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# Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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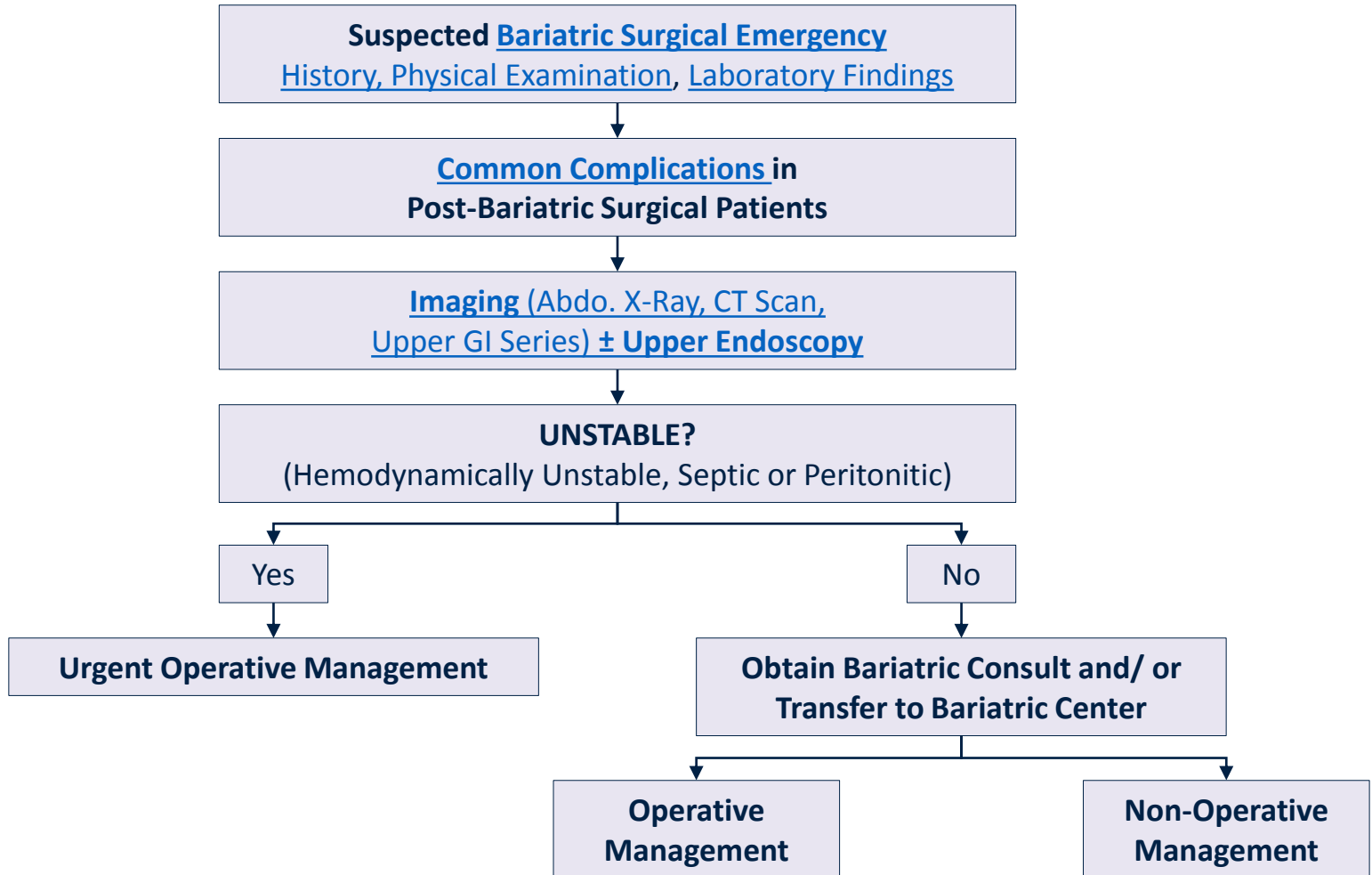
# BARIATRIC SURGICAL EMERGENCIES

