Enteroscopy, An Evolving Field

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Disclosures

- Nor commercial conflicts of interest to disclose
Objectives

- Appraise the history and evolution of enteroscopy
- Understand the indications, contraindications and potential complications of deep enteroscopy
- Become familiar with the instruments and techniques available for deep enteroscopy
- Know how to set up an enteroscope with single balloon and spiral techniques
- Revise pre, intra and post-procedural care of patients undergoing deep enteroscopy
- Observe case presentations
- Analyze reimbursement and investment related issues
The Ligament of Treitz

- a band of smooth muscle extending from the junction of the duodenum and jejunum to the left crus of the diaphragm and functioning as a suspensory ligament
- Treitz, Wenzel (1819–1872), Austrian physician.
History and Evolution of Enteroscopy
History and Evolution of Enteroscopy

- Initially concept of upper tract, locked area where ‘not much happens’ and lower tract
- Development of capsule endoscopy in 2001 opened that ‘black box’
- Capsule Advantages:
  - Entire small bowel visualization
    > Newer generation provides better images
    > Can obviate need for enteroscopy in celiac disease
- Capsule limitations:
  > Prep precluding view
  > Unidirectional view
  > Lack of therapeutic ability

History and Evolution of Enteroscopy

- Before capsule:
  - Rope-way enteroscopy: Swallowed rope emerging from anus, exchanged for teflon overtube through which enteroscope was inserted
  - Sonde enteroscopy: Thin scope with balloon tip swallowed, propelled by peristalsis. Exam on withdrawal, no therapeutics
  - Intraoperative enteroscopy: ‘Gold standard’
History and Evolution of Enteroscopy

- After capsule
  - Fujinon created double balloon enteroscopy
  - Olympus created single balloon enteroscopy
  - Spirus Medical created spiral overtubes
History and Evolution of Enteroscopy
Indications for Enteroscopy

- Obscure GI Bleeding intervention, such as cauterization, clipping
- Abnormal area on capsule endoscopy to obtain biopsies
- Enteroscopy can be performed for therapeutic
  - Polypectomy, stricture dilation, or removal of foreign bodies, including retained capsules
- Lesions can be tattooed to target subsequent surgical interventions
- Biliary procedures and/or examining the stomach and duodenum in patients with a Roux-en-Y after bariatric surgery
- Unexplained malabsorption, diarrhea, refractory celiac disease
- Radiographic abnormalities of the small bowel

Indications for Enteroscopy

- In the Large Bowel
  - Difficult insertion (failed to reach cecum)
  - Non-sedated cases
  - ESD/EMR of proximal large polyps

Contraindications

- Altered surgical anatomy
- Coagulopathy
- Present/recurrent pancreatitis
- High-grade bowel obstruction
- Latex allergy in double balloon. Olympus’ overtube is constructed from silicon and Spirus Medical’s is made from polyvinyl chloride
- Large esophageal or gastric varices
- Severe mucosal inflammation

Potential Complications

- **Capsule Endoscopy**
  > Aspiration
  > Retained capsule 0.75%

- **Push Enteroscopy**
  > Limited data, but perforation reported in small bowel and piriform sinus (oropharynx)

- **Double-Balloon Enteroscopy**
  > Most frequently abdominal pain
  > 0.3% pancreatitis (unclear why)
  > Perforation more frequent with surgical anastomosis
  > Ileus, unclear prevalence
Potential Complications

- Single-Balloon Enteroscopy
  - Transient post-procedure fever
  - Mucosal tear
  - Perforation (ileal pouch)

- Spiral Enteroscopy
  - Mucosal trauma, sore throat 41% (one report)

- Intraoperative Enteroscopy
  - Air embolism
  - Peritonitis
  - Post-operative laparotomy complications (Wound infection, pneumonia)
Instruments for Enteroscopy
Capsule Endoscopy

- Given and Olympus
- 11 mm x 26 mm weighs less than 4 grams
- 2 pictures per second, 8 hour battery life. Around 55,000 pictures
- All pictures converted into video in different software setups
- Reading time 20-40 minutes
Wireless Capsule
Balloon Assisted Enteroscopy
Double Balloon Enteroscopy
Single Balloon Enteroscopy
Spiral Enteroscopy

