MRAD 254: Fluoroscopic Imaging

Outcomes: 2 and 3

Upper Gastrointestinal Exams

MRT Program

Objectives

2.1) Describe the gross anatomy, relational anatomy, and physiology of the digestive system

2.2) Describe the radiographic procedures used for imaging the digestive system

2.3) Identify contrast media used for individual imaging procedures of the digestive system

2.5) List the indications and contraindications for examinations of the digestive systems

2.6) State the key components when verifying a patient's clinical history

2.7) Determine patient preparation and post-procedural care of each of the individual digestive system procedures

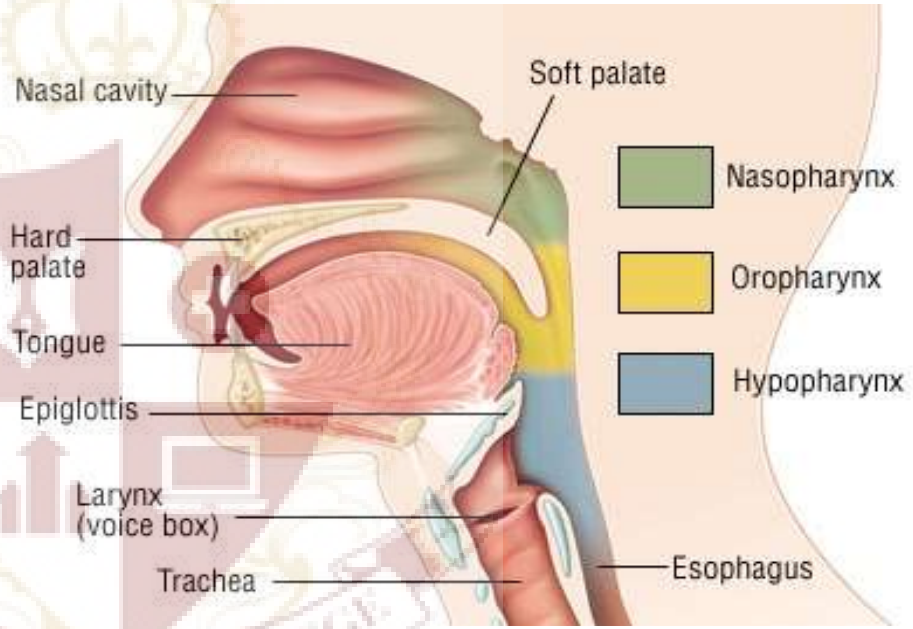
2.8) Identify procedures for prioritizing examinations according to medical status and resource availability

3.4) Identify topographical landmark locations of the digestive system

Generalize how to increase patient comfort during an exam of the digestive system

Anatomy - Pharynx

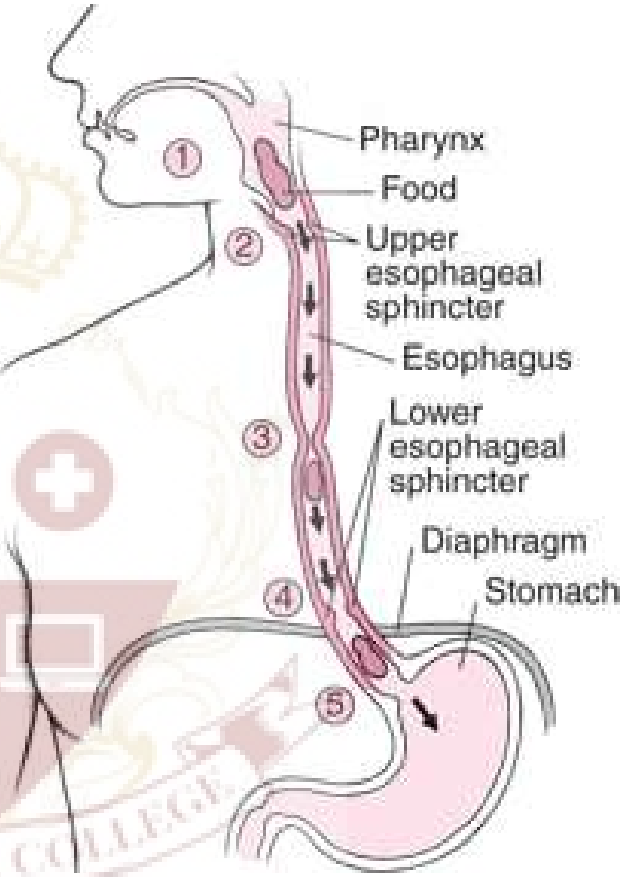
- 3 parts
  - Nasopharynx
  - Oropharynx
  - Hypopharynx
- Hypopharynx contains the epiglottis
- What does the epiglottis do?



