Dysphagia and Dysarthria: The Relationship of Sensorimotor-Speech and Swallowing
Duane Trahan, MS, CCC-SLP

Types of Dysarthria

<table>
<thead>
<tr>
<th>Dysarthria type</th>
<th>Lesion locus</th>
<th>Distinctive neurologic deficit</th>
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</thead>
<tbody>
<tr>
<td>Flaccid</td>
<td>Lower motor neurons (cranial and spinal nerves)</td>
<td>Weakness</td>
</tr>
<tr>
<td>Spastic</td>
<td>Upper motor neurons (bilateral)</td>
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<tr>
<td>Mixed</td>
<td>Cerebellum (cerebellar control circuit)</td>
<td>Incoordination</td>
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<tr>
<td>Hypokinetic</td>
<td>Basal ganglia control circuit</td>
<td>Rigidity, reduced range of movement</td>
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<tr>
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<td>Basal ganglia control circuit</td>
<td>Involuntary movements</td>
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<td>Unilateral upper motor neuron</td>
<td>Upper motor neuron (unilateral)</td>
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<td>Two or more of the above</td>
<td>Incoordination, (?)</td>
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<td></td>
<td></td>
<td>Spasticity</td>
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Dysarthria

- May affect the Aerodigestive System related to
  - Timing
  - Vocal quality
  - Pitch
  - Volume
  - Breath control
  - Speed
  - Strength
  - Steadiness
  - Range
  - Tone
Dysarthria and Dysphagia

Comparing Swallowing and Speech

- Swallowing
  - Generally reflexive
  - One of the most primitive behaviors
  - Controlled in large part by the Medulla

- Speech
  - Voluntary
  - Uniquely human behavior
  - Controlled by several higher brain elements
    - Cerebral Cortex
    - Cerebellum
    - Basal Ganglia

Common Neurologic Conditions resulting in Dysarthria & Dysphagia

- Parkinson’s
- Alzheimer’s/Dementia
- Amyotrophic Lateral Sclerosis (ALS)
- Multiple Sclerosis (MS)
- Myasthenia Gravis
- Polymyositis & Dermatomyositis
- Guillain-Barre
- CVA
- TBI/ABI
- Neurosurgical procedures (acoustic neuroma, tumor)
- Cerebral Palsy
- Progressive Supranuclear Palsy

Prevalence of Dysarthria with Dysphagia

- Nishio et al. (2004) strong correlation between Dysarthria and Dysphagia in patients with Neurovascular disease
- Jani et al. (2004) Co-occurrence of Dysarthria and Dysphagia in patients with Neurological disorders was 45%
- Parkes et al. & da Costa (2003) strong relationship between Swallowing and Dysarthria with ALS & significant correlation of Dysphagia and Dysarthria scales
- Latham et al. (2003) Dysphagia is associated with Dysarthria with Progressive Supranuclear Palsy (PSP)
- Suen et al. (2003) Dysarthria was more severe than Dysphagia with Myasthenia Gravis
- Sharir et al. & Laster et al. (2003) Significant relationship between dysphagia and aspiration with Acute Stroke
- Logemann et al. (2003) The best predictor of the presence or absence of an oral stage problem in Dysphagia is Dysarthria
- Horner et al. (2003) Aspiration strongly correlated with the severity of dysphagia (mild, moderate, and severe)

Fig. 1. Distribution of Dysarthria and Dysphagia (n=119).

Nishio (2004)
Occurrence of Communication and Swallowing Disorder

Jani (2014)

Table 1: Summary of differences on basis of diagnosis and occurrence of aphasia, dysarthria, and dysphagia.

<table>
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<tr>
<th>Diagnosis</th>
<th>Aphasia (yes)</th>
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Jani (2014)
**Prevalence amongst Etiology**

![Prevalence amongst Etiology](image1)

**Fig. 2.** Distribution of dysphagia and dysphonia in major categories according to etiology (n = 105).

ALI = Amyotrophic lateral sclerosis, PD = Parkinson’s disease, SCD = spinocerebellar degeneration, CVD = cardiovascular disease.