- Designed to pleat instead of applying linear force to intestine
- Uses mechanical advantage of screw to convert rotational into linear force
- Mechanical advantage = circumference/pitch
  - Higher spiral more pulling power
  - Smaller pitch, greater mechanical advantage
- Over 2000 cases as of April 2009, 0.34% perforation rate
- Up to 41% sore throat

Schembre D. Yield of antegrade double balloon versus spiral enteroscopy for obscure gastrointestinal bleeding. Abstract DDW 2009;69.
The Setup Process
OBJECTIVES

• Explain the care for patients undergoing enteroscopy in pre, intra and post procedure phases
• Illustrate the equipment needed for this procedure and demonstrate how to set them up
• Visualize the nurses role in assisting for specific parts of this procedure
• Relate key concepts such as “resistance” and plan correct actions to take
• Assess the indications, contraindications and complications of this procedure
• Appraise the key ingredients to positive patient and procedure outcomes
• Evaluate if the capital, time and training invested is worthwhile
Patient Preparation

Best practice: phone screen before patient arrives in the unit - high risk patients are required to have a work up/clearance - prevents cancellations and mishaps

AIDET: Acknowledgement
  Introduction
  Duration
  Explanation
  Thank you

Patient Identification
Patient Preparation

• NPO after midnight - anterograde approach

• Bowel prep
  — Retrograde approach
  - clear liquids, Halfluidly/Golytely

• Patent IV access

• Pregnancy test for women in childbearing age

• Consent Process
  - informed
  - risks and benefits
Patient preparation

• Comprehensive head to toe assessment

• AIRWAY Assessment- use of Mallampatti scale

• ASA classification of Physical Status

• Past medical history to include previous surgeries and experiences with sedation/anesthesia

• Medication reconciliation including herbals medications, supplements, over the counter drugs

• Confer with MD on significant assessment findings
Patient teaching

- Explain the purpose of the procedure
- Positioning
- Relaxation methods
- Techniques to be used
- Sensations that patient is likely to experience during and after the exam
- Document patient’s comprehension

- REASSURE and MANAGE UP
SETTING UP THE EQUIPMENT
(SPIRAL/ SINGLE BALLOON ENTEROSCOPY)

• Discuss with physician
  — Single or spiral
  — Anterograde or retrograde approach.

• Gather all necessary equipment
  — Basic endoscopy setup
  — Enteroscope
  — Overtubes
Olympus SIF180 Enteroscope

200cm mark or the base of the handle
INTRAPROCEDURE (SPIRAL/SINGLE BALLOON ENTEROSCOPY)

- TIME OUT should be done
- Left lateral position and bed is placed at angle
- Sedation
  - MAC
  - Moderate sedation
- Vital signs monitoring
SINGLE BALLOON ENTEROSCOPY
EQUIPMENT NEEDED FOR SINGLE BALLOON ENTEROSCOPY

OLYMPUS SINGLE BALLOON OVERTUBE

BALLOON CONTROL UNIT WITH REMOTE CONTROL

100% latex free, radiopaque materials
Olympus Single Balloon Kit

- overtube
- Air tubing
- cover
Preparing the overtube

- Introduce approximately 30ml of normal saline into the overtube.
- Work the solution through the entire length of the overtube.
- Insert the scope through the proximal tip of the overtube.
Continuation.... (preparing overtube)

- Proximal tip of overtube is positioned at the 200 cm mark or base of the handle of the scope
- Attach the air tubing to proximal tip of the overtube and the end to the BCU
Balloon Control Unit with Remote Control

BCU with remote control

Testing the balloon
Assisting with Single Balloon Enteroscopy

Hold the scope and overtube as a single unit

Balloon tip must be lubricated and fully deflated
Continuation... (assisting with SBE)

- Physician will try to pass the scope with the overtube beyond the *ligament of treitz*
- Nurse should prepare to advance the overtube
  - *Advance the overtube with slow, twisting, pushing motion*
  - *Lumen in full view*
  - *Proximal tip of tube is line at the 150cm mark*
Continuation....... (assisting with SBE)

• Inflating the balloon
  — once 150 cm mark is reached
  — Full inflation in less than 10 secs
  — Steady light on remote control indicate full inflation
  — Notify MD when balloon is fully inflated

• Reducing the bowel
  — The physician will utilize the pull (to reduce) and push (to advance) technique

• Make sure tension is applied to the overtube
  — Provide stability, allow scope to move freely, prevent looping
Continuation....(assisting with SBE)

- **Deflate the balloon**
  - Balloon should be fully deflated before advancing the overtube.
  - Takes approx. 5 secs.

