

Esophageal Motility

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Alimentary Tract Motility

- Propulsion
 - Movement of food and endogenous secretions
- Mixing
 - Allows for greater contact of food with digestive enzymes and absorptive surface
- Reservoir

Determinants of GI Tract Motility

- Myogenic control
- Neurogenic control
- Endocrine factors

Myogenic Control

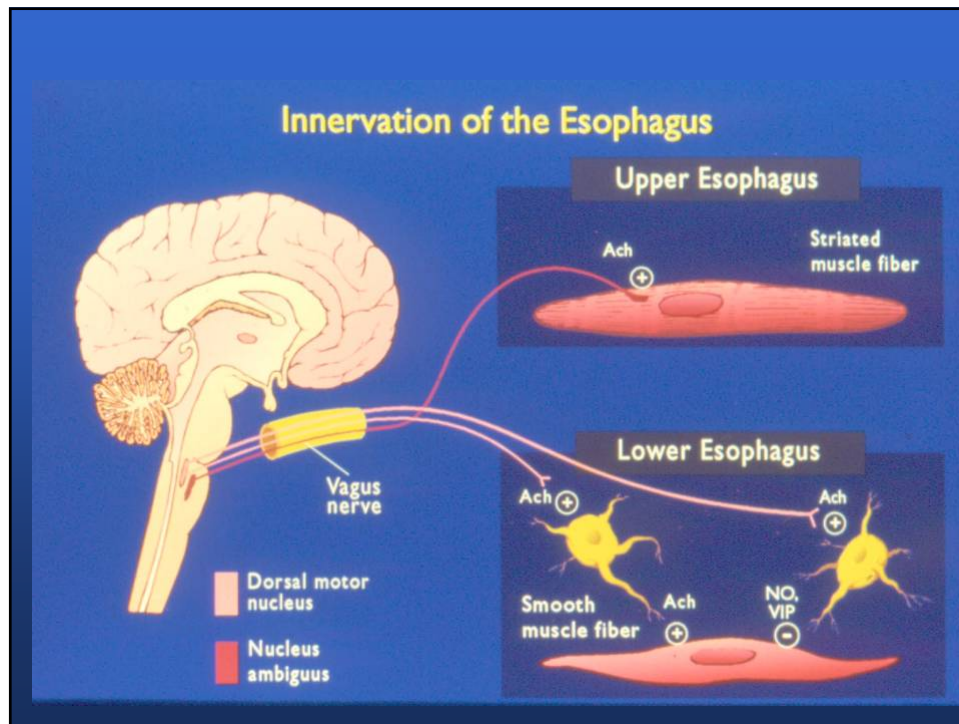
- Basic Electrical Rythm:
 - intrinsic rhythmic fluctuation of smooth muscle membrane potential
- Pacemaker Cells:
 - set BER for the entire organ
- Slow waves:
 - spread from cell to cell via gap junctions

Enteric Nervous System

- Afferent and efferent arms
- Numerous interneurons in the ENS are highly integrated and receive input from:
 - CNS
 - efferent arm of ENS
- Afferent neurons receive input from ENS interneurons and these affect:
 - smooth muscle
 - blood vessels
 - secretory cells

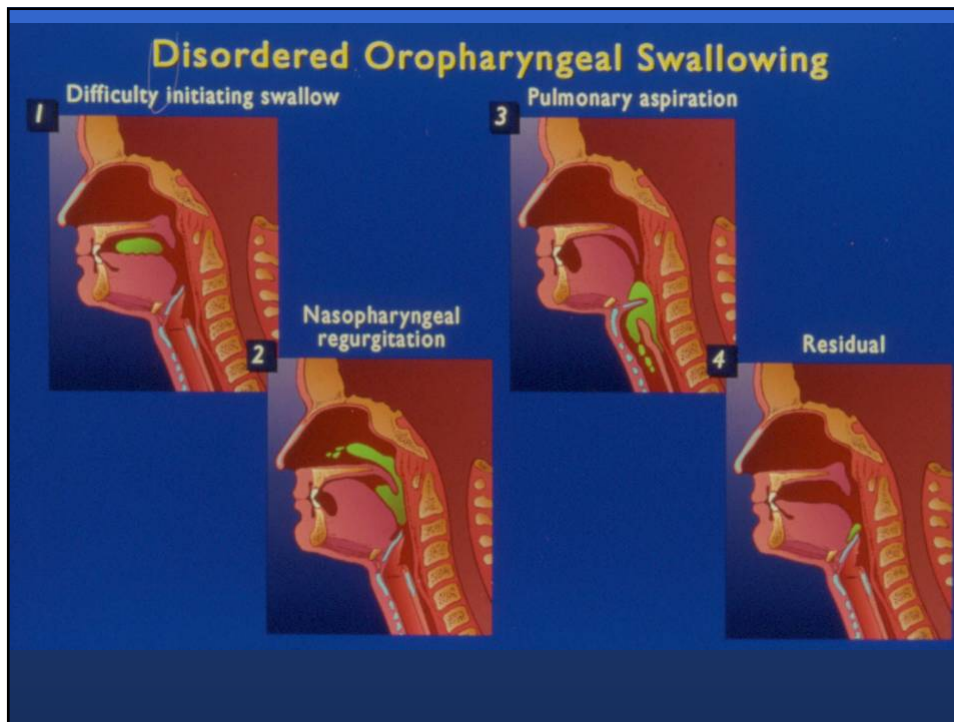
Swallowing

- Oropharyngeal Phase
 - Involuntary & Voluntary Phases
 - Extremely rapid
 - Dx test: Video esophagram
- Esophageal Phase
 - Slow
 - Stereotyped
 - Dx test: Esophageal Manometry