Dynamic Practice Guidelines for Emergency General Surgery

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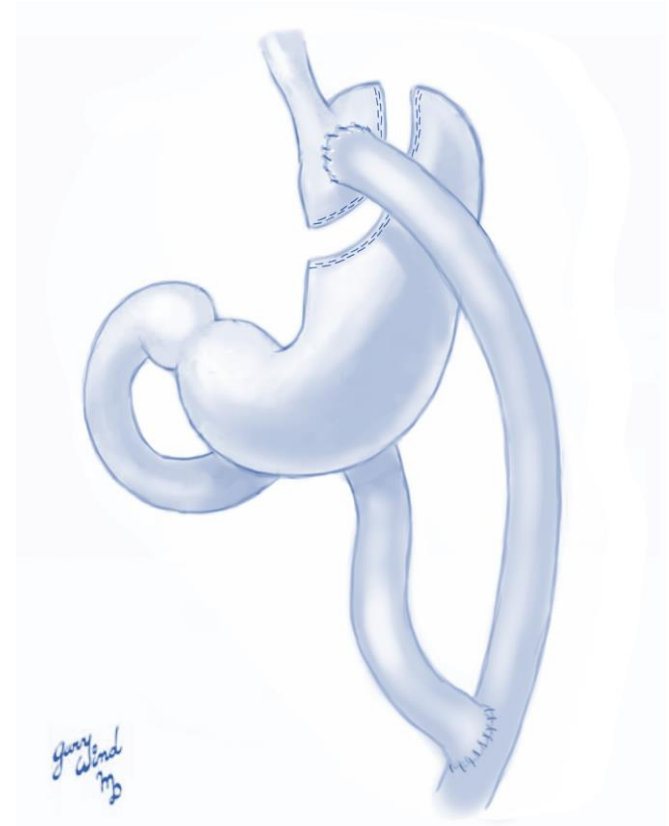
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# BARIATRIC SURGICAL EMERGENCIES



## BACKGROUND

- Postoperative complications can be broadly grouped into Early and Late complications
  - Early complications occur within the first two weeks of surgery
  - Late complications occur after the second postoperative week
- Improving safety of bariatric operations has become a high priority, leading to the establishment of strict criteria for centre accreditation, guidelines for safe bariatric surgery, and monitoring of surgical outcomes



# BARIATRIC SURG. EMERGENCIES

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## TYPES OF SURGERY

The most common bariatric procedures in Canada:

- Roux-en-Y gastric bypass (RYGB)
- Sleeve gastrectomy (SG)
- Laparoscopic adjustable gastric banding (LAGB)

Complications	RYGB	SG	LAGB
Early	<ul style="list-style-type: none"><li>• Hemorrhage</li><li>• <a href="#">Leak</a></li></ul>	<ul style="list-style-type: none"><li>• Hemorrhage</li><li>• Leak</li></ul>	<ul style="list-style-type: none"><li>• Hemorrhage</li><li>• Gastric perforation</li><li>• Stomal obstruction</li><li>• <a href="#">Band slippage</a></li></ul>
Late	<ul style="list-style-type: none"><li>• <a href="#">Marginal ulcer</a></li><li>• <a href="#">Internal hernia</a></li><li>• Small bowel obstruction</li><li>• Gastric remnant distension</li><li>• Stomal stenosis</li></ul>	<ul style="list-style-type: none"><li>• Stomal stenosis</li></ul>	<ul style="list-style-type: none"><li>• Pouch or esophageal dilation</li><li>• <a href="#">Band erosion</a></li></ul>

## ETIOLOGY

Dependent on type of bariatric procedure.