- **Max. Depth of Insertion** has been reached when...
  - RN no longer able to advance the overtube.
  - MD unable to reduce bowel.

- Markings as needed.
Continuation....... ( assisting with SBE )

• After MDI is reached
  — Full inspection of small bowel begins by slow withdrawal of scope
  — Tension should be applied to the overtube while balloon is kept inflated
  — As soon as the scope’s 150cm mark is lined at the proximal tip of the tube, RN has to notify MD, and deflate the balloon
Continuation.......( assisting with SBE )

• When to withdraw the overtube
  — Withdrawal only begins after the balloon is fully deflated
  — Use slow, twisting, pulling motion
  — Continue withdrawal until the proximal tip of the overtube is at the 200 cm mark or at the base of the handle of the scope
• Supplies commonly used for therapeutic interventions
  — Sclerotherapy needles
  — Clips.
  — Bipolar/gold probe
  — APC
  — Balloon dilators (colonic CRE)
  — Accessories longer than 200cm

• Inflating the balloon provides MD excellent control in delivering therapeutic interventions
Continuation......(assisting with SBE)

- Procedure ends upon complete withdrawal of the scope.
  - Suction pt. PRN
  - SOP on scope care.

- Observe for any signs of procedural complications.
  - CV compromise, hypoxemia, perforation etc.
SPIRAL ENTEROSCOPY
TYPES OF SPIRAL OVERTUBES

- **ENDOEASE DISCOVERY SB**
  - Anterograde/Upper approach
  - Standard profile – ht. 5.5 mm
  - Low profile – ht. 4.5 mm

- **VISTA Retrograde**
  - Retrograde/Lower approach
  - Compatible with Pedi colonoscope.
  - Single ergonomic grip
Preparing the overtube.

• Gather all needed equipment
  — Enteroscope
  — Spiral overtubes

• Choose the correct overtube.
  — Endoease discovery SB
  — Standard scope with 200cm in length.
  — Outer diameter of 9.1mm – 9.5mm
Continuation.....( prep. of overtube )

- Lube the tube and scope
  - 2 person is preferred
  - Specially formulated lube
  - 30ml, through the proximal port. Unlock the coupler

- Vigorously work the mix
  - This should not be rushed

- Insert the scope
  - Proximal end
  - Coupler should be unlocked
  - Push and pull motion
  - Scope should move freely
Continuation...... ( prep. of overtube )

• Proximal end of overtube lined at the 140cm mark of the scope.
  —Approx. 20cm of scope is out from the distal tip of the tube.

• Scope is coupled with the overtube.
  —Gentle lock coupler in locked position
Assisting with Spiral Enteroscopy

- Generously lubricate the spirals on the overtube
  - *KY jelly*
- Use soft, gentle clockwise rotation and push on insertion
  - *Deflate the ET balloon if intubated*
  - *Suction pt PRN*
- Spiraling commences
• First resistance
  —Spiraling but no capturing or pleating of small bowel
  —Large loop in the stomach
  —Few counter clockwise rotation releases the loop
  —Abdominal pressure PRN

• Physician will attempt to pass through the ligament of Treitz
  —Capturing or pleating the small bowel begins
  —Spiral with a moderate pace
• Spiral in Moderation
  > Finger tip control
  > Clockwise rotation with soft forward pressure.
    —Maintains capturing of the small bowel.
    —**DO NOT push!!!**
    —Spiral will work as a “screw” to pleat the Small bowel
  > Importance of good hand - eye coordination
    —Never advance without direct visualization of the lumen
• How long can the assisting nurse last?
  — Always remember finger tip control
  — Spiral in moderation

