



Bedside Clinical Swallow Test and the Fiberoptic Endoscopic Evaluation of Swallow - Level of Agreement

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Abstract

Introduction Bedside test are important tool for evaluating aspiration during swallowing. FEES that is functional endoscopic evaluation of swallowing is a gold standard method used in evaluation of dysphagia patients. Through this study we aim to assess the sensitivity and specificity of Bedside Clinical swallow evaluation in comparison with Fiberoptic Endoscopic Evaluation of Swallowing.

Objective To analyze which physiological examination amongst oro motor labial examination, lingual examination, gag reflex, coughs during or post swallow, change in voice quality and hyo-laryngeal excursion during swallow with semi-solid and thin liquid consistency in the Bedside Clinical swallow evaluation is better indicator for presence or absence of aspiration.

Methodology 38 patients with different diagnostic entities were presented & included in the study for the assessment of swallowing difficulties as presence or absence of aspiration and possibility of weaning from nasogastric or Nasojejun tube between March 2016 to October 2016. They were 32 (86%) males and 6 (14%) females. Aspiration correlates were assessed using bedside test (labial movement, lingual movement, gag reflex, strength of productive cough, hyo-laryngeal excursion, And post swallow changes in the quality of voice). FEES was then performed and sensitivity and specificity was compared.

Result Bedside test showed 84.62% sensitivity and 100% specificity in comparison to FEES. Gag and voice quality were noted to have significant difference with value of 0.009 and 0.033 respectively.

Conclusion Bedside tests can be considered as an important, easy, sensitive, and specific for the detection of aspiration. Combination of gag reflex and change of voice as parameters of aspiration compared with FEES showed high sensitivity and specificity.

Keywords Oropharyngeal dysphagia · Bedside swallowing tests · FEES

Introduction

Dysphagia is a symptom that refers to any pain or difficulty during the progression of food bolus from mouth to the stomach. Dysphagia can be of neurological or mechanical in origin or due to pathophysiology of structure related functional causes. Oro pharyngeal dysphagia can be caused by variety of diseases such as stroke, post radiation reflux,

Road traffic accident/ headinjury, degenerative disorders. Dysphagia has significant impacts on patient's quality of life, life expectancy, and economic burden. The evaluation of swallowing disorders and their rehabilitative modalities is an important topic [1].

The complications may be due to aspiration of ingested materials resulting in chest infection, malnutrition, and airway obstruction. Hence, it is imperative on ENT surgeons to detect the causes of dysphagia and the aspiration at an early stage to enable to start rehabilitative measures.

In recent practice, swallowing difficulty and aspiration is identified by certain screening test like bedside and other instrumental tests like VFS (videofluoroscopic study) and FEES (functional endoscopic evaluation of swallowing).

Bedside tests also may be used to identify patients with oropharyngeal dysphagia and those at risk of aspiration.

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The main clinical indicators of dysphagia at bedside tests are (1) abnormal volitional cough, (2) abnormal gag reflex, (3) dysphonia, (4) dysarthria, (5) cough after swallow, and (6) change of voice after swallow [2].

Bedside test have advantage of being cost effective, which require no special instrumentation, quick to perform, safe & simple, good sensitivity, but the reproducibility and consistency of these protocols have not been established and have been shown to be poor at detecting silent aspiration [3].

However, FEES and VFSS can be performed in the most complicated cases. Functional endoscopic evaluation of swallowing requires a fiberoptic endoscope which inspects the oral cavity, orofacial praxis, bite strength, salivation management, neck musculature, and laryngeal elevation. The scope is introduced through the nasal floor, and once the hypopharynx is reached, a range of procedures are performed including the presence of mucosal residue, lingual strength and propulsion, the different phases of swallowing through the ingestion of semi-solid and liquid substances, and the reflexes of cough and laryngeal adduction are evaluated [4].

