Hello and welcome back to InterpreterPrep.com

This is our second presentation on the DIGESTIVE SYSTEM. We will be continuing our journey down the digestive tract where we left off at the mouth in Part One. Today, we'll be talking about:

1. The PHARYNX
2. The ESOPHAGUS
3. The STOMACH

Now, back in part one, the spaghetti had been chewed by the teeth, had been mixed with saliva becoming the BOLUS seen in green in the top image and then along comes the TONGUE and pushes the bolus back into the throat (aka PHARYNX) to be swallowed. When swallowing, the SOFT PALATE goes up blocking off the nasopharynx so that the bolus goes down your throat and not up into your nose!

Now, if you put your fingers on the front of your neck and swallow you will notice that something moves up! That's your voice box (aka LARYNX). When the larynx goes up it comes in contact with a flap of cartilage called the EPIGLOTTIS, sealing the glottis which is the entrance to the windpipe (aka TRACHEA) to keep the food or liquid out when we swallow. So now we know that when we swallow, the soft palate blocks access to the nasopharynx and the epiglottis blocks access to the windpipe.

Once the bolus hits the pharynx waves of muscle contractions called peristalsis push the bolus down the ESOPHAGUS. On the lower left side of the image we can see the bolus (in green) going down the esophagus. We see how the muscle above the bolus contracts (CONSTRUCTION) pushing the BOLUS down while the muscles below the bolus relax (RELAXATION) and this is how that PERISTALTIC WAVE nudges it down into the stomach as seen on the bottom right.

All this that we've talked about: putting food in your mouth, chewing and swallowing is known as INGESTION. It's the only part of the digestive process that is under our control. Once you swallow the rest is on auto-pilot! Isn't it great that we don't have to think about all these things that our bodies are doing for us?!

OK, now let's talk a little more about the ESOPHAGUS. The esophagus is a muscular tube that receives the bolus from the pharynx and takes it down to the stomach. The inside of this muscular tube is called the LUMEN. The inside of the stomach and intestines is also called lumen. From now on instead of saying “the inside of” I will just say: lumen. The lumen of the esophagus is covered by mucous membrane. As we see in this image, the esophagus -seen in red- is located in the back part of the thorax descending in front of the vertebral spine, in between the lungs and behind the heart (the heart was removed in this image to make the esophagus visible-either that or this is the body of a heartless person!). Before connecting to the stomach the esophagus passes through a thin, dome shaped muscle called the DIAPHRAGM which separates the abdomen from the thorax.
The point where the esophagus meets the stomach is known as the **CARDIAC SPHINCTER** (aka **LOWER ESOPHAGEAL SPHINCTER**). As we see here on the top right, the cardiac sphincter **acts as a valve keeping the acid in the stomach**. When it malfunctions, the acid in the stomach spills up into the esophagus (as we see in the bottom right, signaled by the red arrow going up) and **acid reflux occurs**. This condition is known as **GASTRIC REFLUX** or commonly known as **GERD**.

We are now at the **STOMACH**. They say the way to a man's heart is through his stomach and maybe that's why they called it the “cardiac” sphincter! I guess we'll never know but what I can tell you is that the stomach is located in left upper quadrant of the abdomen and we see it in red in this image. So, the bolus is now in a chamber full of acid! The **HYDROCHLORIC ACID** in the stomach is so corrosive that the cells which make up the stomach's lining are constantly shed and replaced by new ones every 3 days which means that every 3 days we have a completely new stomach lining because the acid ate it away!!! There is also **PEPSIN** in the stomach, an **enzyme** that **breaks down protein**.

The stomach is all wrinkled on the inside these wrinkles are called **rugae** which help the stomach expand when the food arrives and play an essential role in a hot dog eating contest! How else can someone eat 50 hot dogs in ten minutes!!??

The stomach is divided into 3 parts:

1) The **FUNDUS**: which is it's hat or top part
2) The **BODY**: it's central part that curves to the right
3) The **PYLORUS aka GASTRIC ANTHRUM**: where it narrows down and the duodenum begins. The point where the stomach ends is marked by a muscular ring called **PYLORIC SPHINCTER** which regulates the passage of the **partially digested food**, now called **CHYME** to the **DUODENUM**.

The **STOMACH'S FUNCTION** is to:
4) **HOLD** the **FOOD, BEGIN DIGESTION** breaking it down and **REGULATE DELIVERY TO** the **DUODENUM** a **little at a time** so that the intestine's job is of absorbing it is easier.

**SOME SIGNS OF DISEASE:**

1) **ABDOMINAL PAIN**
2) **HEARTBURN**
3) **DIFFICULTY SWALLOWING**
4) **BAD BREATH**
5) **REGURGITATION**-(GERD): causes a vinegar-like taste in the mouth.
6) **NAUSEA/ VOMITING**
7) **INDIGESTION**: sluggish emptying of stomach.
8) **G-I BLEEDING** : which may be evidenced by:

   vomiting blood known as-->**HEMATEMESIS**
   or dark/tarry stools -->**MELENA**
SOME DISEASES:

1) **ACHALASIA**: decreased mobility of the lower half of esophagus which dilates a lot. Of unknown cause, patients from South America may develop this as part of *Chaga's Disease* which is caused by a parasite. Not frequently seen in the US.

2) **ESOPHAGEAL VARICES**: dilated veins found at the end of the esophagus, due to congestion. Frequently seen in **alcoholics**.