https://sites.google.com/a/mtlstudents.net/homepage/home/pharynx-and-esophagus

Anatomy - Esophagus

- Muscular tube
  - Hypopharynx to gastroesophageal junction
- Passes through hiatus of diaphragm
- 4 layers of tissue
  - Mucosa
  - Submucosa
  - Muscularis propria
  - Adventitia



Swallowing

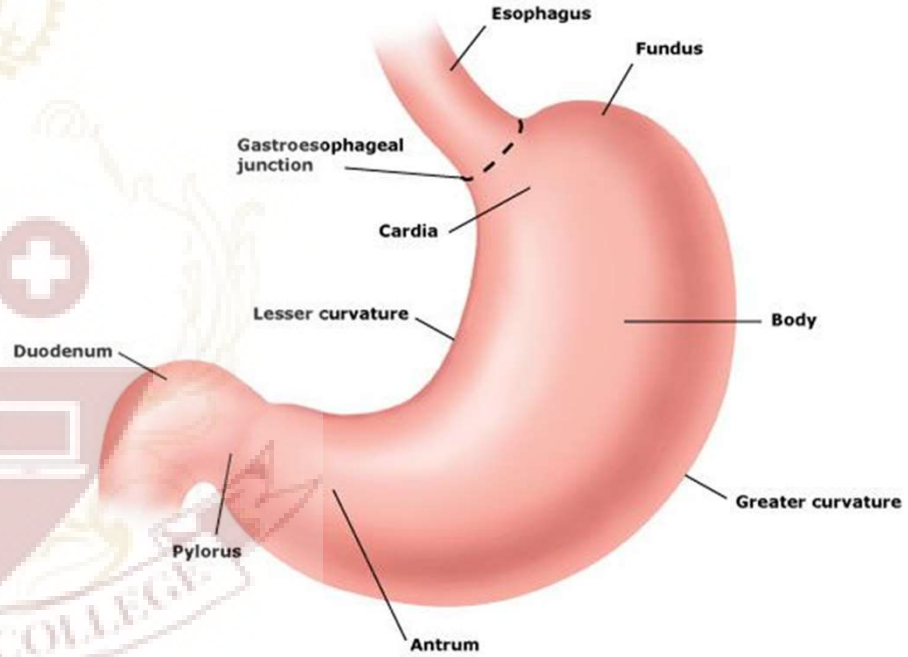
- Conscious initiation
- Muscular contractions move food down towards stomach
- Lower esophageal sphincter under unconscious control
- Speed of bolus movement depends greatly on a person's position

Anatomy - GE Junction

- What does GE stand for?
- Where the esophagus joins to the stomach
- Posterior aspect of stomach
- Below fundus
- Prime site for pathology
  - Change in tissue type

Anatomy - Stomach

- 4 layers of tissue
- Longitudinal folds
  - Rugae
- Position heavily influenced by body habitus and patient position
- What are the 4 body habitus types?
  - Asthenic
  - Hyposthenic
  - Sthenic
  - Hypersthenic

