

# MBS / FEES

# Course Objectives

- Know the normal anatomy of swallowing
- Know the normal physiology of swallowing
- Enumerate different etiologies of oropharyngeal dysphagia
- Be able to do bedside assessment (KKUH visit)
- Interpret MBS and FEES procedures
- Write MBS and FEES reports
- Put a short-term and long-term treatment plan

# Modified Barium Swallow (MBS-VFSS)

# MBS vs. Barium Swallow (BS)

1. Amount of material.
2. Type of material.
3. Position of patient.
4. Views of study.
5. Purpose of the study.

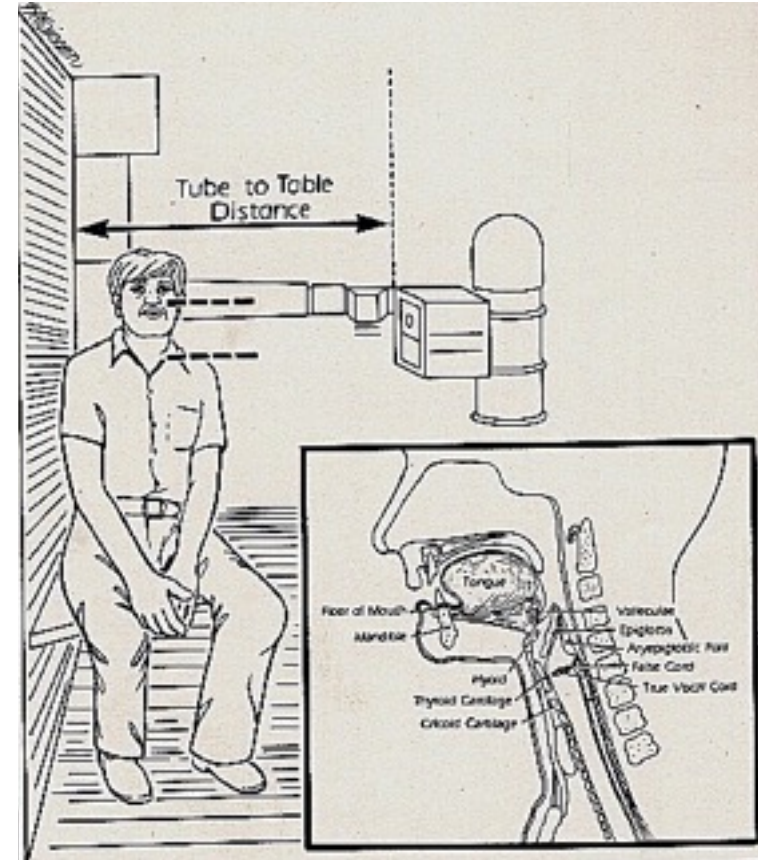
# Rationale

- 1- Study the anatomy and the physiology of the oral preparatory, oral, pharyngeal, and cervical esophageal stages of deglutition.
- 2- Define management and treatment strategies that will improve the oropharyngeal dysphagia patient's swallowing safety or efficiency.

# Positioning of the patient

## Lateral view

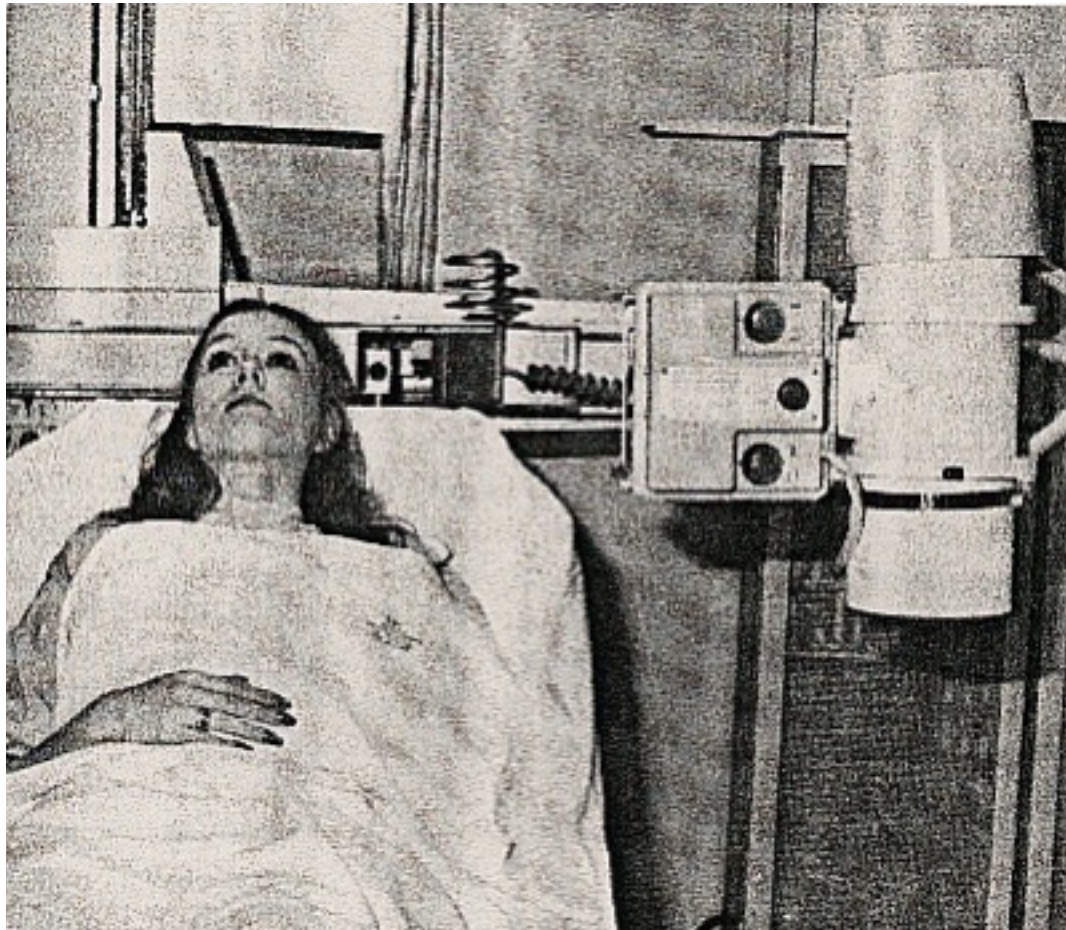
- 1- The oral and pharyngeal transit times.
- 2- Location of stasis of the bolus along the vocal tract from anterior to posterior.
- 3- Analysis of patterns of lingual movement.
- 4- Gross estimate of the time elapsed before the swallowing reflex triggers.
- 5- Estimate of the amount of vallecular residue, and the amount of material aspirated per bolus, as well as the reason for the aspiration.



*Logemann, J. (1993): A Manual for Videofluoroscopic Evaluation of Swallowing, ed 2. Austin, Pro-Ed.*



# Lateral view

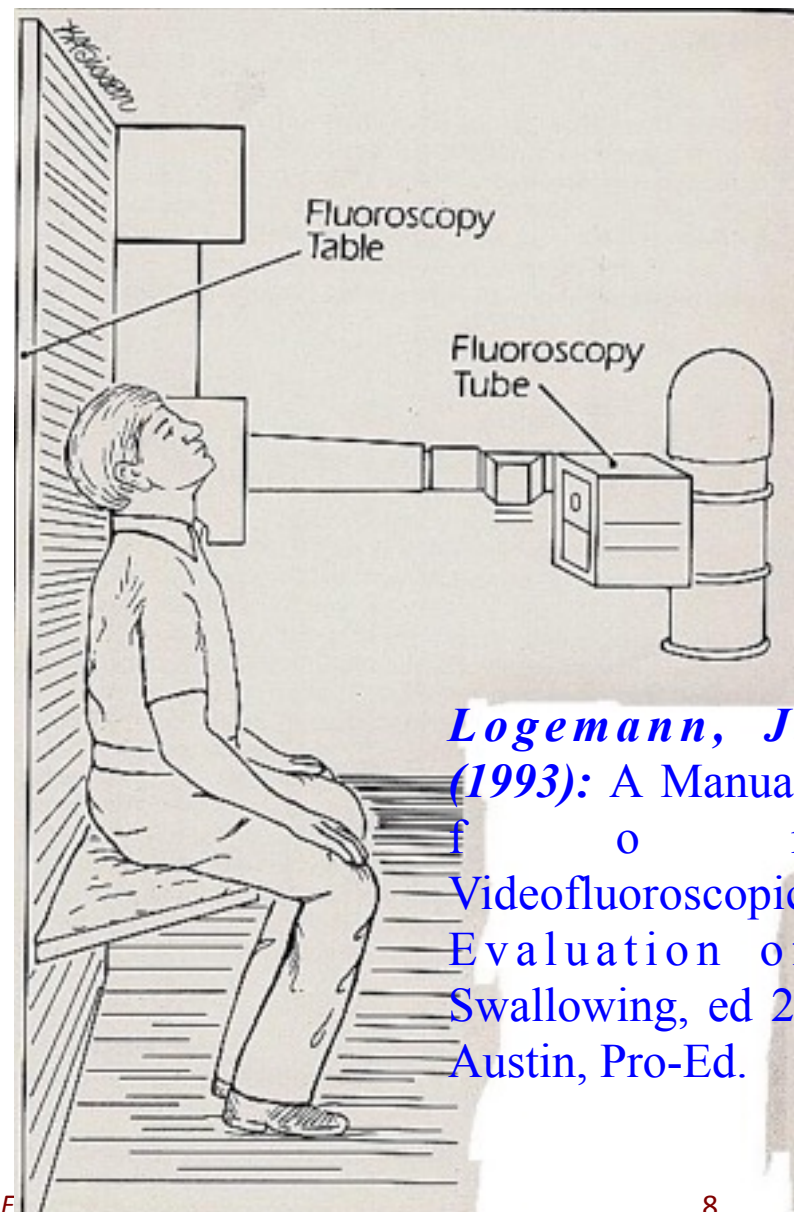


*Logemann, J. (1993): A Manual for Videofluoroscopic Evaluation of Swallowing, ed 2. Austin, Pro-Ed.*

# Positioning of the patient (Cont.)

## Antro-posterior view

- 1- Symmetry in function, particularly of the vocal folds.
- 2- Viewing residues such as collection of material in the valleculae and residue in the pyriform sinuses.
- 3- Examine the residue in the pharynx after the swallow, comparing the two sides.
- 4- Provide a clear picture of vocal fold movement by tilting the patient's head backwards and ask him to vocalize a continuous ah and a rapidly repetitive /a/a/a/.

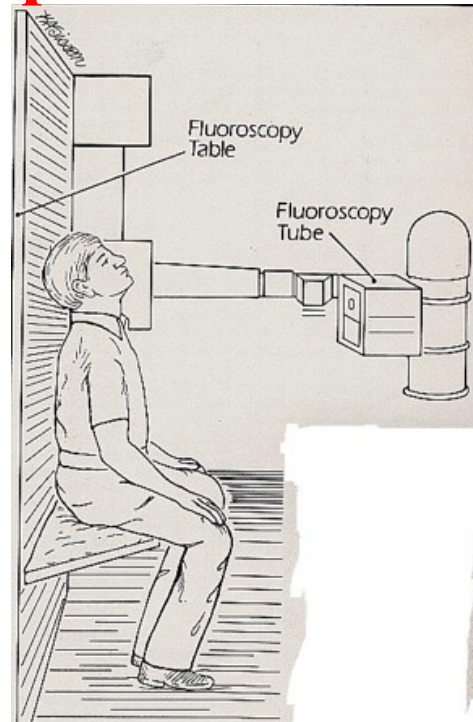
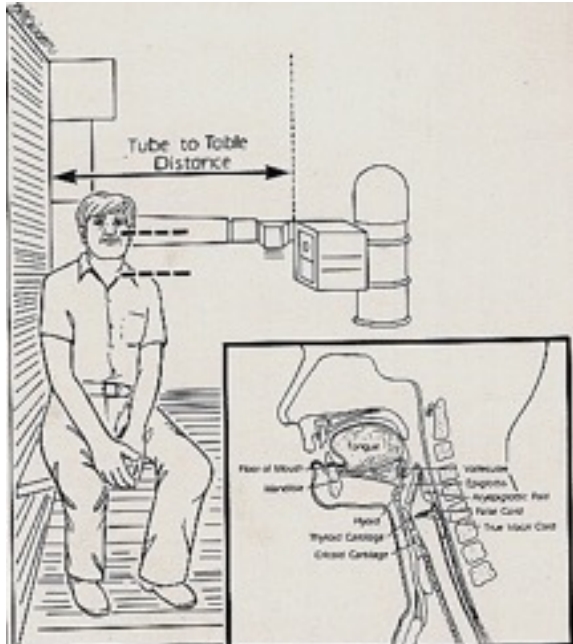


