March is COLORECTAL CANCER AWARENESS MONTH

Colorectal Cancer: You Can Prevent It.

New Patient Education Materials to Download
Participating in the Webinar

All attendees will be muted and will remain in Listen Only Mode.

Type your questions here so that the moderator can see them. Not all questions will be answered but we will get to as many as possible.
How to Receive CME and MOC Points

LIVE VIRTUAL GRAND ROUNDS WEBINAR
ACG will send a link to a CME & MOC evaluation to all attendees on the live webinar.

ABIM Board Certified physicians need to complete their MOC activities by December 31, 2021 in order for the MOC points to count toward any MOC requirements that are due by the end of the year. No MOC credit may be awarded after March 1, 2022 for this activity.

MOC QUESTION
If you plan to claim MOC Points for this activity, you will be asked to: Please list specific changes you will make in your practice as a result of the information you received from this activity.

Include specific strategies or changes that you plan to implement. THESE ANSWERS WILL BE REVIEWED.
ACG Virtual Grand Rounds
Join us for upcoming Virtual Grand Rounds!

Week 12, 2021
Colorectal Cancer Screening and Prevention in the US and Worldwide: Lessons from the COVID-19 Pandemic
David A. Greenwald, MD, FACP
March 25, 2021 at Noon Eastern

Week 13, 2021
Healthcare Carbon Footprint: “Scope” of the Problem
Swapna Gayam, MD
April 1, 2021 at Noon Eastern

Visit gi.org/ACGVGR to Register
SPECIAL EDITION – COVID-19 Vaccine Update
Speakers will explain the data behind the various vaccines, clinical recommendations, allergy and safety recommendations, and describe COVID-19 vaccine special issues in underrepresented minorities.

TUESDAY, MARCH 30th, 8-9:30 PM EDT

Faculty
- Freddy Caldera, DO, MS
- Francis A. Farraye, MD, MSc, MACG
- David T. Rubin, MD, FACG
- Pascale M. White, MD

Moderator
- ACG President David A. Greenwald, MD, FACG

Disclosures:

Speaker:
Shivangi T. Kothari, MD, FACG
Consultant: Boston Scientific and Olympus

Moderator:
Julie Yang, MD
Consultant: Olympus and Cook Medical
Managing Complications of GI Endoscopy

Shivangi T. Kothari, MD, FACG
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Objectives/Disclaimer

- Review common endoscopy complications
- Discuss interesting/challenging cases
- Tips and tricks to manage various endoscopy complications

Disclaimer:
“Because I speak on this topic as an expert does not mean these are all my complications” - SK
Just like we have EVOLVED...

...So has ENDOSCOPY....

Rigid Endoscopy ➔ Flexible Endoscopy ➔ Wireless capsule Endoscopy
EUS
ERCP
So has the armamentarium for endoscopic management of adverse events

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**Definition**

**Adverse event/Complication**
- Event that prevents completion of the planned procedure and/or results in admission to hospital, prolongation of existing hospital stay, another procedure

**Incident**
- Unplanned events that do not interfere with completion of the planned procedure or change the plan of care
- E.g.: Self limited bleeding, transient hypoxia

*Dependent on self-reporting: Underestimated*
Complications

- **Timing:**
  - Immediate/Intraprocedure
  - Post (< 14d)
  - Late (14-30d)

- **Severity:**

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Fatal</th>
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<tbody>
<tr>
<td><strong>Adverse events</strong></td>
<td>Requiring admission or prolongation of planned admission to 2-3 days</td>
<td>Requiring hospitalization of 4-9 days</td>
<td>Hospitalization for more than 10 days or needing surgery or intensive care</td>
<td>Death attributable to the procedure</td>
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Cotton et al GIE 2010

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Patient Factors
- Comorbidities
- Age
- Anticoagulation
- Prior surgery, altered anatomy
- Adhesions

