

# Role of Fiberoptic Endoscopic Evaluation of Swallowing in the Management of Oropharyngeal Dysphagia

## ABSTRACT

**Background:** Fiberoptic endoscopic evaluation of swallowing (FEES) is one of the tools for the assessment of oropharyngeal dysphagia (OD). The objectives of our study were to evaluate the role of FEES in deciding the management of OD in our indoor and outdoor patients and study the recovery pattern. **Methods:** A total of 30 consecutive patients of OD on whom FEES was performed to formulate management strategy were included in our study. The detailed history, levels of dysphagia, laryngeal sensations, penetration, aspiration, hyolaryngeal elevation, and response to dry swallow as well as various food consistencies was noted in every serial FEES test. Silent aspiration of saliva and/or food was specifically looked for. The management strategies planned as a result of the FEES findings with subsequent response to them were noted. The penetration-aspiration score (PAS) was utilized to monitor progress of the OD. **Results:** In 30 patients of OD, nine patients belonged to neurosurgery group, five neurodegenerative group, 12 stroke patients, two head and neck cancer surgery, and two had an idiopathic etiology. Aspiration of saliva was detected in 19/30 (63.3%) patients with 10/30 (33.3%) having silent aspiration pre-therapy. Aspiration of saliva was detected in 6 (20%) patients post-therapy using FEES guidance. Out of these six patients, five patients had a silent aspiration of the saliva. Two stroke patients, one patient of head neck cancer surgery, one post neurosurgery, and two patients of neurodegenerative group (due to primary disease progression) did not show any improvement. Pre-therapy 25 patients had aspiration with food and post-therapy six patients had aspiration with both food and saliva. Average time for improvement in neurosurgery patients was 2.8 months, in neurodegenerative patients 2 months, in stroke 3 months, in head neck surgery patients 5.5 months, and in idiopathic etiology patients, it was 1 month. A minimum of 1 month and a maximum of 1 year was the range for follow-up. The PAS score comparison revealed that neurological patients showed a higher PAS score (worse response) with thin and mild thick, whereas head neck cancer patients had a higher PAS score (worse response) with extremely thick consistency. **Conclusion:** Utilizing fees in 30 cases of OD, we detected aspiration of saliva in 63% and aspiration of food on 83.33%; 33% of these patients had silent aspiration. Post-therapy aspiration of saliva and food reduced to 20%, out of which 16.66% were silent aspirators. FEES can effectively and objectively identify the silent aspirators who seemed to have the worst prognosis in our study group.

**Key words:** Fiberoptic endoscopic evaluation of swallowing, Food consistency, Oropharyngeal dysphagia, Penetration-aspiration score, Silent aspiration

## INTRODUCTION

Swallowing is a complex process, in which a bolus of liquid or food is transferred from the oral cavity to the stomach, through the oropharynx and esophagus while protecting the airway. This process requires a well-coordinated neuromuscular control. Any disturbance in these series of events leads to dysphagia.<sup>[1,2]</sup> Fiberoptic endoscopic evaluation of swallowing (FEES) is the most commonly utilized method for the assessment of swallowing<sup>[3-6]</sup> and was first described by Langmore in 1988.<sup>[7]</sup> There is no radiation exposure to the patient in this procedure which is withstood well by most.

The objective of our study was to evaluate the role of FEES in deciding the management of oropharyngeal dysphagia (OD) in our indoor and outdoor patients at our Voice and Swallowing Center.

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## MATERIALS AND METHODS

This prospective 1 year study was conducted at our Voice and Swallowing Center, wherein all patients in the age group of

18–70 years with the complaint of OD were included in the study. Our study design was a non-randomized prospective observational study in a total of 30 patients of OD.

For all the outdoor and indoor patients who could be shifted on a wheelchair, the test was performed at the Voice Center and for indoor and ICU patients who could not be shifted; FEES was performed bedside. All evaluations were performed by the laryngologist and speech language pathologist (SLP) as a team approach [Figure 1].

