

A diagnostic modality in dysphagic patients-FEES (Functional Endoscopic Evaluation of Swallowing)

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Abstract

Introduction: Dysphagia originates from the Greek word 'dys' (with difficulty) and 'phagia' (to eat). Dysphagia has been investigated using various radiological techniques. In our study, dysphagia was evaluated with flexible fiberoptic Endoscope, proving to be a useful and effective procedure for diagnosing dysphagia.

Aims and Objectives: 1.To identify common aetiological factors age and sex prevalence. 2. Analyse outcomes of investigative procedures.

Materials and Methods: The study was conducted on the Outpatient and Inpatient from the Department of ENT in A.J. Institute of Medical Science, Mangalore.

A. Inclusion criteria: 1. Patients with dysphagia. 2. Patients willing to participate.

B. Exclusion criteria: 1. Diagnosed cases of malignancy, inflammatory conditions requiring active intervention. 2. Patients unwilling to participate.

Results: In our study 100 patients were evaluated with FEES, in 74% Showing presence of sensation, 51 showed No obvious pathology and 23 patients showed Laryngopharyngeal reflux. In patients showing absence of sensation (26%) aspiration was noted in 17 patients and Laryngopharyngeal reflux + Aspiration in 9. Rigid esophagoscopy was done in patients presenting with aspiration, aspiration/laryngopharyngeal reflux and in those with no pathology.

Conclusion: FEES has taken advantage of a marvelous tool, the flexible endoscope to visualize the pharyngeal and laryngeal structures. Likewise, in our study it has proven to be a valid and cost-effective procedure for diagnosing dysphagia and guiding treatment. Additionally, it can be done as a bedside procedure and used in critically ill patients.

Keywords: Dysphagia, Fees, Barium swallow, Rigid esophagoscopy.

Introduction

Difficulty with swallowing may have life threatening consequences as quoted "When a person is unable to swallow, the ability to enjoy almost all other aspects of life is affected" Lack of enjoyment of food, can have profound social consequences for both the person and members of the family. Aspiration of food, drink and saliva is frequently caused by oropharyngeal dysphagia. Swallowing is a continuous process split into three distinct phases namely: oral, pharyngeal and esophageal. Swallowing requires the coordinated activity of muscles in three regions of the head and neck namely the oral cavity, pharynx, larynx, and the esophagus. This complex of sequence of motor behaviour is partly reflex and partly under voluntary control. The evaluation of dysphagic patient requires careful history taking and examination. It has been extensively investigated using techniques like radiography, ultrasound, electromyography, videofluoroscopy and endoscopy like rigid endoscope and flexible fiberoptic endoscope. One of the treatment in oropharyngeal dysphagia is swallowing therapy, which has a unique role in management of oropharyngeal dysphagia, depending on the type and nature of dysphagia, underlying cause, and the needs and preferences of the individual. Considering the safety of the swallow, managing aspiration and preventing complications are of paramount concern. In children the aims and objectives will change as appropriate to the age, as the child's anatomy and neurological abilities alter with their

growth and development. This study aims to study the trends in presentation of dysphagia i.e. symptoms, aetiological factors and strategies of management in dysphagia. It also aims to see the outcomes of results mainly with flexible fiberoptic endoscopic evaluation and the management with dietary modifications and swallowing manoeuvres.

Objectives

Primary Objective was to identify the common and major aetiological factors, age and sex prevalence in dysphagic patients, presenting to the department of ENT in A.J institute of medical sciences and Research centre, mangalore. Secondary objective was to document and analyse the outcomes of dysphagia patients by.¹ Thorough Clinical history and examination with indirect laryngoscopy, and an office based flexible fiberoptic endoscopic evaluation, barium swallow and flexible or rigid esophagoscopy.² To treat the dysphagic patients with the dietary modifications, therapeutic swallowing manoeuvres including several swallowing exercises and to access the functional outcome of the patients.

Materials and Methods

The study was conducted in the Department of Otorhinolaryngology department of ENT in A.J. Institute of Medical Science and Research centre, Mangalore. This study is designed to evaluate swallowing movements in the

dysphagia patients with the help of flexible fiberoptic endoscope.

A. Inclusion criteria

1. All patients who came to A.J. Institute of Medical Science and Research center, Mangalore with the complaints of Dysphagia.
2. Patients willing to participate.

