Dysphagia and stroke

- Prevalence of dysphagia ranges from 25%-70% in patients who have experienced stroke
  - Estimates vary because of method of assessing swallowing function, timing of assessment, and number and type of stroke patients studied
- High incidence of dysphagia and pneumonia in patients with stroke

Converging evidence about neurology of swallowing

- Common sites of involvement are evident
- Distributed neural network
  - Both cerebral hemispheres and subcortical structures
  - Involvement of multiple levels
    - May induce more severe or protracted dysphagia

Consequences of dysphagia

- Mortality
- Malnutrition
- Dehydration
- Pneumonia

How can we identify dysphagia?

- Screening
- Clinical evaluation by SLP
- Instrumental evaluation by SLP

- Incidence of dysphagia per type of procedure:
  - Screening 37-45%
  - Clinical exam by SLP 51-55%
  - Instrumental testing 64-78%
  - Martino et al 2005
For Primary Stroke Center certification, The Joint Commission (TJC) previously required a dysphagia screen be conducted prior to any patient receiving any food, fluids or medication by mouth.

Beginning in January 2010 the Joint Commission no longer required primary stroke centers to report data regarding dysphagia screening for stroke performance measure 7 (STK-7) to maintain primary stroke center certification.

However primary stroke centers will be required to follow clinical practice guidelines regarding dysphagia screening, monitor results and track patient outcomes.

Why screening should continue (Lakshminarayan et al 2010)

- 18,017 patients in registry
- Classified as:
  - Unscreened US 4,509 (25%)
  - Screened and passed S/P 8,406 (47%)
  - Screened and failed 5,099 (28%)

Utility of dysphagia screen

- Screened patients were significantly more impaired
- Suggests patients are selectively screened
- Pneumonia rates
  - US 4.2%
  - S/P 2.0%
  - S/F 6.8%
- After adjusting for demographic and clinical features, US patients were at higher risk of pneumonia compared to S/P

Does Dysphagia Screening Work?

- What are the expected outcomes?
  - Correct identification of potential dysphagia
  - Correct implementation of precautions
  - Correct triage for further assessment
  - Appropriate intervention for dysphagia
  - Improved health status outcome
- Lower incidence of dysphagia-related complications such as aspiration pneumonia, prolonged length of hospital stay, death

NPO except meds?

- Case study Leder & Lerner 2012
- 71 year old male deemed at risk for aspiration due to coughing with thin liquids
- An aspirated 5cc puree bolus elicited a cough reflex and a pill was expelled from the trachea (that had been given some time before that)
Screen vs. Evaluation/Assessment

- SCREEN
  - Seeking signs and symptoms that suggest patient is at risk
  - Quick, efficient, safe for patient at highest risk
  - Does not give: physiology, merely provides information

- EVALUATION/ASSESSMENT
  - Provides physiological data
  - In depth history
  - Observation
  - Considerable expertise by clinician
  - Invasive

Does Dysphagia Screening Work?

- SLP literature focuses almost exclusively on correct identification of aspiration
- The accuracy of identification has usually been measured in two ways:
  - In comparison to a subsequent instrumental examination
  - By looking at the incidence of an ultimate health status consequence (pneumonia rates, length of stay)

Some Big Problems…

- Cough does not necessarily indicate aspiration
- Cough does not necessarily indicate ejection of material from the larynx
- Absence of cough does not necessarily rule out silent aspiration
- Absence of cough does not rule out other swallowing problems (e.g. residue)

What about cough? (Ward et al 2010)

- VC and RC are both impaired in hemispheric stroke patients, despite preserved expiratory muscle strength.
- Sensory pathways seemed intact
- Cough coordination is probably cortically modulated and affected by hemispheric stroke.