*Logemann, J. (1993): A Manual for the Videofluoroscopic Evaluation of Swallowing, ed 2. Austin, Pro-Ed.*





# Positioning of the patients in MBS



**Before**



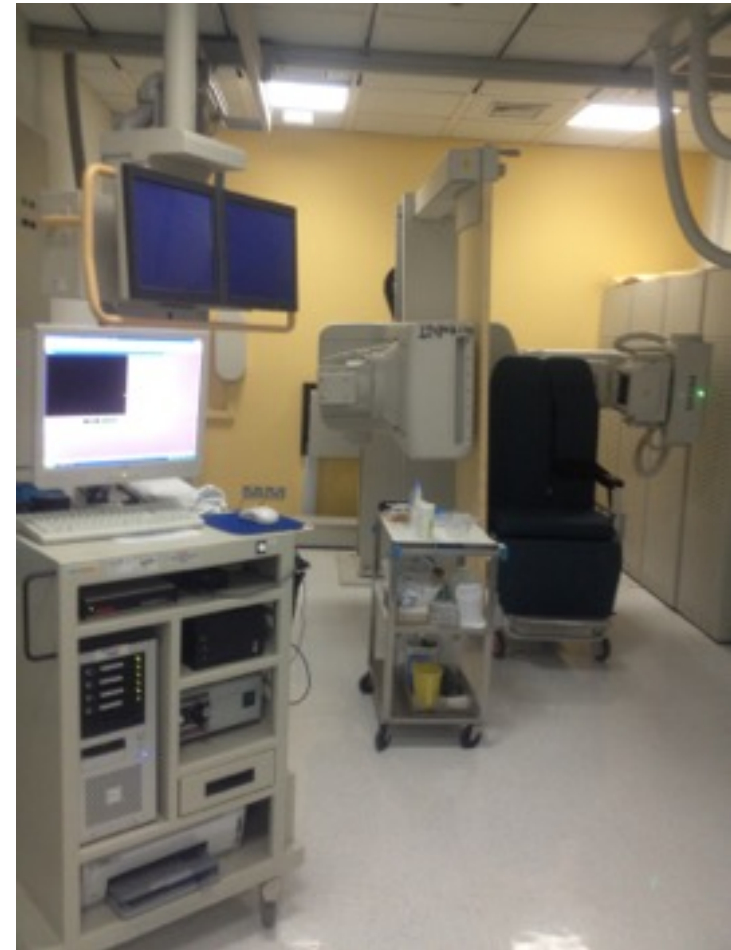
**Now**

# MBS Chair (KKUH)



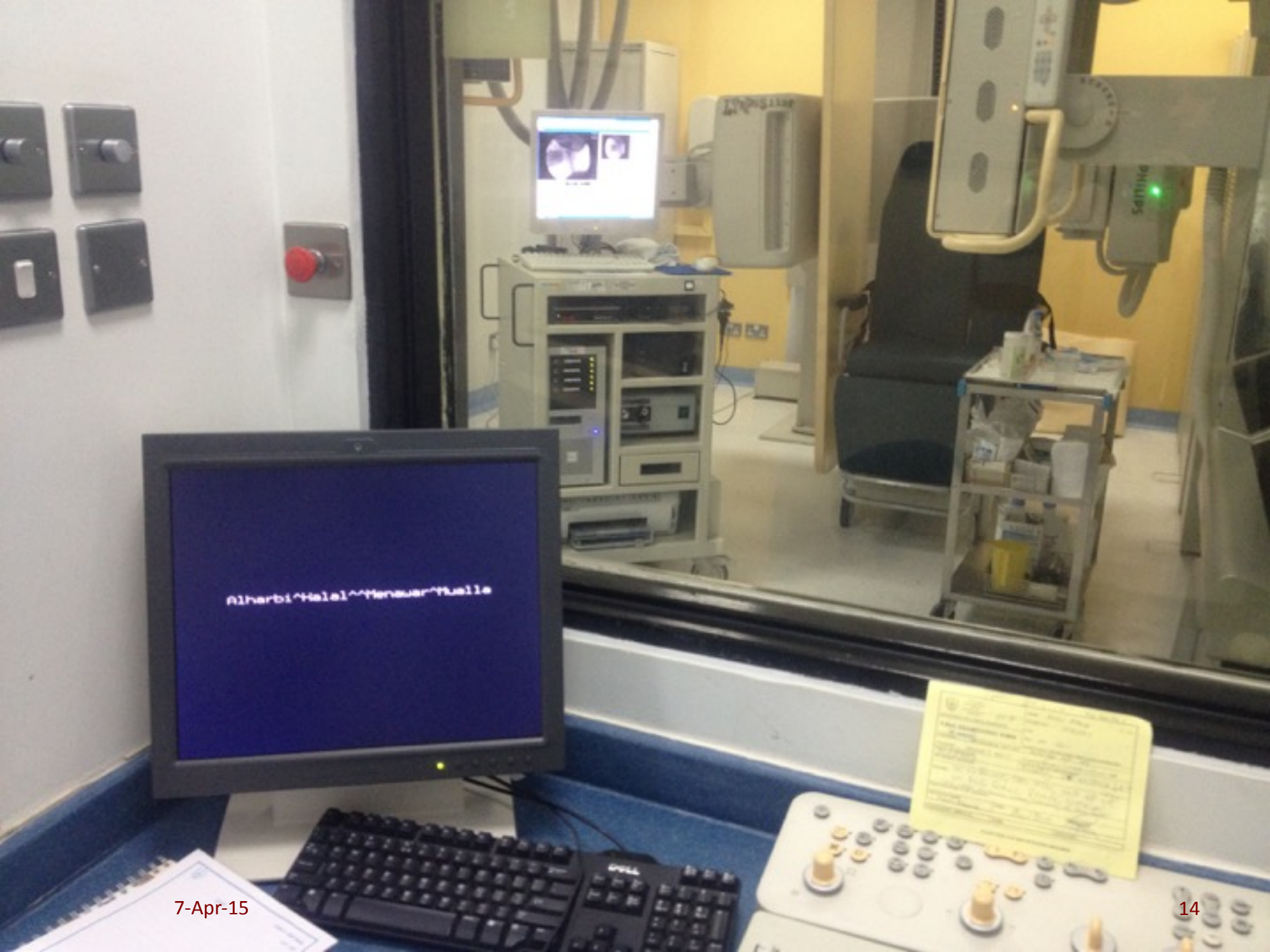


# MBS Equipment (KKUH)





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# Food presentation

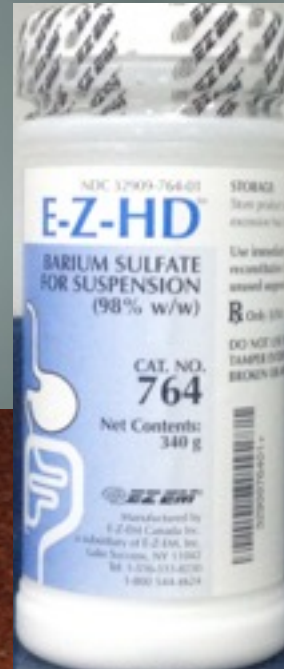
The patient is asked to swallow three swallows of each of the following :

- (a) 3 ml, 5 and 10 ml **thin liquid** (20% barium sulfate [prontobario H.D.®] and 80% water);
- (b) 3, 5, and 10 ml **thick liquid** (50% barium and 50% water);
- (c) 3, 5, 10 ml **semisolid** (pudding mixed with barium powder) and
- (d)  $\frac{1}{4}$  of a **cookie** (coated with pudding + barium powder)

**Thin liquid** (20% barium sulfate [prontobario H.D.®] and 80% water) [1:4]



**Thick liquid** (50% barium and 50% water) [1:1]



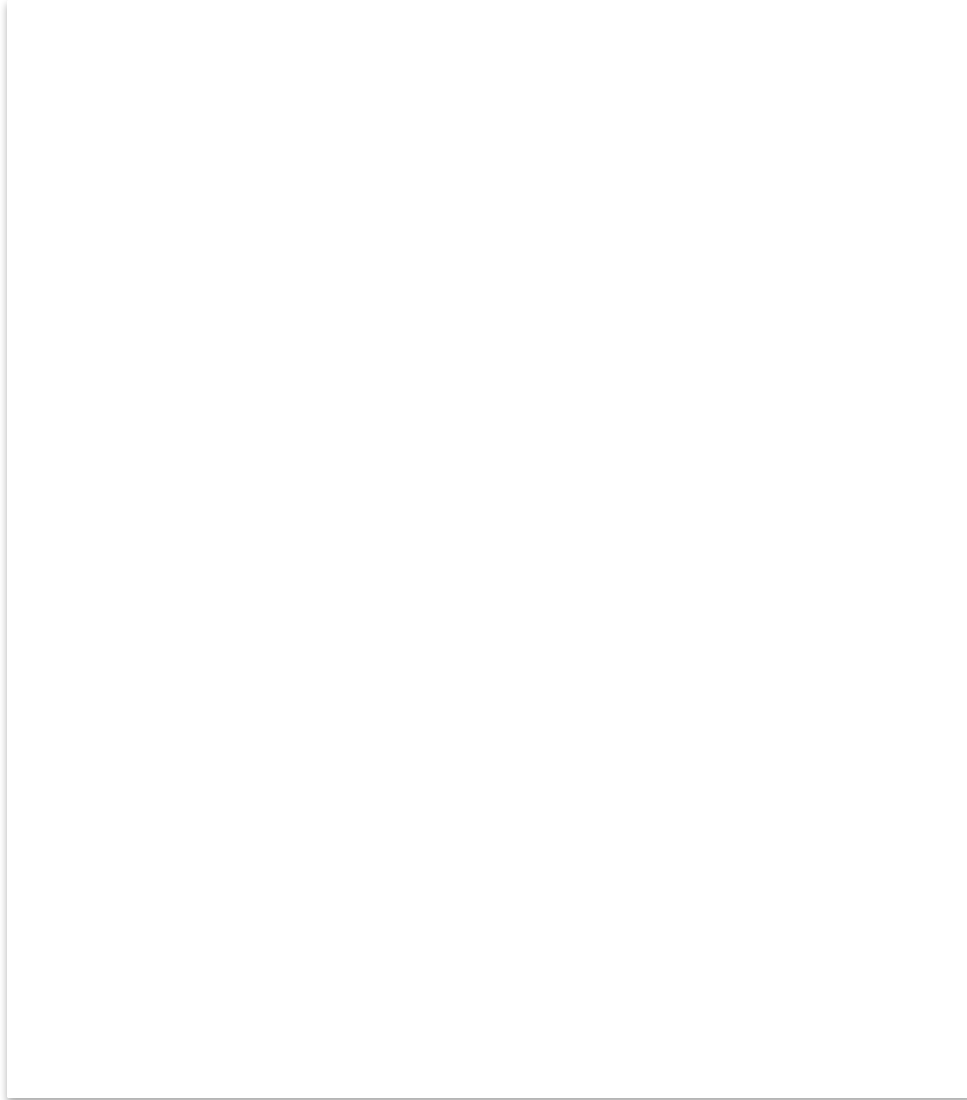
**Semisolid** (pudding mixed with barium powder)



**cookie** (coated with pudding + barium powder)

# Ready made consistencies





# Normal MBS/ Lateral view



# Measuring parameters

- 1- Range of structural movement
- 2- Duration of bolus movement; transit times
- 3- Oropharyngeal Swallow Efficiency [OPSE]
- 4- Coordination of pharyngeal swallow events



## Penetration-Aspiration Scale (Rosenbek et al, 1996):

### Normal

1 = Material does not enter the airway.

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### Penetration

2 = Residue ABOVE TVF, patient expels it.

3 = Residue ABOVE TVF, patient does not sense it.

4 = Residue ON TVF, patient expels it.

5 = Residue ON TVF, patient does not sense it.

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### Aspiration

6 = Residue BELOW TVF, patient expels it.

7 = Residue BELOW TVF, patient does not expels it despite effort.

8 = Residue BELOW TVF, no effort to expel it.