B. Exclusion criteria

1. Diagnosed malignant cases and inflammatory conditions requiring antibiotics, surgical intervention, chemo or adiotherapy.
2. Patients unwilling to participate.

Method: Subject will have to first fill a proforma/questionnaire which will include the basic details of the person like the age, sex, address. Detailed history and routine ENT examination was done and all necessary investigations like routine haemogram, serology, indirect laryngoscopy were carried out.

Procedure for FEES (Fig. 1)

It is effective for swallowing evaluation and helps to acquire information on various swallowing abnormalities. It is an alternative to modified barium swallow in patients with risk of aspiration. In FEES, the endoscope is passed through the anterior nares, along the floor of the nasal cavity under the inferior turbinate. Local topical anaesthetics can be used if needed. Passage between the middle and inferior turbinate or through the opposite nostril may be necessary if airway is narrowed. Once the endoscope is in the post nasal space, the patient is asked to inspire through the nose, this opens the post nasal sphincter allowing the passage of the endoscope into the oropharynx. The main advantage is the ability to view the laryngeal structures like base of tongue, epiglottis, bilateral vallecula, bilateral aryepiglottic fold, bilateral arytenoids, bilateral pyriform fossa and bilateral vocal cords at rest and with phonation and respiration. The sensory and motor status of the pharyngeal and laryngeal structures are also evaluated. The sensation of laryngeal surface of epiglottis (area with most sensory receptors) is assessed first using the tip of the flexible fiberoptic endoscope, if sensations were absent, then the aryepiglottic folds, the arytenoids, the false vocal folds and the true vocal folds were assessed respectively.⁵

Barium Swallow

Following FEES, the patients with aspiration were not subjected to barium swallow. Rest of the patients were subjected to barium swallow in which the hypopharynx and upper esophagus were assessed, to delineate the contiguous involvement of the pyriform fossa, pharyngeal wall and the post cricoid region, hence ruling out other causes of dysphagia.^{1,6}

Rigid Esophagoscopy (Fig. 2)

Following barium swallow, rigid esophagoscopy was done to complete the battery of investigation, the whole of the esophagus was examined with an esophagoscope, including the hypopharyngeal area, folds of the stomach in the region of the esophageal entrance. The procedure done was as follows, under GA, patient lies in supine position on the table with the head ring. The neck is initially flexed forward upon the head rest. The esophagoscope is held between the fingers and thumb in the right hand, the lips are retracted and the guard is held over the upper teeth. The lower end of the esophagoscope is lubricated with lignocaine jelly and the tip of the esophagoscope is introduced pointing posteriorly and superiorly, then passed upto the posterior pharyngeal wall by passing through the midline of the palate. The tip of the esophagoscope lies behind the epiglottis and the endotracheal tube maybe kept in the midline and passed into the right pyriform fossa. All movements should be done under direct supervision and all the pharyngeal contents are aspirated using suction. Now, the esophagoscope is taken near the first constrictor i.e.16cm from the upper incisor, the esophagoscope has to be passed through the cricopharynx, and should never be passed blindly and against resistance because it may cause perforation. After this, the head is extended at the atlanto-occipital joint, the smooth passage of the esophagoscope may be aided by mild deflation of the endotracheal cuff and gently lifting the larynx. The lumen of the esophagus should be kept in the mid-line and continuous suctioning has to be one. At about 23cm, the indentations of aortic arch may be felt. At approximately 38cm mark, the area where the lumen closes into a mucosal rosette; which marks the point of lower esophageal sphincter. The careful inspection of the area and proper suctioning aids in detecting abnormalities in the esophagus.^{1,6} If the barium swallow and rigid esophagoscopy were normal, then based on the examination findings of FEES, the patient received further treatment. If any signs of aspiration, laryngopharyngeal reflux were found, the patient was treated with swallowing manoeuvres along with dietary modifications.

Dietary Modifications included^{1,6}

1. Small bites periodically.
2. Slowly consumption of meals.
3. Avoidance of speech during meals.
4. When one side of the mouth is weak, food is placed into the stronger side of the mouth. At the end of the meal, check the inside of the cheek for any food that may have been pocketed.
5. Try turning the head down, tucking the chin to the chest, and bending the body forward when swallowing. This often provides greater swallowing ease and helps prevent food from entering the airway.
6. Do not mix solid and liquids in the same serve and do not wash foods down" with liquids, unless you have been instructed to do so by the therapist.
7. Eat in a relaxed atmosphere, with no distractions.
8. Following each meal, sit in an upright position (90 degree angle) for 30 to 45 minutes.

