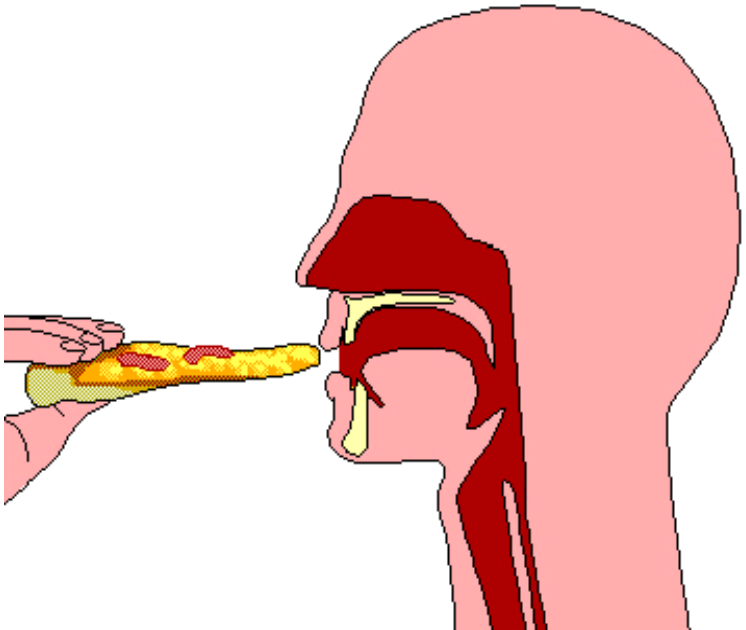
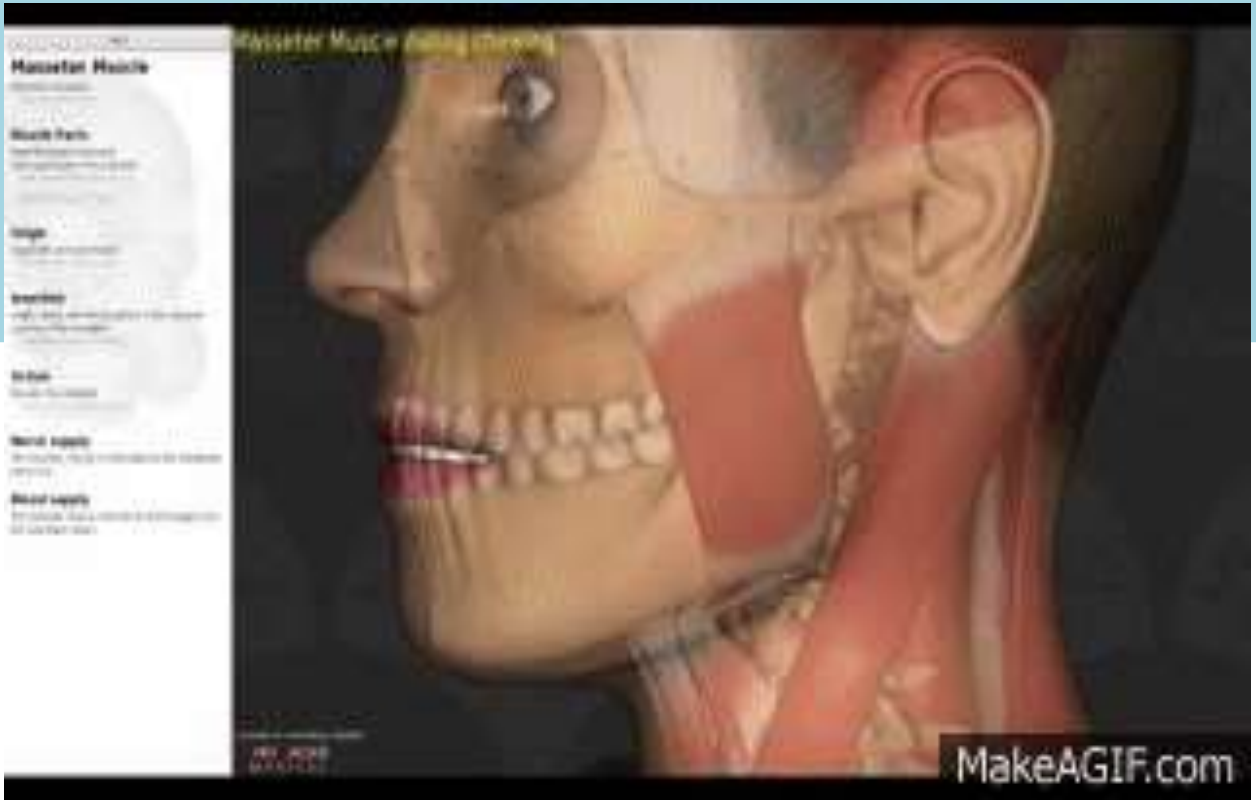
Physiology Of Deglutition



