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FEES as a second-stage diagnostic tool in 117 patients with dysphagia

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Short title: Elective FEES examination

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Key points

- FEES is a useful tool for monitoring and assessing the degree of dysphagia.
- In this study, we assessed 117 primary FEES examinations, finding a correlation between the underlying cause and the degree of dysphagia.
- FEES is recommended for use as a second-stage diagnostic tool in a multidisciplinary environment for managing dysphagia patients.

Introduction

In 1988, Langmore et al. developed fiberoptic endoscopic evaluation of swallowing (FEES) as a safe and reliable tool for the diagnosis and monitoring of dysphagia.¹ Currently, FEES represents the gold standard in oropharyngeal dysphagia, although videofluoroscopy may supplement clinical assessment in select cases.² One or a work pair speech–language therapists (SLTs) most often serve as endoscopists during FEES. In Finland, an ear, nose and throat (ENT) specialist or a phoniatrics specialist as well as an SLT perform FEES either together or alone. Although this work-pair setting is considered superior vis-à-vis safety and precision, a limited amount of research exists on various aspects of the care pathway for patients with dysphagia at a tertiary health care centre.²

Thus, this study aimed to evaluate the utilisation and outcome of FEES procedures at a tertiary teaching hospital.

Patients and Methods

This internal quality assurance study included 130 FEES procedures completed between 2011 and 2012 in the Department of Otorhinolaryngology – Head and Neck Surgery, Helsinki University Hospital (HUS; Helsinki, Finland), an academic tertiary care centre situated within a referral area encompassing 1.6 million inhabitants (Table 1). The primary dysphagia assessment consisted of a careful history and clinical examination performed by an ENT specialist performed in our department. Three procedures were interrupted due to compromised patient compliance and 10 procedures consisted of secondary FEES exams. Thus, in our analysis, we included 117 primary FEES procedures after removing 13 examinations. Details on referrals, the clinical condition, symptoms and outcomes as well as the findings from FEES examinations were recorded from medical charts and FEES videos. From these records, we extracted an impression for the overall swallowing performance to the best of our ability. Institutional study permission was granted for the review of the digital FEES investigations and hospital charts.

Five clinically relevant conditions were assessed prior to FEES and were recorded: no underlying cause for dysphagia, a neurological disorder, a benign or malignant tumour in the head and neck (HN) region and a non-somatic disorder (functional or psychiatric). Pneumonia five years prior to FEES was recorded if the patient was managed at HUS. No assessment determined whether pneumonia was expressly aspiration or not.

We recorded recommendations based on FEES procedures that identified indications for percutaneous endoscopic gastrostomy (PEG) insertion or removal or sustained PEG. PEG insertion was typically recommended if a significant weight loss, gross aspiration or the degree of dysphagia indicated an obvious weight loss in the near future were recorded.

A team of two experienced ENT specialists and a trained medical student reviewed and discussed all recorded FEES videos frame by frame. Based on our judgement of the clinical details, we retrospectively graded the degree of dysphagia according to the criteria and the seven classes described by O'Neil et al.³: none, none/mild, mild, mild/moderate, moderate, moderate/severe or severe.

All FEES procedures were performed using a flexible nasolaryngeal endoscope (Karl Storz GmbH & co KG, Tuttlingen, Germany) combined with the rpScene 10.2f (Rehder/Partner GmbH, Hamburg, Germany) video program for analysis.

We performed all statistical analyses using IBM's SPSS for Mac, version 22.0 (SPSS Inc, Chicago, IL, USA), employing the Pearson's correlations to examine correlations. We relied on two-tailed *p*-values, and considered $p < 0.05$ statistically significant.

Results

Across all 117 cases, 116 (99%) experienced symptoms for more than 6 months prior to FEES.

