

## Swallowing Sequence & Musculature/Cranial Nerve Involvement

Swallowing Solids/Semi-Solids	Muscular Involvement	C.N.
<b>BOLUS ACCEPTANCE</b>		
Jaw opens to accept bolus	Lateral pterygoids	V
	Geniohyoids	XII
	Mylohyoids	V
	Anterior belly of digastric muscles	V
Jaw closes to fracture bolus	Temporalis	V
	Masseter	
	Medial pterygoids	
Lips close	Obicularis obis	VII
Bolus moves to posterior teeth via A-P movement of tongue	Genioglossus	XII
<b>ORAL PREP</b>		
Bolus is reduced via:		
Saliva	Parotid glands	IX
	Submandibular glands	VII
Mastication – Rotary motion	Lateral pterygoids	V
	+ Jaw opening/closing muscles	
Lateral lingual compression	Superior longitudinal	XII
	Transversus	
Cheek flattens/tenses to hold bolus in contact w/teeth	Buccinators	VII
Tongue tilts its dorsal plane toward working side, while jaw opens and closes to keep food btwn teeth	Inferior tongue muscles	XII
Sensory feedback coordinates tongue position/shape to the moving mandibular arch		
<b>ORAL TRANSIT</b>		
Bolus is medialized on dorsum	Superior longitudinal	XII
Soft palate elevates to close off nasopharynx	Levator veli palatini	IX, X
	Superior constrictor	
	Tensor veli palatini	V
Musculature 'sling' creates tone necessary to support the positive pressure build up	Obicularis oris	VII
	Buccinators	
	Superior constrictor	IX, X
Posterior tongue depresses	Hyoglossus	XII

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Remainder of tongue presses against hard palate (anterior to posterior)	Inferior tongue muscles	XII
Bolus is propelled toward oropharynx		
<b>PHARYNGEAL STAGE (many of these steps occur simultaneously)</b>		
Bolus is divided at level of vallecula and flows down lateral channels		
Swallow motor response is triggered at anterior facial arches OR level of vallecula		
Brain receives afferent signal when bolus enters hypopharynx		
Medulla sends efferent signal to initiate swallow		
Brief period of apnea		
Arytenoids medialize and tilt toward epiglottis	Aryepiglottic	X
Tongue base retracts towards posterior pharyngeal wall, sealing off oral cavity to create necessary pressure to drive bolus propulsion	Palatoglossus	IX, X
	Superior constrictor	
	Hyoglossus	XII
	Transversus	
VP port closes	Styloglossus	
	Tensor veli palatini	V
	Levator veli palatini	X, XI
Hyoid/Larynx elevate anteriorly and superiorly	Superior constrictor	
	Anterior belly of digastric muscles	V
	Mylohyoid	
Pharyngeal squeezing & shortening	Geniohyoid	XII
Epiglottis retroverts		
Vocal folds adduct (.63 sec after arytenoids begin medialization, so airway closure is not complete at level of the glottis until midway thru swallow... bad for swallow delay!)	Thyroepiglottic	XII
	Thyroarytenoids	X
	Transverse arytenoids	
	Oblique arytenoids	
Pharyngeal stripping wave constricts bolus and bolus descends	Lateral cricoarytenoids	
	Superior constrictor	X, XI
	Middle constrictor	X
PES opens (d/t anterior movement of hyoid) to accept bolus	Inferior constrictor	X, XII
	Cricopharyngeus	

“Pressure Point” : Must make complete contact/closure in order to build up enough pressure to propel bolus

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## Muscle Reference List

### **Facial**

- Obicularis oris
- Buccinators

### **Masticatory**

- Temporalis
- Masseter
- Medial pterygoid
- Lateral pterygoids

### **Lingual**

- **Intrinsic**
  - o Superior longitudinal
  - o Inferior longitudinal
  - o Transversus
  - o Verticalis
- **Extrinsic**
  - o Hyoglossus
  - o Genioglossus
  - o Styloglossus
  - o Palatoglossus

### **Hyoid**

- **Suprahyoid**
  - o Geniohyoid
  - o Mylohyoid
  - o Anterior belly of digastric
  - o Posterior belly of digastric
  - o Stylohyoid

### - **Infrahyoid**

- o Omohyoid
- o Thyrohyoid
- o Sternohyoid
- o Sternothyroid

### **Palatal**

- Tensor veli palatini
- Levator veli palatini
- Palatoglossus
- Uvular

### **Laryngeal**

- Thyroarytenoids
- Transverse arytenoids
- Oblique arytenoids
- Lateral cricoarytenoids
- Posterior cricoarytenoid
- Interarytenoid
- Aryepiglottic
- Thyroepiglottic

### **Pharyngeal**

- Cricopharyngeus
- Stylopharyngeus
- Palatopharyngeus
- Salpingopharyngeus
- Superior pharyngeal constrictor
- Middle pharyngeal constrictor
- Inferior pharyngeal constrictor