### Roux-en-Y gastric bypass (RYGB)

- Anatomical manipulation increases risk of anastomotic leaks (0.4 to 5.2%) occurring mostly at the gastrojejunal anastomosis
- Marginal ulcers (0.6 to 16%) occur near the gastrojejunostomy
- Internal herniation (0 to 5%) occur through mesenteric defects

### Sleeve gastrectomy (SG)

- Gastric leaks (5.3%) and bleeding (0.4 to 4%) in early postoperative period

### Laparoscopic adjustable gastric banding (LAGB)

- Stomal obstruction is an early complication (0 to 14%)
- Band erosion is a late complication (0 to 7%)
- Band slippage (2 to 14%) can occur at any time and occurs with varying degrees of obstruction

## PATHOPHYSIOLOGY

### Post-Operative Leak

- SG: Inadequate blood supply and oxygenation causing ischemic staple-line.
- RYGB: Surgeon experience and technical factors predict leak.

### Hemorrhage

- SG: Bleeding typically from short gastric vessels during dissection of the greater curvature or from staple line.
- RYGB: Bleeding typically at the anastomotic site.

### LAGB Complications

- Stomal obstruction: inclusion of excess peri-gastric fat, insufficient diameter, tissue edema.
- Band erosion: Gastric wall ischemia, excessively tight band, thermal injury.
- Band slippage: Prolapse of stomach through the band.

## PATHOPHYSIOLOGY

### Marginal Ulcers in RYGB

- Poor tissue perfusion at the anastomotic site
- Presence of foreign material
- Excess acid exposure
- NSAIDS
- Helicobacter pylori infection
- Smoking

### Bowel Obstruction

- Internal herniation
- Adhesions
- May cause gastric remnant distension, a rare but lethal complication





## HISTORY

- Type and date of bariatric procedure
- Immediate intra- and post-operative complications (Blood transfusions, ICU stay, previous bariatric emergencies)
- Symptoms: abdominal pain, fever, hematemesis or melena, obstipation, nausea, vomiting, reflux, decreased appetite, dysphagia and excessive weight loss
- Past medical and surgical history, medications and smoking history

## PHYSICAL EXAMINATION

- Vital signs (heart rate, blood pressure, temperature)
- Tachycardia (HR > 120) is an important predictor of post-operative leak or bleeding
- Abdominal exam: distension, local tenderness, peritonitis – abdominal exam is less reliable in obese patients
- Outputs: blood/purulence from drains, decreased urine output
- General exam: respiratory and cardiac

## LABORATORY INVESTIGATIONS



Investigations	Finding	Reason
Complete Blood Count	↓ Hgb ↑ Hgb, Hct ↑ WBC	Hemorrhage Dehydration Leak, gastric or bowel ischemia, port site infection
Kidney Function Tests	↑ Cr ↑ BUN ↓ eGFR	Dehydration
Electrolytes	↓ K ↓ Cl	Severe emesis
Arterial Blood Gases	↓ H+ ↑/↓ PCO <sub>3</sub>	Severe emesis Bowel ischemia
Lactate	↑ Lactate	Bowel ischemia/Dehydration

