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Treatment of Neurologic Dysphagia

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- Abstract -

Dysphagia consequent to neurologic diseases may be diverse depending on the nature and symptoms of the diseases. The initial step in the management of dysphagia would be systematic and through evaluation of swallowing function in both oral and pharyngo-laryngeal stages. Other important step might be to acquire knowledge on underlying neurologic disorder and its possible impact on swallowing. Specific indirect and direct management strategies that can be applied to specific impairments are presented.

Key Words : Dysphagia, Neurologic disease, Oral, Pharyngo-laryngeal

The clinical approach to the management of neurologic dysphagia must be based upon an understanding of 1) normal structural as well as physiologic-biomechanic characteristics of swallowing; 2) nature of underlying disorder and its possible impact on swallowing; and 3) deviations of swallowing patterns from the normal patterns. The traditional stages of swallowing physiology include oral, pharyngo-laryngeal, and esophageal stages. At oral stage, food manipulation and mastication are performed and the tongue propels food from the anterior of the oral cavity to the back until the swallowing reflex is triggered. Oral stage is considered as voluntary stage of the swallow. Structures related with oral stage include lips, cheeks, mandibles, tongue, hard and soft palates, and anterior and lateral sulci. Pharyngo-laryngeal stage occurs rather reflexively and the bolus is carried through the pharynx. This particular stage compromises a series of actions including velo-pharyngeal closure, pharyngeal peristalsis, hyoid-laryngeal excursion, downward motion of epiglottis, laryngeal closure, and relaxation and opening of cricopharyngeal sphincter. Important structures involved with pharyngo-laryngeal stage include tongue base, hyoid bone, epiglottis, pharyngeal wall, cricopharyngeal sphincter, valleculae, pyriform sinuses, and vocal folds. Esophageal stage begins when the bolus arrives at the upper esophageal sphincter and esophageal peristalsis carries the bolus through the cervical and thoracic esophagus into the stomach.

Medical condition or underlying diseases that might be related with dysphagia can be diverse depending on disease characteristics, progression, lesion loci, medication, and so forth. For example, a patient with medullary cerebrovascular lesion might present with pharyngo-laryngeal dysphagia including incompetent laryngeal closure and poor pharyngeal peristalsis. In contrast, Parkinson 's disease might induce oral dysphagia that is characterized by freezing oral mastication and poor oral transport. General cognitive and language functions need to be screened because reduced such functions observed in a patient with dementia often exert negative impact on swallowing.

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Table 1. *Tasks, Oral-Pharyngeal Mechanism Findings, and Clinical Findings*

Tasks	Oral-Pharyngeal Mechanism Findings	Clinical Findings
Chewing	Limited jaw movements	Difficulty in mastication
Lip puckering-spreading	Incomplete lip closure	Drooling
Puffing cheeks	Weakness/paralysis of facial musculature	Lateral sulci residue
Sensory stimulation of oral cavity with cotton swab/ tongue depressor	Intra-oral hyposensitivity	Pooled oral secretions; Reliance on oral suctioning; Premature spillage into pharyngeal cavity
Tongue movement, range of motion, rate	Reduced tongue elevation, lateralization; Reduced strength & coordication of tongue movement; Reduced rate of movement	Prolonged oral bolus transport; Pocketing of foods in oral cavity; Premature falling of foods into pharyngeal cavity; High correlation with aspiration(*before* swallow)
Gag reflex	Hypo- or hyper-reflex	Any relationship with swallowing reflex?
Intermittent /a- - - / phonation	Soft palate weakness/paralysis	Hypernasality; Liquids regurgitated into nasal cavity; Residue on soft palate/ back of the tongue
Prolonged /a -/ phonation: Volitional cough	Breathy voice quality; Diplophonia; Wet voice quality;	Susceptibility of aspiration due to vocal folds paralysis; High correlation with aspiration(*during* swallow) Silent aspiration
Dry swallow Wet swallow	Reduced or absent ROM of hyoid-larynx & pharyngeal wall	Immediate coughing/ throat clearing; Aspiration (*during/after* swallow); Multiple effortful swallows per bolus

Deviation of normal swallowing pattern can be identified using specific tasks that are related with certain structures and functions in each stage of swallowing. Table 1 presents a series of tasks to be performed to a patient, possible oral-pharyngeal mechanism findings, and correspondent clinical findings.

