

Comparing Simultaneous Clinical Swallow Evaluations and Fiberoptic Endoscopic Evaluations of Swallowing: Findings and Consequences

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Abstract

Introduction: Simultaneous blinded comparisons between the results of a clinical swallowing evaluation (CSE) and fiberoptic endoscopic evaluation of swallowing (FEES) were performed.

Methods: Raters were two groups of speech-language pathologists (SLPs) with expertise in dysphagia. One group analyzed the FEES video alone and the other group analyzed the CSE video alone. No consistent agreement was found between the CSE and FEES raters regarding pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, and oral diet recommendations.

Results: There was also no consensus on the need for instrumental testing. Watching the CSE video alone prevented expert SLPs who use a CSE from determining pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, silent aspiration, and making informed diet recommendations and intervention strategies. Watching the FEES video alone allowed expert SLPs who use FEES to determine pharyngeal and laryngeal anatomy and physiology and bolus flow characteristics and make evidence-based oral diet recommendations.

Discussion: A CSE does not have good clinical utility for determining pharyngeal dysphagia. The consequences of these results will be discussed.

I would like to begin this article with a true story:

It was around 4:00 pm on a Friday afternoon after a very busy week. I checked the computer system one last time before going back to the office and there it was: a new consult for a swallow evaluation. I took a deep breath and went to see the patient.

The patient was an 84-year-old male admitted from an extended care facility (ECF) 5 days before with altered mental status and decreased oxygen saturation. Although currently ordered a puree diet, the registered nurse (RN) noticed coughing with thin liquids at lunch, was concerned for aspiration, and called the medical team who, appropriately, placed a nil per os order and swallow evaluation consult.

On examination, the patient was in bed, appeared to be weak and de-conditioned, and spoke in a soft but audible voice. The RN as well as the patient's wife and daughter were present. As has been my practice for many years, I administered the Yale Swallow Protocol (Leder & Suiter, 2014). A brief cognitive evaluation indicated correct orientation to person, place, and time (which was improved from day of admission); an oral mechanism examination revealed adequate labial closure, appropriate lingual range of motion, and symmetrical facial movements; but the 3 ounce water swallow challenge resulted in coughing during drinking. By definition, the Yale

Swallow Protocol was failed indicating that an instrumental swallowing evaluation was necessary to determine if dysphagia was present and, if so, what therapeutic interventions could be done to promote safe swallowing.

But it was now close to 4:30 pm. I had three options. First, I could recommend continued **nil per os status**, placement of a **nasogastric** feeding tube, and **re-evaluate on Monday**. Second, I could do what I usually do and bring my digital swallow workstation into the room and perform a fiberoptic endoscopic evaluation of swallowing (**FEES**). Third, a clinical swallow evaluation (**CSE**) could be done.

I knew full well that 71% of patients who failed the Yale Swallow Protocol were still capable of having some type of oral diet by either bolus volume control (Suiter & Leder, 2008) or viscosity alterations (i.e., single small sips or changing thin liquids to nectar-like thickened liquids, respectively; Leder, Judson, Sliwinski, & Madson, 2013). But here is the problem: *Which* patient is in the 71% group versus the 29% group and will, therefore, continue to aspirate with puree (Suiter & Leder, 2008) or who may exhibit silent aspiration with smaller volumes of thin liquid and puree foods (Leder, Suiter, & Green, 2011)?

Over the past several months I had been talking with clinicians from around the country who routinely perform a clinical swallowing evaluation (CSE). None seem fazed, and many dismissive, by my assertions that it was **impossible to determine pharyngeal or laryngeal** anatomy or physiology, bolus flow characteristics, or presence of silent aspiration **with a CSE**. On the contrary, they were all sure that they could “tell” when successful swallowing occurred. So, despite knowing these pitfalls, I said to myself, “Let’s try a CSE.” I took a spoonful of pudding and stood on the patient’s left side. The RN was on the right side and the wife and daughter at the foot of the bed. I had the spoon in my hand, the patient’s mouth was open...but I hesitated. What was I going to learn from this puree bolus swallow? I actually said out loud, “You know, **I can’t see what’s going on in Mr. X’s pharynx when he swallows this pudding.**” To which the RN replied, “Neither can I.” And then I stated my tried and true mantra: “You know, you can see a lot by just looking.” The wife and daughter smiled understandingly. If I wasn’t going to follow my own evidence-based data who would? I put the spoon down and proceeded to do what I should have done in the first place (i.e., perform a FEES).