Nishio (2004)

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**Dysphagia Severity by Type of Dysarthria**

![Dysphagia Severity by Type of Dysarthria](image2)

**Fig. 4.** Proportions of dysphagia severity level in each category of dysarthria type (n = 113).

Nishio (2004)

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**Rating Scale of Dysphagia**

**Table 4.** Rating scale for swallowing disorder

1. Patient takes nothing by mouth secondary to risk of aspiration.
2. Patient takes nothing by mouth but is appropriate for swallowing treatment.
3. Patient is safe for oral intake with a modified diet, and swallowing management precautions such as supervision for bite size and positioning are maintained. This patient is unable to meet nutritional needs only.
4. Patient is safe for oral intake with a modified diet and swallowing management precautions. With these modifications, the patient is able to meet nutritional needs only.
5. Patient is safe for oral intake with either modified diet or swallowing management precautions.
6. Patient is safe for oral intake with premorbid diet and no precautions.

Nishio, Masaki M (2004). Adapted from Yorkston et al.
Prevalence of Dysarthria with Dysphagia

- Overall agreement that Medullary infarcts have high correlation of both
- Impaired tongue movement is significant for both
- Negative correlation between conversational intelligibility and swallowing function is significant
- Regarding neuromuscular dysfunction there is no significant difference between gender or age

Distinguishing Oral Mechanism Findings

i. = Distinguishing when present; ii. = May be present

- Flaccid
  1. Atrophia, Fasciculations, Rapid deterioration & recovery with rest, Nasal regurgitation, Unilateral palatal weakness without stridor
  2. Hyperactive gag, Hypotonia, Dysphagia, Drooling, Unilateral palatal weakness without stridor

- Spastic
  1. Hyperactive gag, Sucking reflex, Snout reflex, Dysphagia, Drooling, Pseudobulbar affect
  2. Dysphagia, Drooling, Reduced ROM on alternate motion rates (AMRs)

- Ataxic
  1. Dysmetric jaw/tongue AMRs
  2. Hypotonia, Head tremor

Distinguishing Speech Findings

i. = Distinguishing when present; ii. = May be present

- Flaccid
  1. Hypernasality, Breathiness, Drooling, Unilateral lower face weakness
  2. Nasal emission, Audible inspiration, Speaking on inhalation, Short phrases
  3. Pitch breaks, Monopitch, Monoloudness, Reduced loudness

- Spastic
  1. Harshness, Low pitch, Slow rate, Strained-strangled quality, Pitch breaks, Slow & regular AMRs
  2. Hypernasality, Breathiness, Short phrases, Equal stress, Monopitch, Monoloudness, Intermittent breathy/aphonic segments

- Ataxic
  1. Excess & equal stress, Irregular articulatory breakdowns, Irregular AMRs, Distorted vowels, Excess loudness variation, Prolonged phonemes, Telescoping of syllables
  2. Slow rate, Slow & irregular AMRs, Inconsistent articulatory errors

- Hypokinetic
  1. Monopitch, Reduced stress, Monopitch, Reduced stress, Slow rate, Inconsistent articulatory errors, Multiple motor tics, Myoclonus of palate/pharynx/larynx/lips/nares/tongue/or respiratory muscles
  2. Hypernasality, Breathiness, Intermittent breathy/aphonic segments

- Hyperkinetic
  1. Irregular AMRs, Distorted vowels, Strangled quality, Phonation/phonetic disorders, Vocal tremor, Voice stoppages, Voice tremor, Voice cessation, Voice irregularity, Voice fremitus, Voice hoarseness
  2. Hypernasality, Breathiness, Prolonged intervals, Sudden forced inspiration/expiration, Voice stoppage/arrests, Transient breathiness, Voice tremor, Myoclonic vowel prolongation, Intermittent hypernasality, Marked deterioration with increased rate, Inappropriate vocal noises, Intermitent breathy/aphonic segments