Endoscopist Factors
- Experience
- Years out of training
- Expertise

Procedure Factors
- Therapeutic
- Intervention performed
- Difficult procedure
- Long case
• Junior interventionalists and those with complications with highest stress/burnout

19

20
Do’s and Do Not’s

**DO’S**
- STAY CALM
- Understand it’s inherent
- Anticipate
- Early identification and intervention during procedure
- Call for help/second opinion
- Listen to staff in room
- Multidisciplinary management
- Communicate and document
- LEARN

**DO NOT’S**
- Ignore patient symptoms
- Discharge patient post procedure with symptoms
- Panic
- Not fix problem adequately
- Poor communication/lack of follow up
- Beat yourself up/lose confidence

Common Complications

- Cardiopulmonary
- Bleeding
- Perforation
- Infection
- Post polypectomy syndrome
- Splenic injury
- Peg tube complications
- Post ERCP Pancreatitis
Cori Database 324,737 procedure = 0.9% of cases
- 0.6% EGD
- 1.1% colonoscopy
- 2.1% ERCP
- 0.9% EUS
- Account for 60% of UGI endoscopy adverse events

Commonly seen:
- Transient hypoxia, bradycardia, hypotension, hypertension

Severe:
- Aspiration pneumonia
- Cardiopulmonary arrest
- Cardiac arrhythmia
- Angina, myocardial infarction
- Stroke
Factors contributing to CPE

**Patient factors**
- Preexisting cardiopulmonary disease
- Advanced age
- ASA class III or higher
- Inpatient status
- Increased modified Goldman score
- Routine use of oxygen
- BMI

**Procedure factors**
- Difficulty intubating the esophagus
- Prolonged procedure
- Prone position
- Trainee involvement

Minimizing/Managing Cardiopulmonary Events

- Identify high-risk patients **pre-procedure**: Plan accordingly
  - Anesthesia consult
  - Delay if needed/possible
  - Plan to admit post procedure for observation
- Appropriate monitoring
- Patient position
  - Supine vs Prone if ERCP
Bleeding

- Clinically significant rare for diagnostic/screening procedures
  - 0.8 per 1000 colonoscopies
- Risk increases with:
  - Intervention
  - Polypectomy
  - Anticoagulation use
  - Coagulopathy
    - Diagnostic EGD platelet > 20k, Biopsy platelet > 50K
- Pooled bleeding rate
  - EMR 4%
  - ESD 2.2%
  - ERCP 0.3 to 2%

References:
- Kothari et al GIE 2019
- Ben-Menachem et al GIE 2012
- Chandrasekhara et al GIE 2017
Bleeding

- Clinically significant delayed bleeding is defined by hematemesis, melena, and/or hematochezia, with a drop in hemoglobin ≥2 g/dL

- Post ERCP Classification:
  - Mild: Hb drop <3 gm, no transfusion
  - Moderate: Transfusion needed (<4 units), no angiography or surgery
  - Severe: Transfusion needed (>4 units), angiography or surgery

Resuscitation

- IV access: large bore peripheral IV’s
- Use crystalloids first
- Anticipate need for blood transfusion
  - Type and screen
  - Transfuse if Hb ≤ 7 gm/dL
- Correct coagulopathy
- Admit if outpatient
- If post polypectomy bleed, bowel prep
- Manage endoscopically as far as possible
Hemostatic modalities

- Epinephrine
  - Not used as monotherapy, helps slow down bleed
- Thermal therapy
  - APC, bipolar probe, coagulation grasper, hot biopsy
- Mechanical therapy
  - Endoclips
  - Over The Scope Clip (OTSC)
- Fully covered self expanding metal stent
- Endoscopic suturing
- Hemostatic spray

Coagulation grasper in EMR

Courtesy Dr. GS Raju
Endoscopic clipping

- Ease of use
- Readily available in endoscopy units
- Do not have to withdraw scope
Can be used in difficult location
Clinical success 86.0%
Technical success 96.8%
Be careful during intubation/luminal narrowing
Lower rebleed compared to standard therapy
**First line:** 92.4% efficacy, ↓ rebleed mortality