FEES was developed and popularized by Langmore [5] and modified by Flaksman et al. [6] It has proved to be a significant tool in the assessment of the pharyngeal stage of the swallow process. Numerous studies [7–10] have highlighted its utility in visualization of the larynx and diagnosis of aspiration. They reported that FEES was prioritized to allow visualization of structures as it has no risk of radiation. They mentioned that FEES is an much easier, efficient and reliable method to assess the swallowing status in cerebrovascular accidents patients.

When combined with FEES, bedside swallow assessment and swallow exercises, can from a good tool for evaluating patients with swallowing difficulty.

Aims and Objectives

This study was to assess the sensitivity and specificity of Bedside Clinical swallow evaluation in comparison with Fiberoptic Endoscopic Evaluation of Swallowing.

The second goal of this study was to analyze which physiological examination amongst oro motor labial examination, lingual examination, gag reflex, coughs during or post swallow, change in voice quality and hyo-laryngeal excursion during swallow with semisolid and thin liquid consistency in the Bedside Clinical swallow evaluation is better indicator for presence or absence of aspiration.

Materials and Methods

The present study was carried out as a cross-sectional study in the Department of Otorhinolaryngology, Medanta The medicity hospital Gurgaon (Tertiary Care Centre) between March 2016 to October 2016 after approval from Institutional Ethics Committee and obtaining consent from all the participants. 38 patients with different diagnostic entities were presented & included in the study for the assessment of swallowing difficulties as presence or absence of aspiration and possibility of weaning from nasogastric or Nasojejunal tube. They were 32 (86%) males and 6 (14%) females. The patients included in the study were from 51 years to 82 years of age. The Mean age of patient was 59.6 years.

They were admitted due to various etiologies like Stroke, Chikungunya, Sepsis, Polymyositis. Stroke 23 patients, 5 patients with diagnosis of Chikungunya, 3 patients with Parkinson and myasthenia gravis and 7 with other conditions like Polymyositis, Sepsis were included in the study.

Bedside Clinical Examination

A written referral for swallow evaluation by the primary team of doctors was received for each patient. Patient's general clinical condition was evaluated. They were assessed for alertness, cognitive status, gag reflex, voluntary cough and throat clearing. Patients who could not obey verbal orders, markedly impaired degree of consciousness, with receptive aphasia or with significant apraxia were excluded from the study.

The bedside swallow evaluation was done with thin liquids and semisolid consistency in the sitting / upright posture. The patient's oro-motor examination was done. Prior to swallow test they were evaluated for labial movement, lingual movement, gag reflex and the strength of productive cough. They were evaluated for hyo-laryngeal excursion during each swallow. And post swallow changes in the quality of voice/ wetness was evaluated.

The findings from the bedside swallow evaluation was documented in the file. If the patient passed the clinical bedside swallow evaluation, they were rated on Functional oral intake scale (FOIS) and blended food was initiated. If the Clinical swallow evaluation was not cleared patient were rated on Level 1 of FOIS and were recommended to continue non oral mode of nutrition. They were then referred for Fiberoptic Endoscopic Evaluation of Swallowing either on the same day of the clinical swallow evaluation or on the next day.

