Gastrinoma

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Risk

- Occurs in about 0.1–3 cases per million, usually in pts aged 20–50 y; male/female predominance about equal.
- 65–80% of gastrinomas are sporadic and have high (40–85%) malignant potential.
- 20–35% of cases occur with MEN1, with low (7–12%) malignant potential.
- Less than 0.1% of all PUD is caused by gastrinomas.

Perioperative Risks

- Risks associated with PUD
- Associated abnormalities of MEN1
- Risks associated with metastatic disease (regional lymph nodes, liver, bone)

Worry About

- Large gastric fluid volume
- Esophageal reflux (common)
- Lyte imbalance and volume depletion secondary to secretory diarrhea
- Coagulopathy due to liver metastases/resection

Overview

- Gastrinoma is a gastrin-secreting neuroendocrine tumor (non-beta islet cell tumor), occurring most commonly in duodenum and/or pancreas.
- Gastrin release stimulates gastric acid hypersecretion, causing symptoms of abdominal pain (due to refractory peptic ulcer disease), diarrhea, and reflux.
- Diagnosis often delayed several years from onset of symptoms because of difficulties distinguishing gastrinoma from other causes of PUD.
- Symptom control with PPIs also may delay diagnosis.
- May occur with other functional pNETs (e.g., carcinoid, insulinoma, parathyroid hormone-related peptide secreting tumor, Cushing).
- See also Multiple Endocrine Neoplasia Type I and II, Cushing Syndrome, Carcinoid Syndrome, Insulinoma, and Hyperparathyroidism for more information.

Usual Treatment

- Control gastric acid hypersecretion with PPIs and H_2 blockers.
- Chemotherapy, mTOR or tyrosine-kinase inhibitors, and/or somatostatin analogues for metastatic disease.
- Surgical exploration and resection.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Hypovolemia Right-sided valvular disease* Tachyarrhythmias*	Weakness, dizziness Dyspnea, edema, ascites, palpitations	Vital signs Cardiac murmur Cardiac exam	Orthostatics ECHO ECG
RESP	Wheezing*	Dyspnea	Pulmonary exam	CXR
GI	Gastric acid hypersecretion	Abd pain, reflux, diarrhea	Abdominal exam	Fasting gastrin, secretin stim
METAB	Hypokalemia	Weakness, muscle cramps		Lytes, ECG
ENDO	Hyperparathyroidism* Hypoglycemia*	Confusion, nausea/vomiting, abdominal pain, nephrolithiasis Dizziness, confusion	Mental status exam, abdominal exam	Serum parathyroid hormone, serum calcium CBG
RENAL	Nephrolithiasis*	Flank pain, hematuria	CVA tenderness	Urinalysis
CNS	Pituitary adenoma*	Headaches, visual changes	Visual field exam	MRI, prolactin level
MS	Weakness, arthralgias*	Proximal muscle weakness	Strength, reflexes	Serum calcium
HEME	Coagulation disorder	Bleeding abnormalities		INR/PT, PTT

*If gastrinoma presents as component of MEN I or other functional pNETs.

Key References: Ito T, Igarashi H, Robert J: Zollinger-Ellison syndrome: recent advances and controversies, *Curr Opin Gastroeterol* 29(6):650–661, 2013; Perry RR, Feliberti E, Vinik A: Gastrinoma Zollinger-Ellison-syndrome. In De Groot LJ, Beck-Peccoz P, Chrousos G, et al., editors: *Endotext* [Internet], South Dartmouth, MA, 2000, MDText.com, Inc., updated 2013.

Perioperative Implications

Preoperative Preparation

- Ensure adequate treatment of gastric hypersecretion.
- Evaluate for other endocrinopathies of MEN I syndrome.
- Evaluate for other functional pNETs; plan intraop management accordingly.
- Assess volume status.
- Check lytes and coagulation tests.
- Consider epidural catheter for intraop/postop pain control if no contraindications.
- Consider preop NG tube placement.

Monitoring

- May require central venous pressure monitoring and arterial line, depending on associated symptoms and comorbidities. Measure urine output with a bladder cath.

Induction

- Treat as full stomach due to increased gastric acid volumes and increased risk for aspiration.
- Use rapid-sequence induction with cricoid pressure.

Extubation

- Ensure adequate respiratory function and neuromuscular blockade recovery before extubation.

Postoperative Period

- Decreased vital capacity and functional residual capacity due to pain and ileus.

Anticipated Problems/Concerns

- Continued symptoms may occur if surgical resection is not curative.
- There are lower cure rates after resection for pts with gastrinomas associated with MEN1 or in the presence of metastatic liver disease.

Acknowledgment

The authors would like to acknowledge Dr. Christine Piefer's contribution to this text in the previous edition.

Gastroesophageal Reflux in Children

Francine S. Yudkowitz

Risk

- Physiologic GER usually resolves by 12–15 mo of age.
- 10% of pyloric stenosis pts.
- After diaphragmatic hernia, tracheoesophageal fistula, and esophageal atresia repairs
- Neurologically impaired, developmentally delayed, trisomy syndromes, and hiatal hernia.

Perioperative Risks

- Aspiration during induction of anesthesia
- Severe bronchospasm in pts with RAD
- Decreased pulm reserve secondary to chronic aspiration and pneumonitis

Worry About

- Pulm complications from aspiration pneumonitis and RAD
- Anemia and malnutrition

Overview

- Lower esophageal sphincter function matures by 6 wk postnatal age.
- GER is defined as regurgitation without pathologic consequences. GERD is defined as regurgitation resulting in esophagitis, nutritional compromise, and/or respiratory complications.
- Presence of a hiatal hernia does not necessarily mean pt will have GER.
- Sandifer syndrome: Opisthotonos or other abnormal head movements.
- Older children may complain of heartburn, dysphagia, and chest and abdominal pain.
- Degree of reflux, duration of acid exposure in the esophagus, and ability of the esophagus to clear the