Debated Techniques

- Observing “wet voice” as an indicator
- Water swallow test
  - High false positive rate in study with patients with variety of disorders
- Pulse Oximetry (desaturation as an indicator)
- Laryngeal Cough Reflex (absence of cough to irritant chemical as indicator)

Commercially available or screening tools found in the literature-examples

- TOR-BST
- Gugging Swallowing Screen
- Barnes Jewish Acute Stroke/Acute Stroke Dysphagia Screen
- 3 oz water swallow
Systematic Review  Schepp et al 2011

- What standardized protocols have been described
- How do protocols compare with respect to reliability, validity, and feasibility as defined by ease of training and administration
- What are the challenges of screening?

Another systematic review  Daniels et al 2012

- Only 1 study used dysphagia as the outcome measure.
- Aspiration or risk of aspiration (laryngeal penetration with residue) was the outcome measure in the remaining studies.
- Items generally achieved either high specificity or high sensitivity (>80%).

Systematic review cont’d

- Only 1 item, the water swallow test (WST) administered in 10 5-mL volumes, achieved both high sensitivity and specificity;
- However, this study did not achieve a high score for methodological rigor.
- Most studies reported only validity for single items;

Systematic review cont’d

- However, 1 study reported that the presence of any 2 of 6 clinical items improved validity over single items (sensitivity 92%, specificity 67%) in determining risk of aspiration
- Abnormal volitional cough
- Abnormal gag reflex
- Dysarthria
- Dysphonia
- Cough or throat clear after swallowing
- Voice change after swallowing

Systematic review

- Another study found that a combination of 4 of these same features achieved better validity (McCullough et al 2001)
- Using logistic regression, unilateral jaw weakness, dysphonia, and global judgment of aspiration on the 3-oz WST were identified as the best combination of features to identify aspiration
  - McCullough et al 2005

Conclusions

- A WST appears to be an important part of screening; however, the most valid protocol remains to be determined.
- Cough and wet voice after swallow typically used
- Given inconsistent validity for most items, it appears that a cluster of swallowing and non-swallowing features may achieve both high sensitivity and specificity.
One hospital’s approach—Baptist Health-Lexington in 2005

- Literature review (ASHA FAQ on screening)
- Item selection, review and revision
- Training
- Competency validation
- We conducted inter-rater reliability b/t the nurse and the SLP for two years. The best we achieved was 90%

Bedside/clinical evaluation by SLP

- Usually the first step in assessing a patient
- Sometimes it is all that can be done
- If treatment for suspected pharyngeal disorder is based solely on bedside evaluation, patient is placed at risk

Bedside/clinical evaluation by the SLP

- Identification of patients warranting instrumental testing
- Develop hypothesis of etiology of dysphagia
- This evaluation yields important information about the oral phase of the swallow and..
- Provides clues about the pharyngeal phase
- Develop thoughts about management program

What should the clinical exam include?

- Review of medical records
- Evaluation of:
  - Cognition (e.g. responsiveness, comprehension)
  - Oral motor skills
  - Sensation
  - Speech & Voice
  - Swallowing

Predicting risk of aspiration

Daniels et al 1997 & 1998

- Consecutive stroke patients
- Six features were predictive of identifying risk of aspiration

- Abnormal volitional cough
- Abnormal gag reflex
- Dysarthria
- Dysphonia
- Cough after trial swallow
- Voice change after trial swallow

Identification of any 2 of the 6 clinical features was accurate in identifying risk of aspiration

- Sensitivity – 92%
- Specificity – 67%

McCullough et al 2001

- High sensitivity with presence of 2 of 6 of the same clinical predictors
- High specificity required 4 of the 6 clinical predictors
Leder & Espinosa (2002)

- Used Daniels 6 factors
- Consecutive acute stroke patients (N=49)
- Examined within 24 hours of admission
- Some differences in how risk of aspiration was defined and different protocols
- Sensitivity = 86%
- Specificity = 30%
- Underestimated aspiration risk in patients with aspiration risk and overestimated aspiration risk in patients who did not exhibit aspiration risk

Mann Assessment Swallowing Ability: Risk ratio example (Mann & Hankey, 2001)
- Clinical items as independent predictors of dysphagia (measured radiographically)
- Age > 70
- Male
- Disabling Stroke (Barthel < 60)
- Palatal weakness or asymmetry
- Incomplete oral clearance
- Impaired pharyngeal response (cough/gurgle)