Fiberoptic endoscopic evaluation of swallowing (FEES) results showed a left true vocal fold immobility and pre-swallow pooling of secretions in the valleculae and pyriform sinuses indicative of a weak pharyngeal swallow. A 5–10cc puree bolus given with a spoon resulted in severe valleculae residue, severe pyriform sinus residue, moderate laryngeal penetration after the swallow, no aspiration, but aspiration risk with > 10cc bolus volumes. Thin liquids and solid consistencies were deemed unsafe to give due to coughing and generalized de-conditioning, respectively. A modified consistency diet of nectar-like thickened liquid and puree consistency foods given in single small 5–10cc bolus volumes via spoon with assistance at meal times was recommended (Leder et al., 2013). It was also recommended to crush tablets and give with puree or change to liquid formulation and thicken to nectar-like consistency. In addition, it was recommended to the medical team to consult with otolaryngology regarding the left true vocal fold immobility. Follow-up on Monday indicated the patient was tolerating the modified consistency diet and medication regimen successfully and was discharged back to his extended care facility later that morning.

What is to be learned from this? The correct evidence-based evaluation must be done no matter how late the consult comes in or how tired you are. A CSE cannot provide information on pharyngeal and laryngeal anatomy and physiology (the left true vocal fold immobility would have been missed), cannot determine if there are pre-swallow pooled secretions in the valleculae and pyriform sinuses (which this patient had) or bolus flow characteristics, and, by definition, cannot detect silent aspiration. I challenge my fellow clinicians who use the CSE to provide any meaningful evidence-based information relevant to a patient’s pharyngeal swallow. I do not think they will be able to do so.

Background

Making an **evidence-based decision** is a three-fold process integrating external scientific **evidence** and **patient** perspectives combined with internal clinical **expertise** (American Speech-Language-Hearing Association [ASHA], 2005). While external factors can influence patient care, it is only when practitioners consciously examine their own implicit and explicit assumptions and biases can true change occur (Hoffman, 2014). The provision of best practices and highest quality of clinical care requires more than knowledge of external evidence and honoring patient preferences. Clinicians must examine their own long-held beliefs to make sure they have incorporated new insights from emerging scientific evidence and, most importantly, are willing to let go of beliefs and familiar actions that are no longer sufficient to meet the demands of clinical practice (Hoffman, 2014). In other words, change is good.

Data do not support use of any CSE to diagnose dysphagia, determine aspiration status, or make oral diet recommendations for patient care (McCullough et al., 2005). But long-held beliefs and ingrained clinical practice patterns are very difficult to change. Rather, unsubstantiated clinical “intuition” trumps evidence-based data. Clinicians rationalize thusly: *My* CSE and *my* experiential knowledge can reliably determine pharyngeal dysphagia, discern pharyngeal and laryngeal anatomy and physiology, and recognize bolus flow characteristics in order to make appropriate oral diet recommendations and intervention strategies.

This resistance to reality persists even though the literature has shown that **40% of** variables typically used in a **CSE** are **unsupported** by data (McCullough, Wertz, Rosenbek, & Dinneen, 1999), only 44% of the measures clinicians typically use exhibited adequate intra- and inter-judge reliability (McCullough et al., 2000), and **detecting aspiration was seldom > 70%** while **ruling it out was even worse** (McCullough et al., 2005). Additionally, blinded comparison of results between a standardized swallowing screening protocol and videofluoroscopic swallowing study (VFSS) revealed that *none* of the screening variables were adequate for decision-making, for detecting pharyngeal dysphagia, or laryngeal penetration and aspiration (Steele et al., 2011).

And even if a swallowing problem is “guessed” correctly, results from any CSE provide absolutely no information on either its etiology or severity. Why? Because without visualization it is impossible for any CSE to determine pharyngeal and laryngeal anatomy and physiology or bolus flow characteristics, i.e., pre-swallow spillage to or post-swallow residue in the valleculae, pyriform sinuses, or laryngeal vestibule. Importantly, silent aspiration which, by definition, occurs without any overt signs of dysphagia (i.e., coughing or choking), can only be determined with instrumental FEES or VFSS testing.

I would like to present some unpublished data from a study in progress. The purpose of the study was to conduct blinded ratings of simultaneously recorded CSE and FEES using exactly the same swallows thereby allowing for control of both temporal issues and testing environments. The null hypothesis was that there would be no differences in CSE and FEES results regarding determination of pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, ability to make oral diet recommendations, and need for further instrumental testing.

Methods

Blinded comparisons with four simultaneous CSE and FEES recordings were made. A camera with both audio and video capabilities (Apple iPhone 4s) was positioned to capture an image of the patient from the waist to head. FEES was performed in the standard manner (Langmore, Schatz, & Olson, 1988, 1991) with a digital swallow workstation (KayPentax, Lincoln Park, NJ 07035, model 7200).

Ratings were made in a quiet room by two groups of speech-language pathologists (SLPs) with 4–30 (mean 19) years of expertise in dysphagia management. All raters reported using their own idiosyncratic CSE. Written patient case histories were provided (Appendix 1). One group

analyzed FEES alone (n = 7) for a total of 28 patient ratings and the other group analyzed the CSE alone (n = 15) for a total of 60 patient ratings.