# Modified Barium Swallow checklist

Patient Name :		Gender : M / F		Age :		Date of evaluation : / /	
File Number (KAUH):		(KUH):		Telephone # :		Tape # :	
Examiner :		New / Follow-up		Inpatient / Outpatient			
Diagnosis :							

Stage of Swallowing	Thin liquid (1 Ba x 4 water)				Thick liquid (1 Ba x 1 water)			Semisolid (pudding-Ba)			Cookie
	3cc	5cc	10cc	cup	3cc	5cc	10cc	3cc	5cc	10cc	
<b>I. Oral Phases:</b>											
1) Reduced lip closure					Lateral view						
2) Poor mandibular movement											
3) Poor bolus formation											
4) Poor tongue movements:											
- rotatory movements											
- tongue-to-palate contact											
- A-P movement											
- repetitive A-P movements											
- tongue thrust											
5) Oral residue: *											
- anterior sulcus											
- lateral sulcus											
- dorsum of the tongue											
- % oral residue											
6) Premature swallow:											
7) Piecemeal deglutition:											
8) Oral transit time: **											
<b>II. Pharyngeal Phase:</b>											
1) Nasal regurgitation											
2) Swallowing initiation***											
3) Pharyngeal delay time ##											
4) Reduced velar elevation											
5) BOT-PPW contact											
6) Reduced laryngeal elevation											
7) Ant. hyolaryngeal excursion											
8) Reduced laryngeal closure											
9) UES (cricoph) opening											
10) Penetration (%): "											
before - during - after											
11) Aspiration (%): "											
before - during - after											
12) Pent. / Asp. Scale \$											
13) Cough resp. to pen/aspi =											
<b>\$ Penetration-Aspiration Scale (Rosenbek et al., 1996):</b>											
1- enters airway											
2- enters airway / above folds / ejected											
3- enters airway / above folds / not ejected											
4- enters airway / contacts folds / ejected											
5- enters airway / contacts folds / not ejected											
6- enters airway / below folds / not ejected											
7- enters airway / below folds / not ejected despite effort											
8- enters airway / below folds / no effort											
<b>* Post-swallow residue:</b>											
0 = no residue, 1 = mild (coating), 2 = moderate, 3 = severe											
<b>** Oral transit time:</b> from initiation of posterior bolus movement to arrival of the bolus head at ramus of the mandible											
<b>*** Swallowing initiation:</b>											
0 = normal, 1 = mild delay, 2 = moderate delay, 3 = severe delay, 4 = absent											
<b>% of bolus penetrated / aspirated:</b>											
0 = No pen/aspi., 1 = < 10 %, 2 = > 10 %											
<b># Cough response:</b>											
0 = present, 1 = weak, 2 = absent											
<b>## Pharyngeal delay time:</b>											
From bolus head passing ramus to onset of laryngeal elevation											

# Modified Barium Swallow checklist

→

Stage of swallowing	Thin liquid (1.5a x 4 water)				Thick liquid (1.5a x 1 water)			Semisolid (pudding+5a)			cookie
	3cc	5cc	10cc	cup	3cc	5cc	10cc	3cc	5cc	10cc	
<b>II. Pharyngeal stage (cont.):</b>											
14) Pharyngeal residue:											
- base of tongue											
- post. pharyngeal wall											
- valleculae											
- aryepiglottic folds											
- pyriform sinuses											
- % of pharyngeal residue											
15) Pharyngeal transit time: ###											
<b>III. OPSE score: %</b>											
- % of bolus swallowed:											
- Total swallow duration:											
- OPSE Score											
- Mean OPSE Score											
i - for bolus volume:											
ii - for bolus consistency:											
- Total OPSE Score											
<b>IV. Degree of impairment:</b>											
- Mean degree of impairment											
i - for bolus volume:											
ii - for bolus consistency											
- Total degree of impairment											
<b>Anterior - Posterior view:</b> 1 - alignment of the mandible: 2 - symmetry of bolus movement: 3 - symmetry of pooling in oral cavity: 4 - symmetry of vallecular stasis: 5 - symmetry of stasis in pyriform sinuses: 6 - degree of vocal fold adduction: 7 - height of the vocal folds: equal / unequal											
<b>### Pharyngeal transit time:</b> From arrival of bolus head at ramus to bolus tail past UES. <b>% Oro-Pharyngeal Swallowing Efficiency Score</b> (Rademaker et., 1994): % of bolus swallowed / total swallow duration. % of bolus swallowed / total swallow duration											
<b>Circle if present:</b> Trach. Tube    NG Tube    G Tube    J Tube											
<b>Trial Therapy:</b>	<b>Comments:</b>										
<b>Recommendations:</b>	Diet:  Swallowing posture:  Swallowing maneuver:  Others:										

# Follow up

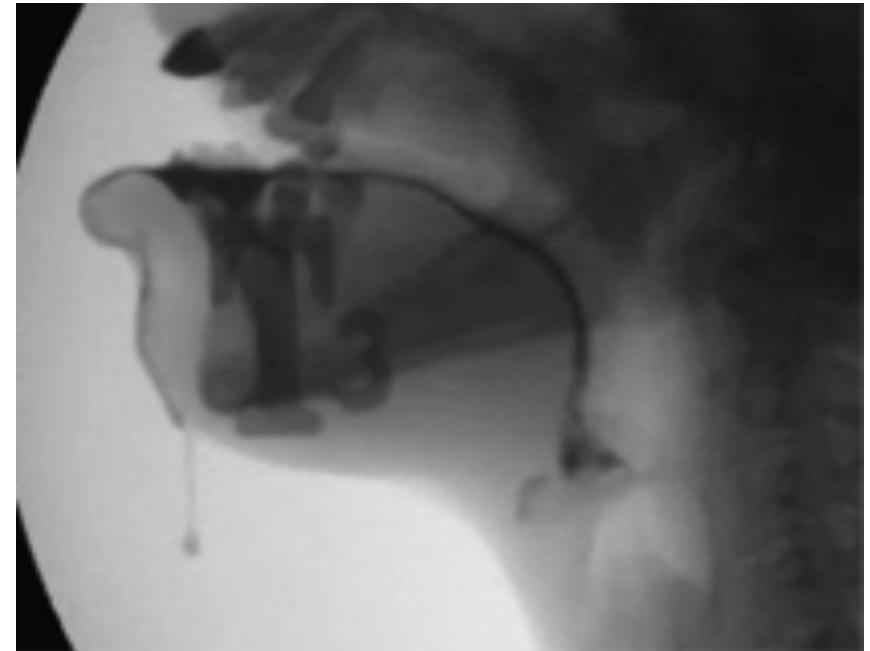
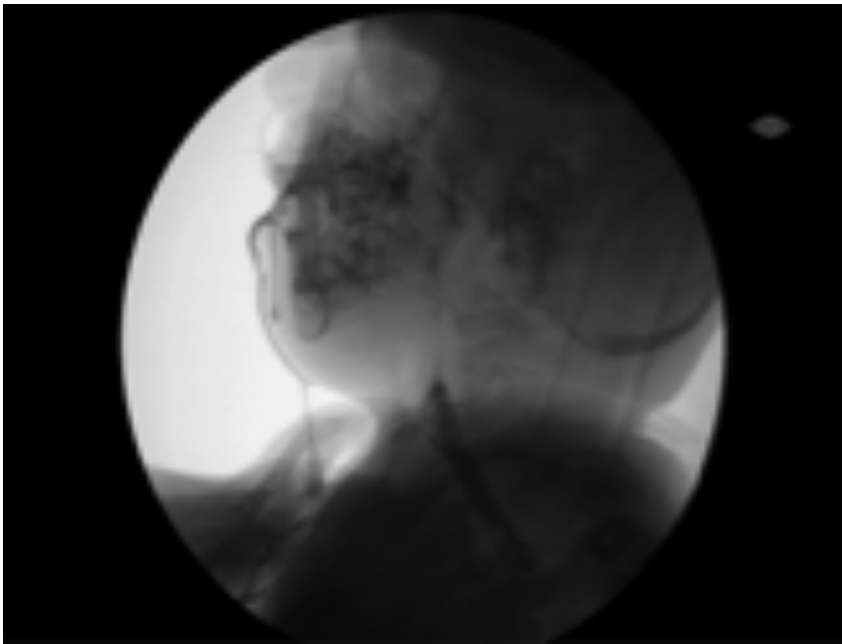
Depends on the patient's medical diagnosis, anticipated rate of recovery, and prognosis.

1- Questionnaires (SWAL-QOL/ DHI/ EAT-10 tool/ patients' compliance)

2- MBS

# Abnormal MBS

# Poor lip seal (Oral spillage)

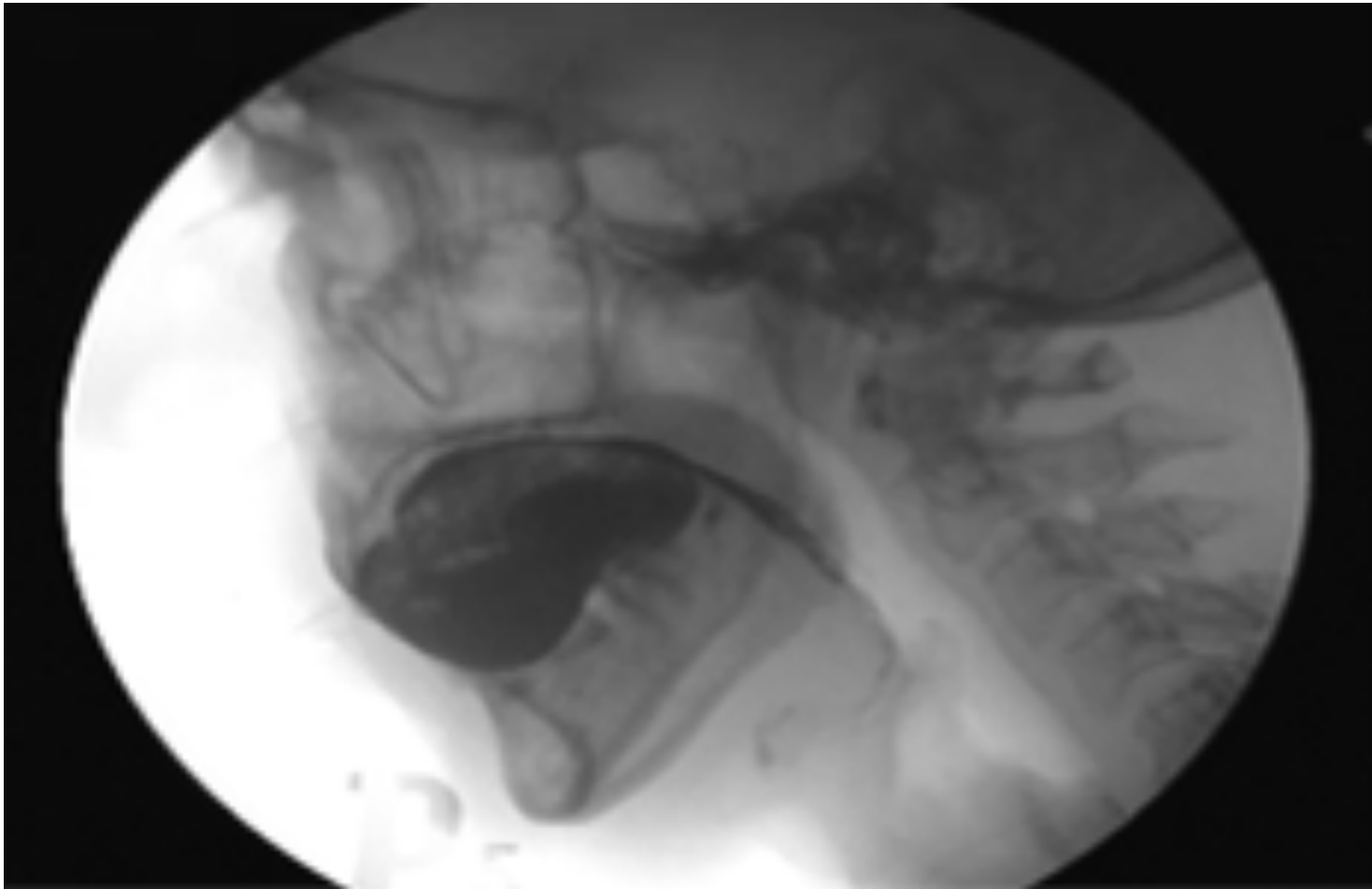


Premature spillage



# Diffuse bolus

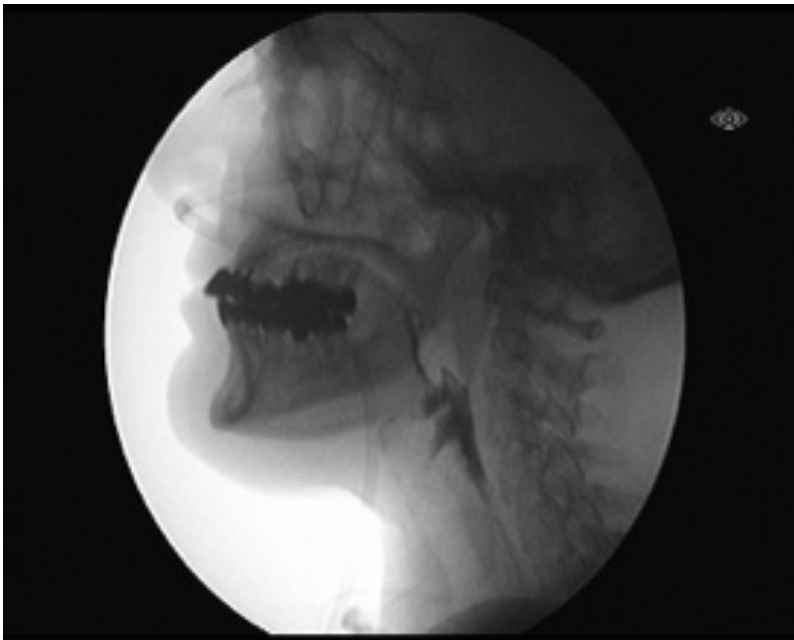
(poor oral manipulation)