Dr. Nimty Raina

The mechanism of food digestion is initiated by MASTICATION & SWALLOWING of food



Mastication (Chewing)

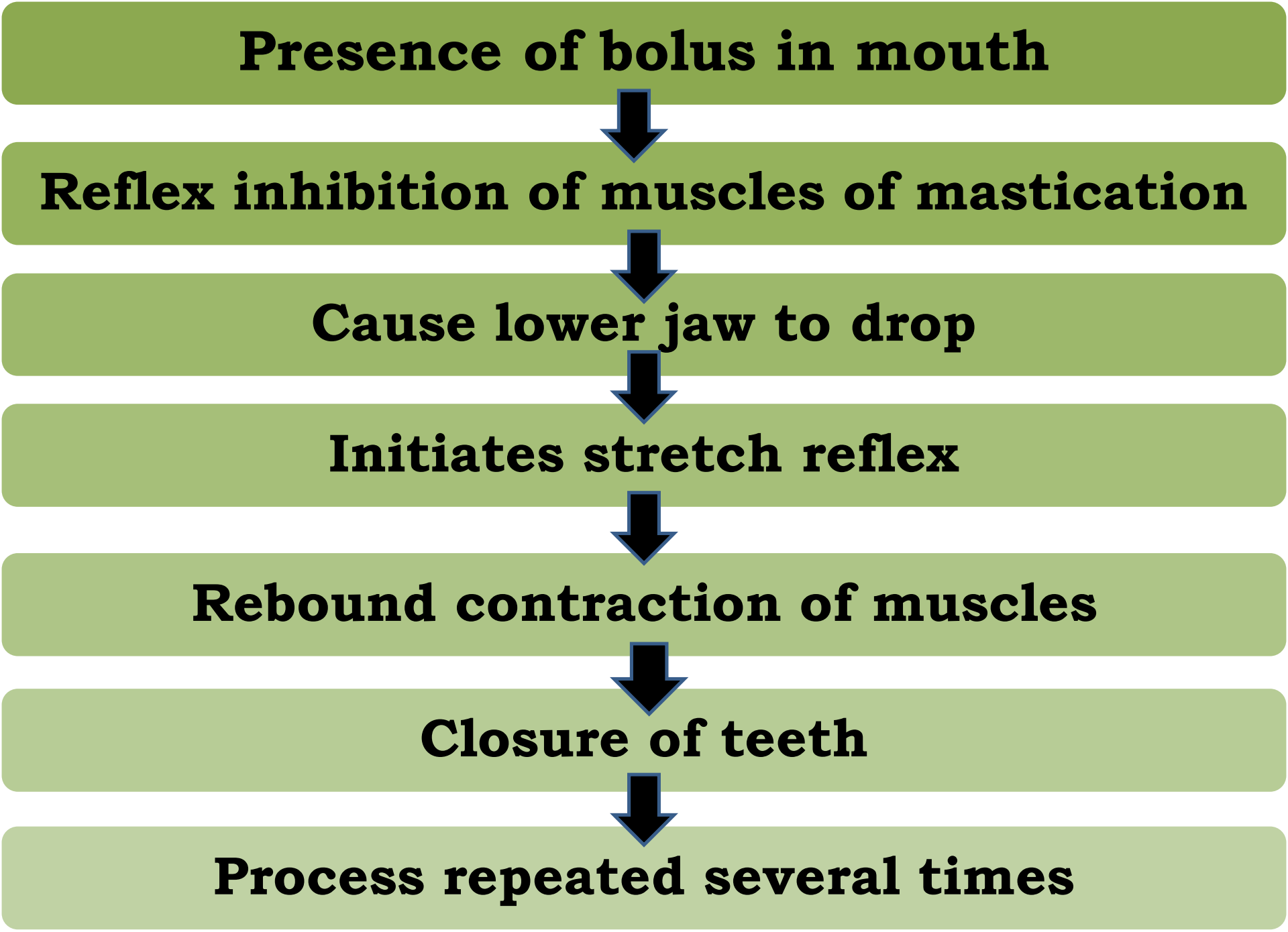
Anatomical structures involved are :