Fig. 1 We had 84% of males and 16% study participants were female

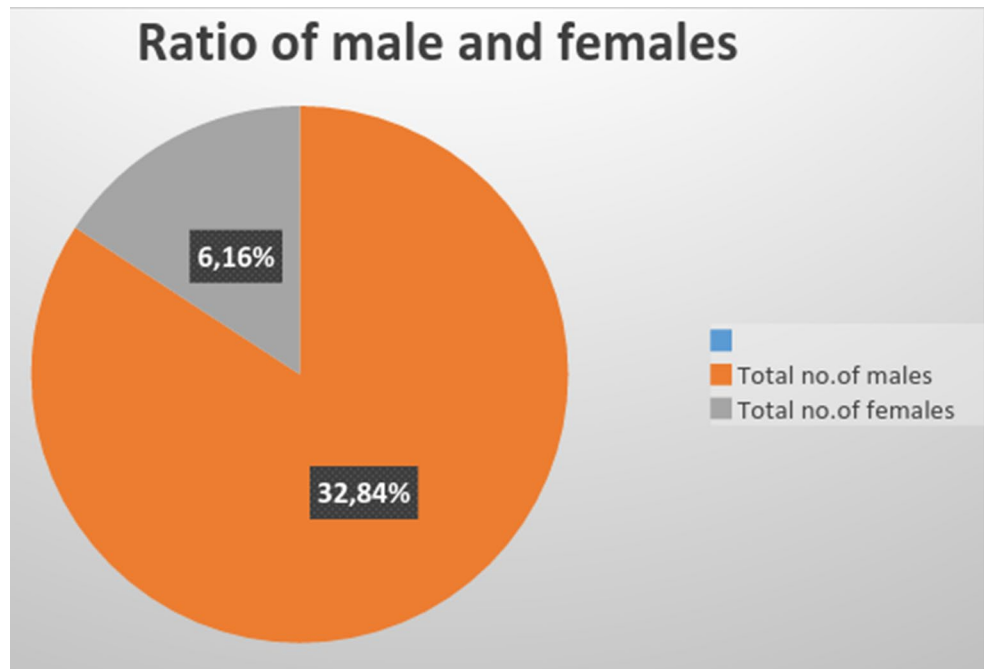
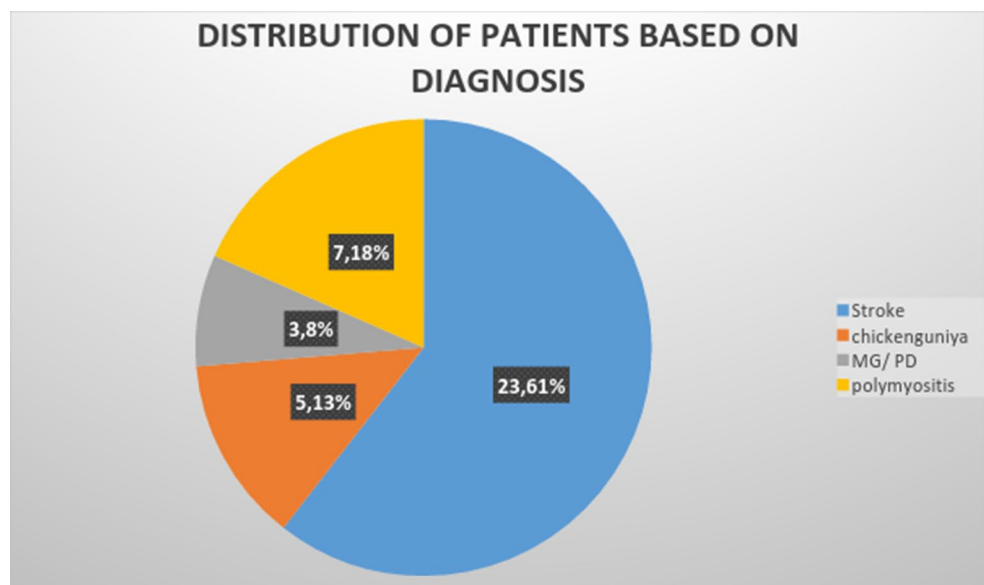


Fig. 2 Distribution of patient based on cause



Fiber Optic Endoscopic Evaluation of Swallowing (FEES)

Digital Swallowing Workstation by KayPENTAX was used. The patient was seated for FEES in the sitting position (whenever possible) However, in some cases, this was not possible, instead, a semi-upright position on the bed was adopted. The flexible fiberoptic laryngoscope was inserted transnasally into the pharynx. It provided detailed information about the anatomy of the nose, pharynx and larynx. Laryngeal adduction Reflex of the vocal folds or reflex cough and choking were observed. Different food consistencies

as fluids (water), semisolids (thick juice/yoghurt) were used to evaluate swallowing. The salient findings noted were residue in the valleculae or the pyriform sinus, penetration and aspiration of the trialed consistency into the larynx.

Results

The bedside tests required an average of 15 min and FEES required about 10 min.