# Piece meal deglutition



# Penetration

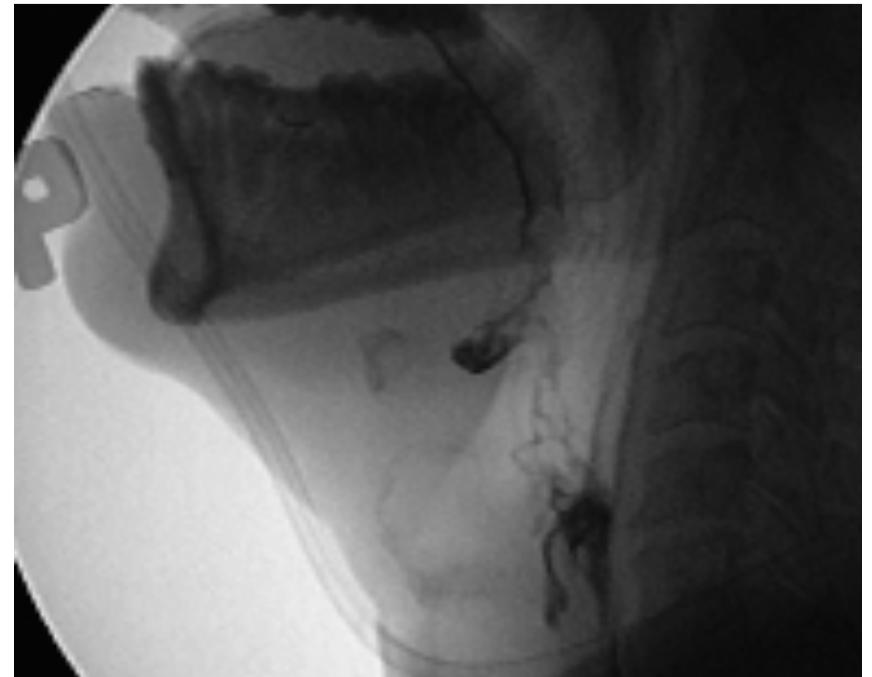


During swallowing



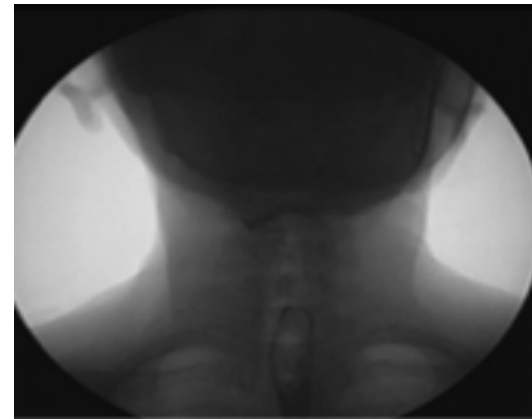
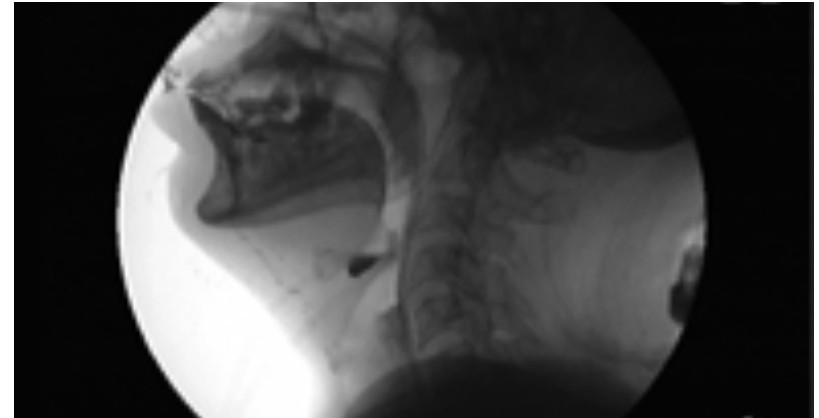
With open airway

# Aspiration



Posterior aspiration

# Residues



?

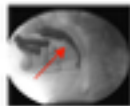




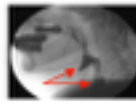
# MBS Report

## SWALLOWING DISORDERS CLINIC – KKHU Modified Barium Swallow (MBS) Report

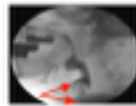
Name: [REDACTED] Age: 75 y.o. Gender: Male.  
Diagnosis: D.M, HTN, CVA, Dyslipidemia, Alzheimers - MRN: 185687.  
Date: 20/11/2011.



Prolonged oral phase with puree tip



Pooling in valleculae & pyriform sinuses before swallow with 2nd thick liquid



Aspiration before swallow with 2nd thick liquid

Modified Barium Swallow Study was performed in fluoroscopy room at radiology department in the presence of the swallowing team on this 75-year old female patient, who is presented with Hx of D.M, HTN, Dyslipidemia, metabolic encephalopathy and Old CVA + Recurrent CVA – 5 weeks ago. Admitted to the ER on 14/11/2011 with main complain of decreased level of consciousness. Patient was on a regular diet at home, during his hospital stay he remained on a regular diet + IV fluid, till bedside assessment was done and revealed (+) signs of silent aspiration, where puree + honey thick liquid was recommended, patient's caregivers mainly complained of coughing with food & liquids. He was seated on a stretcher in semi upright position with lateral view. Patient was very difficult to position, trachea was invisible due to improper positioning, patient was found to be very sleepy, for that full protocol was not followed.

Consistencies presented: Varibar's "ready made consistencies" presented to the patient by the clinician in the following order:

- 1- Thin Liquid : 2x 2ml, 2x5ml.
- 2- Nectar/Thick Liquid : 2x2ml.
- 3- Honey thick Liquid : 2x2ml, 2x5ml.
- 4- Puree : 2xtop, 1x 1Tbsp. Puree 1 top + lemon.
- 5- Soft mechanical : one bite.
- 6- Nectar Thick Liquid : 2x5ml.

### Oral-phase:

- Anterior spillage due to reduced lip seal.
- Diffused bolus with all presented volumes and consistencies due to reduced oral control and manipulation.
- Coughing on tongue blade and palate that increase with increasing volume and upgrading consistencies.
- Prolonged oral phase with puree.
- Poor spoon retrieval with puree.
- Soft mechanical could not be retrieved or manipulated.

## SWALLOWING DISORDERS CLINIC – KKHU Modified Barium Swallow (MBS) Report

### Pharyngeal-phase:

- Delayed initiation of pharyngeal swallow with 2nd thin/thick liquid that lead to posterior penetration with 2nd thin liquid.
- Pooling in valleculae and pyriform sinuses before swallow 2nd thin liquid/ 2nd thick.
- Transient penetration during swallow 2nd thin / 3-2nd honey thick liquid due to incomplete airway protection.
- Penetration during swallow 2nd honey thick liquid due to incomplete airway protection.
- Posterior post-swallow penetration with residues of 2nd thin/ 2nd thick/2nd honey liquid.
- One episode of overt aspiration before swallow 2nd thick liquid, in attempt to wash residues was detected.
- Aspiration could not be ruled out due to the study limitations.
- Residues in valleculae due to decreased base of tongue retraction and on pyriform sinuses & UES due to decreased pharyngeal squeeze & incomplete hyolaryngeal excursion with all volumes of liquids and increased volumes of puree, these residues put the patient at risk of post swallow aspiration.
- No significant difference found when lemon was used.

### Impression :

- Moderate oral severe pharyngeal Neurogenic dysphagia characterized by decreased oral control and manipulation, delayed initiation of pharyngeal swallow, incomplete airway protection, decreased base of tongue retraction & decreased pharyngeal squeeze.
- Study limitations: Reduced study reliability due to improper positioning and patient's inability to follow commands along with his drowsiness.

### Recommendations:

- 1- Short term alternative mean of nutrition.
- 2- Puree in top for pleasure and therapy purposes under strict swallow precautions that are already explained to the family.
- 3- Risks of oral feeding already explained to the family.
- 4- Monitor chest condition & VS, in case of any temperature spikes or chest complications noticed stop any form of oral feeding and seek medical advice.
- 5- F.U in 3 weeks in OPD will be provided.
- 6- FEES procedure in N.A.A to rule out aspiration.

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# Fiberoptic Endoscopic Evaluation of Swallowing (FEES)



كرسي بحث  
أمراض الصوت والبلع والتهنيط

جامعة  
الملك سعود  
King Saud University



# History of FEES



Various instrumental techniques have been developed to investigate dysphagia.

Among them, videofluoroscopic evaluation of swallowing (VFES) is said to be the ‘gold standard’ because it investigates oral, pharyngeal, and esophageal phases of swallowing.

However, there are many conditions in which VFES is difficult to undertake. So, there must be additional methods that can help in these situations.





Flexible nasopharyngolaryngoscopy was introduced to Otorhinolaryngology in 1968 (*Sawashima and Hirose, 1968*).

It first appeared in clinical practice in the 1970s (*Williams et al, 1975*).

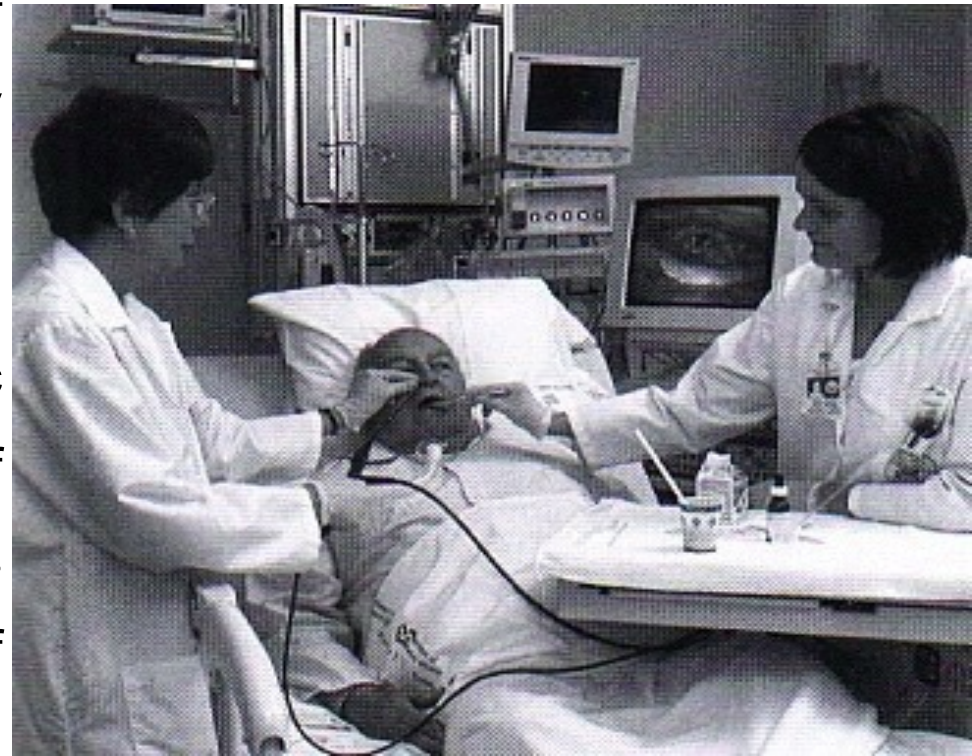
Significant technologic improvements were developed in 1980s.