- Unilateral Upper Motor Neuron
  1. Ø
**Flaccid Dysarthria**

- Generally Lower Motor Neuron (LMN) involvement
  - Cranial Nerves (Medulla, Pons, Midbrain)
  - LMN involving the intercostals & abdominals (12 Thoracic & 1st Lumbar segment)
  - LMN involving the diaphragm (4th Cervical segment)
  - All types of movement are impaired (Voluntary, Automatic, and Reflexive)
- Trauma (32%), Surgical (28%), Neuropathies (25%), Degenerative (ALS, Multiple systems atrophy), Muscle disease (Muscular Dystrophy), Myasthenia Gravis, Neoplastic, Stroke, Infection (Meningitis), Anatomic Malformation, Demyelinating (GB)
- Clinical characteristics
  - Weakness, Reduced Reflexes, Atrophy, Fasciculations, Progressive weakness with use

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**Dysphagia Severity by Type of Dysarthria (Flaccid)**

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**Flaccid Dysarthria**

- Considerations for Oral Swallowing
  - **Trigeminal (V)**
    - Jaw deviation to weak side (U) or hang open (B)
    - Decreased bite, Impaired sensation to face, lip, cheek, tongue, teeth, or palate, Decreased tension of floor of mouth
  - **Facial (VII)**
    - Lower face weakness and loss of tone including lip, cheek, U/B
  - **Glossopharyngeal (IX)**
    - Reduced gag, Brief attacks of severe pain in throat, neck, lower jaw with tongue protrusion or swallowing

- Translation into potential deficits
  - **(V):** Impaired mastication, Impaired extreme jaw opening, Drooling, Buccal / Lingual / Floor of mouth due to sensation, Decreased hyoid elevation
  - **(VII):** Drooling, Impaired sucking, Impaired lip seal, Anterior loss of bolus, Buccal stasis/pocketing
  - **(IX):** No significant issues

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*U/B = unilateral (U) or bilateral (B)*
Flaccid Dysarthria

Considerations for Oral Swallowing

- Vagus (X)
  - Palatal weakness (U/B)
- Accessory (XI)
  - Reduced shoulder elevation and weakened head turn
- Hypoglossal (XII)
  - Tongue weakness (U/B) and deviation (U), Decreased anterior excursion of hyoid

*U/B = unilateral (U) or bilateral (B)

Translation into potential deficits

- (X): Nasal regurgitation. Main issues are pharyngeal and laryngeal
- (XI): Postural issues affecting respiration, may predispose to drooling and anterior loss of bolus; issues for postural strategy consideration
- (XII): Most significant. Global oral deficits: Bolus manipulation & cohesion, Posterior larynx transport, tongue base function, Deceleration and deceleration in tongue base due to weakness. Palatal/roof of mouth stasis. Premature pharyngeal slippage, Vallecular stasis, Stasis at pyriforms,UES inlet (less hyoid excursion)

Considerations for Pharyngeal Swallowing

- Respiratory
  - Reduced vital capacity, Abnormal chest wall movements, Embarrassed glossopharyngeal breathing (Compensatory)
- Laryngeal
  - Incomplete glottal closure (U/B), Increased breaths per minute, Reduced pause frequency and duration, Reduced range and variability

*U/B = unilateral or bilateral

Translation into potential deficits

- Respiratory
  - Poor breath support, Diminished cough, Abnormal respiratory cycle during swallowing, Decreased apneic period during swallowing, Delayed onset of oropharyngeal swallow, Predisposition to penetration and/or aspiration before swallow, Penetration and/or aspiration after the swallow
- Laryngeal
  - Incomplete laryngeal vestibule closure, Incomplete vocal fold closure, Impaired arytenoid-to-epiglottic approximation, Impaired laryngeal elevation, Impaired thyroid-to-hyoid approximation, Reduced or Absent laryngeal sensation, Reduced subglottic pressure

*U/B = unilateral or bilateral

Considerations for Pharyngeal Swallowing (cont...)

- Velo- & Hypopharyngeal
  - Reduced or absent palatal movement (U/B), Reduced or absent pharyngeal wall stasis, Nasal airflow, Reduced pitch range, Reduced overall intensity and intensity range, Extra resonances
- Lingual
  - Reduced sustained lingual force

*U/B = unilateral or bilateral

Translation into potential deficits (cont...)