Swallowing manoeuvres^{1,3,6}.

1. Mendelsohn manoeuvre (Fig. 3): In this manoeuvre, the larynx is elevated in a way that facilitates the opening of esophagus during the swallow by relaxing the upper esophageal sphincter and thus preventing the entry of food/liquid into the airway. The patient was instructed to hold the larynx in an elevated position at the peak of hyolaryngeal elevation.
2. Effortful swallow manoeuvre: In this manoeuvre, the posterior tongue base movement is increased in such a way that the bolus clearance is done. The patient was instructed to swallow and push hard with his/her tongue against the hard palate.
3. Supraglottic swallow manoeuvre: This Manoeuvre was designed to close the vocal folds by voluntarily holding one's breath before and during swallow in order to protect the airway. The patient was advised to hold his or her breath just before swallowing to close the vocal folds and the swallow was followed immediately by a volitional cough.
4. Super-supraglottic swallow manoeuvre: This manoeuvre was designed to voluntarily move the arytenoids anteriorly, closing the entrance to the laryngeal vestibule before and during the swallow. The Super-supraglottic swallow manoeuvre is similar to the supraglottic swallow manoeuvre; but here the patient is made to increase his/her effort during the breath hold before the swallow, to facilitate glottic closure.



Fig. 1: Normal functional endoscopic evaluation of swallowing



Fig. 2: Rigid esophagoscope



Fig. 3: Mendelsohn manoeuvre

Results

The age distribution of the cases are tabulated as follows:

Table 1: Age Distribution

Age	Frequency	Percent
20 & below	3	3
21-30	19	19
31-40	25	25
41-50	20	20
51-60	20	20
61-70	7	7
70 and above	6	6
Total	100	100

Table 1, summarizes the age distribution in the study group. The total number of subjects in the study was 100, of which 25% belonged to the age range 31-40 years, 20% belonged to the age range of 41-50 and 51-60 years, 19% belonged to the age range 21-30years, 7% belonged to the age range of 61-70 years, 6% belonged to the age range of 70 and above and 3% belonged to the age range of 20 and below.

The sex distribution of the cases are tabulated as follows:

Table 2: Sex Distribution

Sex	Frequency	Percent
Female	45	45
Male	55	55
Total	100	100

Table 2, summarizes sex distribution of the study group, the total number of males in the study was 55 (55%) and total number of females was 45(45%).

Table 3: Symptoms

Symptom	Frequency	Percent
Dysphagia	12	12
Dysphagia, Cough	18	18
Dysphagia, Odynophagia	33	33
Dysphagia, Nasal Regurgitation	37	37
Total	100	100

Table 3, summarizes symptoms of the study group, Among the various symptoms, the most frequent symptom was Dysphagia and Nasal regurgitation (37%) followed by Dysphagia and Odynophagia (33%).

Table 4: FEES

FEES	Frequency	Percent
Aspiration	17	17
Aspiration, Laryngopharyngeal Reflux	9	9
No Obvious Pathology	51	51
Laryngopharyngeal Reflux	23	23
Total	100	100

Table 4, summarizes FEES findings in the study group, among which no obvious pathology was noted in 51%,

laryngopharyngeal reflux in 23 %, aspiration in 17% and aspiration + laryngopharyngeal reflux in 9%.

Table 5: FEES with Sensory Testing

FEES	Sensory Testing	Frequency	Percent
Aspiration	Absent	17	17
Aspiration, Laryngopharyngeal reflux	Absent	9	9
No obvious pathology	Present	51	51
Laryngopharyngeal Reflux	Present	23	23

Table 5, summarizes Evaluation of FEES with sensory testing, showing it was present for no obvious pathology patients (51%) and laryngopharyngeal reflux(23%), absent for aspiration is (17%) and aspiration + laryngopharyngeal reflux is (9%).

Fees: As aspiration, R-Aspiration, Laryngopharyngeal reflux.nop-no obvious pathology. R-laryngopharyngeal reflux.sensory testing:A-absent, P-present.

