The deglutition and conditions affecting it.

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ABSTRACT: Deglutition is a very complicated neuromuscular function starting from the very first moment the man is born, providing to the organism necessary nutrients for growing and maintaining in life.
It takes place in three stages (Anatomical aspects) commencing with a voluntary one and followed by other two involuntary successive reflexes coordinated from the deglutition centre in the medulla near the vegal nucleus and the respiratory centre. However, this fine function may be affected by various conditions (Clinical aspects) analysed in the text.

Key Words: Neuromuscular function voluntary, Involuntary, Oesophageal stenosis, Vascular ring.

INTRODUCTION

ANATOMICAL ASPECTS

First stage (voluntary)

It starts by introducing food into the oral cavity. The anterior part of the tongue raises and presses the hard palate, the soft palate close, the solid food is masticated, mixed with saliva, form the bolus and pushed to the posterior part of the oral cavity by the intrinsic muscles of the tongue (superior and inferior longitudinal, transverse and vertical) mainly by the superior longitudinal, and the transverse. At the same time, by contraction of the geniohyoid, mylohyoid, digastric and stylohyoid, the hyoid bone ascends and becomes fixed. By the action of styloglossi the posterior part of the tongue elevates posterosuperiorly and by the constraction of palatoglossi and approximation of the palatoglossal arches the bolus is squeezed backward into the oral part of the pharynx.

In case of fluids the intrinsic tongue muscles push the fluid back through the mouth into the oral pharynx.

Second stage (involuntary)

It begins as soon as the bolus passes through the oropharyngeal isthmus into the oral pharynx with the elevation of soft palate by the elevator muscles - veli palatini - and by the tensor muscles - tensor veli palatini.

Furthermore, by the contraction of the palatopharyngeal sphincter and the upper fibres of the superior constrictor the bolus approximates to the posterior pharyngeal wall and the pharyngeal isthmus closes preventing its upwards passing.

By the action of stylopharyngeus, salpingopharyngeus, thyrohyoid and palatopharyngeus muscles the larynx and pharynx drawn upwards.

At the same time, in order to prevent the entrance of the bolus into the larynx, the aryepiglotic, oblique arytenoids and thyroarytenoid muscles contract, the aryepiglotic folds are approximated and the arytenoids cartilages are drawn upwards and forwards.

The descend of the bolus into the oesophagus is facilitated by the contraction of the palatopharyngeal muscles which convert the posterior pharyngeal wall into an inclined surface directed downward and backward.

Third stage (involuntary)

The inferior constrictor compresses the bolus into the oesophagus. (Gray's 1973).

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CLINICAL ASPECTS

The function of deglutition may be altered:

In cases of palatine cleft (Gray's 1973, Snell 1995, Ger et al 1996), the frequeney of which, in general, is 1 in 750 births (Sinnatomby 1999). Deglutition malfunction grade depends on the degree of malformation.

In case of oesophageal stenosis due to vascular ring (Godtfredsen et al 1977, Backer et al 1989, Morris et al 2000) or to extrinsic oesophageal compression by regional carcinomas and/or enlarged lymph nodes. There are also cases of intrinsic stenosis due to trauma, infections or radiotherapy (Camidge 2001).

In case of mediastinal vascular anomalies. Normally the right subclavian artery arises from the brachiocephalic trunk and the left one from the aortic arch; however, sometimes the right subclavian artery originates as a last branch from the aortic arch arising directly from it. In its course then to the neck, in order to get in its normal position (Sclavounos 1934-1938, Ellis 1997), it passes behind the trachea and oesophagus and may compress the oesophagus (Kasimos 1976) causing difficulty in swallowing - «dysphagia lusoria» - (Gray's 1973, Ellis 1997, Sinnatomby 1999).

It has also been reported (Gupta and Winslet 2005) that tortuousity of the right common carotid artery; coil of the proximal common carotid artery (Lin et al 2000); aneurysms of the common carotid; aneurysms of the internal carotid artery; aberrant subclavian arteries may also cause extrinsic oesophageal compression (Rowe et al 1994, Nicolosi et al 1995).