- Veloopharyngeal
  - Nasal regurgitation, Impaired/fled duct pressure generation of bolus, Impaired constricting bolus (U/B)
- Lingual
  - Impaired tongue base retraction, Decreased pressure generation, Impaired anterior hyoid excursion, Impaired epiglottic inversion, Incomplete laryngeal vestibule closure, Secondary PES dysfunction
- Stasis on base of tongue/vallate (U/B), Penetration during swallow

*U/B = unilateral or bilateral
### Flaccid Dysarthria

- **ALS**
  - Decreased lingual motility, Delayed pharyngeal swallow, Decreased laryngeal elevation, Delayed and reduced duration of UES opening, Aspiration

- **Stroke**
  - Lateral sulci retention, Delayed oral transfer, Delayed pharyngeal swallow, Decreased hyolaryngeal elevation, Unilateral Pharyngeal paresis, Aspiration

- **Carotid Endarterectomy/Cervical Spine Surgery**
  - Decreased hyolaryngeal elevation, Decreased pharyngeal movement, Decreased UES opening, Decreased epiglottic movement, Decreased pharyngeal constriction, Aspiration

### Myasthenia Gravis

- Pharyngeal swallow delay, Reduced pharyngeal motility, Pharyngeal residue, Penetration, Silent aspiration

### Polymyositis & Dermatomyositis

- Pharyngeal, striated esophageal, and laryngeal muscle involvement, Xerostomia, Lingual weakness, UES dysfunction

### Spastic Dysarthria

- **Damage to Pyramidal Tract/Direct Activation Pathway/Upper Motor Neurons and Extrapyramidal Tract/Indirect Activation Pathway bilaterally**
  - Degenerative (40%), Vascular (29%), ALS (14%) Traumatic, Demyelinating, Tumor, Undetermined

- **Speech deficits**
  - Generalized hypertonicity, weakness, immobility, abnormal force physiology, and exaggerated reflexes of virtually all muscles of the speech mechanism produce obvious dysfunction of the articulation subsystem. Speech is slow-labored, and imprecise articulatory efforts, compounded by disturbances of respiration, resonance, and phonation often render speech unintelligible

- Dysphagia is common and sometime severe
Spastic Dysarthria

- Considerations for Oral Swallowing
  - Diminished chewing
  - Decreased frequency of swallowing
  - Slowed jaw, lip, and facial movements
  - Reduced ROM of and strength of tongue
  - Slowness and reduced range of individual and repetitive movements
  - Reduced force of movements
  - Excessive muscle tone
  - Hyperactive gag
  - Oral reflexes may be present
    - Sucking, Snout, Jaw Jerk

- Translation into potential deficits
  - Food avoidance, Increased mastication time, Impaired mastication, Pharyngeal deglutition
  - Drooling, Impaired secretion management
  - Delayed oral prep and oral initiation of swallow
  - Impaired/Discoordinated bolus manipulation/cohesion/posterior transport, Premature spillage; Oral block
  - Fatigue, Increased meal time
  - Reduced tongue base retraction
  - Palatal stasis, Vallecular stasis

- Considerations for Pharyngeal Swallowing
  - Respiratory
    - Reduced inhalatory & expiratory volumes, respiratory efficiency, maximum vowel prolongation; Paradoxical breathing in which abdominals fail to relax during inhalation
  - Laryngeal
    - Decreased laryngeal airflow, increased subglottal pressure, glottal resistance, Hyperadduction of true & false cords during speech (resulting in underlying hypofunction), Slowed laryngeal movements

- Translation into potential deficits
  - Respiratory
    - Poor breath support, Diminished cough, Abnormal respiratory cycle during swallowing, Decreased apneic period during swallowing, Delayed onset of oral pharyngeal bulk
  - Laryngeal
    - Incomplete laryngeal vestibule closure, Incomplete vocal fold closure, Incoordination of pharyngeal/laryngeal structures
    - Penetration (U/B) and/or aspiration during and/or after the swallow

*U/B = unilateral or bilateral
Spastic Dysarthria

- Considerations for Pharyngeal Swallowing (cont…)
  - Velo- & Hypopharyngeal
    - Slow velopharyngeal mvmt, incomplete velopharyngeal closure
  - Lingual
    - Reduced: speed and range of tongue/jaw/palatal mvmts, tongue strength, sustain maximum tongue contraction, oral pressures

