

# Applied physiology

## Temporal measures:

- Oral Transit Time (OTT)
- Pharyngeal Delay Time (PDT)
- Pharyngeal Transit Time (PTT)
- Oropharyngeal Swallowing Efficiency Score (OPSE score)



# Course Objectives

- Know the normal anatomy of swallowing
- Know the normal physiology of swallowing
- Enumerate different etiologies of oropharyngeal dysphagia
- Be able to do bedside assessment
- Interpret MBS and FEES procedures
- Write MBS and FEES reports
- Put a short-term and long-term treatment plan



# Abnormal oropharyngeal Swallow: Conditions and Diseases

# Definitions

- Swallowing (Phagein = to eat)
- Dysphagia (dis-fa´je-ə)
- Aphagia?
- Coughing
- Choking
- Regurgitation
- Nasal regurgitation

# Definitions (Cont.)

- Penetration
- Aspiration: Prandial → Mendesohn classification

## Aspiration before the pharyngeal stage

***Most common type in central neurological disease***

Due to loss of bolus control during oral phase or to delayed pharyngeal swallow

## Aspiration during the pharyngeal stage

***Least common type of aspiration***

Due to vocal palsy, paresis, or incoordination

## Aspiration after the pharyngeal stage

***Due to inhalation of uncleared residue at the laryngeal inlet***

*Mendelsohn M. New concepts in dysphagia management. J Otolaryngo. 1993;22(Suppl 1):9.*

# Epidemiology

- ❖ 50 – 90 % of normal elderly patients show some degree of dysphagia.
- ❖ 30 – 40 % of stroke patients have dysphagia.
- ❖ 50 % of stroke patients have silent aspiration.
- ❖ 10 – 15 % of stroke patients die of aspiration pneumonia.
- ❖ 90 % of dementia patients demonstrate dysphagia.
- ❖ 70 % of head and neck cancer patients complain of dysphagia.

# Importance

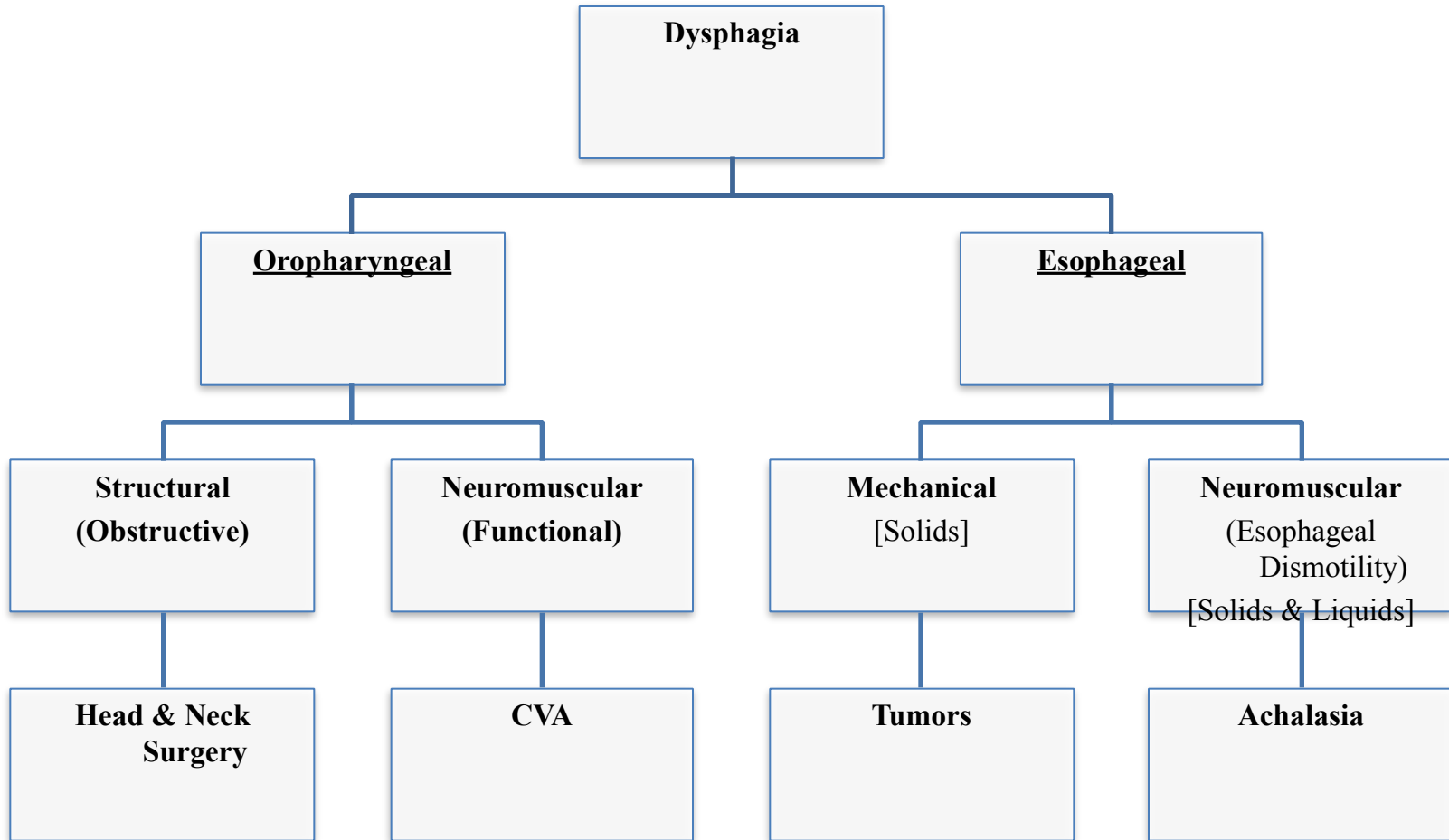
- The average human swallows more than 2000 times in a day and even swallows while asleep.
- It is not surprising that dysphagia produces a significant disability.