Table 5: FEES, Sensory testing and Barium Swallow

FEES, Sensory Testing and Barium Swallow				
FEES	Sensory Testing	Barium swallow	Frequency	Percent
Aspiration	Absent	Not done	17	100
Aspiration, Laryngopharyngeal Reflux	Absent	Not done	9	100
No Obvious Pathology	Present	Normal	50	98
		Stasis	1	2
		Total	51	100
Laryngopharyngeal Reflux	Present	Normal	3	13
		Stasis	20	87
		Total	23	100

Table 6: Summarizes, in 17 patients with aspiration, and 9 patients with aspiration, laryngopharyngeal reflux where sensory testing was Absent, barium swallow was not done. In no obvious pathology patients, where sensory testing was present barium swallow showed normal study in

50 patients and stasis in 1 patient. In patients with laryngopharyngeal reflux where sensory testing was present, barium swallow showed normal study in 3 patients and stasis in 20 patients.

Table 7: FEES, Sensory testing and Barium Swallow and Rigid Esophagoscope.

FEES	Sensory Testing	Barium Swallow	Rigid Esophagoscope	Frequency	Percent
Aspiration	Absent	Not Done	No Lesions/No Fistulae	17	100
Aspiration, Laryngo pharyngeal Reflux	Absent	Not Done	No Lesions/No Fistulae	9	100
No Obvious Pathology	Present	Normal Stasis	Not Done	50	98
			No Lesions/ No Fistulae	1	2
Laryngopharyngeal Reflux	Present	Normal Stasis	Not Done	3	13
			No Lesions/ No Fistulae	20	87

Table 7, summarizes in 17 patients with aspiration, no lesions/ fistulae were noted in rigid esophagoscope. No lesions/ fistulae were noted in all 9 patients who presented with aspiration/ laryngopharyngeal Reflux. In no obvious pathology patients, no lesions/fistulae were noted in those with stasis in barium swallow study. 23 patients who

presented with laryngopharyngeal reflux showed no lesions/fistulae in rigid esophagoscopy.

Evaluating FEES, Sensory testing Barium Swallow and Rigid Esophagoscope who received Dietary Modification and Swallowing Therapy.

Table 8: FEES, Sensory testing, Barium Swallow and Rigid esophagoscope who received dietary modification and swallowing therapy

Fees/sensory testing/barium swallow/rigid esophagoscope/dietary Modification/swallowing therapy							
Fees	Sensory Testing	Barium Swallow	Rigid esophagoscope	Dietary Modification	Swallowing Therapy	Frequency	Percent
Aspiration	Absent	Not Done	Nolesions /No Fistulae	Yes	Yes	17	100
Aspiration, Laryngo Pharyngeal Reflux	Absent	Not Done	Nolesions /No Fistulae	Yes	Yes	9	100
No Obvious Pathology	Present	Normal Stasis	Not Done	Yes	No	50	98
			No Lesions/ No Fistulae	Yes	Yes	1	2
Laryngopharyngeal Reflux	Present	Normal Stasis	No Lesions/ No Fistulae	Yes	Yes	3	13
			No Lesions/ No Fistulae	Yes	Yes	20	87

Table 8, Summarizes, all patients received dietary modifications, while swallowing therapy was given to all except no obvious pathology patients whose Barium Swallow study was normal.

Discussion

Dysphagia is defined as experiencing difficulty in swallowing which may in turn affect any part of the swallowing pathway anywhere from the mouth to the stomach. Dysphagia arises from the Greek word 'dys' (with difficulty) and 'phagia' (to eat).^{1,6} The process of swallowing consist of three stages: oral, pharyngeal and esophageal stage. The abnormality in the site of dysphagia can be identified from the history of the patient. Patients with oral and pharyngeal problems will have difficulty in passing the bolus from the mouth to the upper esophagus hence presentring with difficulty in initiating the swallow, as well as problems with aspiration, choking and nasopharyngeal regurgitation. Patients with esophageal cause come with complaints of food sticking in the throat or at a point in the chest, also if the obstruction is in the distal esophagus then

the complaint or perception will be at the level of stricture.² All patients have to undergo all routine investigations and are treated accordingly. The purpose of our study was, that all patients with dysphagia, underwent all the routine ENT examination, mainly Indirect laryngoscopy which if normal, the patients underwent Flexible fiberoptic endoscopic evaluation of swallowing which was been done according to the proforma. Depending on the findings and sensory testing the patient was investigated with barium swallow and rigid esophagoscope. The patient has been treated accordingly with dietary modifications and swallowing manouevres. In our study, patients who came with complaints of dysphagia, odynophagia, cough and nasal regurgitation were evaluated as follows. In Evaluation with FEES, the findings noted were, no obvious pathology, signs of aspiration, laryngopharyngeal reflux, or both. In our study, 51% showed no obvious pathology, 23% showed laryngopharyngeal reflux, 17% showed aspiration and remaining 9% showed both aspiration and laryngopharyngeal reflux.