- Translation into potential deficits (cont…)
  - Velopharyngeal
    - Nasal regurgitation, Impaired/loss of positive pressure generation of bolus, Diminished pharyngeal stripping wave
    - Penetration/aspiration after the swallow, Stasis in valleculae/lateral channels/pyriform sinuses (U/B)
  - Lingual
    - Impaired tongue base retraction, Decreased pressure generation, Impaired anterior hyoid excursion, Impaired epiglottic inversion
    - Oral ataxis, Stasis on base of tongue/valleculae (U/B), Penetration during swallow

*U/B = unilateral or bilateral

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Ataxic Dysarthria

- Associated with damage to the Cerebellar control circuit. Characteristics are more evident in articulation and prosody
- Reflects the effects of incoordination and reduced muscle tone
- Degenerative (35%), Demyelinating (17%), Undetermined, Vascular, Toxic/Metabolic, Traumatic, Inflammatory, Tumor
- Oral mechanism exam is often normal and reflexive swallow is usually normal on casual observation

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Spastic Dysarthria

- TBI
  - Decreased oral control, Decreased BOT retraction, Delayed pharyngeal swallow, Decreased hyolaryngeal elevation, Aspiration
- Pseudobulbar Palsy
  - Slow/Inadequate chewing, Difficulty with bolus formation and movement, Slowed initiation of swallow, Pharyngeal residue, Aspiration
Ataxic Dysarthria

• Considerations for Oropharyngeal Swallowing
  • Usually reported with progressive ataxias
  • Related to discoordination of oral, pharyngeal, laryngeal, and respiratory movements mainly during volitional movements
  • Issues are usually involved in the Oral stage of swallowing

• Translation into potential deficits
  • Incoordination of bolus preparation & mastication
  • Diminished mastication
  • Premature spillage
  • Piecemeal deglutition
  • Oral stasis (labial and buccal sulci)

Ataxic Dysarthria

• Considerations for Oropharyngeal Swallowing
  • Respiratory &/or Laryngeal
    • Abnormal and paradoxical rib cage and abdominal movements, Reduced vital capacity 2/2 incoordination, Voice tremor, Increased shimmer & jitter, Increased voice onset time, Increased pitch, Poor laryngeal control or laryngeal-supraglottic timing errors

• Translation into potential deficits
  • Respiratory
    • Poor breath support, Diminished cough, Abnormal respiratory cycle during swallowing, Delayed closure of vocal cords, Decreased apneic period during swallowing, Delayed onset of oropharyngeal swallow,
    • Predisposition to penetration and/or aspiration before and during swallow with liquids, Penetration and/or aspiration after the swallow with solids
Ataxic Dysarthria

- Considerations for Oropharyngeal Swallowing
  - Velopharyngeal
    - Inconsistent velopharyngeal closure
  - Lingual
    - Difficulty initiating purposeful movement, slow tongue movement, reduced range and velocity, reduced or restricted anterior-posterior movement during vowel production

- Translation into potential deficits
  - Velopharyngeal
    - Intermittent nasal regurgitation
  - Lingual
    - Impaired bolus control/cohesion, premature spillage, impaired bolus transit and coordination between lingual and pharyngeal structures, impaired bolus propulsion
    - Labial and Buccal stasis, Pilemeal deglutition, Pharyngeal residue, aspiration before/during swallow, Valлеcular stasis, Pyriform stasis

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Ataxic Dysarthria

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<th>Case</th>
<th>Sex</th>
<th>Age</th>
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<th>咽 head</th>
<th>UES relaxation</th>
<th>Bolus in pharynx</th>
<th>Palatal</th>
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*Stasis typically cleared with repeat swallow

Ataxic Dysarthria

- Multiple Sclerosis
  - Decreased bolus formation, delayed pharyngeal swallow, decreased pharyngeal constriction, decreased UES relaxation

- Progressive Ataxias
  - Dysphagia occurs less often than dysarthria
  - Premature spillage, pilemeal deglutition, pharyngeal residue, aspiration
Hypokinetic Dysarthria