Following a detailed case history, the current weight, current diet, and presence of any feeding tube were noted. An examination of all cranial nerves V–XII was performed.

FEES was performed by introducing an extremely thin flexible (2.8 mm outer diameter, no suction channel) scope through the nostril which was placed just over the laryngeal introitus to examine and record the findings of the patients response to swallowing of saliva and various consistencies of food. During the swallowing of saliva and different consistencies of food, the presence of any penetration and aspiration was noted and graded using the PAS score. Penetration is the presence of saliva or food on the supraglottis but not going beyond the false vocal folds. Aspiration is the presence of saliva or food beyond the true vocal folds into the subglottis. Frank aspiration of the food bolus is seen within the laryngeal introitus in Figure 2. In Figure 3, frank aspiration of salivary secretions was observed within the laryngeal introitus.

Localization and amount of pharyngeal residue as well as patients' reactions (such as coughing) were visualized and also documented.<sup>[8]</sup>

FEES was performed in three phases. The first phase comprised evaluating the anatomy and physiology of the pharynx and larynx with specific regards to palatal movements, vocal folds mobility, pooling of secretions in the vallecula, pyriform fossa and in glottis, ability to manage the secretions, laryngeal elevation, and presence of Laryngeal Adductor Reflex (LAR). The LAR is assessed to check for

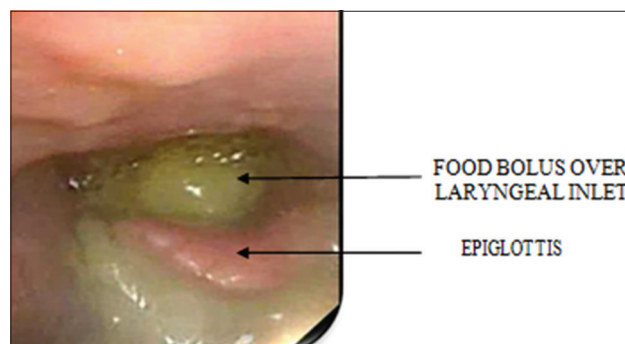
presence of laryngeal sensations and is typically absent with silent aspiration of saliva.

Depending on the findings of this above evaluation, the safety regarding the second phase was evaluated. The second phase comprises assessing the swallowing with different consistencies of trial feed. A small amount of green food coloring was usually added to assist with accurate pick up of aspiration, penetration, and pharyngeal residue. We begin with the easiest and most comfortable consistency for the patient. Usually blenderized/semisolids were the first consistency used followed by solids, liquids, and finally mixed consistency foods. Various consistencies of different therapeutic Indian test diet were used.

In the third phase of FEES, various positions and maneuvers were utilized during the testing with the various consistencies of food to improve the swallowing ability.

Scoring using the penetration aspiration scale (PAS) was utilized for each consistency of test diet which was the objective basis for analysis of recovery patterns using our prescribed Indian test diet.<sup>[8]</sup>

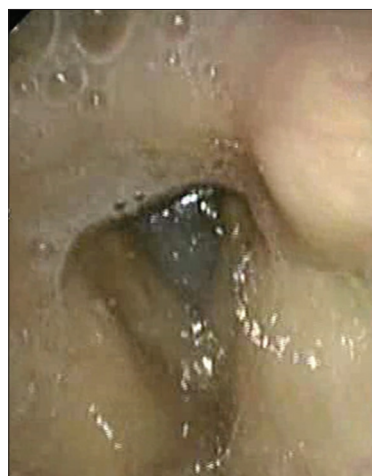
When the patient had a tracheostomy, the size of the tube, presence of cuff, and partial and complete cuff inflation was noted. It was also determined during the FEES if it was safe



**Figure 2:** Frank aspiration of the food bolus is seen within the laryngeal introitus



**Figure 1:** Our office setup for performing FEES



**Figure 3:** Frank aspiration of salivary secretions

to deflate the cuff for brief spells or through the entire day and if the swallowing therapy with food trial was safe to be given with the cuff deflated.