Oropharyngeal Phase of Swallowing

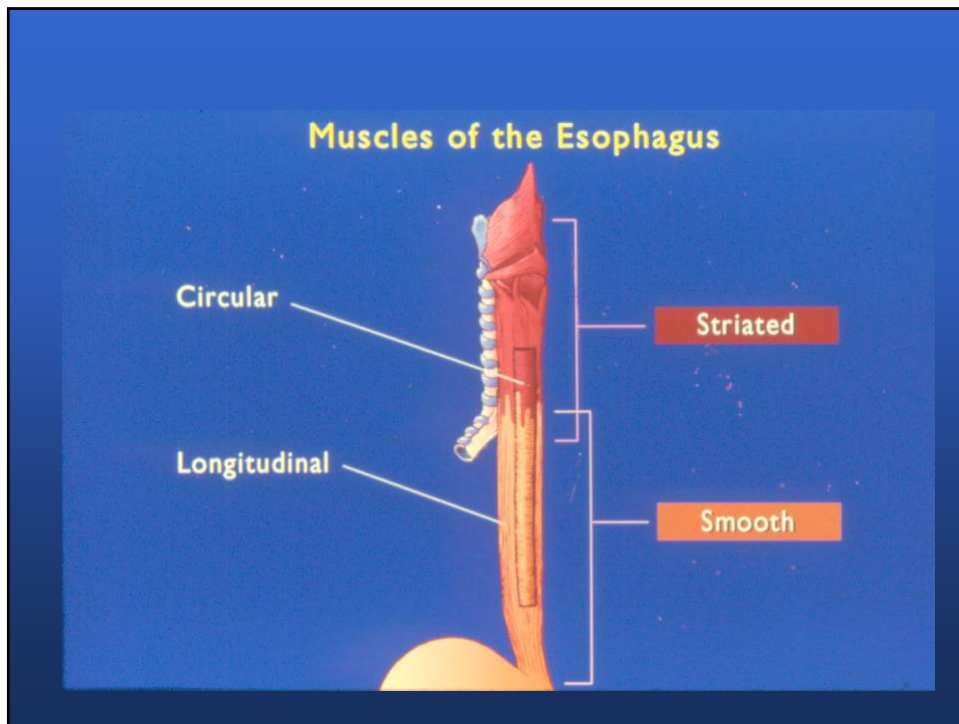
- Moves ingested food and fluid into upper esophagus
- Prevents aspiration or regurgitation of the bolus
- Voluntary movement by the tongue of the bolus into the pharynx triggers the involuntary phase of swallowing



Oropharyngeal Dysphagia

- Obstructing Lesions**
 - Tumors
 - Osteophytes
- Neurologic Disorders**
 - Central nervous system lesions
 - Cranial nerve lesions
- Skeletal Muscle Disorders**
 - Inflammatory myopathies
 - Muscular dystrophies
- Neuromuscular Transmission Disorders**
 - Myasthenia gravis
- ? Primary Cricopharyngeus Dysfunction**

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Esophageal Disease Symptoms

- Dysphagia
 - Oropharyngeal Dysphagia
 - Esophageal Dysphagia
- Pain
 - Odynophagia
 - Atypical Chest pain
- GE Reflux disease (GERD)

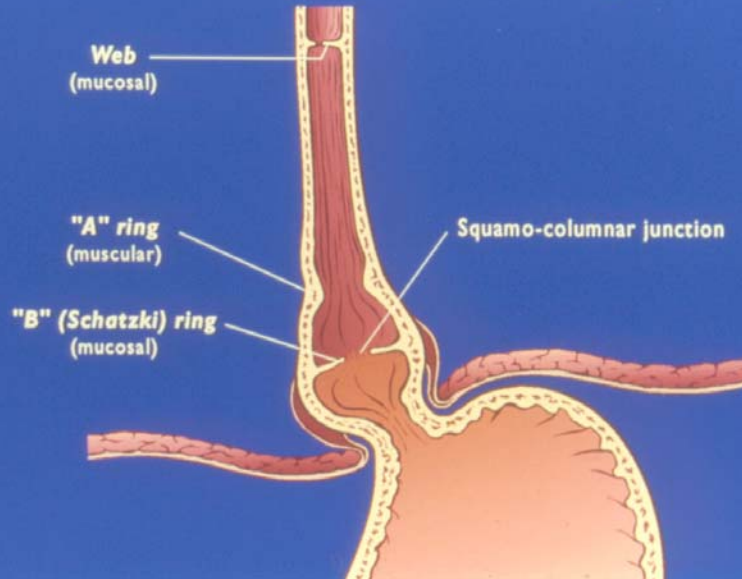
Dysphagia

- Oropharyngeal
 - Difficulty transferring bolus out of mouth
 - Associated w/ coughing & aspiration
- Esophageal
 - Sense of bolus “sticking in chest”
 - Mechanical causes
 - Motility disorders

Esophageal Dysphagia Mechanical Causes

- Typically occurs with solid foods
- Frequently progressive, especially with malignancy
- Food impaction (w/ forced regurgitation) common
- Prominent weight loss only w/ malignancy