Wedi et al. Surg Endosc 2018
Schmidt et al. Gastro 2018
Kesar et al. AJG 2020
Weiland et al. Minim Invasive Ther Allied Technol 2019
Cereatti et al. WJG 2020
Bring mucosa and deeper wall layers in close apposition to strangulate vessels
- Learning curve
- Can be cumbersome in gastric cardia, right colon, small bowel

- Double or single channel scope
- Large EMR/ESD defect closure
Hemostatic spray

- Safe and easy
- 89% hemostasis; 10-30% rebleeding
- Slow down brisk bleeding
- Useful in difficult locations or anatomy
- Catheter can clog
- May cover the lesion and affect further therapy
- Salvage therapy

Management/Minimize Risk

- Manage anticoagulation in collaboration with Cardiology/Neurology/PCP
- Use blended current rather than pure cut
- Carefully select patients: if high risk consider observation
- Prophylactic Clipping for large EMR
  - Large polyps, proximal lesions, anticoagulation use
- Observe intraprocedure before pulling scope out
- Severe cases may need IR and rarely surgery
Perforation

What happens when you see this on endoscopic view??

Anxiety + Sleepless nights......
Perforation

- Endoscopist’s worst nightmare!!
- Increasing invasiveness of the procedure increases the risk of perforation
- Overall perforation rate
  - EGD 1 in 2500 to 1 in 11,000
  - Esophageal dilation 2% to 10% risk of perforation
  - Screening colonoscopy 1.6 to 11.9/10,000
  - Colon EMR 1.1 to 2.2%
  - Colon ESD 7.2%

Factors contributing to increased risk of perforation

**Patient factors**
- Frail, elderly
- h/o radiation, surgery
- Diverticulosis
- Zenker’s diverticulum
- Cervical osteophytes
- Altered anatomy
- Steroid use

**Procedure factors**
- Stricture dilation
- Ampullectomy/extended sphincterotomy
- EMR/ESD
- Provider volume
↓ need for surgery

Sepsis  Peritonitis  Large perforations  Active leak

Endoscopic Closure Devices

- **Endoclips**
  - Usually up to 10 mm

- **Over The Scope Clip (OTSC)**
  - Usually 10 mm to 30 mm

- **Apollo Overstitch device (Endoscopic suturing)**

- **Fully covered self expanding metal stent**
  - Esophagus, bile duct/periampullary
Frank perforation – Endoclip (Zipper clipping)

- ≤ 1 to 2 mm distance between clips
- Not full thickness closure
- 98.3% success perforations < 1 cm
ERCP

Cut and paste: Endoscopic management of a perforating biliary stent utilizing scissors and clips
Monique T. Barakat, Shivangi Kohari, and Sibhas Banerjee
DDS 2018

CT SCAN
ERCP

2 months later
OTSC

- Full thickness closure
- Requires scope change
- Can lead to luminal obstruction
- 85% success

Study of 88 patients with upper GI leaks, fistulas and perforations
Resolution achieved in 77.6% with fully covered metal stents
Used for periampullary/post sphincterotomy/guidewire perforation
CBD Guidewire perforation
Endoscopic Suturing

- Full thickness closure
- Clinical success 98.6%
- Mean perforation size 33.9mm

Perforation management

- STAY CALM and COMMUNICATE!!
- Use/switch to CO2
- Assess for tension pneumoperitoneum/rigid abdomen ➔ large bore angiocatheter decompression
- Antibiotics, IV hydration/nutrition, NG tube
- Early and immediate identification of perforation
  - > 90% success with endoscopic closure
- Surgery collaboration
Infection

- Transient bacteremia up to 8% of endoscopy
- Significant events like endocarditis rare
- No antibiotic prophylaxis recommended for routine endoscopy
- Antibiotics:
  - EUS FNA pancreas/mediastinal cyst
  - Incomplete biliary drainage/transplant
  - Cirrhosis with GI bleed
  - PEG/PEJ (one dose first gen cephalosporin)
- Duodenoscope associated carbapenem-resistant Enterobacteriaceae:
  - Diligent mechanical cleaning of the duodenoscope and strict adherence to the manufacturer’s standard protocol for high-level disinfection (HLD).