In diphtheria soft palate may paralyse, due to the action of the toxin on the nerve cells in the medulla oblongata, with an end result of regurgitation of fluids or food into the nose when swallowing is attempted (Mericas 1973, Gray's 1973, Ellis 1997). These symptoms, usually, last for one or two weeks, rarely more, and finally they disappear (Mericas 1973). Typically patients with different types of oesophageal tumours (Table 1) (McBeth et al 2008), exhibit progressive dysphagia to solids and liquids and about 50% of them experience pain (odynophagia). Other causes of dysphagia may due to acute or late side effects of radiotherapy to the oesophagus. The acute side-effect is mucositis and the late one is benign stricture that is needed endoscopic evaluation, biopsy and dilatation.

In case of hypercalcaemia, which is a common metabolic complication of malignancy, probably because it reduces the contractility of smooth muscles. If its properly treated and the serum calcium normalizes (2,1-2,65 mmol/l) the symptoms of dysphagia rapidly improve (Grieve and Dixon 1983, Balcombe 1999, Amin 2002).

In case of injuries of the hypoglossal nerve (12^{th} cranial nerve) which cause difficulty in swallowing (Gray's 1973).

In cerebral trauma involving the 9^{th}, 10^{th} and 11^{th} cranial nerves (glossopharyngeal, vagus ans accessory) the swallowing reflex is depressed (Gray's 1973, Elli 1997) and foreign material may be aspirated into the pulmonary trunk, especially in cases the patient lies on his/her back position (Ellis 1997).

In patients being unconscious or anaesthetized normal swallowing cannot take place, because the first stage of swallowing is a voluntary one (McMinn et all, 1996). In those patients the tongue muscles relax and the tongue may fall backwards and obstruct the pharyngeal part of the airway (Ellis 1997, Sinnatomby 1999). In such cases the tongue must be pulled forwards in order to restore a patent airway (Sinnatomby 1999). The narcotics depress the central nervous component of the swallowing reflex and normal deglutition is «disturbed» having as a result the aspiration of food or liquids administered (Ellis 1997) with serious consequences.

Table 1. Types of oesophageal tumour.

Type	Example
Benign neoplasms	Adenoma
	Leiomyoma
	Haemangioma
Primary	Adenocarcinoma (65%)
Malignant Neoplasms	Squamous carcinoma (≈25%)
	Others (≈ 5%)
	Small cell carcinoma
	BCC (Basal Cell Carcinoma)
	Adenoid cystic carcinoma
	Mucoepidermoid carcinoma
	Carcinoid
	Lymphomas
	Melanoma
	Leiomyosarcoma
	Gastrointestinal stromal tumour (GIST)
Secondary Malignant Neoplasms	Lung carcinoma
	Breast carcinoma
	Melanoma

Η κατάποση και οι παράγοντες που την επηρεάζουν.

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ΠΕΡΙΛΗΨΗ: Η κατάποση είναι μια τέλεια και σύνθετη νευρομυϊκή λειτουργία, που αρχίζει από την στιγμή που γεννιέται ο άνθρωπος, παρέχοντας στον οργανισμό τα απαραίτητα συστατικά διατροφής για τη διατήρηση στη ζωή.
Περιλαμβάνει τρεις φάσεις (από πλευράς ανατομικής), η πρώτη είναι εκούσια και οι άλλες δύο ακούσιες και αντανακλαστικές με εντολή του κέντρου κατάποσης στο μυελό κοντά στον πυρήνα του πνευμονογαστρικού και του αναπνευστικού κέντρου. Αυτή η τέλεια λειτουργία μπορεί να προσβάλλεται από διάφορες παθολογικές καταστάσεις. Στο κεφάλαιο που ακολουθεί γίνεται μια προσπάθεια να αναλυθούν οι ανατομικές και οι κλινικές καταστάσεις που επηρεάζουν την κατάποση.

Λέξεις Κλειδιά: Νευρομυϊκή λειτουργία, Εκούσια, Ακούσιες, Οισοφαγική στένωση, Αγγειακός δακτύλιος.

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