ETIOLOGIC FRAMEWORK FOR NEUROLOGIC DYSPHAGIA

The neurologic causes for dysphagia are numerous. The principal neurologic causes of dysphagia are as follows: Acquired central disorders including stroke syndromes and vascuclar disorders, movement disorders, poliomyelitis and other systemic infections, amyotrophic lateral sclerosis. Other central disorders comprise dementias, multiple sclerosis, tuberculosis, syphilis, neoplasm, and degenerative disorders. Acquired peripheral disorders include recurrent laryngeal neuropathy, and cranial and other neuropathies. Common neuro-developmental disorders include cerebral palsy. Among the stroke syndromes, brain stem lesion may be very detrimental because strokes of the brain stem affect structures involved in the control of swallowing. It is important to know that specific nuclei and tracts within pons and medulla might be more responsible than others for certain swallowing impairments such as reduced lingual control, delayed or absent swallowing reflex, reduced laryngeal closure, and reduced pharyngeal peristalsis. Of movement disorders that consistently affect swallowing, Parkinson's disease is of importance because tremor, bradykinesia/akinesia, and muscular rigidity might seriously affect oral stage of swallowing function. They might present disrupted lingual control characterized by extraneous lingual movement and inefficient mastication(i.e., rocking motion, freezing event). However, such oral dysphagia is not an early feature of Parkinson's disease and reduced pharyngeal peristalsis and increased crocopharyngeal hypertonicity might be observed in much later stage. Dementia patient might hold bolus in mouth without adequate mastication and

Table 2. *Compensatory Postural Modifications*

Clinical Findings	Postures	Rationale
Inefficient oral transit	Head back	Utilizes gravity to clear oral cavity
Delayed swallowing reflex	Chin down	Widens valleculae, narrows airway entrance
Reduced tongue base retraction	Chin down	Pushes tongue base backward
Unilateral laryngeal dysfunction	Chin down Head turn	Places epiglottis in more protective position Increase vocal fold closure
Reduced laryngeal closure	Head turn	Increase vocal fold closure, narrows laryngeal entrance
Unilateral pharyngeal paresis	Head turn	Eliminates damaged side from bolus path
Unilateral oral & pharyngeal weakness	Head tilt	Direct bolus down stronger side
Cricopharyngeal dysfunction	Head turn	Pull cricoid cartilage away from posterior pharyngeal wall reducing resting pressure in cricopharyngeal sphincter

Table 3. *Compensatory Postural Modifications*

Maneuvers	Goals	Methods
Mendelsohn Maneuver	Heightening laryngeal elevation & cricopharyngeal opening	1. Patient is trained to hold the larynx in its involuntarily initiated, elevated position. 2. Patient is instructed to hold the larynx in the elevated position for 3 to 5 seconds during dry or 1-mL water swallows. 3. Repeat the procedures as needed.
Thermal tactile stimulation	Facilitating swallowing reflex	1. Put a spoon in a cup with cold water or water with ices. 2. Message facial pillars with the spoon without water. 3. Instruct the patient to swallow the saliva. 4. Repeat the procedures as needed.
Supraglottic swallow	Voluntary protection of airway	1. Take and hold a breath. 2. Place food or liquid in the mouth. 3. Swallow once or twice, depending on the efficiency of pharyngeal clearance 4. Clear your throat. 5. Swallow again.
Double swallow	Reducing the residue	Direct the patient to swallow two or three times per bolus
Vocal cord adduction exercise		Pull the bottom of a chair with two hands while sitting and phonating /a- - - /.

decreased motor/sensory functions may result in silent aspiration. A patient with amyotrophic lateral sclerosis may present severe dysphagia if bulbar symptoms are predominant. They may show reduced lingual control and delayed swallowing reflex resulting in aspiration before swallow reflex is induced, that is, aspiration before swallow. Multiple sclerosis can present very heterogeneous swallowing characteristics in nature depending on neurologic lesions but may show reduction in pharyngeal peristalsis and delayed swallowing reflex being predominant. A patient with cerebral palsy mainly present oral stage of dysphagia, but the severity may vary. He may show poor saliva control and disorganized lingual movements, reflexive behaviors or delayed swallowing reflex and we may rarely observe cricopharyngeal dysfunction in him.