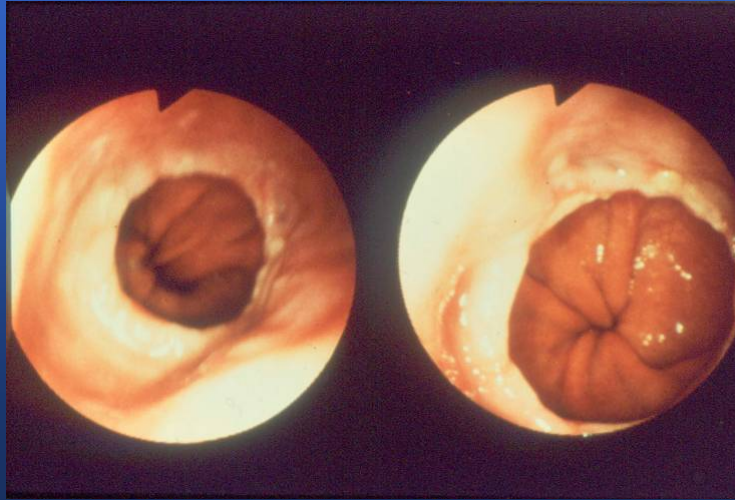
Esophageal Webs and Rings



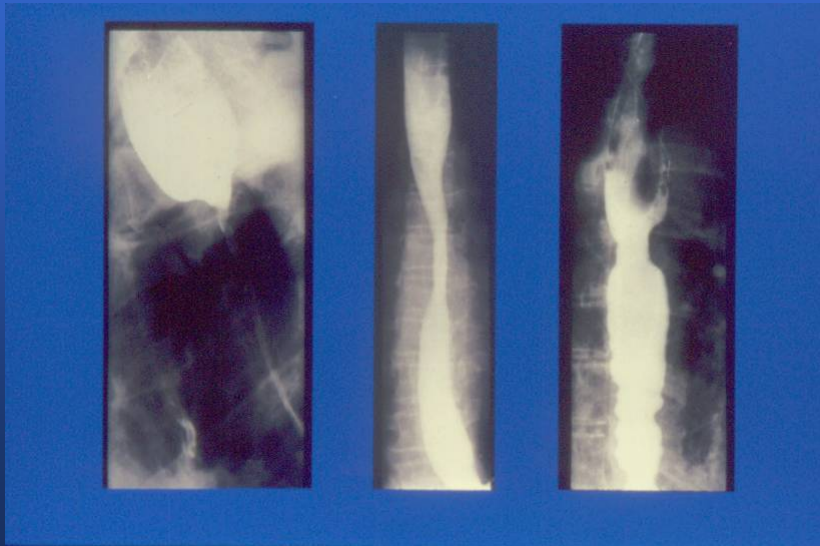
Schatzki Ring



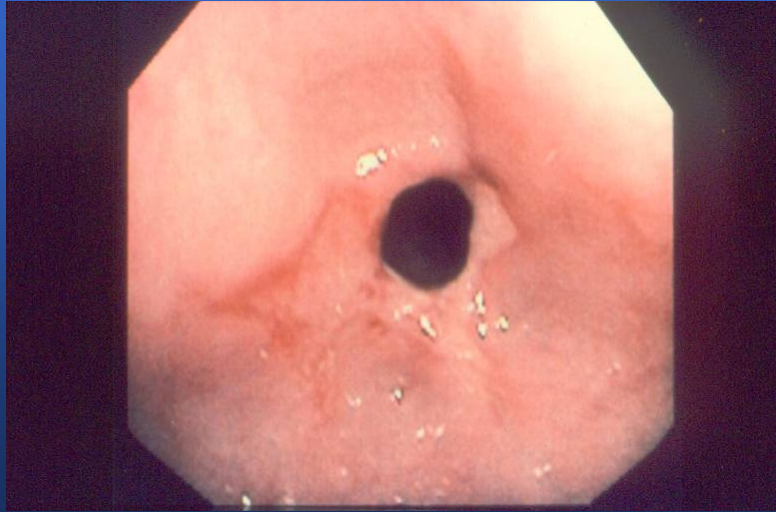
Schatzki Ring



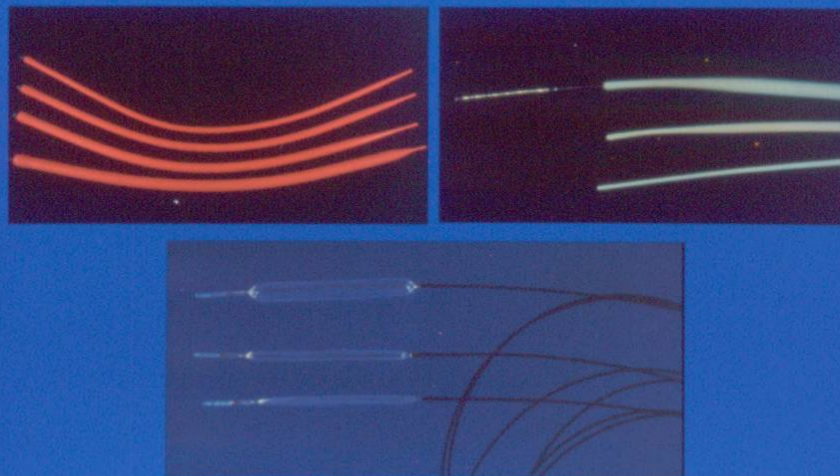
Esophageal Strictures



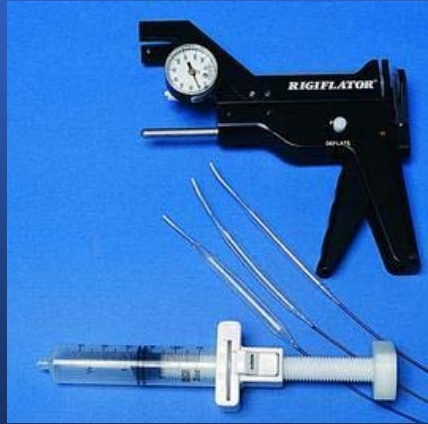
Esophageal Stricture



Esophageal Dilators



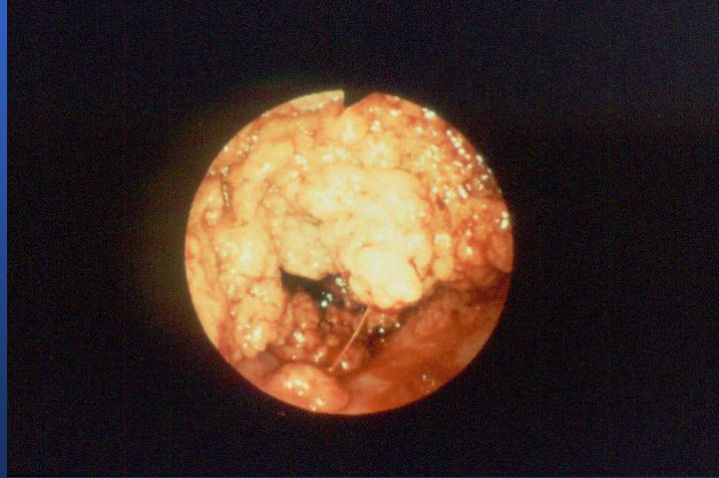
TTS Ballons



Esophageal Carcinoma



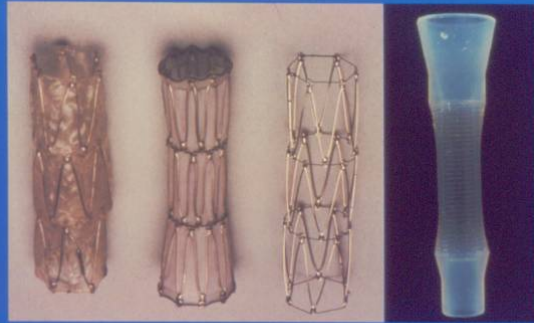
