Diagnosis, Incidence, and Treatment of Dysphagia after Spinal Cord Injury

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Disclosures

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Kazuko Shem, MD; Kathleen Castillo, MA, CCC-SLP; and Stephanie Kolakowsky-Hayner, PhD have no financial interest to disclose.
Objectives for this 90 minute presentation include:

1.) Presenting and discussing the pros and cons of various methods for evaluation of dysphagia.

2.) Explaining at least two basic noninvasive approaches to treatment.

3.) Sharing results of a prospective study on incidence, risk factors and diagnosis of dysphagia after spinal cord injury.
Obtaining CME/CE Credit

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What is dysphagia?

Defined....

swallowing dysfunction affecting the regular transport of food from the mouth to the stomach
Why is dysphagia important?

- Dysphagia can cause aspiration.
- In an able-bodied person, aspiration can result in:
  - Pneumonia/ Chemical pneumonitis
  - Dehydration/malnutrition
  - Sepsis
  - ARDS
  - Death
Cost of Missing Dysphagia

• In SCI, same medical morbidities as seen in the general population

• Additionally:
  – Significantly longer wean time from ventilator
  – Intubation / Reintubation
  – Tracheostomy placement
  – Hinder rehabilitation course
  – Deconditioning
  – Longer length of hospital stay
  – Increased cost of care
Common Risk Factors in SCI

- Oral intubation
- Tracheostomy
- Anterior spine surgery
- Anterior osteophytes
- GERD
- Bronchoscopy
- Ventilator dependence
- Supine position
- Gastrointestinal hypomotility
- Iatrogenic – medications leading to N/V or further slowing of GI motility
- Advanced age
- Cervical orthoses/halo
Risk Factors for Dysphagia
Anterior Surgical stabilization

- Interruption of motor/sensory innervation from dissection and retraction of structures in the larynx and pharynx
- Implanted hardware protrudes into esophagus, similar to anterior cervical spine OA
Risk Factor for Dysphagia: Tracheostomy

1. Desensitization of the larynx → impaired glottic closure reflex
2. Increased extrinsic esophageal pressure → regurgitation
3. Reduction in laryngeal elevation
   Incomplete opening of cricopharyngeal muscle
4. “Prevents exhalation through larynx”
   Exhalation normally occurs after swallowing; upward airflow helps clear residual in the larynx
Prior Studies in SCI

- Wolf: 80% incidence in Germany
- Kirshblum: Incidence of 22.5% of population complaining of dysphagia
- Shem: Incidence of 71% in high tetraplegic patients
Early Identification

• High index of suspicion for dysphagia in any SCI involving the cervical levels.

• In acute period, medical interventions are often exacerbating causes:
  – Cervical spine surgery, tracheostomy, NG tube placement, cervical orthoses, supine position

• Silent aspiration is common and easily missed by “screen protocols.” An experienced speech language pathologist is most ideal person to evaluate for dysphagia.
Questions to ask when considering to start oral feeding

• What is the current vital capacity?
• Any O2 requirements? > 40%
• What is the color, viscosity and amount of secretions.
• How is the pt handling their oral secretions?
“Quit complaining and eat it! ... Number one, chicken soup is good for the flu, and number two, it’s nobody we know.”
Bedside Swallow Evaluation (BSE)

Evaluation of dysphagia at the bedside using solids and liquids
Signs & Symptoms of Dysphagia

• Watery eyes
• Runny nose
• Decreased excursion of larynx with either palpitation and/or observation
• Uncoordinated laryngeal movement
• Audible swallow

• Coughing or choking before/during/after a swallow
• Drooling
• Wet/ “gurgley” vocal quality
• Patient tells you they have difficulty swallowing
• Weight Loss (all other causes ruled out)
• Recurrent Pneumonia
Bedside Evaluation

Advantages & Disadvantages

• Pt does not leave the room
• Can be done in bed or in wheelchair
• In the position the pt will be in when eating
• Can evaluate endurance
• Less costly

• Relying on clinical judgment
• Skills vary from one therapist to another
• Certainty of results may take a 24h/48h
Video Fluoroscopy Swallow Study (VFSS)

A radiographic study used to evaluate oral, pharyngeal and esophageal dysphagia
Advantages of VFSS

• Can determine WHY a pt is aspirating
• Results are immediate
• Can be reviewed by multiple staff
• Aspiration/penetration is obvious
• Determine if strategies are effective
Disadvantages of VFSS

- Pt must be able to sit up, leave the room and have enough endurance
- More labor intensive (RCP, Nsg, SLP, Radiologist)
- Pt is in a special chair that is NOT a natural position
- Costly
- Radiation exposure
- Food mixed with barium and tastes like
“Quit complaining and eat it! …
Number one, chicken soup is good for the flu,
and number two, it’s nobody we know.”
Objectives

1. To determine the incidence of and risk factors for dysphagia in individuals with SCI
2. To determine if BSE is as effective in diagnosing dysphagia as with VFSS
3. To describe timing of resolution of dysphagia
Methods

• Design: Single-center, prospective study
• BSE were conducted as soon as deemed clinically safe
• VFSS were conducted within 72 hours of BSE
• Subjects with dysphagia were followed while inpatient until resolution of dysphagia or till discharge
• One SLP performs all studies to minimize interoperator variability
• 2nd SLP blinded would make diet recommendations on VFSS to avoid bias
Methods