• Second resistance
  — Spiraling with more than just finger tips.
  — Loop is developing
  — Few counter clockwise rotation to release
• Tube fatigue or buckling of the overtube
  > What does it indicate?
    — Ignoring the second resistance
    — Spiraling against resistance
  > What are the consequences?
    — Severe trauma to the gut
• Engaging and disengaging of the gentle lock coupler
  — Is done as soon as the advance spiraling is no longer effective
  — Allows the scope to move freely

• Maximum depth of insertion has been reached
  — Advance spiraling is no longer effective
  — MD is no longer able to advance the scope
Once MDI is achieved, physician will start to:

- Slowly withdraw the scope to begin inspection of small bowel
- Tension should be applied to the overtube during withdrawal
- Nurse assisting notifies MD as soon as the scopes 130 cm mark is line with the proximal tip and lock the coupler at that position.
- withdraw the overtube with slow counter clockwise rotation, 1 rotation every 3 – 5 secs
- **DO NOT pull the tube without spiraling !!!**
• Advantages of using spiral overtube for therapeutic intervention
  — Ease of advancement and withdrawal
  — Stability of the overtube
  — Therapy delivered with great precision and control

• Supplies commonly used for therapeutic interventions
  — Sclerotherapy needles
  — Clips
  — Bipolar or gold probes
  — APC
  — Balloon dilators (colonic CRE)
  — Accessories should be longer than 200 cm
• Procedure ends upon complete withdrawal of the scope.
  — *Suction pt PRN*
  — *SOP on scope care.*

• Observe for any signs of procedural complications.
  — *CV compromise, bleeding, perforation, etc.*
Post Procedure

-Same parameters of care with other endoscopy procedures

• Monitor for complications
  - perforation
  - bleeding/hemorrhage
  - aspiration
  - respiratory depression
  - cardiac arrythmias
  - hypotension
  - paralytic ileus
  - hypotension
The UMH Experience

- Spiral enteroscopy as a single physician and nurse assisted procedure
- Positive outcomes attributed to:
  > Training
  > Degree of mastery of technique
    — *May take time to develop*
  > The ability of the physician operator and the assisting nurse to act as one unit
MD credentialing and training

- MD credentialing will be based on medical by laws of your institution
  - privilege for push enteroscopy can be used as the foundation
  - further training with an expert physician or institution is recommended for deep enteroscopy (10 proctored cases)
  - courses offered by ASGE for MDs and nurses
  - training in Tampico, Mexico-private clinic x 2 days
    10 driving cases and 10 spiraling cases on actual patients (Spirus Medical)
  - Olympus training: representatives on site
  - Spirus medical: representatives on site
Staff training

- On site in services with company’s representative
- Concept of super user/train the trainer
- Learning curve is equivalent to advanced ERCP
- Make a staff competency checklist
- Mentorship between MD and assistant
- Critical thinking is crucial
Is it worth the Investment?

• **Enteroscope and Balloon Control Unit for Single balloon**
  - approximately $60,000 capital outlay plus the cost of disposables
  - approximately half the amount for spiral enteroscopy, need the enteroscope only plus cost of disposables

**Outpatient Reimbursement for Florida:**

CPT codes 44300-44346, = Enteroscopy including therapeutic procedures--------$632.34 (facility )

CPT code 44370,44379=Enteroscopy with stenting= $1,697.77
Is it worth the investment? (cont.)

- Downstream procedures
  surgeries, CT scan, Xray procedures, lab work

Patient may avoid surgery if bleeding sources are identified and therapy can be endoscopically performed

Retained capsules could be removed without surgery

Provision of a comprehensive care for the patient at your center – display of excellence
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Continuation....... 

- Complications of Spiral Enteroscopy in the first 2950 patients, Abstract details, by Paul Akerman, M.D., Dr. Daniel Cantero.
Multiple AVMs
Spiral Advancement
Alteration of ERCP

- Endo-Ease Discovery SB is being used for ERCP in altered anatomy patients

- Altered anatomy ERCP
  - 100,000 procedures and growing
Jejunal Bleeding, on Plavix
When Everything Else Fails...
References

References

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