Results

There was no agreement between the CSE and FEES ratings regarding pharyngeal and laryngeal anatomy and physiology and bolus flow characteristics. When watching the CSE video alone, results indicated an 83% inability to determine pharyngeal and laryngeal anatomy and physiology, 90% inability to determine the bolus flow characteristics of pre-swallow spillage and post-swallow residue, and 88% inability to determine overall swallow safety.

Despite being unable to determine pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, or even if a safe swallow occurred, 9 of 15 (60%) CSE raters nonetheless recommended oral diets 25% of the time and also recommended specific swallow strategies regarding bolus volume and consistency based solely upon their own idiosyncratic internal logic. The other 6 of 15 (40%) CSE raters never recommended oral diets but rather opted for instrumental testing to determine oral diet recommendations.

When watching the FEES video alone, all 7 viewers were able to determine pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, and whether a safe swallow occurred with 100% accuracy.

Discussion

Watching the CSE video alone prevented expert SLPs who use a CSE from making evidence-based decisions (i.e., based upon instrumental dysphagia testing, regarding pharyngeal and laryngeal anatomy and physiology, and bolus flow characteristics). Nevertheless, and in disregard to both published data and acknowledgment of lack of clinical information for decision making, non-evidence-based oral diet recommendations were made. Unfortunately, no rater voluntarily stated they would change their practice patterns based upon these results. Conversely, watching the FEES video alone allowed expert SLPs who use FEES to determine pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, and make informed oral diet recommendations.

Long-held beliefs and practices are extremely difficult to change. Common examples from the history of medicine include resistance to use of anesthesia during surgery, blood-letting to rid the body of bad humors, and hand washing to prevent disease spread. Only when challenged with convincing evidence to the contrary will incorrect learned behavior perpetuated from experts to novitiates be eventually overwhelmed thereby allowing for advancement to best-practice.

A parallel can be made to the idiosyncratic CSEs used by raters in this study. By ignoring the fact that the vast majority of CSE data are non-evidence-based (McCullough et al., 1999, 2000, 2005; Steele et al., 2011) experienced clinicians are deluding themselves by thinking they “know” what is occurring in the pharynx and larynx during swallowing. The preliminary results of this study show they do not; and the consequences are troubling. A clinician may guess correctly 50% or 60% or 70% of the time but that is certainly not a standard-of-care to be proud of. Patients who are referred for swallowing testing are *a priori* at increased aspiration risk and it behooves the clinician to be at least 95% and preferably 98–99% accurate in determining aspiration risk and the need for instrumental testing (Leder & Espinosa, 2002; Leder & Suiter, 2014).

Conclusions

When blinded to results of instrumental testing, watching the CSE video alone prevented expert SLPs who use a CSE from determining pharyngeal and laryngeal anatomy and physiology and bolus flow characteristics but, and this is most troubling, did not prevent ability to make oral diet recommendations. When blinded to results of CSE, watching the FEES video alone allowed

expert SLPs who use FEES to determine pharyngeal and laryngeal anatomy and physiology, bolus flow characteristics, and to make informed evidence-based oral diet recommendations.

I expect a **lot of push-back** from these findings. However, it is vital to continue to battle false beliefs and promote the truth with evidence. Of all interpretations of the Greek myth of Sisyphus, I prefer that of Camus, “. . .one must imagine Sisyphus happy [because] the struggle itself towards the heights is enough to fill a man’s heart.” It is vital to continue to battle false beliefs and promote the truth with evidence.

Remember, my fellow clinicians, “You can see a lot by just looking.”

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Appendix 1. Case Histories.

Case #1: 69 year old male; POD#11 right vertical hemilaryngectomy; Nil per os; No enteral tube feedings. Oral Mech. Exam: labial, lingual, & facial WNL; adequate dentition; Brief Cog. Eval.: A&Ox3; Yale Swallow Protocol: not given/coughs with sponge swabs

Case #2: 60 year old male; respiratory simplex virus (RSV); Intubated × 14 days/Extubated for 2 days; 3l O₂ (30%) via nasal cannula; Nil per os; NJ tube feedings. Oral Mech. Exam: labial, lingual, & facial WNL; adequate dentition; Brief Cog. Eval.: A&Ox3; Yale Swallow Protocol: Failed.

Case #3: 62 year old female; fall in parking lot; POD#17 right craniotomy & evacuation of epidural hematoma; Nil per os; NJ tube feedings. Oral Mech. Exam.: mild-moderate. Labial closure weakness on left, normal lingual range of motion, and mild-moderate facial weakness on left; adequate dentition. Brief Cog. Eval.: impaired - oriented to name/not oriented to place or time; Yale Swallow Protocol: Failed.

Case #4: 84 year old male; admitted from ECF with altered mental status & decreased SpO₂; Hospital day #5; no enteral tube feedings; Ppuree diet; RN reports cough with thin liquids; Oral Mech. Exam: Oral Mech. Exam: labial, lingual, & facial WNL; adequate dentition. Brief Cog. Eval.: A&Ox3 (Improved); Yale Swallow Protocol: Failed.

Note. WNL= within normal limits