Esophageal Carcinoma



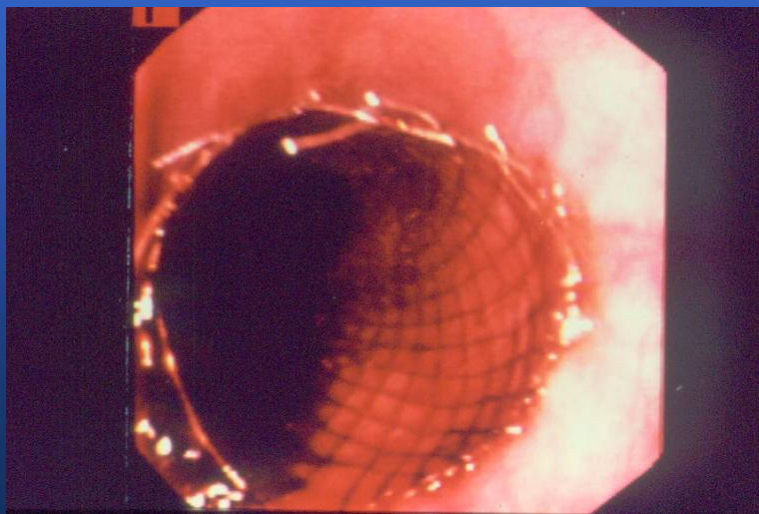
Esophageal Carcinoma



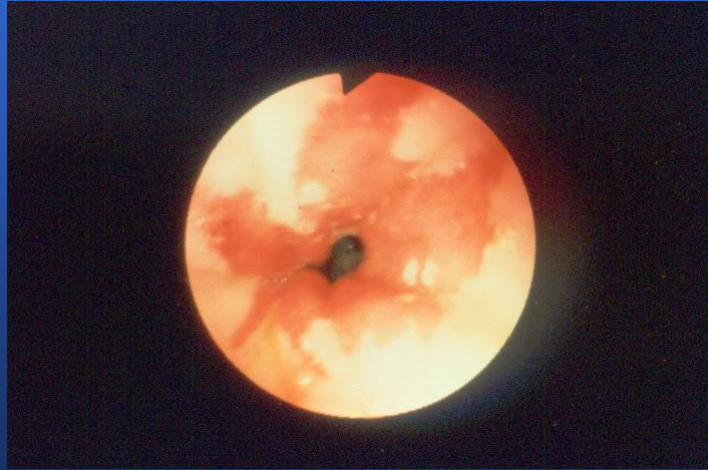
Esophageal Stents



Esophageal Stents

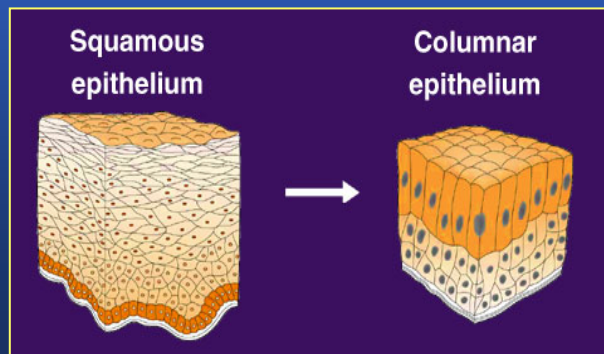


Barrett's Esophagus



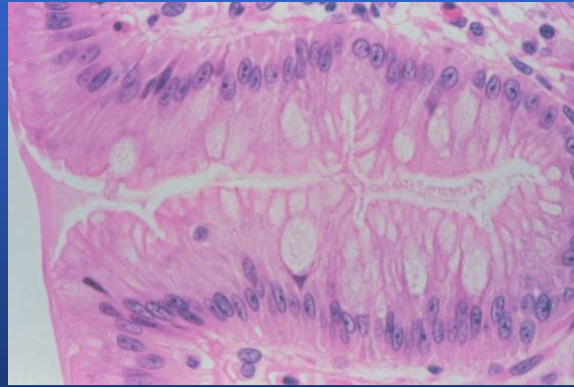
Barrett's esophagus – definition

- “A change in the esophageal epithelium of any length that can be recognized at endoscopy and is confirmed to have intestinal metaplasia by biopsy”