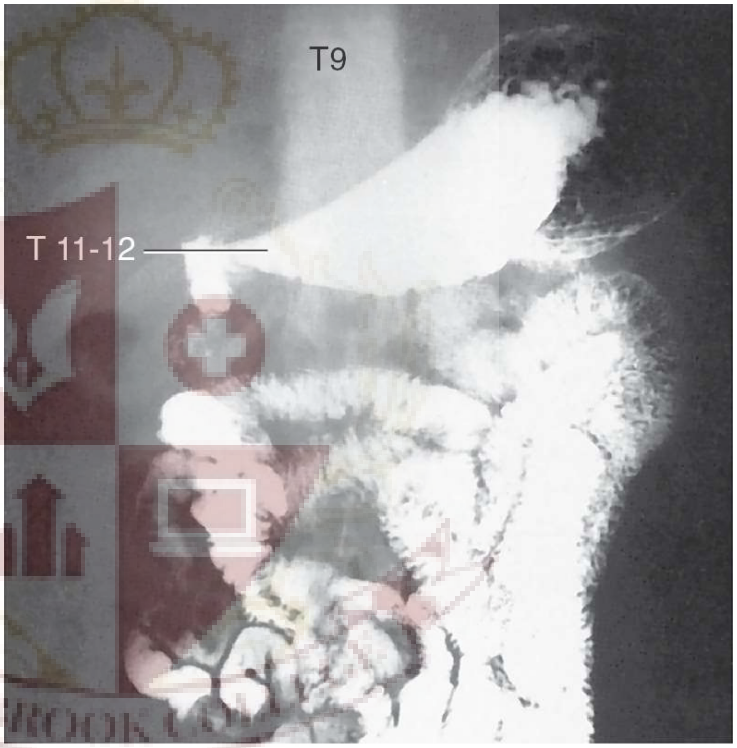


http://www.aboutcancer.com/stomach_anatomy.htm

Hypersthenic Body Habitus and Stomach Location



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Asthenic Body Habitus and Stomach Location



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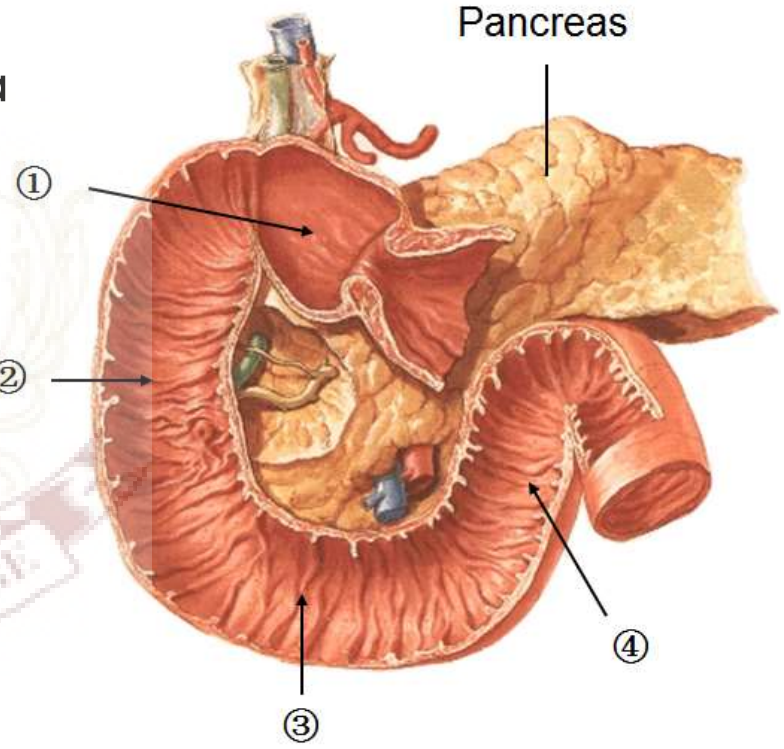
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Gastric Secretions

- Hydrochloric acid and digestive enzymes break down food
- Mucous protects stomach
- Stimulating hormones cause contractions
- Gastric secretions are increased when you eat, drink, chew gum, or smoke.

Anatomy - Duodenum

- First part of small intestine
- Joins to the pyloric portion of the stomach via the pyloric sphincter
- Loops around the head of the pancreas
- Suspended from the diaphragm by the ligament of treitz
- Gallbladder expresses bile into descending duodenum



Indications for Imaging

- Pain
  - Epigastric
  - Chest
- Dysphagia
- Reflux/Heartburn
- Nausea
- Melena
  - Black stool caused by old blood from high up in the GI tract

Exams Done for the Upper GI System

- Esophagram
  - Only looks at esophagus
- Upper Gastrointestinal Series
  - UGI
  - Barium swallow
  - Barium meal
  - OS&D
- UGI looks at esophagus, stomach, and duodenum
- Almost always do entire study , unless patient can only tolerate esophagram.
  - Same prep, same contrast, and same equipment

Purpose of a UGI

- Allows us to see what the upper GI tract looks like without having to sedate the patient
  - Evaluate the mucosal lining of the GI tract
- Allows us to see the function of the upper GI tract
  - Watch swallowing or reflux in real time
  - Watch gastric emptying
- What basically happens in a UGI?
  - Pt drinks some contrast, rolls around on the bed, and we watch it all with fluoroscopy.