# Consequences of swallowing disorders

- Aspiration pneumonia
- Dehydration
- Malnutrition
- Weight loss
- Affect post-treatment recovery
- Quality of life:
  - General health
  - Psychological Well-Being
  - Financial Well-Being



# Causes of dysphagia



# Neurological disorders

Cerebrovascular accident  
Parkinson's disease  
Amyotrophic lateral sclerosis  
Myasthenia gravis  
Polymyositis/dermatomyositis  
Guillain-Barré syndrome  
Dystonia/tardive dyskinesia  
Vocal fold paralysis  
Progressive muscular dystrophy  
Meningitis  
Traumatic brain injury  
Cerebral palsy  
Parkinson's disease and other movement and neurodegenerative disorders  
Progressive supranuclear palsy  
    Olivopontocerebellar atrophy  
    Huntington's disease  
    Wilson's disease  
Torticollis  
Tardive dyskinesia  
Alzheimer's disease and other dementias  
Motor neuron disease (amyotrophic lateral sclerosis)  
Guillain-Barré syndrome and other polyneuropathies

# Neurological disorders (Cont.)

## Neoplasms and other structural disorders

Primary brain tumors

Intrinsic and extrinsic brainstem tumors

Base of skull tumors

Syringobulbia

Arnold-Chiari malformation

Neoplastic meningitis

## Multiple sclerosis

## Postpolio syndrome

## Infectious disorders

Chronic infectious meningitis

Syphilis and Lyme's disease

Diphtheria

Botulism

Viral encephalitis, including rabies

## Myasthenia gravis

## Myopathy

Polymyositis, dermatomyositis, including body myositis and sarcoidosis

Myotonic and oculopharyngeal muscular dystrophy

Hyper- and hypothyroidism

Cushing's syndrome

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Adapted from Perlman AL, Schulze-Delrieu K. *Deglutition and its Disorders*. San Diego, Calif: Singular Publishing Group;1997:322.

# Critical care patients

- Multiple medical conditions
- Nasogastric tubes
- Endotracheal intubation
- LPRD

Possible causes of Dysphagia in the Critical Care Patient: Common Signs and Immediate Trial Treatments

Type	Signs	Possible cause	Treatment
<b>Oral</b>	<b>Buccal pocketing, labial leakage</b>	<b>Facial weakness</b>	<b>Oral motor exercises</b>
	<b>Labored mastication</b>	<b>Lack of dentition, poor cognition</b>	<b>Present food to stronger side</b>
	<b>Premature spill</b>	<b>Lingual weakness</b>	<b>Modify food texture</b>
<b>Pharyngeal</b>	<b>Delayed swallow</b>	<b>Poor oral phase, vagus nerve dysfunction, prolonged intubation</b>	<b>Thermal stimulation</b>
	<b>Deceased laryngeal elevation</b>	<b>Tracheostomy, NGT, suprahyoid muscle dysfunction, edema</b>	<b>Tracheotomy cuff deflation, d/c NGT</b>
	<b>Multiple swallow pattern</b>	<b>Decreased pharyngeal peristalsis/contraction</b>	<b>Alternate liquid and solid swallows</b>
	<b>Cough/throat clear immediately after the swallow</b>	<b>Aspiration secondary to decreased epiglottic deflection, poor oral phase/ Tracheoesophageal fistula</b>	<b>Supraglottic swallow, modify food texture</b>
	<b>Delayed cough, throat clear</b>	<b>Aspiration after the swallow secondary to pooling in the pharynx</b>	<b>Utilize dry swallow, alternating liquid and more solid swallows</b>
	<b>Change in vocal quality</b>	<b>Penetration to the level of the vocal folds Vocal folds weakness</b>	<b>NPL. Modify food texture</b>

# Infectious diseases

- Oral cavity/ Oropharynx
- Chaga's disease
- Deep neck infections
- Laryngeal infections

