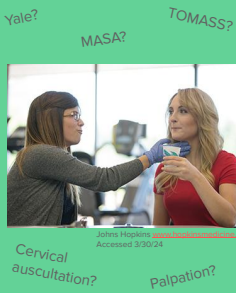


The Common Case of Ears vs. Eyes: Why Dysphagia Must Be Visualized

Christina Everett, M.S. CCC-SLP

Most swallowing assessments begin with a bedside swallow eval, and the quality of that screening procedure is critical to ensuring that the patients who need an instrumental assessment receive one.



Sensitivity: Few false negatives. Almost everyone who has the condition is identified. Very few people who have the condition will go untreated.



Toward 100% sensitivity: There will be false positives. **People will be labeled as having the condition who actually don't.**

Specificity: Few false positives. Almost everyone who is diagnosed as having the condition actually has it. Very few people will be falsely diagnosed.

Toward 100% specificity: There will be false negatives. **Some people who have the condition will be missed and go untreated.**

Virvidaki 2018

- Meta-analysis of sensitivity/specificity of bedside swallow evaluation measures
- Aspiration or aspiration risk was the primary outcome in the majority of the studies.
- 5 had higher specificity, 12 had higher sensitivity
 - The sensitivities of the tests for identifying aspiration risk ranged from 65.2% to 100% and their specificities ranged from 30% to 84.4%

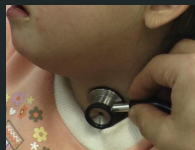
Edmiaston et al. ³³	Four screening items: mental status (Glasgow Coma Scale score <13), and presence of facial, tongue, or palatal asymmetry or weakness	VFSS	Dysphagia	Sensitivity=94% Specificity=66% PPV=71% NPV=93%
Barnes Jewish Hospital Stroke Dysphagia Screen	Subjective signs of aspiration on 90-ml. WST		Aspiration	Sensitivity=95% Specificity=50% PPV=41% NPV=96%
Antonios et al. ³⁶	Physician-weighted screening of 12 items: alertness, cooperation, respiration, expressive dysphasia, auditory comprehension, dysarthria,	Evaluation of dysphagia by SLPs using the MASA ³²	Dysphagia	Sensitivity=92.6% Specificity=86.3% PPV=79% NPV=95%
Modified MASA	saliva, tongue movement, tongue strength, gag reflex, voluntary cough, and palate movement (maximum score=100)		Aspiration	Sensitivity=93% Specificity=53%

Virvidaki 2018

Cervical Auscultation

"Cervical auscultation is the use of a listening device, typically a stethoscope in clinical practice, to assess swallow sounds and by some definitions airway sounds. Judgments are then made on the normality or degree of impairment of the sounds. Listeners interpret the sounds and suggest what might be happening with the swallow or causing impairment."

Leslie et al. 2007



Pocketdentistry.com
Accessed 3/30/24

A history of auscultation



Melnick Medical History Museum

Physician use of auscultation...is it accurate and reliable?

Pulmonary	Cardiac	Intestinal
Sensitivity: 30%-47% Specificity: 85%-92%	Sensitivity: 30%-100% Specificity: 28%-100%	Sensitivity: 22%-32%
"Auscultation can be considered not clinically useful in making a diagnosis in most circumstances." "We must reconsider the use of the stethoscope." Arts 2020	"It is difficult to decide the diagnostic utility of auscultation as a clinical examination...In general, medical doctors should not rely too much on auscultation alone." Davidsen 2022	"Our results approximated those of guessing" "Auscultation of bowel sounds is not a useful clinical practice when differentiating patients with normal versus pathologic bowel sounds." Felder 2013

So why do physicians continue to use auscultation?

"Although there appears to be limited medical reason to detect bowel sounds...auscultation assumes greater importance in the patient's eyes. Sitting down by a patient's bed and listening for bowel sounds in an unhurried and contemplative manner, projects the image of a concerned and thoughtful physician, even if it is performed as a matter of tradition."

Felder 2013

Cervical Auscultation In the bedside swallow examination

- Earliest research was completed in the fields of developmental medicine and pediatric neurology with the swallow sounds of suckling infants, with goal of identifying penetration/aspiration of milk
- Use of CA for assessing dysphagic adults is first described in the literature around 1994

Vice 1990, Bosma 1990, Takahashi 1994, Zenner 1995

Lagarde 2015

- Systematic review of literature on cervical auscultation (CA) from studies completed from the 1990s through 2014
- Only two studies were found to meet all measures of good methodological quality - Stroud 2002 and Bergstrom 2014
- These studies present a sensitivity ranging from 86%–88%, and a specificity ranging from 50%–56%.

Jaghbeer 2022

SLPs chosen for this study met the following requirements:

- Minimum 2 years experience in dysphagia management
- Regularly using CA as part of their clinical practice
- Previous attendance of a minimum 1 day CA workshop

All participants were given an additional 1 hour training developed by the research authors.

103 swallow-respiratory sounds were recorded via a Littmann E-3200 (electronic) stethoscope

"Raters were...advised to rate in one-hour blocks, using noise canceling headphones or in-ear-piece with a good fit, in a quiet room."