## IMAGING

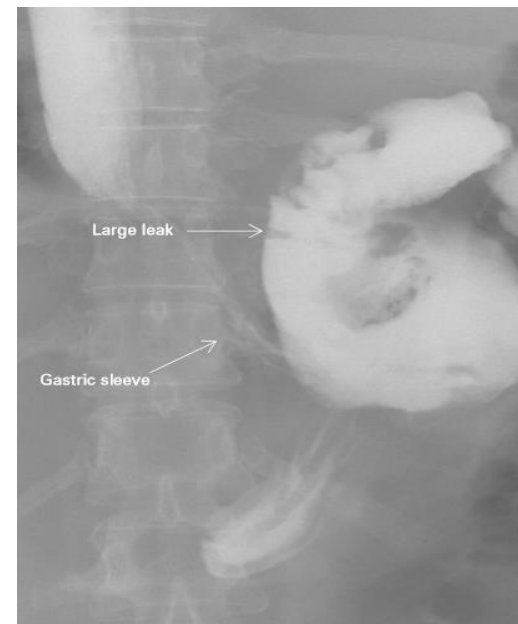


- Abdominal x-ray aids in the diagnosis of gastric remnant distention (large gastric bubble), band slippage (a band in a horizontal position), perforation (free air) and small bowel obstruction.
- Upper gastrointestinal contrast studies (UGIS) may be routine testing (centre-dependent) and is done within the first 24–36 hours postoperatively. It may be useful in diagnosing an early leak.
- CT scan is critical in diagnosing bariatric surgical emergencies. It is helpful in diagnosing internal hernias, anastomotic leaks, band slippages, band erosions, small bowel obstructions, and abscesses. However, CT scan may miss internal hernias.
- Endoscopy (diagnostic & therapeutic) aids in the diagnosis of stomal stenosis, marginal ulcers, band erosion and staple line disruption.

## Plain radiographic and CT findings in Bariatric Surgical Emergencies

### Leak

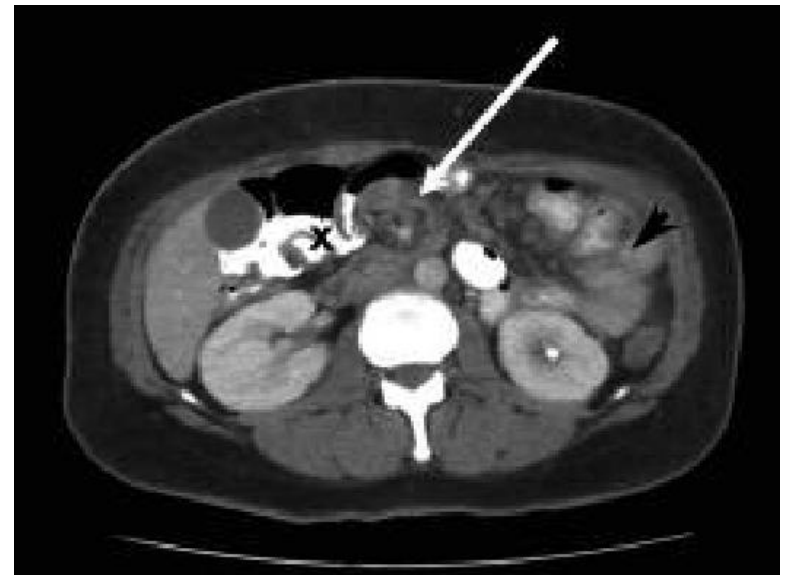
- UGIS or CT scan demonstrates extra luminal contrast material.
- In this image, there is a gastric staple line dehiscence causing a large leak after Sleeve Gastrectomy.
- If imaging is negative and a leak is suspected clinically, surgical exploration may be warranted to prevent progression to sepsis.



## Plain radiographic and CT findings in Bariatric Surgical Emergencies

### Internal Hernia After RYGB

- Internal hernias may appear as swirling within the mesentery.
- May show clustering of bowel in the left upper quadrant.
- May also have signs of bowel obstruction or bowel ischemia.
- Intermittent internal herniation can be missed on CT scans.
- If suspicious despite normal imaging, exploratory laparoscopy/laparotomy may be warranted.



## Plain radiographic and CT findings in Bariatric Surgical Emergencies

### Band Slippage

- Band slippage can be classified as anterior/posterior slippage, pouch enlargement, immediate postoperative prolapse and band slippage with gastric necrosis.
- When the band slips, obstruction of the stomach can occur.
- On AXR, axis of band may shift from usual 2 to 8 o'clock to more horizontal 10 to 4 o'clock position.
- UGIS may show pouch with rugal folds above band.
- This UGIS demonstrates anterior slip.