- Associated with Basal Ganglia
- Characteristics are most evident in voice, articulation, and prosody
- Effects of rigidity, reduced force and ROM, and slow individual but sometimes fast repetitive movements on speech
- Degenerative (78%), Vascular, Undetermined, Toxic/Metabolic, Trauma, Infectious
- Parkinson’s & Parkinsonism (58%)
- Occurrence of swallowing problems in PD ranges from 40-80% and are usually preceded by Dysarthria
  - Questionnaire and Patient reports are not predictive of results related to swallowing when compared to instrumental studies
  - Suggestive of sensory deficits
  - Studies with Questionnaires only may significantly underreport presence of Dysphagia

Occurrence of swallowing problems in PD ranges from 40-80% and are usually preceded by Dysarthria

- Questionnaire and Patient reports are not predictive of results related to swallowing when compared to instrumental studies
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- Studies with Questionnaires only may significantly underreport presence of Dysphagia

Progressive Supranuclear Palsy (16% initially, 83% later stages)

- Very accurate in expressing swallowing difficulties via questionnaire
- Suggestive of intact sensory perception
- Dysphagia is most prominent; Dysarthria is common, but not as frequent as Dysphagia; Dysarthria is not always associated with Dysphagia

Dysphagia Severity by Type of Dysarthria (Hypokinetic)

![Chart showing dysphagia severity by type of dysarthria](image)
Hypokinetic Dysarthria

Considerations for Oral Swallowing
- Decreased swallow frequency
- Tremor of jaw/lips/tongue
- Decreased peak movement of lips/jaw/tongue
- Delayed initiation of movement
- Sensory or perceptual deficits

Translation into potential deficits
- Drooling, impaired secretion management
- Increased oral preparation and mastication time
- Lingual pumping
- Bolus cohesion and transit
- Premature spillage
- Oral stasis
- Delayed initiation of pharyngeal swallow
- Predisposition to penetration and aspiration
- Lack of awareness of deficits

Considerations for Pharyngeal Swallowing

Respiratory
- Reduced vital capacity, amplitude of diaphragmatic movement, strength & endurance, increased pressure, max phonation time, increased respiratory rate, difficulty in Begin expiration
- Irregular breathing patterns, paradoxical rib cage & abdominal movements

Laryngeal
- Bowled TVCs, tremulous arytenoid cartilages, asymmetry of arytenoids & cricothyroid, decreased intensity, pitch & loudness, decreased phonation time
- Voice tremor, dysphonia

Translation into potential deficits
- Poor breath support, diminished cough, abnormal respiratory cycle during swallowing, decreased apneic period during swallowing, fatigue
- Predisposition to penetration and aspiration
- Inadequate secretion elimination before swallow, sensation of aspiration after the swallow, silent aspiration

Laryngeal
- Incomplete vocal fold closure, impaired laryngeal elevation
- Penetration and aspiration during and/or after swallow, inability to clear penetrated or aspirated material

Considerations for Pharyngeal Swallowing (cont...)

Velopharyngeal
- Increased nasal airflow during speech, reduced velar movement

Lingual
- Reduced amplitude & velocity of tongue & jaw stability, tongue endurance and strength, speech rate
- Abnormal tremor at rest and active/passive movement

Translation into potential deficits (cont...)

Velopharyngeal
- Nasal respiration, impaired/loss of positive pressure generation of bolus, diminished pharyngeal stripping wave
- Penetration/aspiration after the swallow, stasis in velopharyngeal lateral channel/pyriform sinuses

Lingual
- Impaired tongue base retraction, decreased pressure generation, impaired anterior hyoid excursion, secondary PES dysfunction
- Oral stasis, Stasis on base of tongue/valleculae, Stasis in pharynx/UES inlet, Predisposition to penetration and aspiration after swallow from residual

Laryngeal
- Impaired vocal fold closure, impaired laryngeal elevation
- Penetration and aspiration during and/or after swallow, inability to clear penetrated or aspirated material
Hypokinetic Dysarthria

- Parkinson’s
  - Lingual tremor, Multiple lingual gestures, Increased oral transit time, Premature spillage, Pharyngeal swallow delay, Decreased laryngeal elevation and closure, Decreased UES relaxation, Oral and pharyngeal residue, Penetration, Aspiration as the disease progresses