Risk ratio example (Mann & Hankey, 2001)

- Clinical predictors of aspiration
- Delayed oral transit
- Incomplete oral clearance

McCullough et al 2005

- N=165 patients within 6-weeks of stroke
- Compared clinical swallow evaluation with videofluoroscopic evaluation
- Best measures of aspiration: 3-oz water swallow test-judgment of aspiration
  - Presence of dysphonia
  - Jaw weakness

Clinical judgment

- Research indicates that most SLPs can rule in aspiration when it is present BUT
- Ruling out aspiration when it is absent is difficult to do

Comparison MBS & FEES®

- Oral phase observed
- Pharyngeal wall and tongue base movement during swallow
- Elevation and forward motion of larynx
- Opening of cricopharyngeus
- Tipping of epiglottis
- Movement of bolus during swallow
- Structures of the larynx and pharynx
- Amount and location of secretions
- Laryngeal sensation
- Closure of true cords
- Arytenoid movement
- Residue in lateral channels
Reliability MBS (McCullough et al 2001)

- Intra-judge reliability on measures of:
  - Penetration-aspiration
  - Lingual function
  - Oral residue
  - Vallegual residue
  - Pyliform sinus residue
  - Hypopharyngeal residue
- Inter-judge reliability of most measures (with exception of aspiration yes/no) varies among clinicians
- Unacceptable
- Are acceptable

What MBS shows with stroke (Rowe et al 2009)

- Determined probability of aspiration from measures of swallowing pathophysiology observed on MBS
- Aspiration was observed in 52% of subjects
- Pharyngeal transit time
- Swallow response time
- Laryngeal closure duration
- If these factors could be translated into something observed on clinical exam, could help direct intervention

Examining swallow recovery with MBS (Daniels et al 2006)

- Small study with normals and stroke
- Pen/Asp is not the only important measure
- Looked at OTT, PTT and STD
- Importance of determining acute and protracted dysphagia with multiple measures of swallowing, not just airway invasion

FEES and stroke (Warnecke et al 2009)

- Prospective study in 300 acute stroke patients
- No airway compromise, decreased LOC, bradycardia, tachycardia, laryngospasm or epistaxis
- Self-limiting nosebleeds 6%
- Did not differ per type of stroke or treatment strategy or secondary prevention regimen
- Excellent tolerance (patient rating) in >80%

Endoscopic Assessment–Simple Dysphagia Score (Dziewas et al 2008)

- 100 patients within 72 hours of stroke onset
- Secretion status evaluated
  - No pooling of secretions
  - Pooling w/o penetration or aspiration
  - Pooling with penetration or aspiration

Endoscopic Assessment –Dysphagia Score

- When corrected for age and NIHSS score on admission, saliva penetration/aspiration was highly predictive of later need for orotracheal intubation
- Rate of aspiration as compared to penetration was significantly higher with liquids than with puree or soft solids

Nancy B. Swigert, M.A., CCC-SLP, BRS-S
Endoscopic Assessment – Dysphagia Score

- Patients showed aspiration or penetration without protective reflex more than twice as often when being given liquids than puree or soft solid
- Pen/Asp at any stage predicted failure at subsequent step with high probability
- Safe swallow at any stage was less predictive of further course of exam *note the order of items presented

Dysphagia Score

- They use the hierarchy to determine if the patient should have NGT and if fed, what kinds of food/liquid
- Some methodological problems
  - exam was terminated when pen/asp occurred at any step
  - Selection bias – only patients with known risk factors for dysphagia were included (dysarthria, facial palsy)

Measuring change in physiology and quality of life


Outcomes measured:
- Lingual strength-increase in maximum isometric pressures
- Bolus flow-reduction in pharyngeal residue
- Pen-Asp scores - reduced
- Quality of life (SWAL-QOL)-All scores increased, with significant changes in: fatigue; communication; mental health