## Endoscopic findings in bariatric surgical emergencies

### Band Erosion

- Band erosion is an uncommon complication after LAGB.
- It is caused by gradual erosion of the band into the stomach wall.
- Symptoms are: loss of restriction, epigastric pain, GI bleeding, intra-abdominal abscesses or port-site infection.
- This is an endoscopic image of an eroded band with color changes due to acid exposure.
- Gastric band erosion is not always visible on CT scan.



## Endoscopic findings in bariatric surgical emergencies

### Marginal Ulcer

- This is a complication of RYGB
- Occurs at the jejunal mucosa near the site of the gastrojejunal anastomosis.
- Presence of *H. pylori* infection preoperatively increases risk of marginal ulcers
- Epigastric pain may be the only symptom
- This is an endoscopic image of a marginal ulcer
- Difficult to detect on UGIS or CT scans





## BARIATRIC CENTRE CONSULTATION

Contact your nearest Bariatric Centre and ask to speak to the Bariatric Surgeon On-call using your regional referral processes or by contacting your bariatric referral centre directly.

In ONTARIO:

- Bariatric Centres of Excellence (BCoE)
  - Find nearest BCoE to contact: <http://www.ontariobariatricnetwork.ca/our-centres>
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## OPERATIVE MANAGEMENT

### PEARLS



- Operative management remains the mainstay of treatment for bariatric surgical emergencies.
- Non-operative management should only be considered in specialized bariatric centres where surgical expertise, advanced monitoring and advanced interventions are available.
- Consider laparoscopy **ONLY** when expertise is available and patient is hemodynamically stable.

## ROUX-EN-Y GASTRIC BYPASS

Non-Operative	Operative
<ul style="list-style-type: none"><li>• Leak: Drainage, IV antibiotics, parenteral nutrition, close monitoring for sepsis.</li><li>• Hemorrhage: Monitor hemoglobin, transfusion and endoscopy if patient stable.</li><li>• Gastric remnant distension: Percutaneous gastrostomy tube for decompression.</li><li>• Marginal ulcer: Medical-acid suppression therapy (proton-pump inhibitor and sucralfate).</li></ul>	<ul style="list-style-type: none"><li>• Leak: Early operative mgmt. = mainstay of treatment. Decontaminate, repair leak, local drainage, feeding gastrostomy in gastric remnant or feeding jejunostomy</li><li>• Hemorrhage: Surgical exploration, clip/oversew bleeding staple lines</li><li>• Internal hernia: Surgical exploration, reduction of internal hernia and closure of mesenteric defect</li><li>• Gastric remnant distension: Operative decompression with gastrostomy tube</li><li>• Marginal ulcer: If perforated, omental patch</li></ul>

## SLEEVE GASTRECTOMY

Non-Operative	Operative
<ul style="list-style-type: none"><li>• Hemorrhage: Monitor hemoglobin, transfusion and endoscopy if patient stable.</li><li>• Leak: Percutaneous drainage and/or endoscopic stenting, IV antibiotics, parenteral nutrition.</li><li>• Stomal stenosis: Endoscopic dilatation</li></ul>	<ul style="list-style-type: none"><li>• Hemorrhage: Exploration and oversewing of staple line.</li><li>• Leak: Exploration, abdominal washout and primary repair.</li><li>• Stomal stenosis: If long segment, conversion to RYGB, stricturoplasty or resection with gastrogastrostomy.</li></ul>

## LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING

Non-Operative	Operative
<ul style="list-style-type: none"><li>• Stomal obstruction: If due to edema, conservative management with nasogastric tube decompression.</li></ul>	<ul style="list-style-type: none"><li>• Stomal obstruction: After failing conservative management, removal of band or surgical revision</li><li>• Band slippage: Reduction of prolapsed stomach without opening the band, opening the band to reduce the stomach and reposition the band, or removal of the band</li><li>• Band erosion: Removal of gastric band may be done laparoscopically or endoscopically. If free perforation, needs laparotomy, removal of band and drainage</li></ul>