- PSP
  - Decreased tongue mobility, Premature spillage, Pharyngeal swallow delay, Impaired laryngeal movement, Pharyngeal residue, Increased velar incompetency, Impulsive, Poor regulation of quantities placed in oral cavity

Hyperkinetic Dysarthria

- Most often associated with disease of the basal ganglia
- Product of abnormal, rhythmic or irregular and unpredictable, rapid or slow involuntary movements
- Clinical characteristics include: Dyskinesias, Myoclonus, Tics, Chorea, Ballismus, Athetosis, Dystonia, Spasm, Tremor
- Unknown (67%), Toxic/Metabolic (12%), Degenerative (9%), Infectious, Vascular

Considerations for Oropharyngeal Swallowing

- Variable depending on characteristics
- Chorea
  - Oral: Quick/unpredictable involuntary movements of tongue/velum/mouth/jaw, Inability to sustain steady head/tongue/jaw/facial postures, Reduced ROM and incoordination of tongue & lips
  - Pharyngeal: Choreiform movements of laryngeal structures, Sudden/forced/involuntary inspiration or expiration

Translation into potential deficits

- Chorea
  - Oral: Disordered oral prep, Impaired mastication, Premature spillage of inadequately masticated solids and liquids, Nasal regurgitation, Anterior loss of bolus, Impaired bolus transit
  - Pharyngeal: Loss of bolus pressure generation, Penetration or aspiration of liquids and solids, Risk for inhalation of food/liquid, Inability to maintain breath hold during swallowing, Valleculae stasis, Pyriform stasis
Hyperkinetic Dysarthria

Considerations for Oropharyngeal Swallowing

- Dystonia - dysphagia is often underdiagnosed (>50%)
  - Oral: Spasms leading to mouth opening/closing, lip pursing/retraction, & protrusion or rotary movements of tongue;
  - Pharyngeal: Spasms may elevate larynx, Torsion of neck/torticollis
- Myoclonus
  - Transient complaints of dysphagia; mainly related to timing of swallowing
- Spasmodic Dysphonia
  - Generally dysphagia stems from treatment (Botox)

Translation into potential deficits

- Dystonia
  - Oral: Disordered oral prep, Impaired mastication, Impaired bolus cohesion, Premature spillage of inadequately masticated solids and liquids, Anterior loss of bolus, Impaired bolus transit, Oral stasis
  - Pharyngeal: Asymmetric pharyngeal transit, Penetration or aspiration of liquids, Vallecular stasis, Pyriform stasis
- Myoclonus
  - Penetration or aspiration before the swallow, Intermittent hypopharyngeal stasis clearing with repeat swallow
- Spasmodic Dysphonia
  - After Botox: Thin liquid aspiration

Hyperkinetic Dysarthria

- Tardive Dyskinesia
  - MBS findings: Tongue thrust, disorganized tongue movements, pharyngeal pooling, aspiration
- Huntington’s Disease: 85%
  - MBS findings: Lingual chorea, asynchronicity of respiration and swallowing, continual postural changes that impact oral and pharyngeal motility, tachyphagia – rapid unregulated swallowing, excessive belching (eructation)
- Dystonia
  - Difficulty coordinating swallowing with respiration, Impaired chewing, Premature spillage, Pharyngeal swallow delay, Vallecular residue

Treatment

- Chorea
  - Postural and compensatory strategies, Early intervention to prevent maladaptive behaviors, Adaptive equipment, Dietary modifications and alterations, PEG for supplemental with transition to primary with disease progression
  - Some evidence to support respiratory retraining, Vocal fold adduction and Oral motor exercise in adjunct to pharmacological tx
- Dystonia
  - Botox injections. May result in worsening of dysphagia symptoms and changes in impairment
Unilateral Upper Motor Neuron (UMN) Dysarthria

- Damage to the Upper Motor Neuron pathways
- Usually reflect the effects of weakness, but sometimes spasticity and incoordination are implicated
- Vascular (90%), Traumatic (4%), Tumor (4%)
- Swallowing correlates with severity of dysarthria
- Speech is often slurred, thick, or slow and deteriorates under fatigue or stress
- May occur in conjunction with Apraxia, Aphasia, and/or Cognitive deficits