Teeth (incisors & molars)

Muscles of mastication

Nuclei lies in BRAINSTEM

The muscles of chewing are innervated by motor branch of fifth cranial nerve


Presence of bolus in mouth
Reflex inhibition of muscles of mastication
Cause lower jaw to drop
Initiates stretch reflex
Rebound contraction of muscles
Closure of teeth
Process repeated several times

Functions of chewing :

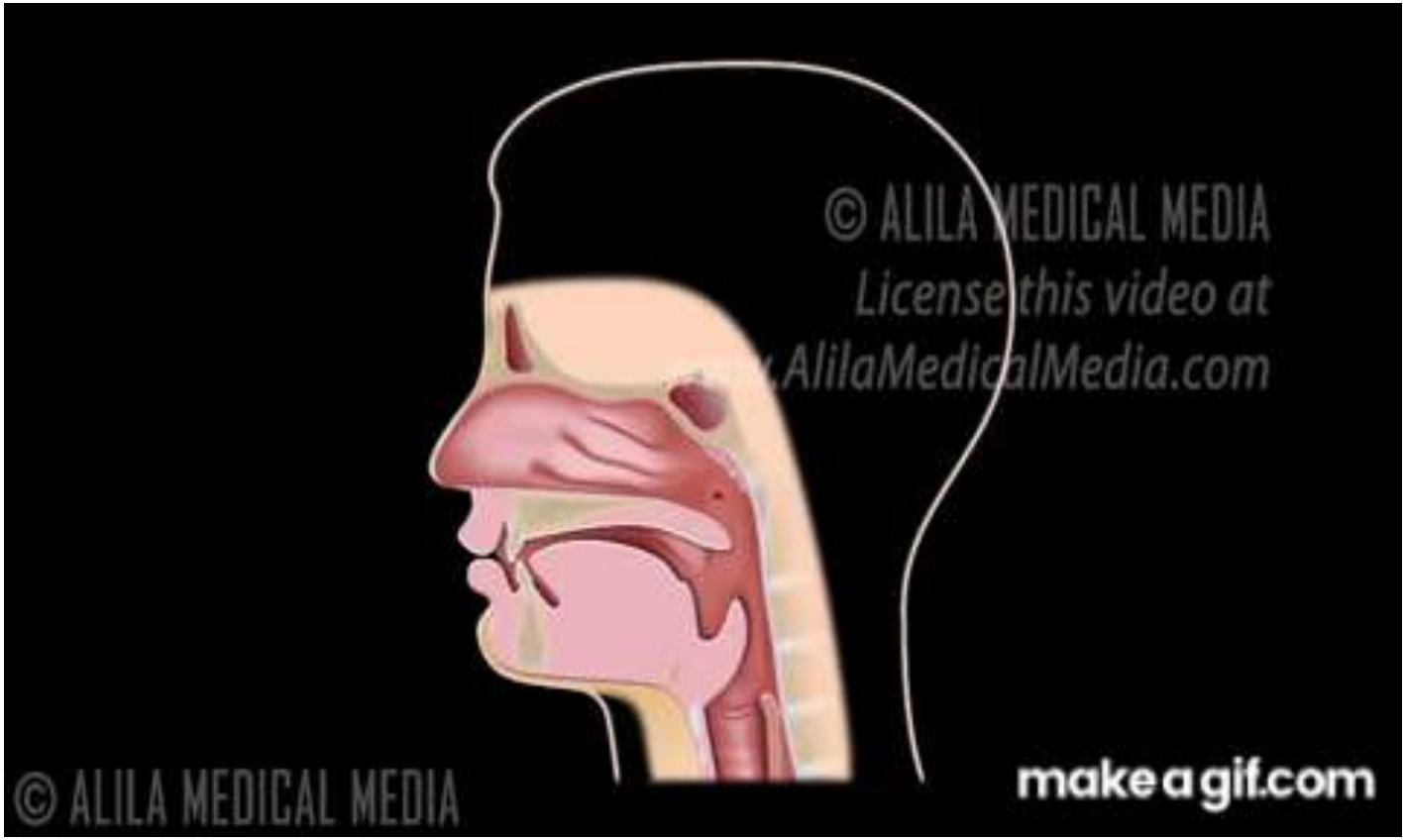
1. Breaks cellulose membrane around raw fruits & vegetables