Post polypectomy syndrome

- Local peritoneal irritation transmural thermal damage
- 0.5% to 1.2% of polypectomies
- Prevention:
  - Submucosal Injection
  - Tent polyp away from wall prior to applying cautery
  - Cold polypectomy
- Presentation
  - 1-5 days after colonoscopy with fever, localized abdominal pain, peritoneal signs, leukocytosis
  - Free air not seen on radiographic studies
- Treatment
  - NPO, antibiotics, monitor white count
  - Usually resolves spontaneously
**Splenic Injury**

- 1.4-5/1000, up to 5% mortality
- Patient-related risk factors
  - Prior abdominal surgery, adhesions, splenomegaly, anticoagulant use.
- Procedure-related risk factors
  - Difficult colonoscopy, deep sedation with propofol
- Nonspecific abdominal pain, LUQ or left shoulder pain (Kehr's sign), shock
- Needs high level of suspicion: **Contrast enhanced CT**
- May require splenic artery embolization.
- Splenectomy reserved for cases with active bleeding and hemodynamic instability.

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**PEG tube complications**

- Lee et al KJG 2014
- Ali et al Cureus 2020
Post ERCP Pancreatitis (PEP)

- 3-10%
- Unpredictable course once sets in
- Severity:

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<td>Pancreatitis</td>
<td>a) Clinical pancreatitis AND b) Amylase at least three times normal at more than 24 hours after the procedure AND c) Requiring admission or prolongation of planned admission to 2-3 days</td>
<td>Pancreatitis requiring hospitalization of 4-10 days</td>
<td>a) Hospitalization for more than 10 days OR b) Development of hemorrhagic pancreatitis, pseudocyst, or infection OR c) Need for percutaneous drainage or surgery</td>
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Risk Factors - PEP

**Technique Related**
- Difficult cannulation
- Precut
- Pancreatic sphincterotomy
- Minor papilla sphincterotomy
- Pancreatic duct contrast
- Biliary balloon sphincteroplasty
- Ampullectomy
- Sphincter of Oddi manometry

**Operator Related**
- Low case volume
- Lack of experience/adequate skills

**Patient Related**
- Prior PEP
- Female sex
- Younger patient age
- Normal bilirubin
- History of acute recurrent pancreatitis.
Post ERCP Pancreatitis: Prevention and Management

- **Strong indication:** avoid diagnostic ERCP
- Proper training and maintaining proficiency: Meticulous technique
- Avoid cannulation and injection of PD.
- Do not keep on attempting if unsuccessful
- **Wire Guided Cannulation:** precise and gentle
- Careful use of cautery
- Low threshold for PD stent (if you think about it, do it)
- Rectal indomethacin
- Hydrate the patient liberally with Ringers’ Lactate solution
- Can be life changing for patient and physician!

Complication: Essential Caveats!

- Appropriate indication
- Detailed Informed consent
  - Discuss alternatives
- **Early identification is key**
- Appropriate infrastructure, resources and staff
- Right equipment & devices for the case
- Adequate back-up (critical care, IR, surgery etc.)
- Monitor patient symptoms post procedure
- Clear and open communication with patient, family and team
- **TEAMWORK:** Keep your cool and work with your team in case of complication
Take Home Points

1. REDUCE
   - Careful patient selection
   - Proper endoscopic technique/tools and patient monitoring

2. RECOGNIZE
   - Complications are inherent
   - Early diagnosis and prompt multidisciplinary management

3. REVIEW
   - All complications should be reviewed as part of quality improvement and education process
   - LEARN FROM THE EVENT

Thank you!
Questions?

Speaker:
Shivangi T. Kothari, MD, FACG

Moderator:
Julie Yang, MD