Dysphagia Severity by Type of Dysarthria
(Unilateral Upper Motor Neuron)

Nishio (2004)

Unilateral UMN Dysarthria

Considerations for Oropharyngeal Swallow
- Oropharyngeal
  - Unilateral (U) lower facial weakness
  - Decreased force of (U) jaw movement
  - Reduced strength, speed, and endurance of (U) lip and tongue movement

Translation into Potential Deficits
- Oropharyngeal
  - Decreased bolus manipulation/ cohesion
  - Diminished bolus/ pharyngeal transport
  - Hypopharyngeal stasis

Oral/Velopharyngeal
- Decreased bolus manipulation/ cohesion
  - Mild buccal/FOM stasis
  - Trace nasal regurgitation
  - Fatigue with mastication

Respiratory
- Fatigue with meals

Laryngeal/Pharyngeal
- Incomplete laryngeal vestibule closure
  - Aspiration risk during swallow

*U/B = unilateral (U) or bilateral (B)
### Mixed Dysarthria

- Distributed across two or more divisions of the nervous system
- Accounts for approximately 30% of all dysarthrias
- Recognition of each component of a Mixed dysarthria may help rule out certain neurologic diagnoses or make other diagnoses more likely
- Degenerative (66%), ALS (43%), Vascular (11%), Traumatic, Multiple causes, Demyelinating, Tumor

### Dysphagia Severity by Type of Dysarthria (Mixed)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flaccid-Spastic</td>
<td>42%</td>
<td>ALS (88%), Vascular (5%), Other</td>
</tr>
<tr>
<td>Ataxic-Spastic</td>
<td>23%</td>
<td>Vascular (17%), Demyelinating (13%), CNS degenerative disease (12%), Inflammatory, Cerebellar degeneration, Spino-cerebellar degeneration, Tumor, Trauma, Other</td>
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<tr>
<td>Hypokinetic-Spastic</td>
<td>7%</td>
<td>Degenerative CNS disease (39%), PSP (20%), Vascular (20%), Multiple (15%), Other</td>
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<tr>
<td>Ataxic-Flaccid-Spastic</td>
<td>6%</td>
<td>ALS (59%), Vascular (18%), Other</td>
</tr>
<tr>
<td>Hyperkinetic-Hypokinetic</td>
<td>3%</td>
<td>Parkinson’s (67%), Other</td>
</tr>
<tr>
<td>Other types</td>
<td>19%</td>
<td></td>
</tr>
</tbody>
</table>
Mixed Dysarthria

- Considerations for Oropharyngeal Swallow
  - Variable dependent on etiologies
  - Next to Spastic Dysarthria, has highest rate of co-existing Dysphagia ranging in all severities

Degenerative Disease

- Identifying typical changes in speech and swallowing that occur at the onset of each disease that can be used to identify the disease entity
- Are there progressive and predictable changes
- How long can the patient continue to eat by mouth
- What techniques can prolong oral feeding

Sudden-Onset versus Degenerative Neurologic Disorder

- Sensitivity to aspiration appears to be significantly reduced, indicated by failure to cough
- If there is a cough, may be non-productive in clearing aspirated material
- Unaware of swallowing disturbances and deny swallowing problem
- Lack of awareness of residue material in the pharynx; therefore, often do not dry swallow to clear residue
- High potential for silent aspiration before, during, and even distantly after swallowing
- Sensory deficits may be result of sudden neurologic deficit; or of desensitization by the presence of residue and aspiration chronically
- Fatigue
Management/Treatment

- Medical management
- Pharmacological/Surgical
- Communication needs
- Nutritional needs
- Restoring lost function
- Promoting use of residual function
- Prosthetics/AAC.

Structures/Functions involved in both deficits
- Similarities/Differences

References

- Daniels, S. K. (2006). Neurological disorders affecting oral, pharyngeal swallowing. GI Motility online
- Giddens, C. L., & Ramig, L. "Speech and Swallowing Disorders in Chorea."
References