What is a Motility Disorder?

- Motility is a term used to describe the contraction of the muscles that mix and propel contents in the gastrointestinal tract.
- The gastrointestinal tract is divided into four distinct parts that are separated by sphincter muscles; these four regions have distinctly different functions to perform and different patterns of motility (contractions):
  - Esophagus (carries food to the stomach)
  - Stomach (mixes food with digestive enzymes and grinds it down into a more-or-less liquid form)
  - Small intestine (absorbs nutrients)
  - Colon (reabsorbs water and eliminates indigestible food residues).
Slide 4

Common Diagnoses

- DYSPHAGIA
- ODYNOPHAGIA
- GERD
- NON CARDIAC CHEST PAIN
- FUNCTIONAL DYPEPSIA
- CHRONIC ABDOMINAL PAIN
- CYCLIC VOMITING SYNDROME
  - Becoming more recognized
- IBS
  - Diarrhea, Constipation, Mixed
- DIARRHEA
- CONSTIPATION
- PELVIC FLOOR DYSYNERGIA

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RELATIONSHIP OF MOTILITY AND FUNCTIONAL GI DISORDERS

SENSORY VS. MOTOR (PAIN VS. TRANSIT DELAY)

- Chest pain vs. GERD
- Globus vs. Esophageal stricture

Slide 6

- Objective Testing is key!
  - Overlap of Functional and Motility Disorders
- Functional disorders affect motility
  - Functional dyspepsia (nausea) affects Mr. Smith's ability to eat.
  - TCA
- Motility disorders are NOT functional
  - Ms. Jones' gastroparesis (nausea) is caused by motility delay in gastric emptying
    - Reglan
**Swallowing Process**

- **Buccal** - mastication, enzymes/salivary amylase, lingual lipase, formation of food bolus, tongue moves up and back against the hard and soft palate for transport of bolus.
- **Pharyngeal** - bolus transport to the esophagus relying on nerve receptors stimulated in the deglutition center medulla oblongata and lower pons of the brain stem signaling the uvula to close off nasopharynx, epiglottis to seal off larynx. UES relaxes to allow passage into the esophagus then contracts to prevent backflow.
  - **Diverticula**
  - **Stricture**
- **Final phase** - involves simultaneous relaxation of esophagus and LES to receive bolus followed by peristalsis of smooth muscle working in wave like fashion to move bolus toward the LES and allows for entry into the stomach.
  - **Achalasia**
  - **Nutcracker Esophagus**

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**The Esophagus**

- A tubular muscle 18- to 25-cm long with cervical, thoracic, and abdominal parts made up of striated muscle in the proximal/upper area, smooth muscle in the distal/lower and a combination of the two in the middle.
- Esophageal motility relies on adequate and normal amplitude of contractions, peristalsis, and normal pressure gradients.
- Upper Esophageal Sphincter (UES) and Lower Esophageal Sphincter (LES) are the muscles that relax and contract to allow for passage and prevention of backflow of consumed contents.

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**Esophagus**

- Backflow and GERD most commonly caused by LES pressure. Pathological esophageal acid not only causes discomfort, can cause stricture.
  - Schatzki’s ring, erosions and ulcerations, can lead to Barrett’s Esophagus and Esophageal CA.
- Hiatal hernias are found in 50% of people, they may be axial, sliding or para-esophageal.
  - These too interfere with LES closure creating more incidence of acid exposure.
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Case Study

• 44 year old healthy woman who developed intermittent dysphagia six months ago to both solids and liquids.
• Initially infrequent became more frequent and severe, including episodes of food impaction.
• Inability to eat now without feeling intense pressure in her sternum.

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Case Study

• Reflux of undigested food sometimes hours after eating.
• Unintentional weight loss of 15 lbs over the past three months.
• Vitals: Wt: 114, Ht: 68 inches, BMI: 17.3
• otherwise unremarkable physical exam

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What are your differentials?
What is your diagnostic work up?
How would you manage and treat this patient?
Differentials

- Neurological-discoordination of oropharyngeal phase resulting in dysphagia with coughing and choking in the midst of the swallow.
- Pharyngeal diverticula- allows for food pocketing in the pharynx resulting in choking sensation in the upper esophagus.
- Esophageal stricture most often caused by pathological acid causing narrowing of the esophagus resulting mainly in solid food dysphagia.
- Schatzki's ring- web like mucosal ring in the lower esophagus caused by pathological acid levels resulting in intermittent dysphagia.