	Does the patient have dysphagia? n=23	What is the patient's dysphagia severity? n=23
Statistical analyses		
Correlation with FEES $r_s=0.62$		
Sensitivity	80.1%	
Specificity	22.9%	
aROC	0.52 (CI=0.42-0.61)	
Intra rater exact agreement	95%	48%
Intra rater close agreement		88%
Intra rater reliability	Gwet's ACI = 0.9	Kw = 0.49 (CI=0.33-0.65)
Inter rater reliability	Kf=0.30 (CI=0.22-0.38)	Kw=0.41 ^a (CI=0.16-0.64) ^b
PPV	74.7%	
NPV	28.9%	
FP (type I error)	77.1%	
FN (type II error)	19.9%	
Exact agreement	65%	27%
Close agreement		81%

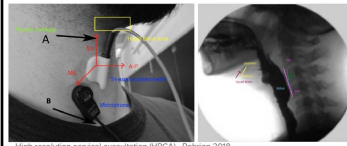
n = Number of patients, r_s = Spearman's Correlation Coefficient, aROC = Area Under the Receiver-Operating Curve, CI = Confidence Interval (95%), Kw = Weighted Kappa, ^a = mean of all 28 Weighted Kappas, ^b = mean of all low limits and upper limits, Kf = Fleiss' kappa, PPV = Positive Predictive Value, NPV = Negative Predictive Value, FP = False Positive, FN = False Negative

Jaghbeer 2022

Much of the newer research in CA focuses on more advanced technology than a traditional stethoscope - technology that is not generally available to practicing clinicians.



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High resolution cervical auscultation (HRCA) - Rebrion 2018

However, a clinician browsing articles/abstracts to find evidence about CA may not recognize this important factor when interpreting results.

Case Study: "Virginia"

76 y/o female
PMH of Parkinson's Disease and COPD

Hospitalized in January for acute SBO and bilateral PNA leading to acute respiratory failure requiring several days of intubation. NG tube was placed.

Hospital SLP was consulted following extubation.

Day 1 (eval)

"Pt demonstrated diminished swallow sounds per cervical auscultation. Exhibited overt s/s pen/asp with ice chip trials.

Pt to remain strict NPO."

—

Day 2

"Overt s/s of aspiration including a significantly weakened cough.

Recommending continued NPO."

—

Day 3

"PO trials were deemed unsafe and not attempted due to respiratory status.

Continue NPO."

—

Day 4

"Ice chips x3 were tolerated with no overt s/s of difficulty. With ½ tsp of thin liquid x2, delayed cough noted.

Pt to remain NPO with 1-3 ice chips every few hours after oral care."

—

Day 6

"PO trials of 2 ice chips and a spoon coating of NTL.

Cervical auscultation revealed mistimed swallow sounds...and breath sound changes with each trial indicative of possible pen/asp. Immediate, strong, persistent coughing.

Recommend strict NPO with oral care."

—

Day 7

"PO trials of ice chips and spoon coating of NTL.

Cervical auscultation initially revealed improved swallow sounds during first ice chip trial; however, abnormal swallow sounds were noted during last swallow. Breath sounds worsened throughout remaining trials.

Recommend NPO. Pt to initiate Masako and CTAR exercises."

—

Day 8

"Pt was presented with an ice chip, which resulted in immediate and persistent strong coughing...PO trials were deemed unsafe.

Recommend strict NPO."

—

Day 9

"Pt was given ice chips x3 and ¼ tsp bites of ice cream x5. Pt exhibited a cough after the first ice chip...pt was given bites of the ice cream...pt tolerated w/o overt s/s distress.

Pt is slowly making progress. Continue NPO for safety."

—

Day 10

"Pt was presented with ice chips x2. Pt tolerated the first without difficulty. Abnormal swallow sounds were audible with cervical auscultation during the second ice chip trial. Pt demonstrated immediate overt s/s asp. Coughing was strong and pt demonstrated clear vocal quality and breath sounds.

Continue NPO. Clinician discussed potential long-term alternative means of nutrition."

—

Day 11

"Pt was given small teaspoons of water from spoon with no overt s/s penetration or aspiration."

(Teaching of swallowing exercises was primary portion of therapy)

"Continue NPO with ice chip protocol."

Day 13

"Trials with ice chips x6 with no overt s/s aspiration. However, she presents with gurgly vocals after PO trials."

Continue NPO with ice chip trials."

Day 14

"Trials with ice chips x6 with no overt s/s aspiration. However, she presents with gurgly vocals after PO trials."

Continue NPO with ice chip trials."

SLP made recommendation for PEG. PEG was placed on the following day .

Day 15

"Pt exhibited cough after first ice chip trial. ½ tsp of applesauce yielded no overt s/s aspiration. Continue NPO with PEG for nutrition."

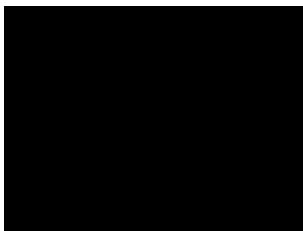
Patient was discharged on Day 17 to SNF for rehab.

Clinician at SNF evaluated patient and also observed the same things that the hospital SLP had noted:

- Coughing (sometimes weak/strong, sometimes immediate/delayed)
- Gurgly vocal quality

However, what the SNF clinician did differently was recognize that ears alone are not sufficient. She ordered an instrumental evaluation of swallowing, which was completed 3 days after patient arrived at SNF.

First, let's take a listen



Now let's take a look



Does cervical auscultation have a place in the BSE?

There is no strong evidence that CA, in its current clinical use, improves the accuracy of dysphagia identification at bedside. Additionally, when clinicians assume that cervical auscultation DOES provide more diagnostic information, they may be LESS likely to follow-up with a true diagnostic assessment (MBSS or FEES).

Does cervical auscultation have a place in the BSE?

As technology improves, advanced CA techniques may be able to provide better diagnostic information than a BSE alone. However - echoing the literature from medicine - auditory information cannot replace visual information in diagnosis, and visualization is necessary for accurate diagnosis of dysphagia.

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