Maximizing Swallowing Function in the BI Population

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Maximizing Swallowing Outcomes in Patients with Traumatic Brain Injury

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Background

- Dysphagia in patients with severe TBI has been reported to be as high as 93% (Hansen et al.)
- Patients with severe TBI admitted to ICU are at specifically elevated risk for developing pneumonia early in their stay. (H Sieh et al)
- Early intervention from the swallowing team has been shown to decrease risk of pneumonia and improve likelihood of safe PO intakes

Basic anatomy

- Swallowing occurs in 3 sequential phases that require coordinated muscle function
- Central processing centers: Cerebral cortex ➞ Medulla ➞ Cranial Nerve Nuclei ➞ Cranial Nerves

Increased Vulnerability in TBI patients

- Primary Factor: Diffuse nature of lesion increases risk of damaging structures crucial for intact swallowing
- Secondary Factors:
  - Prolonged comatose status
  - Seizure activity
  - Cognitive/Behavioral/Linguistic disturbances
  - Decreased frequency of swallowing/atrophy
### Common Deficits

- Terre et al found that 90% of patients with severe TBI had abnormal finding on MBS.
- Oral phase deficits:
  - Bolus transit time
  - Impaired lingual control
  - Piecemeal deglutition
- Pharyngeal Deficits:
  - Delayed swallow initiation
  - Decreased airway protection
  - Diminished laryngeal sensation

### Malnutrition

- Decreased food intake depresses muscle glycotic enzyme activity which reduces total force and high frequency response (Jeejeebhoy)
- Muscular rehabilitation cannot occur in absence of functional/intact nutrition
- Use of modified diets can have a deleterious impact on nutritional status (Davis et. Al)

### Treatment Options: One size does NOT fit all.....

- **Indirect Therapy**
  - Diet Modification
  - Structuring method of intakes (equipment, positioning, environmental modifications)

- **Direct Therapy**
  - Enhancing motor function (NMES, Biofeedback, Strengthening regimen)
  - Use of compensatory techniques (effortful swallow, chin tuck, supraglottic swallow, double swallow)

### Scores on Rancho Los Amigos Scale of Cognitive Functioning

Scores were BEST prognostic factor
Subskills that must be addressed

- Alertness and Orientation
- Cognitive, perceptual and behavioral status
- Positioning and proximal control
- Self Feeding
- Oral/pharyngeal Sensation
- Oral/Pharyngeal Motor function

Alertness and Orientation

- Prefeeding activity may be appropriate at RLA Level 3
- At Level 4, Patients may be appropriate for limited PO intakes
- At RLA 6, patients may be cognitively appropriate for full PO diet
- Promotion of self feeding can facilitate attention to eating

Cognitive/Behavioral Impairments

- Behavioral modification techniques may include:
  - Structured eating environment (Tippett et al.)
  - Paced Prompting
  - Reauditorization
  - Set-up to attend to neglected side
  - Non verbal cues with quiet environment

Positioning and Proximal Control

- Poor body positioning can have deleterious impact on airway protection, self feeding and oral/pharyngeal muscle strength
- Use of adaptive seating devices can facilitate optimal O-M performance and assist with progression from puree to chopped food (Hulme et al)
- 90% hip flexion, 90% knee flexion with a neutral ankle position and trunk/head in midline. Arms on tabletop.
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Self Feeding

- Patients who can feed self have improved bolus acceptance from the utensil with improved preparation and transit
- Guided hand to mouth movements are recommended as opposed to passive feeding (Groher 1992)
- Maximize oral sensory exploration during intakes

Oral/Pharyngeal sensory disorders

- Quantify impact of different foods/textures on abnormal sensory responses
- Modify volume and viscosity of boluses to maximize oral motor responses (Dantas et al)
- Presenting boluses with increased sensory loading (thermal/gustatory properties) can elicit improved sensory proprioception with appropriate desensitization (Groher, 1992)

Biofeedback:

- Basmajian, and DeLuca, 1985
  “The technique of using equipment to reveal to human beings some of their internal physiologic events, normal and abnormal, in the form of visual and auditory signals in order to teach them to manipulate these otherwise involuntary or unfelt events by manipulating the displayed signals”

In other words...

- It gives patients the ability to SEE small motor movements
<table>
<thead>
<tr>
<th>TBI and Tracheostomy</th>
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<tbody>
<tr>
<td>I Use of One-Way Speaking valves (PMV) can promote decreased LOS with more rapid time to decannulation (LeBlanc et al)</td>
</tr>
<tr>
<td>I One way Speaking valve promotes significant reductions in Penetration-Aspiration scale scores (PAS) and secretion levels (Blumenfeld et al)</td>
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<tr>
<th>Impact of dysphagia on medical prognosis and use of hospital resources (Altman et al.)</th>
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<tr>
<td>I Mean length of stay for patients with dysphagia was 4.04 vs. 2.4 in normal swallowing patients (average cost per patient day: $2,454)</td>
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<td>I Patients with chief diagnosis of CVA/TBI + dysphagia had &gt;7 day LOS 73.9% of the time</td>
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<td>I Rehab patients had a 13 fold increase in risk of mortality with co-existing dysphagia</td>
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<tr>
<td>I Patients with dysphagia had increased use of</td>
</tr>
<tr>
<td>- Antibiotics</td>
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<tr>
<td>- Endotracheal intubation</td>
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<td>- Delayed d/c planning due to enteral feeding needs</td>
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