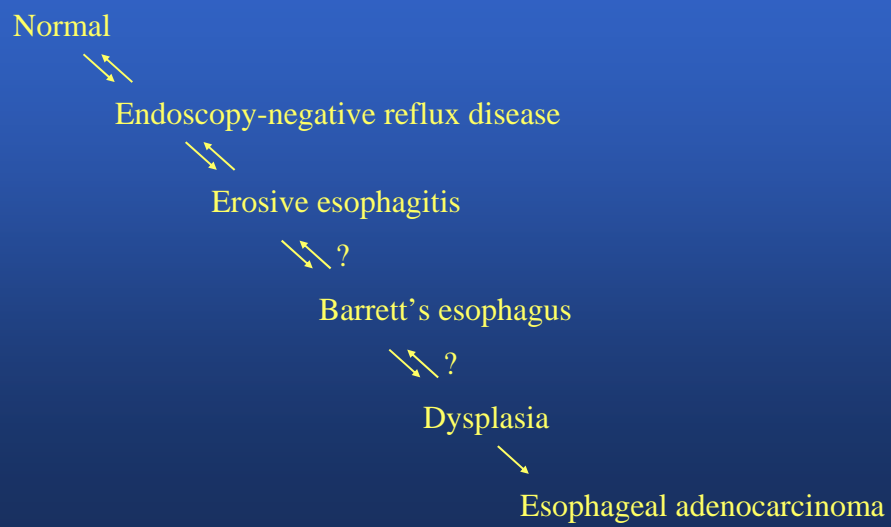


Sampliner. Am J Gastroenterol 1998

Barrett's Esophagus



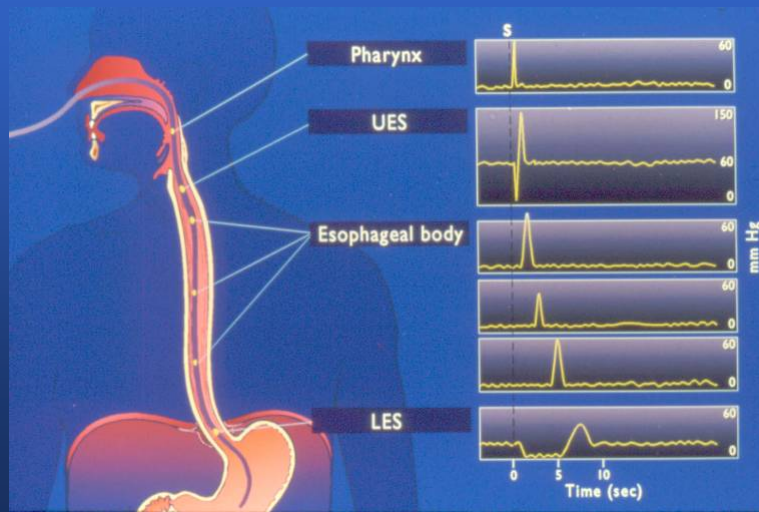
Barrett's esophagus is a premalignant lesion for esophageal adenocarcinoma



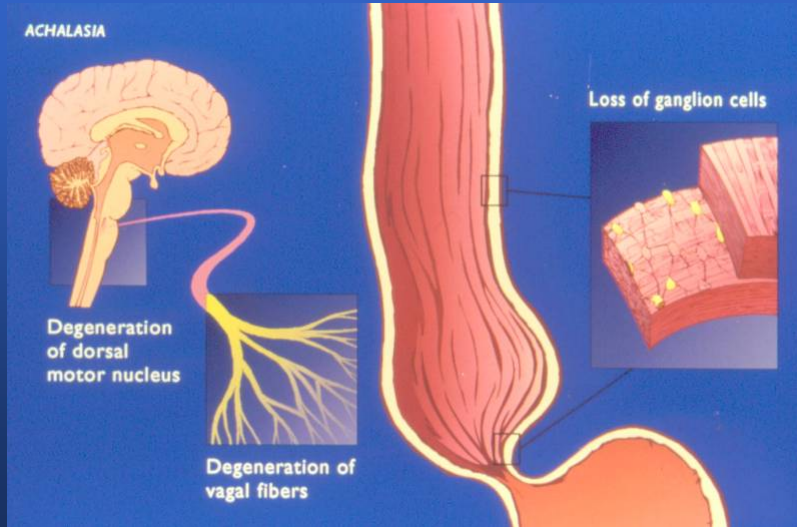
Esophageal Dysphagia

Motor Disorders

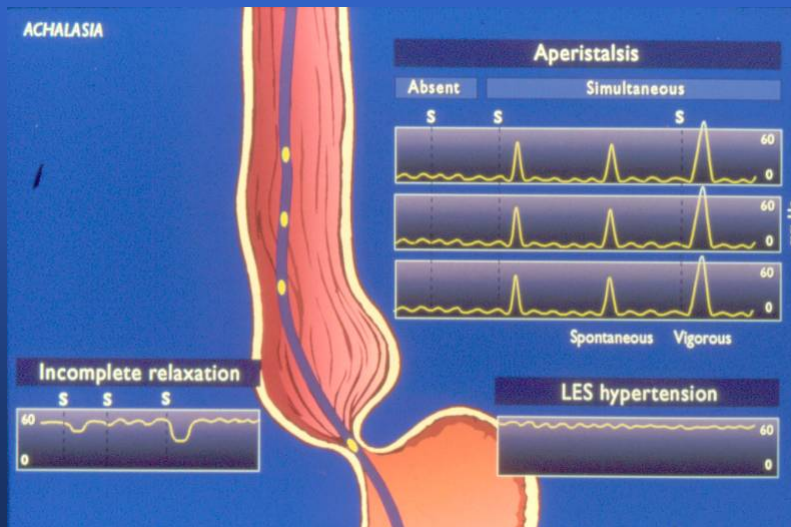
Esophageal Manometry Normal Study



Achalasia



Achalasia



Achalasia



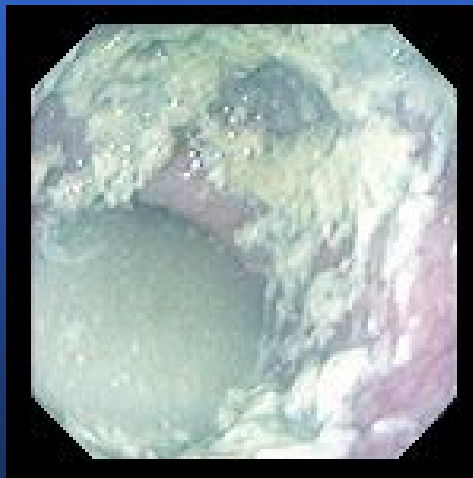
Achalasia



Achalasia



Achalasia




ACHALASIA

Treatments


Drugs

- Nitrates
- Ca⁺⁺ channel blockers
- Botulinum toxin injection

Pneumatic Dilation




Myotomy



Scleroderma

SCLERODERMA

Vascular Obliteration
and
Fibrosis in Smooth Muscle



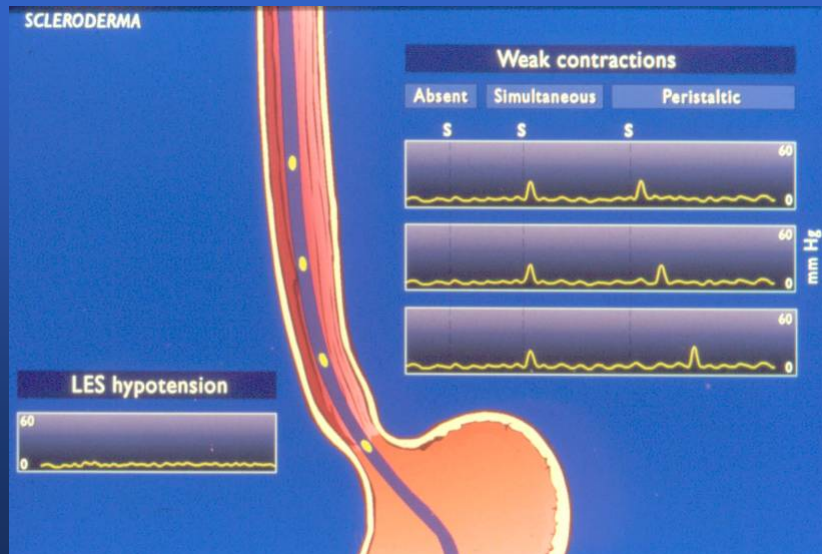
- Weak LES
- Poor esophageal contractility
- Delayed gastric emptying