3) **ESOPHAGEAL CANCER**: related to drinking very hot liquids and chronic GERD

4) **BARRETT'S ESOPHAGUS**: Implies the presence of changes in the lower part of the lining of the esophagus due to chronic inflammation. **Risk factor for developing esophageal cancer**.

5) **GERD**: disorder of the cardiac sphincter causing **ACID REFLUX** into the esophagus (GERD stands for gastroesophageal reflux disease): Causes heartburn.

6) **HIATAL HERNIA**: When you hear the term “hernia” it always means that something is out of place. In this case a part of the stomach is poking up through the hole normally used by the esophagus to reach the stomach. The left side of the image shows a stomach in its normal position. The right side a hiatal hernia. This condition predisposes to **gastric reflux**.

7) **GASTRITIS**: This image is great to look at while we talk about the next 3 disorders. Gastritis is the inflammation of the lining of the stomach which we see here as a red spot.

8) **STOMACH CANCER**: tough to diagnose early. Cancer means, if I didn't explain it before, that cells are dividing too fast and growing wildly out of control. Stomach cancer may not give any symptoms in the beginning since there is a lot of place for the tumor to grow. Sometimes detected by a **chronic anemia** detected in the lab workup due to blood loss from the stomach.

9) **GASTRIC ULCER** (aka **PEPTIC ULCER**): simply said, an ulcer is a wound in the lining of the stomach similar to the one you'd get if you were riding a bike and fell scraping you elbow against the pavement. The difference here is that the acid is what's “scraping” the lining of the stomach. Ulcers are associated with

   - infection of the stomach by a bacteria called **H. PYLORI** and the use of
   - **ALCOHOL** and
   - **NSAIDS** (e.g. ibuprofen).

   If untreated, the ulcer can deepen and perforate the wall of the stomach giving way to **PERITONITIS**

10) **PERITONITIS**: is the inflammation of the peritoneum which is a membrane that covers most of the abdominal organs. It can be caused by an infection (burst appendix) or be chemical in nature (perforated ulcer with spill of hydrochloric acid into the abdomen).

11) **NUTCRACKER ESOPHAGUS**: chest pain and difficulty swallowing due to abnormal peristalsis.
SOME DIAGNOSTIC PROCEDURES

1) **BARIUM SWALLOW**: which is a special kind of X-ray. It's aka **ESOPHAGRAM**. The patient is **given a barium suspension to swallow** which coats the lumen of the esophagus **making the esophagus visible to X-rays**.

2) **UPPER G-I SERIES aka BARIUM MEAL**: as in the barium swallow, the patient is also given a barium suspension. This study **permits the stomach and duodenum to also become visible on X-rays**. It just takes a while longer because the radiologist has to wait for the barium suspension to reach and coat the **stomach and duodenum** before taking the X-rays.

3) **ESOPHAGEAL MANOMETRY**: study used to measure **pressures** inside the esophagus.

4) **UPPER ENDOSCOPY** (aka **EGD: esophagogastroduodenoscopy**): used to see the esophagus, stomach and duodenum using a **fiberoptic endoscope**. An endoscope is a thin tube with a light and a camera on its tip. **Generally done under sedation**.

5) **ABDOMINAL CAT SCAN**. When you get a CAT scan, it's like going into a big donut hole! This machine makes images of the body that look like this. It's like when you take a baguette and slice it with a knife. This machine does the same, it produces **images of “slices” of the human body** but fortunately w/o cutting anyone up!

6) **ABDOMINAL MRI**: obtains **similar images** as a CAT scan but **uses a magnetic field and radio waves instead of radiation (CAT scan uses radiation)** to do so. Also differs from a CAT scan machine in that here the patient's whole body goes INTO the machine (there are “Open MRI's” for claustrophobics though). This gives many patients the impression that “my whole body was MRI'ed”!!

7) **LABS: H. PYLORI TEST**: used to diagnose **H. Pylori infection in the stomach**.

SOME TREATMENTS

1) **STOMACH PROTECTORS**: protect the stomach by **reducing** the acid it makes: OMEPRAZOLE, RANITIDINE. To treat **gastritis and ulcers**.

2) **ANTACIDS**: **neutralize** the stomach acid, example: Mylanta

3) **BLACKMORE TUBE**: special type of **catheter** introduced into the stomach—**with two balloons**—which inflate, once the tube is inside the esophagus and stomach to put pressure on the **bleeding gastroesophageal varices to stop or reduce the bleeding**. Done in **MICU**: medical intensive care unit.

4) **SURGERY** :
   - **GASTRECTOMY**: removal of the stomach totally or in part used to treat complicated ulcers, cancer
   - **VAGOTOMY**: cuts the nerves that make the stomach produce acid—used to treat ulcers
• **FUNDOPPLICATION**: a surgical procedure used to treat hiatal hernias (to avoid the acid reflux from occurring) where the fundus of the stomach is wrapped around the lower esophagus. **Plicate means “fold”**.

5) **ANTIBIOTICS**: for H. Pylori like **AMOXICILLIN, CLARITHROMYCIN**, etc.

In this presentation we have gone over many terms related to **GASTROENTEROLOGY** while we discussed the anatomy of the upper digestive tract. Signs and symptoms of sickness, diseases, diagnostic procedures and some treatments were also discussed. I hope you’ve enjoyed this lesson and come away with a better understanding of the field of **GASTROENTEROLOGY** and the terms related to this field of medicine.

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