Swallowing

Swallowing (deglutition) is a complex mechanism that serves to transport food from the oral cavity through the pharynx to the esophagus. We can define the swallowing reflex as a nerve impulse from the medulla oblongata that causes food to move into the pharynx. The mechanism of displacement is esophageal peristalsis. We can divide it into three phases:

- will *controlled*
- *pharyngeal*,
- *esophageal*.

Will controlled phase

In the first phase, the tongue moves the bite back towards the soft palate, thereby stimulating the mechanoreceptors in the area of the pharyngeal isthmus (*isthmus faucium*). This initiates the automatic, uninterrupted swallowing phase.

Pharyngeal phase

The signal from the mechanoreceptors of the palatal arches is carried by afferent fibers of the *trigeminal nerve*, *glossopharyngeus* nerve and *vagus nerve* to the *nucleus tractus solitarii* and *nucleus ambiguus* and then by efferent fibers of the *trigeminal nerve*, *glossopharyngeus nerve,* vagus nerve *and* hypoglossus nerve *(n. V, n. IX, X, n. XII) back to the pharynx.*

The pharyngeal phase takes place in the following steps:

1. **The soft palate is pulled up**, closing the entrance to the nasal cavity. (At the same time, opening the entrance to the Eustachian tube equalizes the pressure on both sides of the eardrum.)
2. **The palatopharyngeal arches** are brought closer to each other by contraction of the *palatopharyngeus muscle*, so that they create a slit through which only sufficiently chewed food can pass, while larger bites cannot reach the pharynx.
3. A **reflexive cessation of breathing** occurs (at any stage of the respiratory cycle). **The vocal cords come closer to each other** and seal the glottis. At the same time, the **larynx is lifted upwards and ventrally** by the pull of the suprahyoid muscles. This leads to the **overturning of the epiglottis**, which is held in place by ligaments, through **the entrance to the larynx** (*aditus laryngis*), which **closes**. These mechanisms prevent food from entering the respiratory tract.
4. At the same time, the elevation of the larynx leads to a widening of the entrance to the esophagus. At the same moment, the **upper esophageal sphincter** is relaxed (strongly contracted between swallows so that air is not sucked into the esophagus during breathing) and the morsel is moved into the esophagus by a peristaltic wave of the pharyngeal muscles.

Summary: during the pharyngeal phase, the trachea is closed, the esophagus is open, and a rapid peristaltic wave moves the food into the upper esophagus. The entire pharyngeal phase lasts 1–2 seconds.

Esophageal phase

In the final esophageal phase, peristalsis continues through the esophagus and moves the morsel into the stomach within 8–10 seconds. This event is controlled by the *vagus nerve*. If a morsel becomes lodged in the esophagus, the distension of its wall induces a **secondary peristaltic wave**. In addition, during the progress of the peristaltic wave, there is a **receptive relaxation of the stomach** (preparation to accept a bite). At the same time, it also **relaxes the lower esophageal sphincter**, which is closed at rest to prevent reflux of stomach contents. Insufficient relaxation of the lower esophageal sphincter can cause achalasia.

Links

Related articles

- Differential diagnosis of swallowing disorders

Sources

ROKYTA, Richard. *Fyziologie pro bakalářská studia v medicíně, přírodovědných a tělovýchovných oborech.* 1. edition. ISV, 2000. 359 pp. pp. 134–135. ISBN 80-85866-45-5.

GUYTON, Arthur C – HALL, John E. *Textbook of Medical Physiology.* 11. edition. Elsevier, 2006. - pp. pp. 782–784. ISBN 978-0-7216-0240-0.

GANONG, William F. *Přehled lékařské fyziologie.* 20. edition. Galén, 2005. 890 pp. pp. 495. ISBN 80-7262-311-7.

SILBERNAGL, Stefan – DESPOPOULOS, Agamemnon. *Atlas fyziologie člověka.* 6. edition. Grada, 2004. 448 pp. pp. 238. ISBN 80-247-0630-X.