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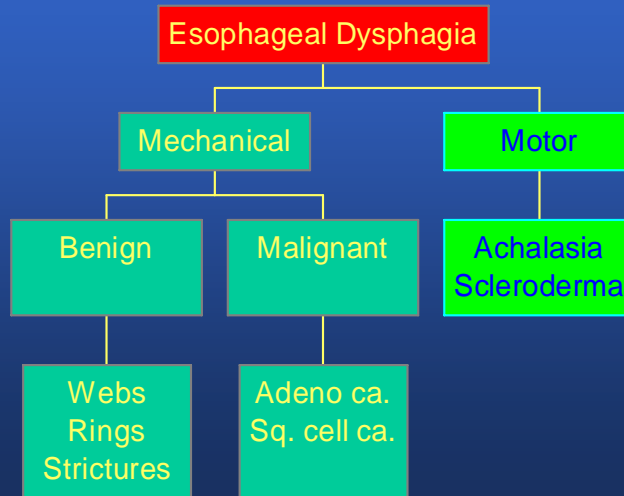
Scleroderma



Scleroderma



Esophageal Dysphagia



Spastic Motility Disorders

Spastic Esophageal Motility Disorders

SYNDROMES

- Diffuse esophageal spasm
- Nutcracker esophagus
- Hypertensive LES
- Nonspecific esophageal motility disorders

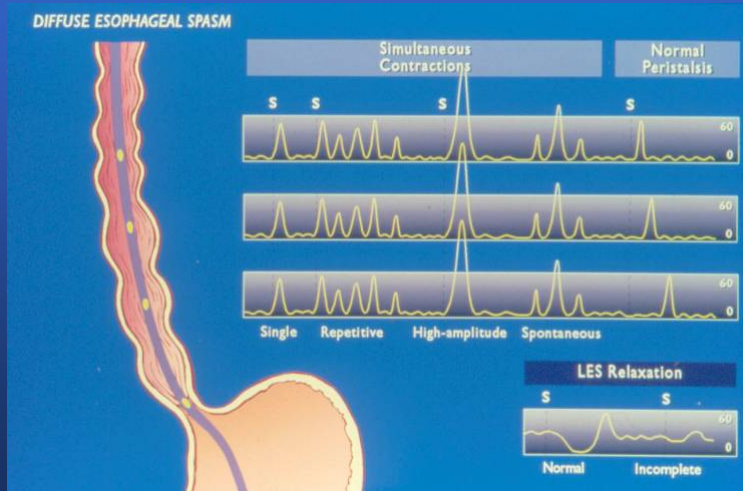
SYMPTOMS

- Chest pain
- Dysphagia

MANOMETRIC FEATURES

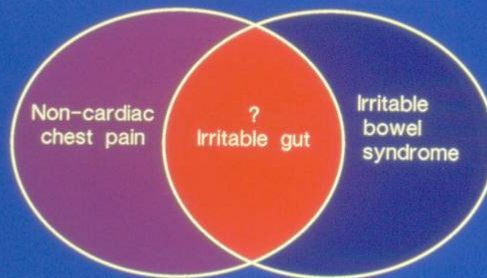
- Some normal peristalsis
- Simultaneous contractions
- Spontaneous contractions
- Repetitive contractions
- High-amplitude contractions
- High LES pressure