MANAGEMENT OF NEUROLOGIC DYSPHAGIA

Aim of dysphagia management needs to be focused on the whole body health of the individual with keeping his/her quality of life in mind. Also, before planning management procedures

Table 4. *Oral-Motor Exercises*

Goal	Tasks	Methods
Increase lip/ cheek function	Lip retraction	Smile, hold 5 seconds, relax and repeat
	Lip protrusion	Round or pucker lips into a “kissing” position, hold in protruded position for 5 seconds, relax and repeat
	Lip press on tongue depressor	Press lips tightly around a tongue depressor for 3-5 seconds while the clinician tries to remove it
	Puff cheeks	Puff cheeks up with air and move the air from one cheek to the other.
Increase tongue function	Tongue extension	Protrude or extend the tongue between the lips, holding the tongue steady and straight. Hold for 3-5 seconds. Relax and repeat
	Tongue retraction	Retract the tongue by humping it posteriorly. Hold for 1-3 seconds. relax and repeat
	Tongue tip up	Open the mouth wide and elevate the tip of the tongue to the alveolar ridge. Hold for 3-5 seconds. Relax and repeat
	Tongue elevation along the palate	Elevate the tongue tip to the alveolar ridge and move it posteriorly along the palate. Repeat 5-10 times
	Tongue side to side	Move the tongue to the left corner of the mouth, and hold it there for approximately 5 seconds. Then move it to the right corner of the mouth and hold. Repeat 5-10 times
	Tongue push forward	Extend the tongue forward and push it against a tongue depressor, or therapist’s finger. Hold for 1 second, then relax. Repeat 5-10 times

and selecting treatment strategies, we have to consider the cognitive function of the patient, not only as it relates to swallow impairments but as it might affect the patient ’s ability to carry out rehabilitation strategies. There are two kinds of management; that is, indirect and direct management. Indirect management does not engage direct hands-on patient contact but includes recommendations given to caregivers by the medical staffs. Indirect management includes structuring the eating environment, modifying utensils, specifying the degree of supervision, modifying food and liquid texture modifications required for safe oral intake.

Direct management, on the other hand, refers to routine rehabilitative practices with the patient. It includes cognitive stimulation, sensory stimulation, compensatory postural modifications, compensatory maneuvers, and oral-motor exercises. Sensory stimulation involves with alterations in food placement within the oral cavity, and modifications in bolus characteristics such as texture, volume, temperature, and taste. Direct application of sensory treatments to regions of the lips, oral cavity and oral pharynx might be useful. Compensatory postural modifications are also effective with patients who can adequately understand the underlying rationale for the modifications and are listed in Table 2. Some postural modification methods are especially useful for those with hemiparesis, resulting in asymmetric dysfunction of oral and/or pharyngeal cavities. Compensatory, rehabilitative maneuvers <Table 3> are also useful only with patients with good cognitive abilities so that they can retain two- to three-step instructions. Therefore, some neurologic patients with reduced cognitive-language abilities(e.g., aphasia, dementia) might not be good candidates using these methods. Oral-motor exercises are also useful for the patients with poor oral control and Table 4 shows specific techniques.

Alternative feeding methods might be necessary for some neurologically dysphagic patients. They include feeding via nasogastric tube, esophagostromy, percutaneous endoscopic gastrostomy, and jejunostomy. However, treatment needs to be designed for the individual patient ’s wants and needs and effectiveness of treatment strategies should be re-evaluated frequently.