Gender distribution:

Table 1 Statistical analysis of clinical parameters during BCST

Statistics	Value	95%CI
Sensitivity	84.62%	54.55–98.08%
Specificity	100.00%	86.28–100.00%
Positive predictive value	100.00% (*)	
Negative predictive value	92.59% (*)	77.74–97.81%
Kappa statistics	87.9%	71.6–100.0%

Bedside Tests vs. FEES

To determine sensitivity, specificity and predictive values, the results of bedside tests were compared with the results obtained using FEES (Table 1). 38 patients 27 patients were noted to have aspiration and 11 patients did not have any aspiration in the bedside swallow test. On FEES test out of 38 only 25 showed signs of aspiration while 13 patients cleared the test (Fig. 3).

Chi square test was administered to check the significance value of the clinical parameters during the BCST.

Labial movements, Lingual movements and palatal movements assessed before the swallow showed chi square value of 0.319, 0.143 and 0.386 respectively. The value obtained show that there is no significant difference.

Hyolaryngeal excursion evaluated during the swallow was found to have no significant difference (with $p < 0.691$). But it was noted that out of 24 patients who had poor hyolaryngeal excursion, 17 (68%) patients had aspiration. Cough again was found to have no significant difference with p value of 0.905. Gag and voice quality were noted to have significant difference with value of 0.009 and 0.033 respectively (Table 2).

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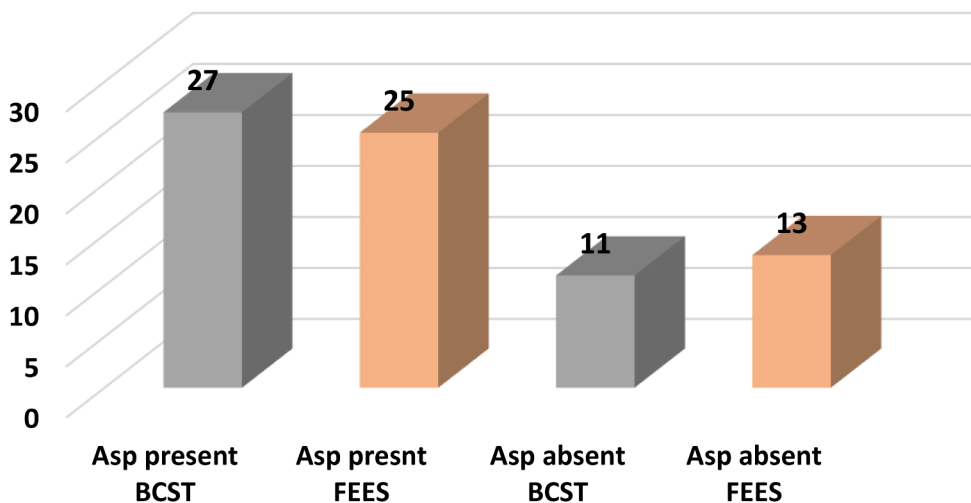
Table 2 Statistical analysis of different parameters

		Asp +	FEES ASP –	P value
Gag	Normal	6(24%)	8(61%)	0.009*
	Weak	16(64%)	3(23%)	
	Absent	0(0%)	2(15%)	
	CNBA	3(12%)	0(0%)	
Palatal	Normal	5(20%)	5(39%)	0.386
	Weak	16(64%)	7(53%)	
	Absent	1(4%)	1(8%)	
	CNBA	3(12%)	0(0%)	
Lingual	Normal	11(44%)	10(76%)	0.143
	Weak	13(52%)	3(23%)	
	Absent	0(0%)	0(0%)	
	CNBA	1(4%)	0(0%)	
Labial	Normal	12(48%)	10(76%)	0.319
	Weak	10(40%)	3(23%)	
	Absent	2(8%)	0(0%)	
	CNBA	1(4%)	0(0%)	
Hyolaryngeal	Normal	4(16%)	3(23%)	0.692
	Weak	17(68%)	7(53%)	
	Absent	4(16%)	3(23%)	
	CNBA	1(4%)	0(0%)	
Cough	Normal	3(12%)	1(8%)	0.905
	Weak	14(56%)	8(62%)	
	Moderate	8(32%)	4(30%)	
Voice	Normal	5(20%)	7(53%)	0.033*
	Wet	20(80%)	6(46%)	