*Sawashima and Hirose, 1968: New laryngoscopic technique by use of fiberoptic. J Acoustic Soc Am. 1968 Jan;43(1):168-9.*

*Williams et al.: Rapid diagnosis of primary influenza pneumonia. Chest. 1975 Oct;68(4):513-7.*

Endoscopic evaluation of swallowing was first described by *Langmore et al (1988)*.

They called it “**F**iberoptic **E**ndoscopic **E**valuation of **S**wallowing” (FEES). It investigates mainly the **pharyngeal** phase of swallowing.



*Langmore SE, Schatz K, Olsen N: Fiberoptic endoscopic examination of swallowing safety: a new procedure. Dysphagia, 1988;2(4):216-9.*



In 1998, Aviv and colleagues described the **FEESST** procedure (**F**iberoptic **E**ndoscopic **E**valuation of **S**wallowing with **S**ensory **T**esting).

FEESST augments FEES by directly testing sensation in the laryngopharynx through air pulses delivered via a fibroscope with a channel.

*Aviv et al.: FEESST: a new bedside endoscopic test of the motor and sensory components of swallowing. Ann Otol Rhinol Laryngol. 1998 May;107(5 Pt 1):378-87.*

Initially, FEES was indicated only when MBS was not available. Today, it is widely used worldwide as a standard tool for diagnosing and treating dysphagia (*Langmore, 2001*).

*Langmore, S.E. (Ed.). (2001). Endoscopic evaluation and treatment of swallowing disorders. New York: Thieme.*

# Technique





7-Apr-15



7-Apr-15

44





7-Apr-15

45



7-Apr-15

## (1) Positioning:

- Ambulatory patients: seated upright.
- Bed-bound patients: bedside, with the head of the bed raised to 45 degrees.

Infants and children: gentle restraint.

## (2) Oral & neck examination.

## (3) Introduction of the fiberoptic pharyngolaryngoscope.

## (4) Introduction of **dyed** liquids and foods.

## (5) Patient / Family counseling.





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# Bedside FEES

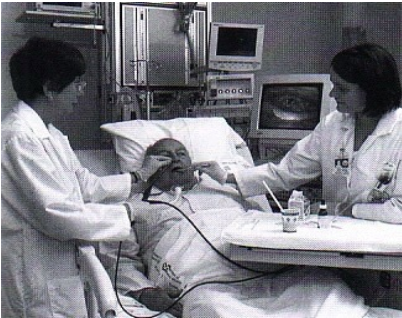


*Fiberoptic endoscopic evaluation of swallowing (FEES®) examination protocol (Susan E. Langmore, Ph.D., 2004) in Endoscopic evaluation of oral and pharyngeal phases of swallowing. GI Motility online (2006)*