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Differentials

- EoE- allergic reaction results in inordinate collection of esophageal eosinophilia, resulting in intermittent dysphagia to solids and liquids. >15 eosinophils per hpf.
- Esophageal Tumor- CA- esophageal tumors lead to dysphagia with odynophagia, pain and other symptoms.
- Achalasia- inability of LES relaxation and 100% aperistalsis of the esophagus resulting in progressive symptoms of dysphagia, red flags of weight loss and/or aspiration.
- Rumination Syndrome- effortless regurgitation of food/liquids.
- Nutcracker Esophagus- painfully strong contractions in the esophageal muscles. Nutcracker esophagus is less likely to cause regurgitation of food and liquids.

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Diagnostics

- Endoscopy- esophagitis, ulcerations, strictures, Schatzki's ring, bx dx BE, esophageal CA, EoE, esophageal candidiasis.
- Barium swallow- reflux, can detect tumors, strictures, esophageal mucosal ulcerations; achalasia, hiatal hernia, diverticula, limited motility evaluation.
- Modified barium swallow- evaluates oropharyngeal phase of swallowing, usually performed by SLT, using different textures to evaluate swallowing.
- High Resolution Esophageal Manometry- evaluates esophageal peristalsis, amplitude of contractions, peristalsis of esophagus.
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Manometry

ACHALASIA

NORMAL

Slide 18

Treatment Options

• Procedure Based Treatment
• PPIs (Omeprazole)
• H2 Blockers (Ranitidine)
• Neuropathic Agents (SSRI, SNRI, TCA, Gabapentin/Lyrica)
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The Stomach

PHYSIOLOGY
- Accommodation
- Gastric Emptying
- Antroduodenal Coordination
- Migrating Motor Complex

DIFFERENTIALS
- Dyspepsia
- Gastroparesis
- Bezoars
- DM Type II
- Gastroparesis
- Cyclic Vomiting Syndrome

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RELATIONSHIP OF MOTILITY AND FUNCTIONAL GI DISORDERS
SENSORY VS. MOTOR (PAIN VS. TRANSIT DELAY)

- Functional Dyspepsia vs. Gastroparesis
- Chronic Abdominal Pain vs. Gastroparesis

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Slide 21

Case Study
- 34 year old male with cc: abdominal pain one hr after eating
- Reports nausea, vomiting, bloating and regurgitation which all occur with meals
- No recent travel, no sick contacts, began all of a sudden 2 months ago.
- PMH: DM Type II, Asthma
- WT: 145 lbs (lost 10 lbs in past 2 mos) Ht: 6 ft BMI: 19.7
- Physical Exam: significant for abdominal pain with palpation in LUQ and epigastric region, otherwise unremarkable.
**Slide 22**

**Presenting Patient**

**Key History Questions**

- Nausea?
- Vomiting?
  - how soon after meals?
- Abdominal Pain?
  - Where and when does this occur (post-prandial?)
- Bloating
- Does this occur with solids, liquids or both?
- Regurgitation
  - how soon after meals?

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**Slide 23**

**GI Motility Work Up**

- Upper Endoscopy
- Small Bowel Follow Through
- Gastric Emptying Scan
- Smart Pill (Wireless Motility Capsule)
- Antroduodenal Manometry
- Assessment of gastroduodenal motility
  - Transit
  - Contractility (neuropathy vs myopathy)

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**GES**

- 0 min
- 20 min
- 40 min
- 120 min
- 180 min
- 240 min
Slide 25

**Wireless Motility Capsule Tracing**

**Diffuse Dysmotility**

**Normal**

**Gastroparesis**

Normals:
- GE: (normal < 5 hrs)
- SB: (normal < 6 hours)
- Colon: (normal < 59 hours)

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**Causes of Delayed Gastroesophageal Emptying**

- Anatomic
  - Presence of a hiatal hernia
  - Esophageal stricture
  - Achalasia
  - Endometriosis
  - Gastroesophageal reflux disease
- Motility disorders
  - Hypogastriaus, anorectal dysfunction
  - Abnormal gastric emptying
- Drugs
  - Opioids, anticholinergics, neuromuscular blockers
- Nervous system diseases
  - Peripheral neuropathy
  - Cerebral palsy
  - Multiple sclerosis
  - Myasthenia gravis
  - Motor neuron disease
- Infections
  - Viral, bacterial, fungal, parasitic infections
  - Scleroderma
  - Idiopathic slow-wave arrhythmia

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**What is your diagnosis for this patient?**