* significant

show that there is no significant difference. Hyolaryngeal excursion evaluated during the swallow was found to have no significant difference (with $p < 0.691$). But it was noted that out of 24 patients who had poor hyolaryngeal excursion, 17 (68%) patients had aspiration. Cough again was found to have no significant difference with p value of 0.905. **Gag and voice quality were noted to have significant difference with value of 0.009 and 0.033 respectively.**

Fig. 3 Aspiration in BCST and FEES



Discussion

Our results are consistent with those from several clinical investigations that also indicate that Bedside swallow test is an important screening tool. FEES and videofluoroscopy - invasive procedure, radiation exposure, time consuming, and costly requires stable patients, technically demanding. In comparison to FEES and videofluoroscopy, clinical assessment is easily performed at the bedside with minimal discomfort to the patient and is less costly.

Limitation is that it is not able to identify overt and silent aspiration. Hence standardized simple clinical tests used along with water swallow test or bedside clinical swallow test are important to help rule out dysphagia [11]. In the current trail out of seven parameters, gag reflex and change in voice quality were found to be good indicators of presence of aspiration with p value of **0.009 and 0.033 respectively**.

In our study the most common cause seen was stroke patients. Clavé et al. [12] mentioned that, the prevalence of oropharyngeal functional dysphagia is very high, it affects more than 30% of patients who have had a CVA; 52–82% of patients with Parkinson's disease; 84% of patients with Alzheimer's disease, and up to 40% adults aged more than 65 years.

Gag Reflex

Our results show that the weak or absent gag reflex can be an important predictor of aspiration. Horner et al. [13] reported that presence of an abnormal voluntary cough, an abnormal gag reflex, or both can be a predictor of aspiration in bilateral stroke patients. However there are studies which state that the presence of a gag reflex does not protect against aspiration, and the absence of a gag reflex does not predict aspiration Leder et al. [14], Davies et al. [15].

Voice Quality

Weir et al. [16] reported that wet voice, wet breathing and cough were good clinical markers for children with oropharyngeal aspiration on thin fluid but not on purée. Wet voice (sensitivity 0.67; specificity 0.92) and wet breathing (sensitivity 0.33; specificity 0.83). Hassan et al. [17] reported change in voice to have 80% sensitivity, 74% specificity, PPV 79% and NPV 72%. In our study we found that out of 26 patients who had wet voice post swallow, 20 patients showed aspiration in FEES.

Hyolaryngeal Excursion

Han et al. [18] Pharyngeal stage of swallowing, hyoid and laryngeal elevation is a key event related to occurrence of

penetration or aspiration. Among stroke survivors with penetration or aspiration, 88% showed reduced hyolaryngeal elevation, but for stroke survivors without penetration or aspiration, only 37% showed reduced hyolaryngeal elevation. This result indicates that stroke survivors with penetration or aspiration tend to have less airway protection or a reduced UES opening during the pharyngeal swallow. Perlman et al. [19], aspirating patients showed limited and reduced elevation of the hyoid and larynx. In our study out of 24 patients with weak laryngeal elevation during swallow, 17 were found to have aspiration. There was no statistical difference noted but clinically laryngeal excursion is an important indicator of dysphagia.

Other Parameters

Like few other previous studies oral stage with affected labial, lingual and palatal movement have no direct relation with penetration or aspiration. These parameters of the oral stage of swallowing were related to sensory and motor skills of the lip and tongue. Lip and lingual control deficiencies after a stroke may be more related to anterior or lateral oral residues or swallowing apraxia.

Conclusion

Bedside tests can be considered as an important, easy, sensitive, and specific for the detection of aspiration. Combination of gag reflex and change of voice as parameters of aspiration compared with FEES showed high sensitivity and specificity. More studies are required to find the most effective set of bedside tests to diagnose silent aspiration.

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Declarations

Conflict of interest Not applicable.

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