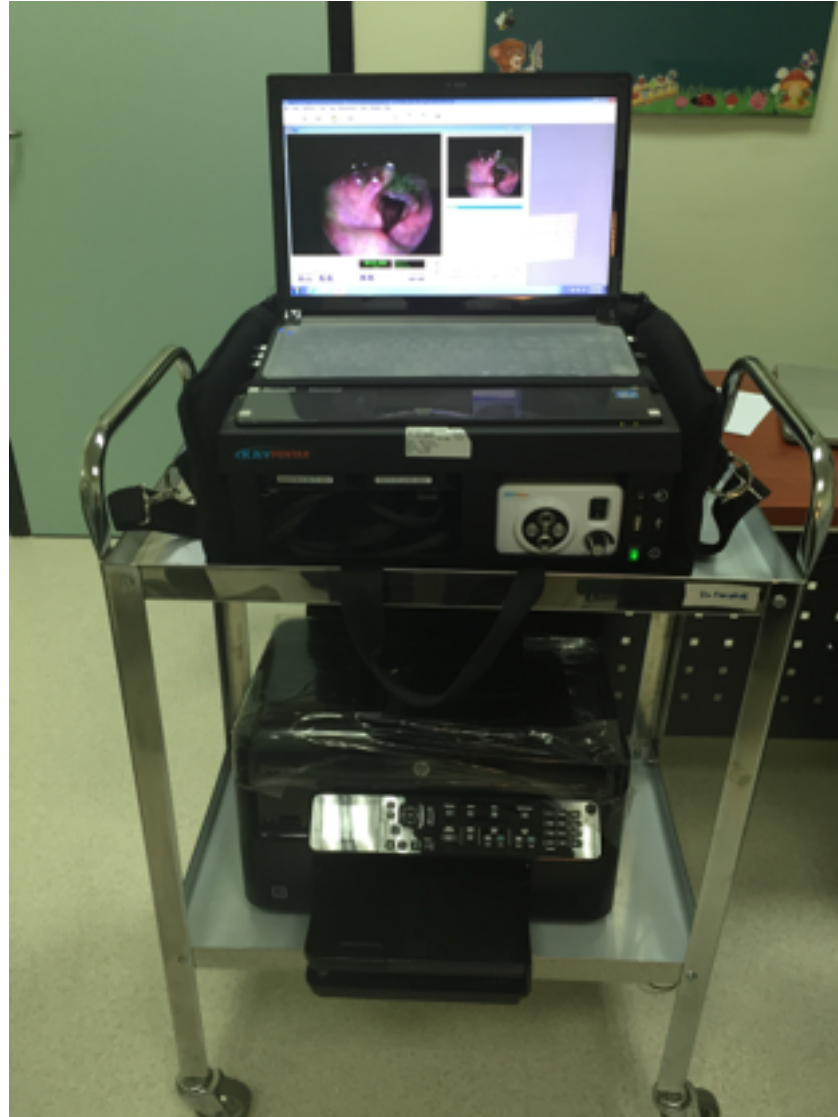


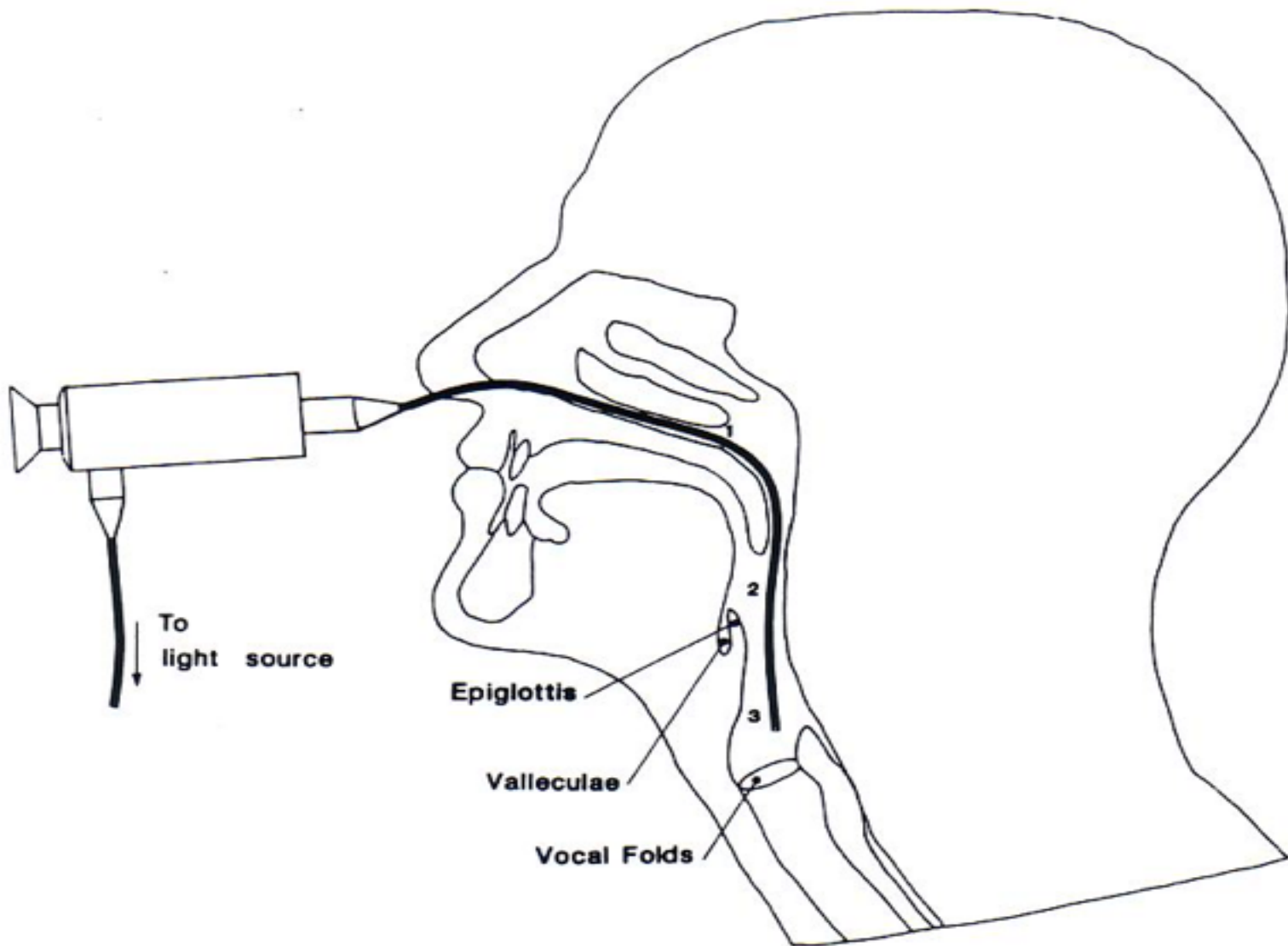


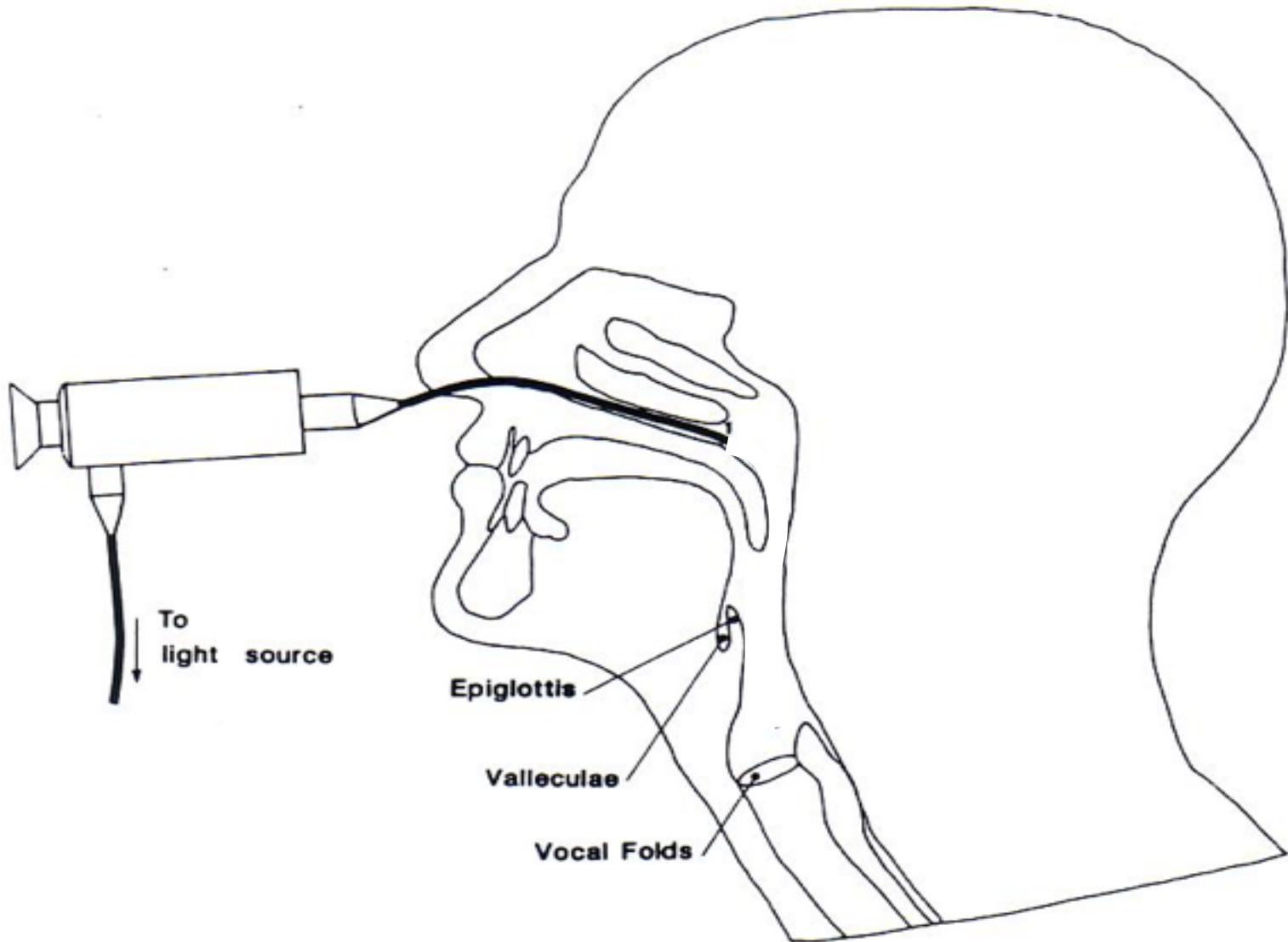
# Bedside FEES

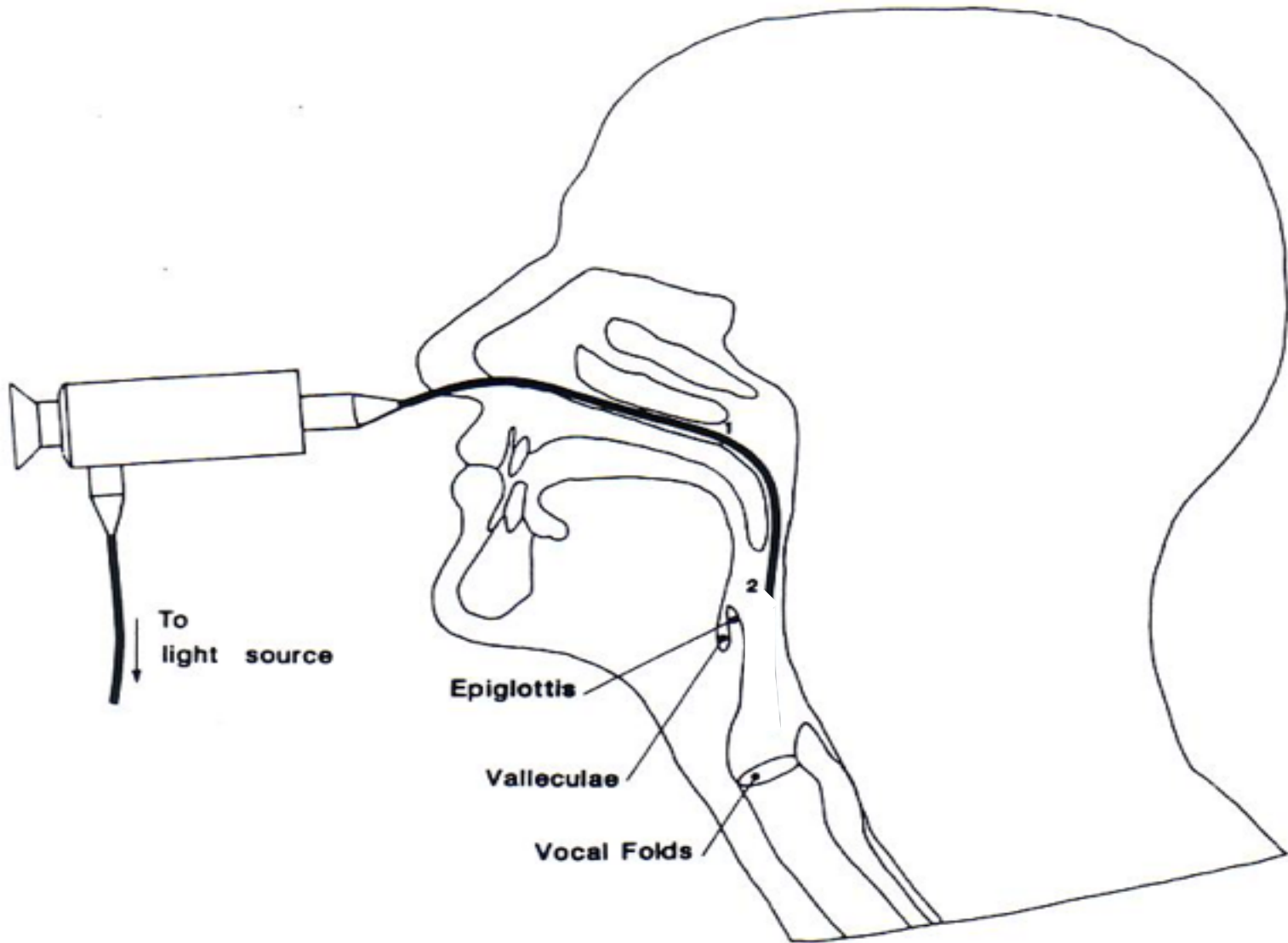


Fiberoptic endoscopic evaluation of swallowing (FEES®) examination protocol (Susan E. Langmore, Ph.D., 2004) in Endoscopic evaluation of oral and pharyngeal phases of swallowing. GI Motility online (2006)

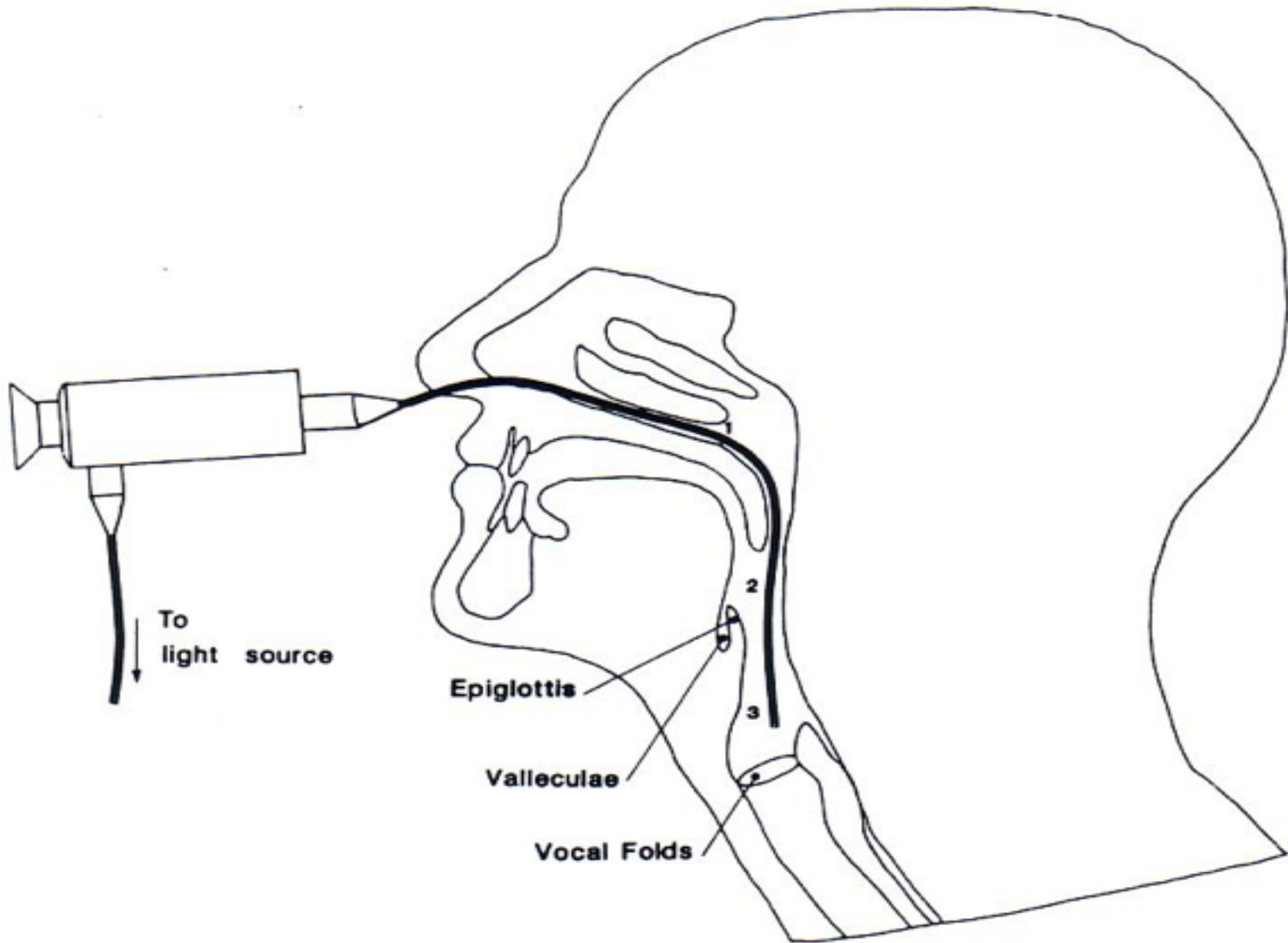


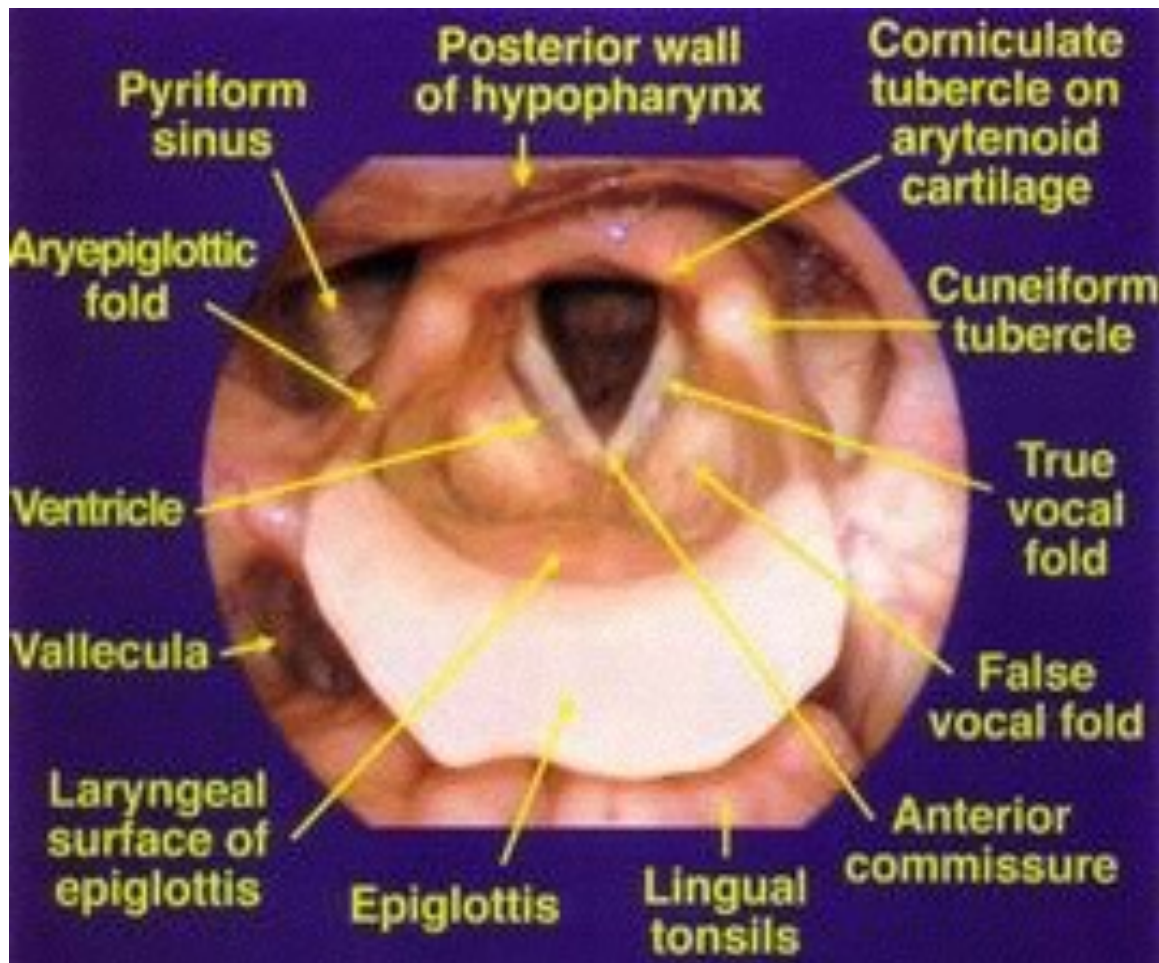


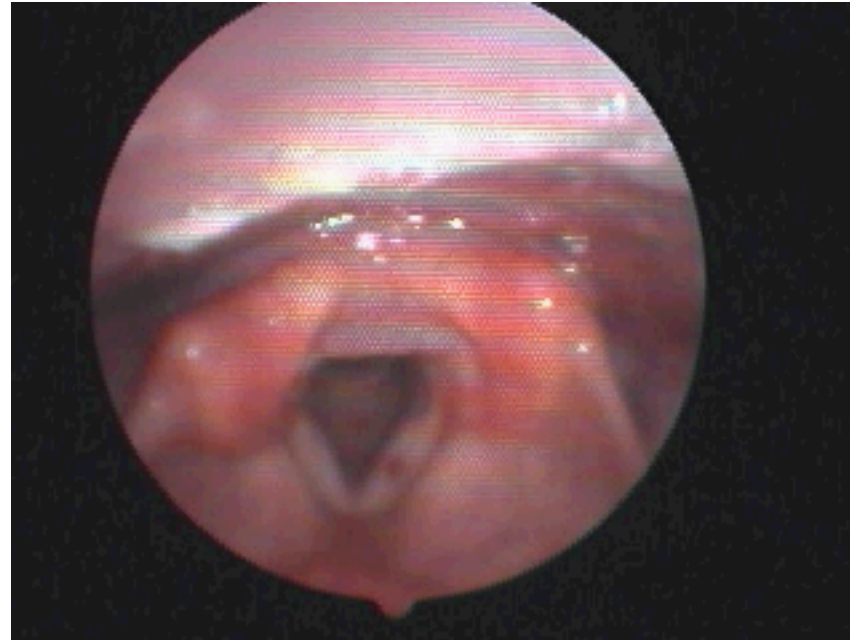












Normal FEES (Thin  
fluid dyed blue)