Patient Preparation

- NPO 8 hours
  - NPO = Nil per os
- Why?
  - Want the stomach empty and dry
  - Food may hide pathology
  - Food may mimic pathology
- Changed into a gown
  - Clothing makes artifacts just like general X-ray

Patient History

- What might we want to know about our patient?
  - Symptoms
    - What
    - Where
    - Duration
- Previous imaging
- Previous surgery on the GI tract
  - When
  - What procedure
- Diabetes
  - Affects where in the schedule they should go

Contraindications

- Pregnancy
- Not prepped
- Very recent surgery
  - Not necessarily a true contraindication
- Allergies to ingredients
- Known or suspected bowel obstruction
  - Same as surgery

Contrast

- Why do we have to use contrast?
  - Walls of the GI tract are radiolucent without it
- Types of contrast
  - Positive
  - Negative
- Barium sulphate
  - Most common positive contrast
  - Not water soluble – will not be absorbed by body tissues

Barium

- Comes as a powder requiring reconstitution or a premade liquid
- Combination of elemental barium, sweeteners, stabilizers, and anti-bubbling agents
- Most common side effect is constipation
- Classified by weight/volume (w/v%)
- Thick barium (E-Z HD)
  - Higher w/v%
  - Coats stomach lining very nicely
  - Less pleasant to drink



https://www.henryschein.com/us-en/Global.aspx

Barium cont.

- Thin barium (Polibar Plus)
  - Lower w/v%
  - Usually comes as a liquid
  - Pour and use
  - Easier to swallow



https://www.dotmed.com/listing/disposables-general/e-z-em/liquid-polibar-plus-barium-sulfate-suspension/2781757

Contraindications to Barium

- Known allergy
  - Barium is non-reactive, so true allergies are rare
  - Usually allergic to additives
- Perforation (known or suspected)
- Very recent surgery
- The body cannot absorb barium

Water Soluble Contrast

- Can be absorbed by body tissues
  - Safe for post-op or if perforation is suspected
- Bitter taste is difficult to mask
- Most common side effect is diarrhea
- Usually only used by hospitals
  - Clinics will refer patients
- Telebrix, Gastrografin, Conray



https://imaging.bracco.com/us-en/products/ct-ct-colonography/gastrografin

Negative Contrast

- EZ Gas II
- Granular powder that fizzes when wet
- Mixture of gas producing and anti-bubbling ingredients
  - Makes one large air bubble instead of many tiny ones
- Distends esophagus, stomach, and duodenum for exam
  - When combined with barium coating, we can see the mucosal lining



https://www.cmxmedicalimaging.com/product/ez-gas-ii/

During the Exam

- Patient is asked to change
- Drink gas granules. No burping!
- Step into fluoroscopy machine while it is upright
  - Hold cup of barium in left hand
- Radiologist will tell patient when to drink
  - Will fluoro while pt drinks
- Tech lays the bed horizontal
- Patient will roll on the table to coat the stomach lining with the barium
- Radiologist will take images with patient in different positions
- When exam is done the patient may change and leave

Patient Experience

- Hard bed
  - Uncomfortable, especially for older people with hip or shoulder pain
- Tipping bed is disconcerting
  - Vertigo
- Confusing instructions
- Trying not to burp or feeling nauseated
- Exam is done in the morning
  - Hungry/thirsty
  - No coffee!
- Nervous
  - Unfamiliar exam
  - Afraid of bad results
  - Don't want to drink gross liquid
- Wearing a gown
  - Cold!
  - Feeling exposed

After the Exam

- This exam is usually quite fast once it starts (< 15 minutes)
- When exam is finished, the patient is usually free to go right away.
- Eat and drink as normal
- Drink extra fluids for a few days
  - Barium is constipating
- Bowel movements will be white for a while

Scenarios

- Patient burps gas granules part way through the test
- Patient is very frail or cannot roll on their own
- Patient is claustrophobic
- Patient tells you they ate breakfast.
  - Or drank ½ glass of water
- Questions?