# Medications

Product Category	Examples	Common Indications	Possible Effects
<b>Neuroleptics</b>			
Antidepressants	Elavil (tricyclic)	Relief of endogenous depression	Drying of mucosa, drowsiness
Antipsychotics	Haldol Thorazine	Management of patients with chronic psychosis	Tardive dyskinesia
<b>Sedatives</b>			
Barbiturates	Phenobarbital Nembutal	Treatment of insomnia	CNS depressant (drowsiness causing decompensation of patients with cognitive deficits)
<b>Antihistamines</b>	Cold and cough preparations	Relief of nasal congestion and cough	Drying mucosa, sedative effects
<b>Diuretics</b>	Lasix	Treatment of edema (eg, associated with congestive heart failure)	Signs of chronic dehydration (dryness of mouth, thirst, weakness, drowsiness)
<b>Mucosal Anesthetics</b>	Hurricane (contains benzocaine)	Topical anesthetic used to aid passage of fiberoptic nasopharyngoscopes, control of dental pain	Suppresses gag and cough reflex
<b>Anticholinergics</b>	Cogentin	Adjunct in Parkinsonism therapy	Dry mouth and reduced appetite

Adapted from Perlman AL, Schulze-Deirieu K. *Deglutition and its Disorders*. San Diego, Calif: Singular Publishing Group; 1997:139.

# Post-Surgical

- Anterior cervical spinal surgery
- Head and Neck surgery
- Skull base surgery
- Floor of the mouth surgery
- Partial glossectomy
- Palate surgery
- Lip surgery
- Mandibular surgery
- Oropharyngeal surgery
- Hypopharyngeal surgery
- Tracheotomy
- Zenker's diverticulum



# Others

- Neoplasms (Intrinsic, Extrinsic)
- Radiotherapy (Acute, Chronic)
- Autoimmune disorders:

Crohn's disease, Epidermolysis Bullosa, Giant Cell Arteritis, Mixed Connective Tissue Disease, Myositis, Pemphigus Vulgaris, Pemphegoid, Rheumatoid Arthritis, Sarcoidosis, Scleroderma, Sjögren's Syndrome, Systemic Lupus Erythematosus, Wegener's Granulomatosis



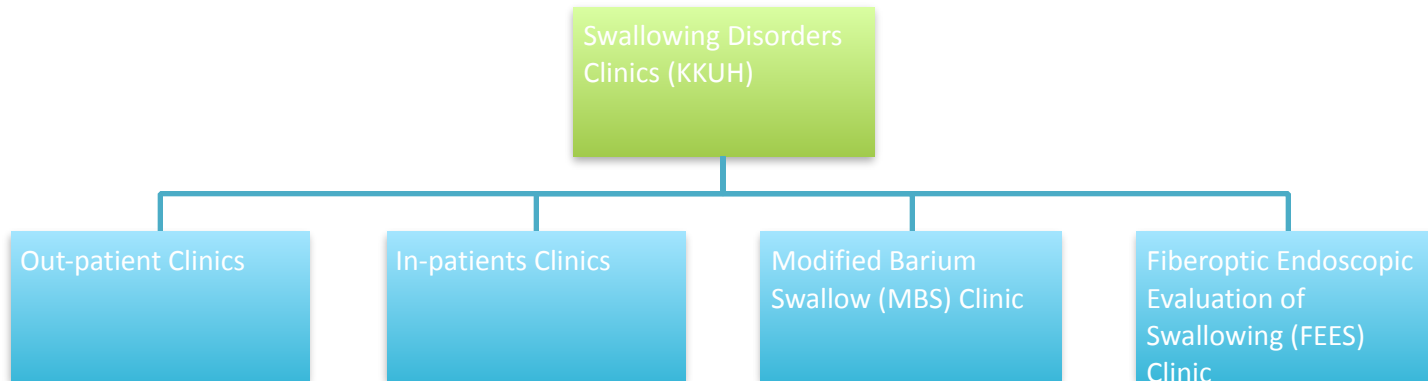
# Assessment of Oropharyngeal Swallowing

# Aim of assessment

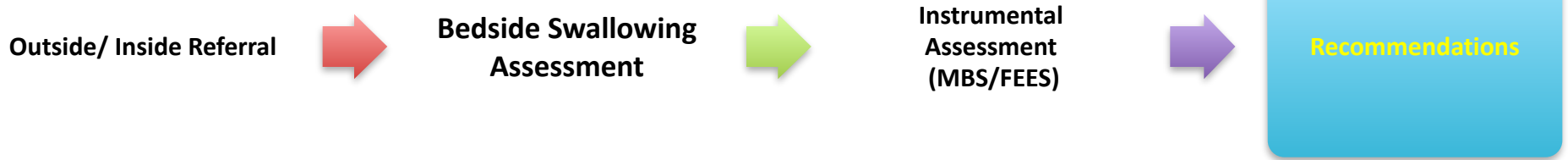
1. Define the nature of the anatomic or physiologic dysfunction(s) in the oral cavity or pharynx which is (are) causing the patient's swallowing difficulty
2. Examine the effectiveness of selected treatment strategies
3. Enable development of a treatment plan in the context of the patient's medical diagnosis and medical history

*Palmer, J.; DuChane, A. and Donner, M. (1991): The role of radiology in the rehabilitation of swallowing. In B. Jones and M. W. Donner (Eds.), Normal and abnormal swallowing: Imaging in diagnosis and therapy (pp. 214-225). New York: Springer.*

# Assessment modalities



# Protocol of assessment



**Sheets**  
Adults      Pediatrics

**Forms**  
MBS/ FEES