2. Breaks food particle increases surface area for more enzymatic activity

3. Mixing with saliva

4. Prevents excoriation of GI mucosa

The DEGLUTITION REFLEX



The process of swallowing, also known as deglutition, involves the movement of food from the mouth (oral cavity) to the stomach via the pharynx and esophagus.

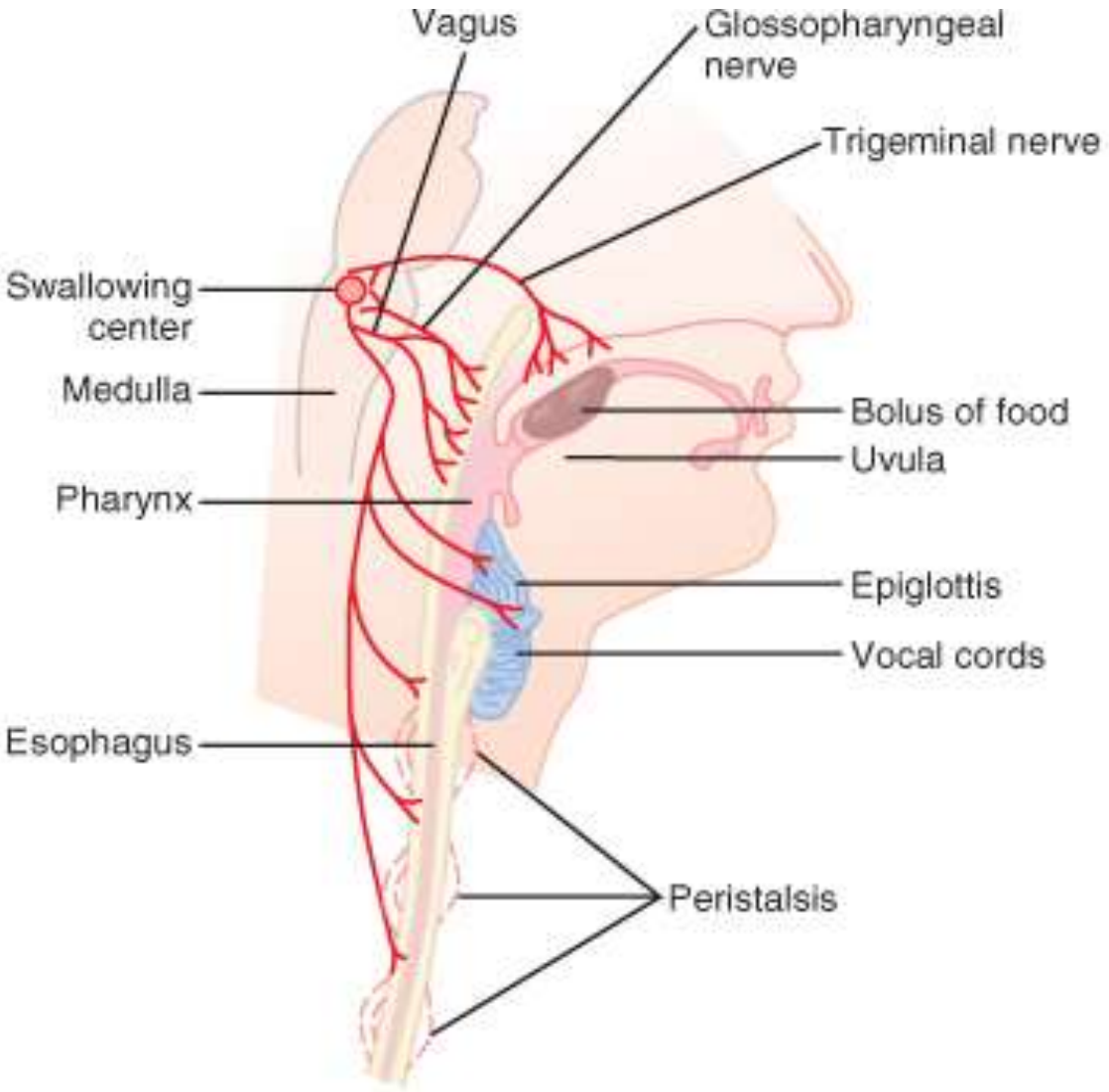
It is a complicated process involving pharynx which also is involved in respiration