In total, 63 (54%) patients presented for FEES with normal swallowing ($n = 39$) or with very mild dysphagia ($n = 24$), whereas 29 (25%) had mild/moderate dysphagia and 25 (21%) had moderate/severe or severe dysphagia (Table 2). Table 2 summarises the degree of dysphagia alongside different underlying causes. The underlying cause of dysphagia and the degree of dysphagia correlated significantly ($p < 0.001$). We also found a correlation when using the underlying cause as a control for globus and the degree of dysphagia ($p = 0.001$).

We also found that the underlying cause ($R_s = 0.41$, $p < 0.001$; Table 3) and pneumonia ($R_s = 0.41$, $p < 0.001$; Table 3) correlated with the degree of dysphagia (Table 3). Pneumonia ($R_s = 0.39$, $p < 0.001$; Table 3) and successful swallowing ($R_s = 0.41$, $p < 0.001$; Table 3) correlated with the underlying case, whereas globus sensation inversely correlated with the underlying cause ($R_s = -$

0.35, $p < 0.001$; Table 3). Patients with aspiration more often had pneumonia ($R_s = 0.45$, $p < 0.001$; Table 3). Patients with pneumonia exhibited less successful swallowing ($R_s = 0.51$, $p < 0.001$; Table 3) and a diminished globus sensation ($R_s = -0.29$, $p = 0.001$; Table 3).

PEG use was recommended for 12 (10%) of 117 patients, all of whom presented with moderate to severe dysphagia. Among 8 patients with severe dysphagia, 5 were PEG-dependent and PEG insertion following FEES was recommended for 3 patients. Among all 18 (15%) PEG-dependent patients, 13 (72%) had moderate/severe or severe dysphagia. Two patients with PEG had none/mild dysphagia, one had mild dysphagia and two mild/moderate dysphagia due to a planned surgery and radiation therapy for HN cancer.

Referral to another medical specialist was made for 16 (14%) patients due to suspicion of a corresponding underlying cause in that specific field of expertise. Four patients with either none, mild, moderate or moderate/severe dysphagia were referred to a neurologist. One patient with none/mild dysphagia was referred to a gastroenterologist. Six patients with none, none/mild or moderate dysphagia were referred to a surgeon. Five patients with none, none/mild or moderate dysphagia were referred to another specialty.

Discussion

This study evaluated 117 consecutive patients who underwent FEES procedures to assess dysphagia over a two-year period at a single academic teaching hospital.

The mean age of patients undergoing FEES was 61 years, a finding similar to previous studies.⁴ Up to 23% of primary care patients apparently suffer from dysphagia.⁵ HN cancer,⁶ stroke⁷ and Parkinson's disease⁸ represent the most frequently encountered underlying causes. This agrees with our study, where the most common underlying causes for dysphagia were a HN tumour (21%) and a neurological condition (22%).

Healthy patients with no known underlying condition presented most often with a globus sensation, and these patients also most often experienced normal swallowing in FEES. According to previous studies, patients with typical globus symptoms do not require further investigation other than an outpatient visit for a nasolaryngoscopy.⁹ Furthermore, patients with a globus sensation appear not to develop any HN malignancies. This study also served as an internal quality control, during which

we noted that a substantial number of FEES procedures were performed due to a globus sensation and, thus, may have been superfluous.

Moreover, one-fourth (26%) of the FEES procedures performed in our centre were carried out to evaluate the indications for PEG insertion. FEES is considered a useful tool to assess patients at risk for aspiration or silent aspiration.¹⁰ In this study, we observed a correlation between aspiration, pneumonia and the degree of dysphagia, although PEG was recommended for two patients considered otherwise healthy.

The weaknesses in our study include its retrospective study design with missing intra- and inter-rater analyses, and the interpretation of some unstructured clinical data.

Conclusions

Patients with no obvious underlying cause for dysphagia appear to present more often with symptoms such as a globus or the sensation of a bolus getting stuck when compared with patients with an underlying HN malignancy or a neurological condition. Therefore, we recommend FEES not as a screening method, but as a second-stage diagnostic tool for dysphagia consultations in a multidisciplinary tertiary-level setting when the patient history and routine clinical ENT examinations appear insufficient.