All patients were reviewed and scored at every subsequent follow-up until they were ready to be on regular feeds. The time frame and pattern of recovery for each patient of OD of various etiologies were, then, analyzed.

**RESULTS**

In our study, out of total 30 patients of OD (18 males and 12 females), 12 (40%) had a history of stroke, 9 (30%) were neurosurgery patients, 5 (16.6%) presented with neurodegenerative disorders, 2 (6.67%) were post head and neck surgery, and 2 (6.67%) had an idiopathic etiology.

Table 1 tabulates the pooling of secretions, penetration, and aspiration including silent aspiration observed objectively utilizing FEES pre- and post-therapy. Table 2 tabulates the presence of penetration or aspiration of food both pre- and post-swallowing therapy.

The detailed response during FEES to food of thin, mildly thick, and very thick consistency is given in Table 3. With thin consistency on presentation, we documented aspiration in 25 (83.3%) patients and penetration in 5 (16.7%) patients, which improved to normal (no penetration aspiration) in 21 patients, aspiration in 6, and penetration in only 3 patients in final FEES.

With mild thick consistency on presentation, we documented aspiration in 24 (80%) patients, and penetration in 5 (16.7%) patients, and one patient was not tested with mild thick consistency diet. On final FEES, findings improved to normal in 21 patients, aspiration in 6, penetration in 2 patients, and one patient was not tested with this consistency.

FEES findings with extremely thick consistency on presentation were aspiration in 12 (40%) patients, penetration in 10 (33.3%) patients, and no penetration aspiration in

**Table 1:** The presence of pooling of secretions, penetration, and aspiration both pre- and post-therapy is detailed

FEES findings (out of 30 patients)	Pre-therapy	Post-therapy
Pooling of secretions	27	7
Penetration of secretions	26	7
Aspiration of secretions	19	6
Silent aspiration	10	5

FEES: Fibreoptic endoscopic evaluation of swallowing

**Table 2:** The presence of Penetration and Aspiration with food pre- and post-therapy is detailed

With food	Pre-therapy	Post-therapy
Aspiration (with any consistency)	25	6
Penetration	5	4
No penetration or aspiration	0	20

**Table 3:** A detailed response to various consistencies of food in terms of aspiration and penetration both pre- and post-swallowing therapy based on patient etiology

Different consistencies	Total patients (30)		Neurosurgery (9)		Neurodegenerative (5)		Stroke (12)		Head neck surgery (2)		Idiopathic (2)	
	Pre-therapy	Post-therapy	Pre-therapy	Post-therapy	Pre-therapy	Post-therapy	Pre-therapy	Post-therapy	Pre-therapy	Post-therapy	Pre-therapy	Post-therapy
Thin consistency	A-25 P-5	N-21 A-6 P-3	A-8 P-1	N-6 A-2 P-1	A-3 P-2	N-3 A-2 P-0	A-11 P-1	N-8 A-2 P-2	A-1 P-1	N-2	A-2 P-0	N-2
Mild thick consistency	A-24 P-5 Not tested-1	N-21 A-6 P-2 Not tested-1	A-7 P-1 Not tested-1	N-5 A-3 P-1	A-3 P-2	N-3 A-1 P-0 Not tested-1	A-11 P-1	N-9 A-2 P-1	A-1 P-1	N-2	A-2 P-0	N-2
Extremely thick consistency	A-12 P-10 No A/P-2 Not tested-6	N-20 A-4 P-4 Not Tested-2	A-3 P-3 Not tested-3	N-5 A-1 P-3	A-2 P-2 Not tested-1	N-3 A-1 P-0 Not tested-1	A-5 P-4 No A/P-2 Not tested-1	N-9 A-1 P-1 Not tested-1	A-0 P-1 Not tested-1	N-1 A-1	A-2 P-0	N-2
Duration of recovery (mean)			2.67 months		2 months		3 months		5.50 months		1 month	

\*A-Aspiration, \*P-Penetration, \*N-Normal (no aspiration/penetration),

● Pre therapy  
● Post therapy

2 (6.7%) patients and 6 (20%) patients were not tested with this consistency. In final FEES, findings improved to normal in 20 patients, aspiration in 4, penetration in 4 patients, and 2 patients were not tested with this consistency.

