Complications of Endoscopy
Raj Santharam, MD
GI Associates, LLC
Clinical Assistant Professor of Medicine
Medical College of Wisconsin

Historical perspective
- FFS first widespread use in the early 1970's
- Expansion of therapeutic techniques
- Scope of complications

Cardiopulmonary and sedation related complications
- Account for about 50% of potentially serious morbidity
- Pre-procedure assessments
- EMBRACE
- Need for MAC
Potential complications

- Over sedation
- Aspiration
- Arrhythmias
- HTN
- CVA
- Angina
- Local site complaints

MAC

Conscious sedation

- It is defined as a “drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation.
- No interventions are required to maintain a patient's airway and spontaneous ventilation is adequate
Hypoventilation

- Drug induced hypoventilation may cause both hypoxemia and CO2 retention which in extreme cases may progress to apnea and even respiratory arrest.

Oversedation

- As for oversedation, loss of verbal contact due to reduced conscious level may be the first sign of impending respiratory depression.

Aspiration

- Aspiration of gastric contents into the lungs is common, causes pneumonia and may result in death.
Arrhythmias
- Cardiac arrhythmias are frequently observed during GI endoscopic procedures
- Fortunately, most are not clinically significant

Ischemia
- Pre-oxygenate
- Management of anti HTN and anti anginal meds

CVA
- Both TIA's and fully completed strokes can and do occur both during and following endoscopic procedures
Complications of Upper Endoscopy

- Common Minor Complications
- Cardiorespiratory
- Infection
- Bleeding
- Perforation
- Rare Complications

Common minor complications

- Many patients experience minor throat and abdominal discomfort
- After upper GI endoscopy. Although these are often considered minor complaints one prospective study found that approximately 2% of patients sought medical advice for these complaints and occasionally patients were hospitalized

Cardiorespiratory

- Cardio respiratory complications related to sedation and analgesia are the commonest complication of diagnostic upper GI endoscopy.
Infection
- Transient bacteremia is uncommon following diagnostic upper GI endoscopy and is rarely of clinical significance.

Bleeding
- Significant bleeding is a very rare complication of diagnostic upper GI endoscopy and mucosal biopsy is rarely complicated by bleeding sufficient to require intervention, in the absence of coagulopathy, thrombocytopenia or portal hypertension.

Perforation
- Perforation related to diagnostic upper GI endoscopy is uncommon with an estimated frequency of 0.03 and mortality of 0.001% (1).
  - Site
  - Patient related factors
Rare complications
- Anaphylactic reactions
- Dental trauma
- Impaction of endoscope

Dilatation and stent insertion
- The principal complications of esophageal dilatation are perforation, pulmonary aspiration, and bleeding.
- The overall perforation rate is 2–3% with a mortality of 1%.
- Perforation is less common following dilatation of benign strictures (1–2% with a mortality of 0.5%) than following dilatation of malignant strictures.

Non variceal bleeding
- A range of endoscopic treatments is available for patients who have actively bleeding lesions and those at high risk of re-bleeding.
- Injection, thermal and mechanical methods are used, often in combination.
Variceal hemorrhage

- Variceal band ligation is useful in the treatment of esophageal varices.
- Variceal band ligation is the method of first choice but if banding is difficult or not available, sclerotherapy should be performed.

Polypectomy

- Hemorrhage following gastric polypectomy occurs in approximately 2%.

Endoscopic Mucosal Resection (EMR).

- Bleeding is the most frequent complication (up to 17% depending on definition) and is usually apparent at the time of resection.
- Fortunately, bleeding during EMR usually stops spontaneously. Some studies suggest resections >1-2 cm are more prone to bleeding.
Argon plasma coagulation (APC)

- Employs high frequency current and ionized argon gas to deliver superficial thermal energy. It appears the easiest and safest ablative technique.

Proximal esophagus

- The development of a local abscess is an indication for cervical drainage.

Colonoscopy

- Frequency of complications vary
- Most studies retrospective with few prospective studies
- Case mix in studies
- Measurement bias
Classification of complications

- Complications caused by the pre-colonoscopy bowel preparation period
- Complications due to the procedure itself – due to:
  - The sedation
  - The insertion of the instrument
  - Diagnostic or therapeutic techniques

Pre-colonoscopy complications

- Complications of bowel preparation
- Bowel cleansing regimens are all uncomfortable for patients but significant complications are rare.

Intra-colonoscopy complications

- Routine colonoscopy is associated with increase in sympathetic tone which may result in hypertension, arrhythmias and ST segment change
Intra-colonoscopy complications
• Perforation occurs by three different mechanisms: pneumatic perforation, mechanical perforation and perforation associated with therapeutic colonoscopy.

Pneumatic perforation
• Pneumatic perforation occurs when the intraluminal pressure is sufficient to rupture the colon wall.
• This is more likely if transmural inflammation or ulceration weakens the colon wall.
• The cecum is most susceptible to pneumatic rupture, followed by the transverse colon, sigmoid colon, and rectum.
• The wall of the right colon is thinner than the left colon. Colonic wall tension is highest in the cecum.

Mechanical Perforation
• Mechanical perforation is most commonly due to forceful insertion of the colonoscope.
• The generation of high stretch and sheer pressures transmitted to either the shaft or the tip of the instrument may cause laceration of the colon wall and rupture.
• Weakened areas of colonic tissue (eg diverticulitis, inflammatory bowel disease, ischemic colitis or recent surgical anastomosis) need less intense transmitted pressure and thus predispose to perforation.
Therapeutic colonoscopy
- Uncontrolled passage of instruments
- Thermal injury

Recognizing perforation
- Usually not difficult to diagnose perforation accompanied by generalized peritonitis.
- Often more difficult to diagnose lesser degrees of abnormality e.g. localized pain, which does not progress to peritonitis.

Post-polypectomy syndrome
- After polypectomy (either by snare or hot biopsy), a transmural burn without perforation may cause symptoms resembling localized perforation.
- The clinical features of the burn injury include localized pain, tenderness, guarding and rigidity, fever, leukocytosis and tachycardia.
- The clinical picture is indistinguishable from localized perforation with peritonitis, but can be distinguished by the absence of free air on the abdominal radiology.
- In most cases, the injury settles without progressing to full perforation.
Investigation
- Any patient suspected of perforation should immediately undergo a plain erect chest and abdominal X-ray

Hemorrhage
- Significant bleeding is an unusual complication of diagnostic colonoscopy. It most frequently complicates snare polypectomy or hot biopsy and only rarely complicates cold biopsy.
- In 11 studies, bleeding was reported in 0.001–0.24% of colonoscopies.

Hemorrhage
- No prospective randomized trials to assess this risk; however, Shiffman et al could find no evidence that these drugs, used in conventional doses, increased the risk of a significant bleed.
- Despite lack of evidence to implicate anti-platelet agents as a risk factor for bleeding including after polypectomy, some clinicians prefer to recommend discontinuation of these drugs 7–10 days prior to colonoscopy.
Procedural factors
- Biopsy
- Polypectomy
- Technique

Primary hemorrhage
- If bleeding is recognized at the time of polypectomy, various hemostatic techniques have been described.

Secondary hemorrhage
- Patients presenting with a secondary hemorrhage should be admitted to hospital.
- Following resuscitation, most patients settle spontaneously. Intervention is required only rarely. Treatment of persistent hemorrhage includes repeat colonoscopy.
Rare complications

- Glutaraldehyde-induced colitis
- Colonoscope incarceration in an hernia
- Splenic rupture and/or hematoma
- Other extracolonic hemorrhages (liver, mesentery)