- 34 year old male with cc: abdominal pain one hour after eating
- Reports nausea, vomiting, bloating and regurgitation which all occur with meals
- No recent travel, no sick contacts, began all of a sudden 2 months ago.
- PMH: DM Type II, Asthma
- Wt: 145 lbs (lost 10 lbs in past 2 mos) Ht: 6 ft BMI: 19.7
- Physical Exam: significant for abdominal pain with palpation in LUQ and epigastric region, otherwise unremarkable.
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**Differentials**

- Peptic Ulcer Disease
- Functional dyspepsia
- Cyclic Vomiting Syndrome
- Gastroparesis

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**Treatment**

- **Diet:** Small, frequent meals low fiber and low fat
- **Medications:** Reglan, Erythromycin, Domperidone (not FDA approved)
- Consideration of neuropathic agent: TCA, SSRI, SNRI

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**Cyclic Vomiting Syndrome**

[Text content not visible in the image]
Cyclic Vomiting Syndrome

- Take careful history including:
  - How often does vomiting occur?
  - Is there a complete resolution of symptoms between episodes?
  - Was there an incipient event?
- Examine GI studies including but not limited to:
  - Gastric Emptying Scan
  - Upper Endoscopy and Colonoscopy
  - CT scan
  - Small bowel follow through
  - Magnetic Resonance Enterography
- What medicines is the patient taking?

Phase Treatment Option(s)

**Interepisodic Prophylactic**

- (daily use)

**First Line:** Tricyclic Anti-depressants (TCA)
  - Amitriptyline
  - Nortriptyline
  - Desipramine

**Second Line options:** (if TCAs fail)
  - SSRI: Citalopram
  - Propranolol
  - Cyproheptadine
  - Imipramine
  - Anticonvulsants: Phenobarbital, Valproate, Carbamazepine
  - Other options:
    - Gabapentin, Topiramate, Levetiracetam, zonisamide
    - Supplements: L-Carnitine, Coenzyme Q-10
Prodromal & Vomiting Acute (abortive)

- Anti-motion
  - Ondansetron
  - Granisetron
  - Aprepitant
- Benzodiazepine
  - Lorazepam
- Anti-Migraine
  - Sumatriptan
  - Frovatriptan
  - Zolmitiptan
- Benzodiazepine/Sedatives
  - Chlorpromazine
  - Dophenhydramine

Recovery
Allow patient to recover without dizziness of nausea and vomiting

Small Intestine, Colon, Rectum

- Absorption of nutrients
- Formation of waste
- Provides for elimination
- Ileus
- Pseudo-obstruction
- Constipation (functional)
- Outlet Obstruction Constipation

RELATIONSHIP OF MOTILITY AND FUNCTIONAL GI DISORDERS

SENSORY VS. MOTOR (PAIN VS. TRANSIT DELAY)

- IBS-C vs. Constipation
- IBS-D vs. Diarrhea
- Proctalgia vs. outlet obstruction constipation (pelvic floor dysynnergia)
Case Study

- 54 year old female cc: "constipation my whole life"
- Reports urge to defecate and straining to defecate, abdominal pain, bloating
- 2 episiotomies (20 yrs ago) No other prior surgery
- Using Senna tabs which used to help but are no longer efficacious
- Physical Exam: significant for LLQ abdominal pain, otherwise unremarkable

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Bristol Stool Chart

- **Type 1**: Narrow hard lumps, no moistening
- **Type 2**: Soft lumps, no moistening
- **Type 3**: Loo-shaped but not soft
- **Type 4**: Loosely formed but not soft
- **Type 5**: Soft stool, not lumpy
- **Type 6**: Semiliquid stool
- **Type 7**: Fully formed stool, easy to pass

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Rome III Criteria

- 12 months as a primary diagnosis
- Five of these symptoms must have been present at least 12 months prior to diagnosis
- Symptoms must have occurred at least 12 weeks during time of observation
- Symptoms must have occurred more often than not during the 12-week period
- Symptoms must have been present for at least 3 months
- Symptoms must not be a result of medication or another medical condition
Diagnostics

- Colonoscopy
- Sitz Marker Study
- Anorectal Manometry
- Defecography
- Smart Pill Study
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Defecography

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Sitz Marker Study

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Differentials

• Slow Transit Constipation
• Outlet Obstruction Constipation
• IBS-C,D,M
• Proctalgia fugex
Slide 46

Treatment Options

- Lubiprostone (Amitiza)
- Linaclotide (Linzess)
- Osmotic Laxatives - miralax
- Stimulant Laxative - dulcolax, mg citrate
- Enema - type
- Suppository-type
- Neuropathic Agent (SSRI, SNRI, TCA, Gabapentin)
- Pelvic Floor PT

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Motility Affects Everyone!

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Questions?

Thank you for your attention!!