Stages are :

1. Oral or Voluntary phase

2. Pharyngeal stage (Involuntary)

3. Esophageal Stage (Involuntary)



1. Voluntary Stage/oral stage

Once food is in mouth, there occurs voluntary squeezing & rolling of food posteriorly into pharynx by tongue pushing it upwards & backwards against palate

2. Pharyngeal Stage

Changes that occur are:

Closure of trachea

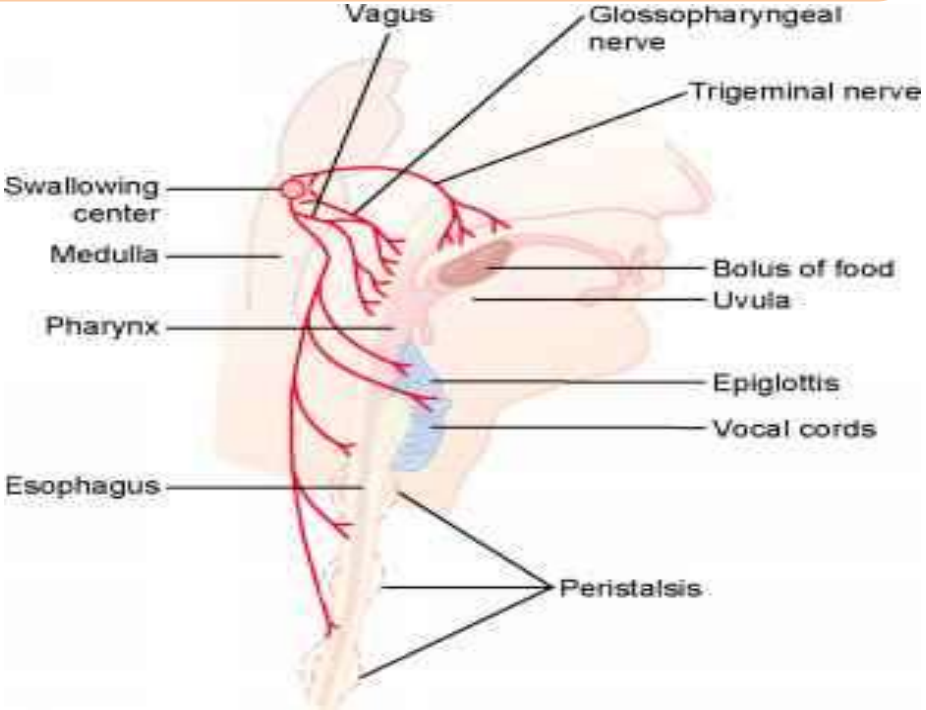
Opening of esophagus

Peristaltic movement pushing food to upper esophagus

Initiated as the bolus enters poterior portion of mouth and pharynx, *epithelial swallowing receptors* around pharynx espcially around tonsilar pillars get stimulated