Measuring change in health status

- More direct impact on cost of care to the health care system
- Elmstahl et al (1999)
  - studied 38 stroke patients
  - after treatment, 60% of cases showed improved levels of albumin and total iron-binding capacity
  - concluded swallowing treatment improves swallow functions, and improved swallow function associated with improvements in nutritional parameters

Reduced cost of care: pneumonia

- The average marginal cost of pneumonia on hospitalization was $27,633
- The data indicate that pneumonia after stroke is associated with higher mortality and hospitalization costs.
  - Wilson 2012

Reduced cost of care-pneumonia

- Doggett et al 2001
- Lit review and analysis of programs for evaluating swallowing in order to prevent aspiration pneumonia
- Implementation of dysphagia programs is accompanied by substantial reductions in pneumonia rates
Reduced cost of care: screening program to reduce aspiration pneumonia

Survey of 15 institutions over one year
Total of 2532 patients with stroke
Overall adherence to dysphagia screen 61%

Hinchee et al (2005)

<table>
<thead>
<tr>
<th>No formal screening program</th>
<th>Formal screening program</th>
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<tbody>
<tr>
<td>• 57% adherence to dysphagia screen</td>
<td>• 78% adherence to dysphagia screen</td>
</tr>
<tr>
<td>• Pneumonia rate 5.4%</td>
<td>• Pneumonia rate 2.4%</td>
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Reduced cost of care-pneumonia

• Study highlighting cost effectiveness in stroke
• 39% failed initial swallow screen which resulted in altered dietary texture and intervention
• No aspiration pneumonia
• “Early swallow screening and dysphagia management in patients with acute stroke reduces risk of aspiration pneumonia, is cost effective, and assures quality of care with optimal outcome”

— Odderson et al, 1995

Reduced cost of care and reduced mortality

Ickenstein et al 2010

• Development of formal screening and evaluation program for patients with stroke
  — Hospital in Germany
• After initiation of screening/evaluation protocol, mortality dropped from 7.4% to 4.2%
• Rate of pneumonia reduced from 9.0% to 2.8%
• Reduced rate of pneumonia resulted in less antibiotics
  — Cost savings of 50% on medications

Dysphagia management

• Coordinated approach to dysphagia management
• Speech-Language Pathologist often the team leader
• Other members of the team:
  • Nursing
  • Patients and families
  • Physicians
  • Occupational therapists

Treating the patient following CVA with a swallowing disorder

• The speech-language pathologist must understand the patient’s cognitive abilities:
  — Attention
  — Language
  — Memory
  — Visuo-spatial ability
  — Executive functions

Goals of dysphagia management

• Rehabilitate the dysfunction
• Prevent aspiration, dehydration and malnutrition
• Re-establish oral intake
• Improve quality of life
Swallowing treatment

- Rehabilitative/facilitory techniques
  - Designed to improve function
  - E.g. Mendelsohn maneuver, Shaker exercise

- Compensatory strategies
  - Designed to compensate for lost function
  - Postural
  - Diet

Diet modifications

- Based on clinical exam and instrumental exam, recommendations are usually made for modification in diet
  - Texture
  - Thickness of liquids

While swallowing treatment is occurring, necessary to ...

- Prevent aspiration
- Prevent dehydration
- Prevent malnutrition

- A comprehensive approach is needed

What are the components of a comprehensive dysphagia management program?

- Aggressive and consistent oral care
- Appropriate positioning
- Tube feeding
- Oral Feeding
- Treatment plan for safe PO intake
- Modified diet
- Compensatory techniques to use when swallowing
- Treatment to improve swallowing function

Reducing the risk of aspiration

- Positioning for tube feeding
  - Head of bed elevated
  - Care taken during transfers and transport
    - Turning off tube feeding does not necessarily eliminate risk of reflux and aspiration of tube feeding

Reducing the risk of aspiration

- Positioning for oral feeding
  - Specifics provided by the SLP’s recommendations
  - Upright
  - Remain upright after eating
    - If reflux is suspected, 1-2 hours