## DISCUSSION

FEES is a promising investigation modality in evaluation and management of OD as it is easy to perform and readily assessable.<sup>[4]</sup> The absence of radiation exposure and the evaluation with extremely thin laryngoscopes makes the procedure both safe and comfortable for the patient. The ideal position to perform FEES is in the sitting position, which may not be possible for some ICU patients, in whom the FEES is then performed bedside in a propped up position. Although the actual moment of swallow cannot be seen due to the laryngeal elevation, the findings just prior and post the swallow guide the team objectively in planning the dysphagia management in a safe manner. Laryngeal sensations and silent aspiration can both be effectively evaluated using FEES.<sup>[9]</sup>

In our study, we assessed the response and recovery pattern in OD patients to different consistencies of Indian diet and pre- and post-therapy. The PAS score comparison was performed which revealed that neurological patients showed a higher PAS score (worse response) with thin and mild thick, whereas head neck cancer patients had a higher PAS score (worse response) with extremely thick consistency. In comparison of pre- and post-therapy, significant improvement in PAS score in all patients groups was observed.

It has been found in the literature that each individual patient has a different line of management and recovery pattern according to primary pathology, general condition of the patient, associated comorbidities, cranial nerve palsies, site of lesion, type, pattern and severity of dysphagia, presence and absence of any complication of dysphagia (aspiration, pneumonia), and presence and absence of tracheostomy.<sup>[10,11]</sup>

On the basis of severity, the dysphagia management protocols were decided for individual patient, using compensatory or rehabilitative strategies which comprised dry swallow exercises, sterile water trial, ice-chip protocol, pharyngeal muscles strengthening exercises, vocal strengthening/adduction exercises, neuromuscular electrical stimulation (NMES), laryngeal elevation maneuvers, and expiratory muscle training for swallowing therapy (EMST).

On the basis of progress of clinical signs and symptoms of OD post-therapy, repeat FEES was performed, in which improvement related to particular consistency of diet was evaluated.

Intake and output chart, and diet charts were maintained; occasionally, dietician's opinion was taken for the same in view of diabetes and other risk factors. After sufficient practices of trial feeds of various consistencies, again evaluation was performed clinically as well as by FEES, based on that recovery was charted.

Mean duration for improvement in neurosurgery patients was 2.8 months, in neurodegenerative patients 2 months, in stroke 3 months, in head neck surgery patients 5.5 months, and in idiopathic etiology patients, it was 1 month. However, therapy was given for as long as 1 year in patients who did not improve.

Two stroke patients, one patient of head neck cancer surgery, one post neurosurgery, and two patients of neurodegenerative group (due to primary disease progression) did not show any improvement.

In our study, head neck cancer patients showed a prolonged period of recovery and most of these patients were post chemotherapy and radiotherapy. Our idiopathic group of patients showed faster and complete recovery and it is possible that they may have had dysphagia due to a viral etiology.

Recovery pattern in oropharyngeal dysphagia revealed that the neurological patients have more difficulty in swallowing with thin consistency than thick consistency, but head neck cancer surgery patients had opposite findings of having more difficulty with thick consistency as compare to thin consistency which is in keeping with most studies.

## CONCLUSION

Utilizing FEES in 30 cases of OD that we detected aspiration of saliva in 63% and aspiration of food in 83.33%; 33% of these patients had silent aspiration. Post-therapy aspiration of saliva and food reduced to 20%, out of which 16.66 % were silent aspirators. FEES can effectively and objectively identify the silent aspirators who seemed to have the worst prognosis in our study group.

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