Duration of Pharyngeal Stage-Less than 6 seconds

Deglutition center- Reticular substance of medulla & Lower pons



Soft palate is pulled upwards to close posterior nares

Palatopharyngeal folds on each side of pharynx are pulled medially to form sagittal slit (stage lasts for less than 1 seconds)

Vocal cords of larynx are strongly approximated, larynx is pulled upwards due to this- epiglotis moves backwards covering opening of larynx

Upward movement of larynx also enlarges opening of esophagus, relaxes upper esophageal sphincter

Upward movement of larynx also causes entire muscular wall of pharynx to contract (PERISTALSIS OF PHARYNX)

3.Esophageal Stage

Includes 2 types of Peristalsis:

Primary peristalsis

Secondary peristalsis

Musculature of Pharyngeal wall & & upper third of esophagus- *striated muscle*

Lower third of *esophagus-smooth muscle*

Primary Peristalsis

It is the continuation of peristalsis that begins in the pharynx & spreads into esophagus

Time taken to pass from pharynx to stomach- 8 to 10 secs

Seconday Peristalsis

If primary fails to move all food that has entered esophagus into the stomach, secondary wave starts

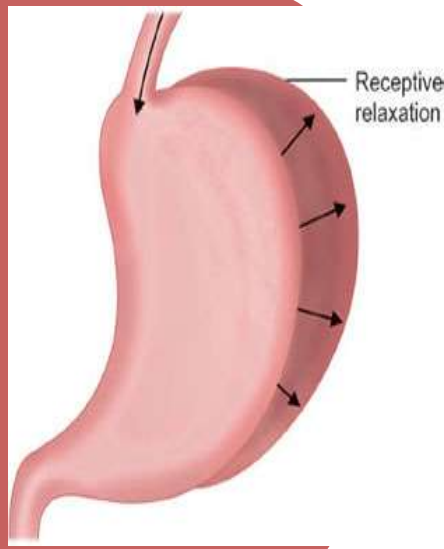
Results from distention of esophagus by food

Intiated by – Partly by Myenteric nervous system

Partly by reflex (Vagal afferents – medulla- esophagus via glossopharengeal & vagal effrent)

Does cutting of vagus nerve and paralysis of brainstem swallowing reflex hamper passage of food from esophagus to stomach????

Receptive Relaxation of Stomach



Transmitted through myenteric inhibitory neurons

Entire stomach & even duodenum relax as the wave reaches lower portion of esophagus to receive food

The Lower Esophageal Sphincter

lower end of esophagus, extending 3 cms above its juncture with stomach

Gastroesophageal sphincter- remains mostly tonically constricted exerting an intra luminar pressure of 30 mmHg

Receptive relaxation of LES causes propulsion of food into stomach

Prevention of Esophageal Reflux:

1. Tonic constriction of LES
2. Valve like closure of LES prevents high intra-abdominal pressure-stomach contents not forced backwards

Protects during cough, hard breath, walk etc

Applied

1. ACHALASIA & Megaesophagus-

Achalasia is a condition in which lower esophageal sphincter fails to relax during swallowing (due to damage of myenteric plexus)

Treatment- Antispasmodic drugs

2. Paralysis of Swallowing Mechanism:

Poliomyelitis, encephalitis (damage of swallowing center)

Muscle dystrophy, Myasthenia Gravis

Deep anesthesia (death by choke)

3. Gastroesophageal Reflux Disease- LES incompetence causes reflux of acid gastric contents into esophagus

Symptoms- heartburn, esophagitis, ulceration

Treatment- Omeprazole (H2 receptor blocker)