# Indications & Advantages

## Indications (ADVANTAGES) of FEES:

1. Transportation to Radiology is difficult, eg on ventilator.
2. Positioning for fluoroscopy is difficult, eg neck halo.
3. Exposure to radiation is risky, eg pregnant.
4. No time limit.
5. Visualization and assessment of velopharyngeal valve (hypernasality) or larynx (eg, vocal fold paralysis, GERD (LPR)).
6. Anatomic changes (color image), eg s/p head and neck surgery, s/p neck trauma, s/p neurological insult.

## Indications (ADVANTAGES) of FEES (cont.):

7. Assessment of integrity of airway protection.
8. Compromised pulmonary clearance (conservative exam).
9. Severe dysphagia (conservative exam).
10. NPO for prolonged period (conservative exam).
11. Evaluation of secretions.
12. Assessment of sensation.
13. Biofeedback tool.
14. Educational tool (patient, family).



# Disadvantages

## Disadvantages of FEES:

1. Whiteout obscures view DURING the peak of swallowing (BUT: 0.5 sec., 7 %).
2. Lack of view in rapid chain swallowing in infants during bottle feeding (BUT: slow motion).
3. Limited information about oral and esophageal stages.
4. Possible discomfort with endoscope passage (BUT: local anesthetic).
5. Possible gagging / vomiting (BUT: decrease as exam. progresses).

# Protocol

## **FEES protocol of evaluation (Langmore, 2004):**

- I. Anatomic and physiologic assessment**
- II. Assessment of food and liquid swallowing**
- III. Assessment of therapeutic interventions**

*Fiberoptic endoscopic evaluation of swallowing (FEES®) examination protocol (Susan E. Langmore, Ph.D., 2004) in Endoscopic evaluation of oral and pharyngeal phases of swallowing. GI Motility online (2006). Available from: <http://www.nature.com/gimo/contents/pt1/full/gimo28.html>*

## Fiberoptic Endoscopic Evaluation of swallowing (FEES) Evaluation Form

Patient Name: \_\_\_\_\_ Gender: M / F \_\_\_\_\_ Age: \_\_\_\_\_  
File Number (KAUH): \_\_\_\_\_ (KKUH): \_\_\_\_\_  
Date of Examination: / / \_\_\_\_\_ Posture: \_\_\_\_\_ Examiner: \_\_\_\_\_  
Diagnosis: \_\_\_\_\_

### I. Anatomic and physiologic assessment:

#### • Velopharyngeal valve:

##### - Soft palate movement:

Symmetric, Deviated to: Rt. Lt.  
Degree: 0 (immobile) 1 2 3 (normal) 4

##### - Lateral pharyngeal wall movement:

Rt. 0 (immobile) 1 2 3 (normal) 4  
Lt. 0 (immobile) 1 2 3 (normal) 4

##### - Posterior pharyngeal wall movement:

Degree: 0 (immobile) 1 2 3 4

##### - Passavant's ridge:

present absent

##### - Velopharyngeal Gap:

Shape: coronal sagittal circular others:  
Size: \_\_\_\_\_

#### • Vocal folds:

- Color: pearly white red white

- Vascular markings: few increased ectasia

- Gap (max. width posteriorly in mm): \_\_\_\_\_

- Swellings: site size shape  
edge surface color

- Deviation of the glottis: none, direction: Rt Lf degree: \_\_\_\_\_

- Gross mobility (adduction/abduction):

normal,  
restricted: Rt Lf  
fixed: Rt Lf

#### • Ventricular folds:

#### • Other laryngeal structures:

#### • Secretions:

- Amount:  
- Site:

#### • Base of tongue:

#### • Laryngopharyngeal sensory testing:

#### • Tracheostomy:

• NG tube: 7-Apr-15

### II. Assessment of swallowing:

Parameters	Thin liquid			Thick liquid			Seminolid (pudding)			Solid
	<5cc	10cc	eup	<5cc	10cc	eup	<5cc	10cc	eup	
1. Spillage during holding the bolus *										
2. Swallowing initiation **										
3. Post-swallow residue ***										
4. Penetration – Aspiration scale #										
5. Relation of aspiration to swallowing ##										

\* Spillage during holding the bolus: 0 = no spillage, 1 = mild, 2 = moderate, 3 = severe.

\*\* Swallowing initiation: 0 = normal, 1 = mild delay, 2 = moderate delay, 3 = severe delay, 4 = absent.

\*\*\* Post-swallow residue: 0 = no residue, 1 = mild (coating), 2 = moderate, 3 = severe.

Site:

# Penetration – Aspiration scale (Rosenbek et al, 1990):

1 = doesn't enter airway.

2 = enters airway / above vocal folds / ejected.

3 = enters airway / above vocal folds / not ejected.

4 = enters airway / contacts vocal folds / ejected.

5 = enters airway / contacts vocal folds / not ejected.

6 = enters airway / below vocal folds / ejected.

7 = enters airway / below vocal folds / not ejected despite effort.

8 = enters airway / below vocal folds / no effort.

## Relation of aspiration to swallowing: 0 = no aspiration, 1 = before the swallow,

2 = during the swallow, 3 = after the swallow.

### Findings:

### Recommendations:

#### • Diet:

#### • Swallowing posture:

#### • Swallowing maneuver:

#### • Others:

K. Maki

Course,

64

## I. ANATOMIC AND PHYSIOLOGIC ASSESSMENT:

(1) Velopharyngeal valve closure:

- Say: /i/ , /s/.
- Dry swallow.

(2) Larynx and hypopharynx:

- Appearance.
- Symmetry.
- Abnormality.



## I. ANATOMIC AND PHYSIOLOGIC ASSESSMENT (Cont.):

### (3) Secretions and swallow frequency:

- Amount.
- Location.
- Frequency of dry swallow.

### (4) Tongue:

- Base of tongue; Say: /sal/ , /mal/.

## I. ANATOMIC AND PHYSIOLOGIC ASSESSMENT (Cont.):

(5) Pharyngeal muscles:

- Say: strained /i:/.

(6) Laryngeal (vocal fold) functions:

- Respiration.
- Phonation.
- Airway protection; Hold breath to the count of 7, cough, clear throat .

## I. ANATOMIC AND PHYSIOLOGIC ASSESSMENT (Cont.):

### (7) Laryngopharyngeal sensory testing:

- Lightly touching pharyngeal walls or aryepiglottic folds.
- Air-pulse stimulator (FEESST).

## II. ASSESSMENT OF SWALLOWING FOOD AND LIQUID:

- ❖ All foods/liquids are **dyed with food colorings**.
- ❖ Consistencies:
  - Thin liquid (water, milk, ...).
  - Thick liquid (thick juice, ...).
  - Puree (pudding consistency, yoghurt, ...).
  - Soft solids, Hard solids.

## II. ASSESSMENT OF SWALLOWING FOOD AND LIQUID (Cont.):

- ❖ Amount:
  - < 5 mL if patient is medically fragile.
  - 5 mL (1 teaspoon).
  - 10 mL.
  - 15 mL (1 tablespoon).
  - From cup, straw, consecutive swallows.

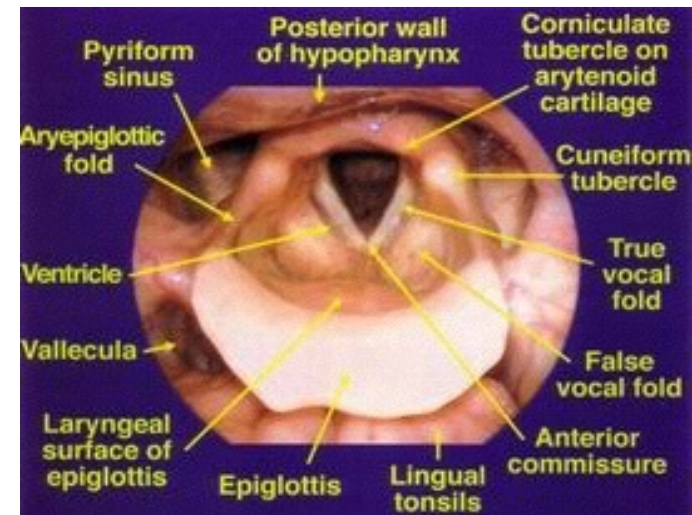


## Cardinal Parameters:

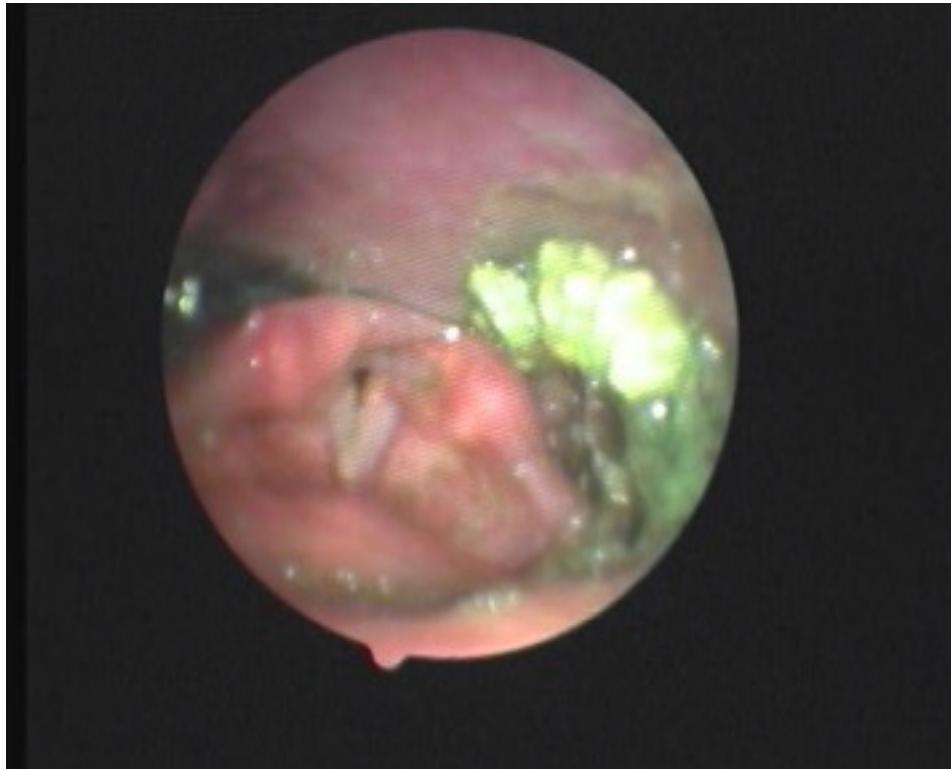
- 1- Pooling of **secretions**.
- 2- **Premature spillage** during holding the bolus.
- 3- Swallowing initiation (**Pharyngeal trigger**).
- 4- Post-swallow **residue**.
- 5- Laryngeal **penetration** (entry of material into the laryngeal vestibule *above* the level of the true vocal folds).
- 6- Tracheal **aspiration** (entry of material *below* the level of the true vocal folds); before, during, or after the swallow.