These patients then underwent sensory testing and those with aspiration and laryngopharyngeal reflux showed

absence of sensation i.e. 26% and the rest showed presence of sensation i.e. 74%. Patients with aspiration didn't undergo barium swallow. In those who did not show any abnormalities in FEES i.e. no obvious pathology patients, 98% showed normal study following barium swallow and 2% showed stasis, while in laryngopharyngeal reflux patients, stasis was noted in 87% following barium swallow and 13% showed normal study. Patients who did not show any abnormalities in FEES and those with normal study of barium swallow in the group with no obvious pathology, did not undergo rigid esophagoscopy while the rest were subjected to the same. Those who underwent rigid esophagoscopy did not show any lesion / fistulae during the procedure. In our study, all patients received dietary modifications, while swallowing therapy was given to all except patients with no obvious pathology, whose barium swallow study was normal. Patients were followed up at the end of 1 and 3 month respectively, and patients showed symptomatic improvement. A study conducted by Susan E. Langmore, et al evaluated dysphagia patients by the fiberoptic endoscopic evaluation of swallowing (FEES) procedure, which is a comprehensive evaluation of the oropharyngeal phase of swallowing that can reveal the nature of the problem and guide management, improving efficacy and outcome. In addition, this technique can be used as a biofeedback tool in therapy. The FEES protocol, as established by Langmore et al., is a comprehensive evaluation of swallowing, including three major components: (1) structural movement, sensory status, and anatomic support for swallowing; (2) ability to swallow food and liquid; and (3) response to postural, dietary, or behavioural alterations to alter the path of the bolus or the way it is swallowed. The FEES has led to research that has uncovered some unique insights about normal and disordered swallowing because it has proven to be a valid, useful, cost-effective, reliable, and effective procedure for diagnosing dysphagia, for understanding the nature of the swallowing problem, and for guiding treatment. In this study both static and dynamic components of FEES were evaluated as opposed to our study where only the static component of FEES was evaluated. The patients in the above mentioned study were managed with postural, dietary or behavioural alterations, while in our study dietary modifications and swallowing manoeuvres were employed, following which patients showed symptomatic improvement. A study conducted by Duval M et al. 2004 evaluated dysphagia patients by flexible fiberoptic endoscopic evaluation of swallowing (FEES), other routine investigations were done and following this evaluation, appropriate treatment, dietary modifications, and swallowing techniques had been taught to the patient. The study result showed that FEES was normal for all consistencies in 28% of patients, and pooling was the most frequently encountered abnormality. The most common etiologies were neurologic (27%), laryngopharyngeal reflux

(22%), and malignancy (21%). The four treatment modalities consisted of dietary modifications (37%), teaching of therapeutic swallowing manoeuvres (33%), medical treatment (26%), and surgical treatment (11%).⁵

Similar findings were also noted in our study where 25% showed neurological etiology, 23% showed laryngopharyngeal reflux. In the above mentioned study the treatment modalities used were dietary modifications, teaching of therapeutic swallowing manoeuvres, medical treatment, and surgical treatment. While in our study, swallowing manoeuvres and dietary modifications were the treatment modalities used, following which patients showed symptomatic improvement.

Conclusion

The FEES procedure has taken advantage of a marvelous tool, the flexible endoscope, to visualize the pharyngeal and laryngeal structures involved in swallowing, thus helping many clinicians to uncover some unique insights about normal and disordered swallowing.

Likewise, in our study it has proven to be a valid, useful, cost-effective, reliable, and effective procedure for diagnosing dysphagia, understanding the nature of the swallowing problem, and guiding treatment. Unlike barium swallow, FEES can be done as bedside procedure and in critically ill/ bed ridden patients.

The field of swallowing and swallowing disorders is an exciting one and flexible fiberoptic endoscopy has opened more doors to the researchers and clinicians alike.

Conflict of interest: None.

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