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Table 1. Patient demographics in 117 primary FEES patients

Gender	Female	61 (52%)
	Male	56 (48%)
Age	Range	17-91
	Mean	60,3
Previous health status	Healthy	35 (30%)
	Functional or	14 (12%)
	Neurological	26 (22%)
	Bening tumor	17(15%)
	Malignancy	25 (21%)
	Total	117 (100%)
Duration of symptoms (months)	< 3	1 (1%)
	3-6	11 (9%)
	6-12	28 (24%)
	> 12	77 (66%)

Table 2. Results and underlying causes in FEES in 117 dysphagia patients

Underlying cause	Degree of dysphagia ¹							Aspiration	
	1	2	3	4	5	6	7	no	yes
Healthy (35)	18	6	6	3	1	1	0	32	3
Functional or psychiatric (14)	6	4	1	1	0	2	0	10	4
Benign tumor (17)	7	3	2	2	2	0	1	12	5
Malignancy (25)	2	6	4	0	3	7	3	19	6
Neurological disorder (26)	6	5	2	1	1	7	4	14	12
Total (117)	39	24	15	7	7	17	8	87	30

¹The degree of dysphagia is split up in classes 1=no dysphagia, 2=none/mild dysphagia, 3=mild dysphagia, 4=mild/moderate dysphagia, 5=moderate dysphagia, 6=moderate/severe dysphagia, 7=severe dysphagia

²Number of pneumonias within five years of FEES

Table 2. Results and underlying causes in FEES in 117 dysphagia patients

Pneumonias ²				Globus		PEG		
None	1	2-4	>4	no	yes	not recommended	recommenda	sustains
34	1	0	0	18	17	33	2	0
13	0	1	0	7	7	13	1	0
16	0	0	1	9	8	15	0	2
17	6	2	0	22	3	15	4	6
13	8	5	0	23	3	11	5	10
93	15	8	1	79	38	87	12	18

Table 2. Results and underlying causes in FEES in 117 dysphagia patients

	Healthy (35)	Functional or psychiatric (14)	Benign tumor (17)	Malignancy (25)	Neurological disorder (26)	Total
Degree of dysphagia						
None	18	6	7	2	6	39
None/mild	6	4	3	6	5	24
Mild	6	1	2	4	2	15
Mild/Moderate	3	1	2	0	1	7
Moderate	1	0	2	3	1	7
Moderate/Severe	1	2	0	7	7	17
Severe	0	0	1	3	4	8
Aspiration						
no	32	10	12	19	14	87
yes	3	4	5	6	12	30
Pneumonias ¹						
none	34	13	16	17	13	93
1	1	0	0	6	8	15
2-4	0	1	0	2	5	8
>4	0	0	1	0	0	1
Globus						
no	18	7	9	22	23	79
yes	17	7	8	3	3	38
PEG						
not recommended	33	13	15	15	11	87
recommended	2	1	0	4	5	12
sustains	0	0	2	6	10	18

¹Number of pneumonias within five years of FEES

Table 3. Correlation of causes and symptoms in FEES in 117 dysphagia patients

	Rs	p
Degree of dysphagia		
Underlying cause	0,41	<0.001
Aspiration	0,15	0,11
Pneumonia	0,41	<0.001
Success in swallowing	0,54	<0.001
Globus	-0,42	<0.001
Underlying cause		
Aspiration	0,28	0,003
Pneumonia	0,39	<0.001
Success in swallowing	0,41	<0.001
Globus	-0,35	<0.001
Aspiration		
Pneumonia	0,45	<0.001
Success in swallowing	0,15	0,115
Globus	-0,16	0,092
Pneumonia		
Success in swallowing	0,51	<0.001
Globus	-0,29	0,001
Success in swallowing		
Globus	-0,29	0,002