Diffuse Esophageal Spasm



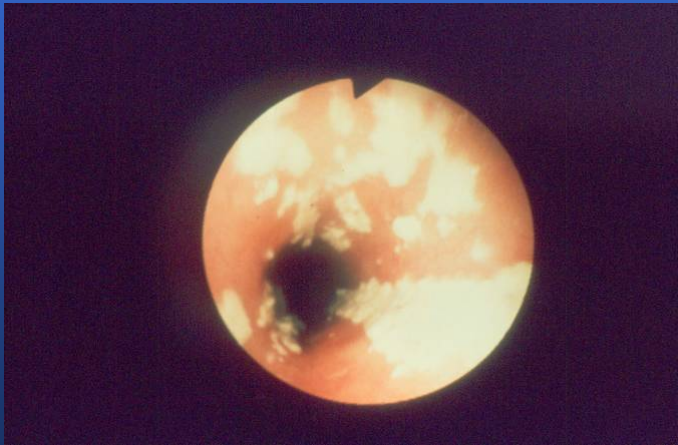
Atypical Chest Pain

NON-CARDIAC CHEST PAIN

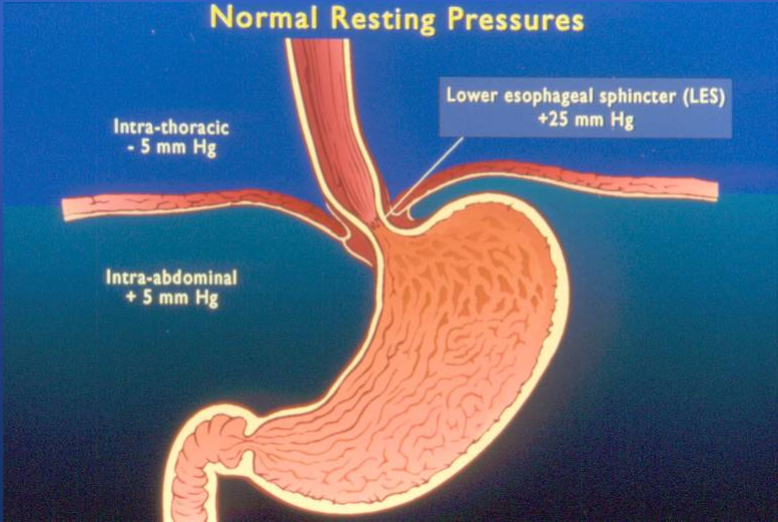


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Candida Esophagitis



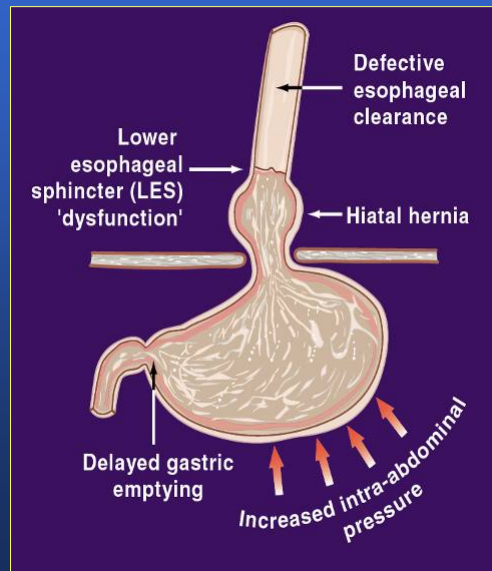
GE Reflux Normal Physiology



GERD

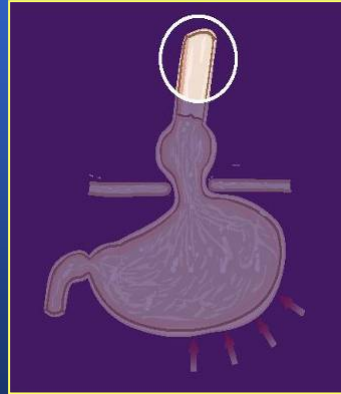
The sequelae of prolonged exposure of esophageal mucosa to caustic gastric refluxate

GERD: Pathogenesis



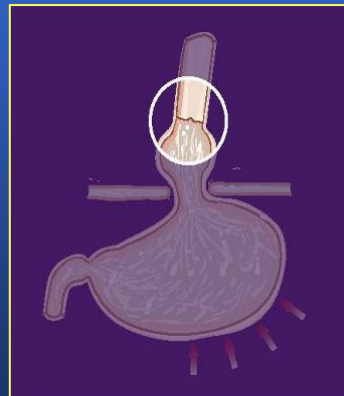
Defective Esophageal Clearance

- Ineffective peristalsis
- Reduced salivary secretion
- Reduced secretion from esophageal submucosal glands

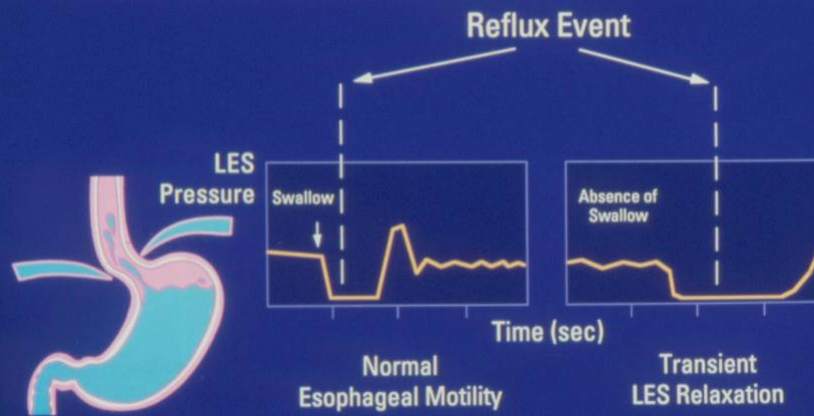


LES 'dysfunction'

- Inappropriate and prolonged transient relaxations
- Reduction in basal LES pressure/tone

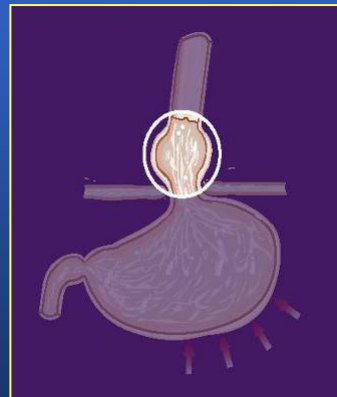


Normal vs. Transient LES Relaxation



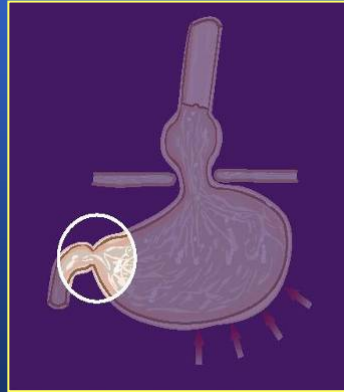
Hiatal hernia

- May trap a reservoir of gastric contents above the diaphragm, increasing reflux
- May compromise LES function



Delayed gastric emptying

- May result in an increase in the volume of gastric contents available for reflux into the esophagus
- Exact role in GERD remains to be clarified

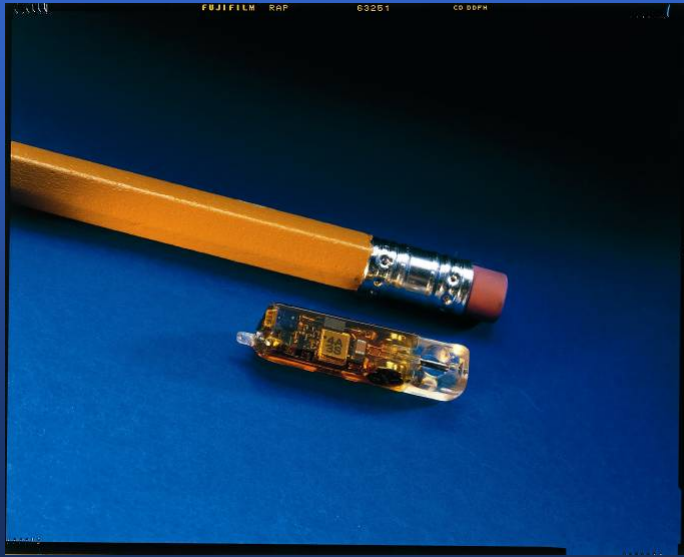


Ambulatory pH Monitoring

- Strengths
 - Quantify reflux
 - Monitor during activities of daily living
 - Allows symptom correlation
- Limitations
 - Availability
 - Technique dependent
 - Cumbersome
 - Cost
 - Variability of response

