endoscopy  | Dilatation                                      |
|                           | Dysphagia                             |                      |                                                 |
| Band erosion / migration | Abdominal pain                        | Plain films          | Decompress band if inflated                     |
|                           | Nausea/vomiting                       | CT scan              | Surgical consultation                           |
| Staple line disruption    | Weight gain                           | UGI, upper endoscopy  | Alternative bariatric procedure                 |
|                           |                                     |                      |                                                 |
| Marginal ulcer           | Epigastric pain                       | Upper endoscopy      | Acid suppression therapy                        |
|                           | Dyspepsia                             |                      |                                                 |

General rule: NG tubes should not be placed until surgical consultation obtained
TAKE HOME POINTS

1. Have a low threshold to consult a surgeon in post-bariatric surgery patient with concerning symptoms
2. Usual imaging studies may not be diagnostic in these patients
3. Volume depletion states may require aggressive fluid resuscitation
4. Avoid placing an NG tube unless the case is discussed with a surgeon first
5. Patients with inflatable bands with symptoms of gastroesophageal obstruction should have band deflated as soon as possible

KEY REFERENCES