• Individuals with acute tetraplegia
  – Age > 18
  – Admitted to SCI unit
  – No pre-injury swallowing dysfunction
  – No oral or nasal intubation
  – No cognitive deficits
  – No Rotorest bed
Data Collection

- AIS / Level of Injury
- Age / gender
- Time since injury
- Premorbid risk factors: osteophytes, GERD, lung disease
- Cervical orthoses/halo
- Intubation
- Tracheostomy
- Spinal fusion approach
Results

• 76 patients enrolled

• Level of Injury:
  – 74% had high tetraplegia (C4 or higher)  n=56
  – 26% had lower cervical tetraplegia  n= 20

• Incidence of dysphagia = 30%, n=23
## Results

<table>
<thead>
<tr>
<th></th>
<th>With Dysphagia</th>
<th>Without Dysphagia</th>
<th>p values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>23</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Age (Years)</td>
<td>48.0 ± 18.6</td>
<td>39.2 ± 16.5</td>
<td>0.056</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Length of stay (Days)</td>
<td>47.6 ± 20.0</td>
<td>39.8 ± 17.9</td>
<td>0.12</td>
</tr>
<tr>
<td>Days to wean</td>
<td>37.5 ± 18.8</td>
<td>42.2 ± 14.9</td>
<td>0.68</td>
</tr>
<tr>
<td>Days to decannulate</td>
<td>49.9 ± 12.9</td>
<td>50.3 ± 15.6</td>
<td>0.98</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>16</td>
<td>14</td>
<td>0.001</td>
</tr>
<tr>
<td>Bronchoscopy</td>
<td>5</td>
<td>5</td>
<td>0.187</td>
</tr>
<tr>
<td>Reintubulation</td>
<td>4</td>
<td>2</td>
<td>0.206</td>
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</table>
# Risk Factors

<table>
<thead>
<tr>
<th></th>
<th>With Dysphagia</th>
<th>Without Dysphagia</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG Tube</td>
<td>4</td>
<td>1</td>
<td>0.012</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>17</td>
<td>23</td>
<td>0.014</td>
</tr>
<tr>
<td>Mechanical Ventilation</td>
<td>15</td>
<td>21</td>
<td>0.04</td>
</tr>
<tr>
<td>Halo</td>
<td>2</td>
<td>1</td>
<td>0.16</td>
</tr>
<tr>
<td>Complete Injury</td>
<td>8</td>
<td>25</td>
<td>0.32</td>
</tr>
<tr>
<td>Collar</td>
<td>14</td>
<td>33</td>
<td>0.76</td>
</tr>
</tbody>
</table>
## Diet Recommendation

<table>
<thead>
<tr>
<th>Diet Type</th>
<th>BSE (n=76)</th>
<th>VFSS (n=33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>53 (69.7%)</td>
<td>19 (57.6%)</td>
</tr>
<tr>
<td>Dysphagia Ground</td>
<td>5 (6.6%)</td>
<td>2 (6.1%)</td>
</tr>
<tr>
<td>Dysphagia Puree</td>
<td>2 (2.6%)</td>
<td>2 (6.1%)</td>
</tr>
<tr>
<td>Mechanical Soft</td>
<td>7 (9.2%)</td>
<td>7 (21.2%)</td>
</tr>
<tr>
<td>NPO</td>
<td>9 (11.8%)</td>
<td>3 (9.1%)</td>
</tr>
</tbody>
</table>
# Liquid Recommendations

<table>
<thead>
<tr>
<th></th>
<th>BSE (n=76)</th>
<th>VFSS (n=33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Liquid Restrictions</td>
<td>35 (46.1%)</td>
<td>15 (45.5%)</td>
</tr>
<tr>
<td>Ice Chips</td>
<td>2 (2.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Carbonated Liquids</td>
<td>2 (2.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Thin Liquids</td>
<td>32 (42.1%)</td>
<td>15 (45.5%)</td>
</tr>
<tr>
<td>No Liquids</td>
<td>5 (6.6%)</td>
<td>3 (9.1%)</td>
</tr>
<tr>
<td></td>
<td>Failed BSE</td>
<td>Normal BSE</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Failed VFSS</strong></td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td><strong>Normal VFSS</strong></td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td><strong>VFSS not performed</strong></td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td><strong>Total BSE</strong></td>
<td>23</td>
<td>53</td>
</tr>
</tbody>
</table>
Conclusions

• Videofluoroscopic swallowing study (VFSS) is the gold standard for diagnosis of dysphagia.

• Compared to VFSS, bedside swallowing evaluation (BSE) is 100% sensitive and 84% specific.
When to use BSE or VFSS

• Almost always do BSE first
• May start a diet and advance as tolerated without doing VFSS
• If any question of aspiration
  VFSS
• Purpose of VFSS is to determine WHY
Conclusions

- Incidence of dysphagia is 30%.
- Risk Factors
  - NG tube
  - Tracheostomy
  - Mechanical Ventilation
- There were NO cases of “missed” dysphagia with BSE.
- Dysphagia resolved within 14.1 ± 9.5 days excluding those who still had dysphagia on discharge.
Summary

• Early evaluation for dysphagia
• Impact on participation in rehabilitation
• Reduce medical complications
• Shorten time to acute inpatient rehabilitation
• Significant risk factors
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