Adapted from American College of Gastroenterology. An Update on GERD, 1995

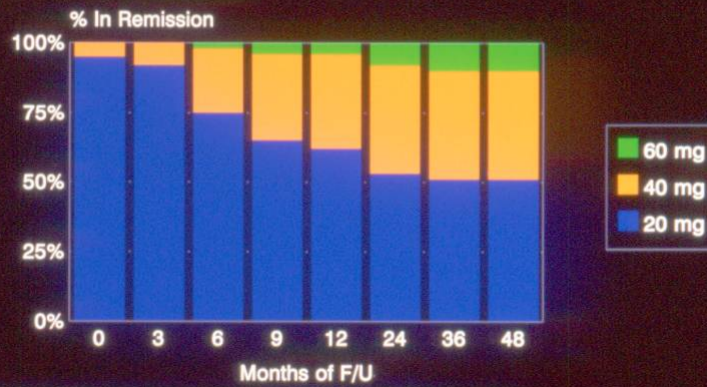
Bravo Capsule



Bravo Capsule

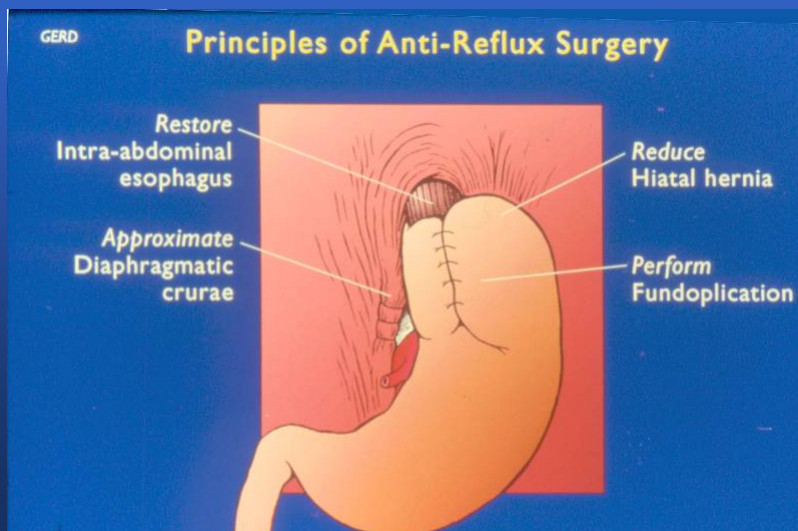


Cumulative Remission On Omeprazole

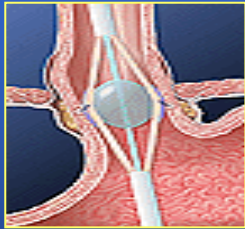


From Klinkenberg-Knol. Ann Intern Med. 1994;121:161

Nissen Fundoplication



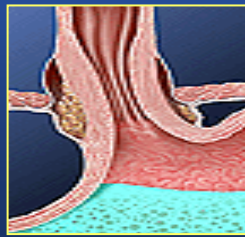
Stretta procedure



Step 1



Step 2



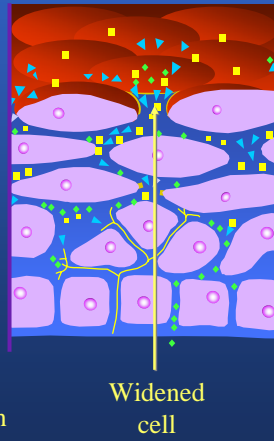
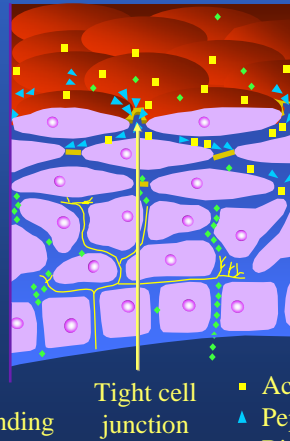
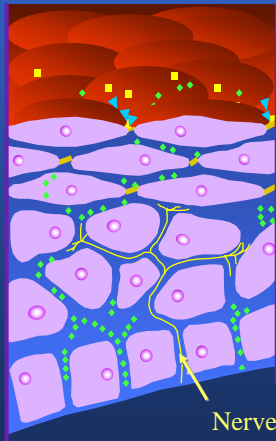
Step 3

Mechanism of action of refluxate in GERD

Acid-peptic attack weakens cell junctions

leading to a widening of cell gaps

and thus allowing acid penetration



Nerve ending

Tight cell junction

Widened cell junction

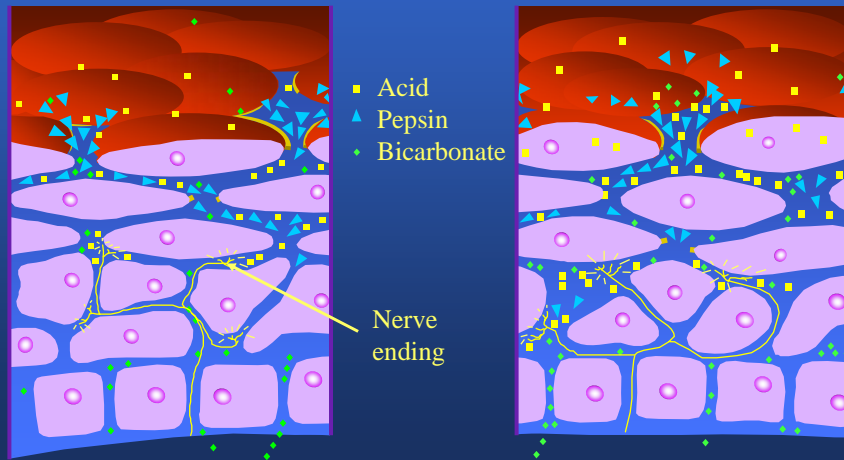
- Acid
- ▲ Pepsin
- ◆ Bicarbonate

Orlando. Am J Gastroenterol 1996

Mechanism of action of refluxate in GERD

Penetration of acid and pepsin allows contact of acid with nerve endings

and disrupts intracellular mechanisms leading to cell rupture and damage



Orlando. Am J Gastroenterol 1996

Esophageal Webs and Rings