## Secretions Score (Langmore, 2001):

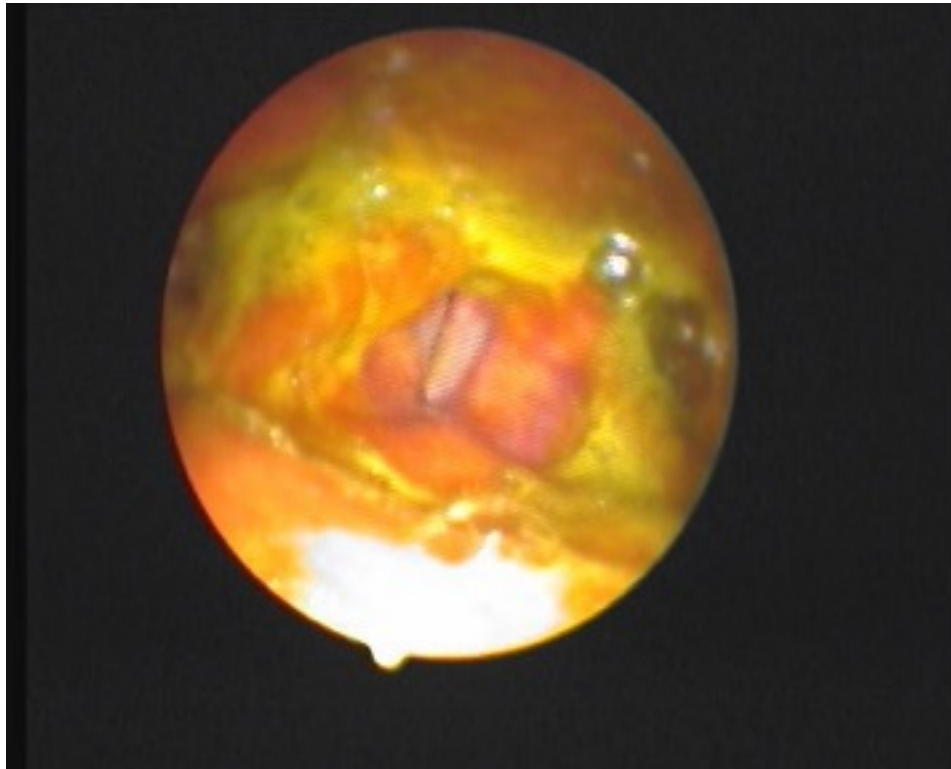
- 0 = Mucosa are moist (Normal).
- 1 = Secretions in valleculae, lateral channel, pyriforms.
- 2 = Secretions in laryngeal vestibule transiently or cleared by the patient.
- 3 = Secretions in laryngeal vestibule throughout examination and not cleared by the patient.



Langmore, S.E. (Ed.). (2001). *Endoscopic evaluation and treatment of swallowing disorders*. New York: Thieme.



## Residue



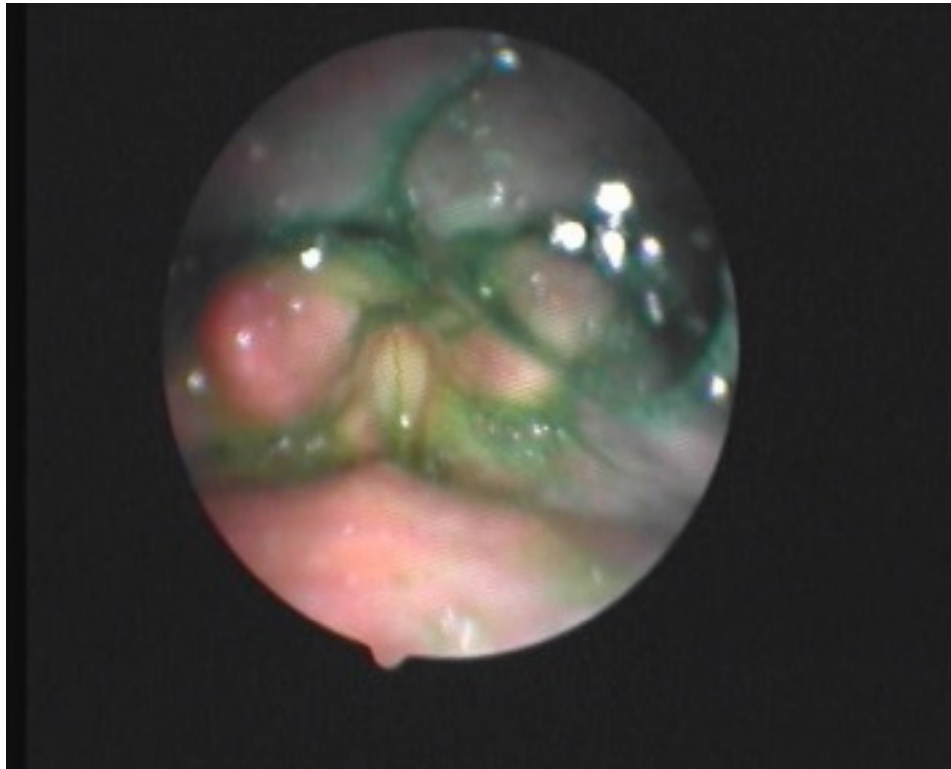
**Residue**



**Residue**



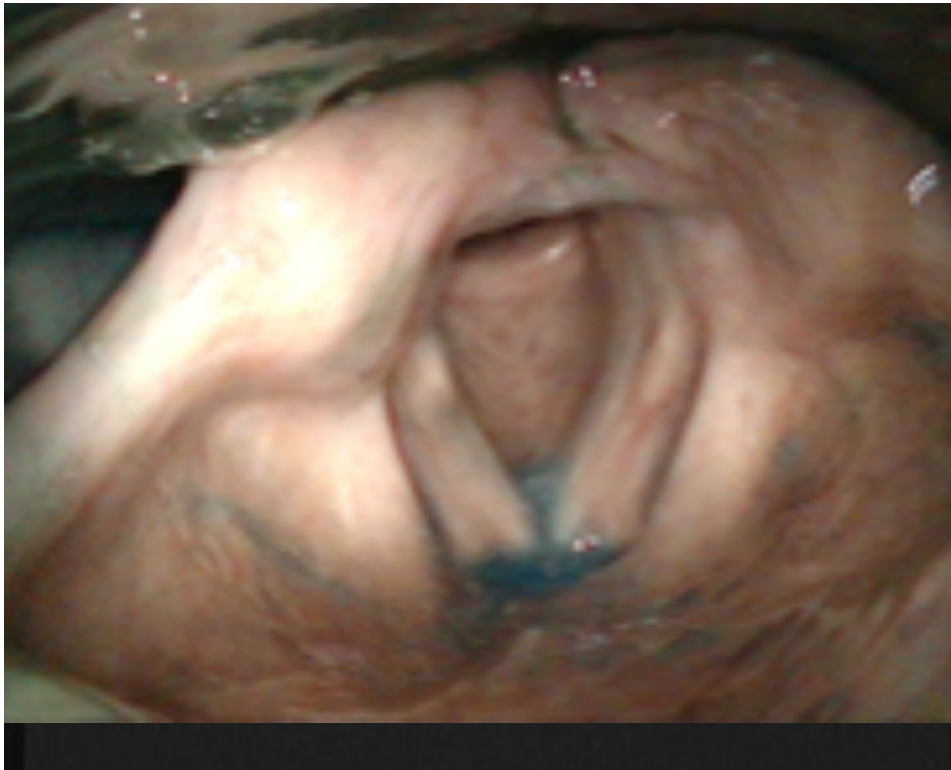




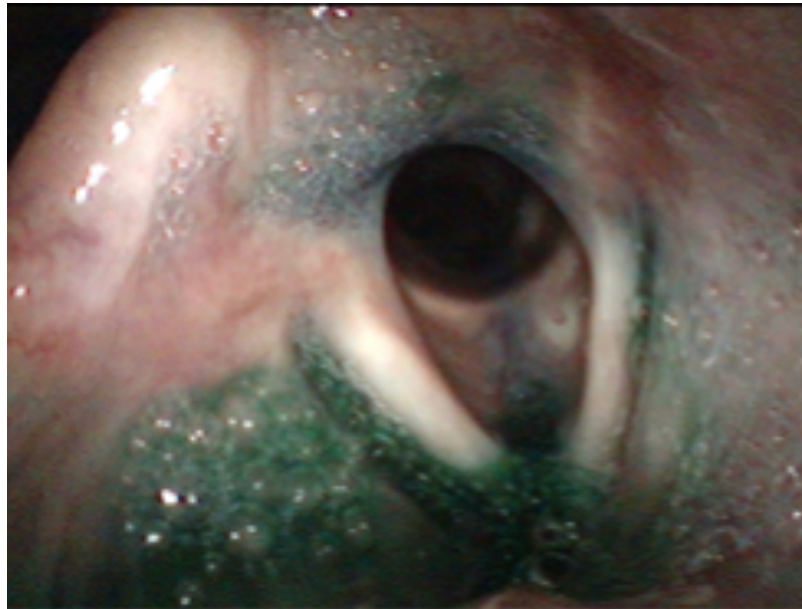
**Penetration**



## Penetration



## Aspiration



## Aspiration



## Aspiration





**Aspiration**



**Aspiration**

### III. RESPONSE TO THERAPUTIC INTERVENTIONS:

BEHAVIOR RE-ADJUSTMENT SWALLOWING THERAPY  
(BRAT) can include:

- Dietary modification.
- Postural techniques.
- Swallowing maneuvers.

Patient Information

Last Name:

First Name Middle Initial:

Date of Birth:

Patient ID:

65 Y/S

Gender:

Male

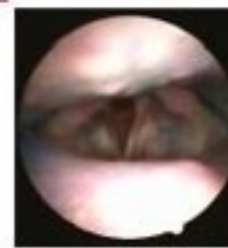
Fiberoptic Endoscopic Evaluation of Swallowing (FEES):



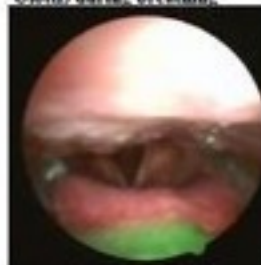
Glottis during breathing



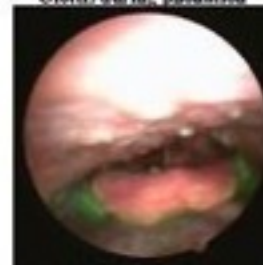
Glottis during phonation



Residue and penetration with liquids



Vallicular residues with semisolids



Pharyngeal residues with semisolids



Residues with solids

65 years old male patient S/P cervical disectomy for cervical prolapse (C3 and C4). After the operation he started to experience swallowing difficulty and weakness on the right side of the body. Brain MRI revealed left capsular infarction. FEES revealed:

- Grade III out of IV coronal closure of Velopharyngeal valve.
- Fair pharyngeal movements with squeeze test. Poor posterior tongue movement.
- Both vocal folds are freely mobile.
- Complete vocal folds coaptation during phonation.
- Residues were noticed in the valleculae, lateral pharyngeal walls with all consistencies. These residues increase with the increase of the consistencies (i.e. from fluids to solids). However, these residues were eliminated with multiple dry swallows.
- Penetration with liquids (during swallowing) occur with bolus > 5 ml and with semisolids (post-swallow). However, this penetration was ejected by the patient and no aspiration was detected with any consistency.

Opinion:

Oro-pharyngeal dysphagia: pharyngeal weakness.

Recommendations:

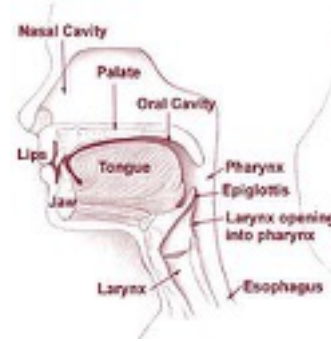
- Reassurance.
- Small bolus volumes with controlled effortful swallows followed by multiple dry swallows.
- Masakow's exercise to improve posterior tongue movement.
- Follow up after 2 months.

*M. Farahat*

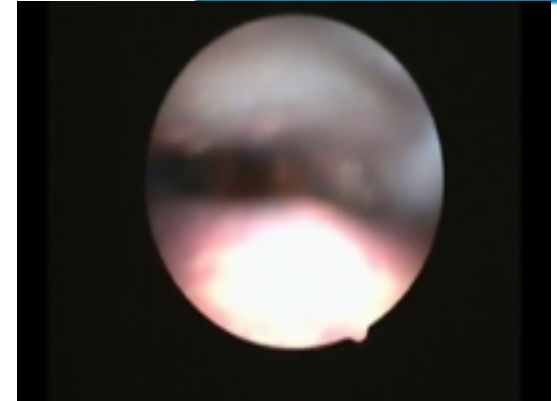
Consultant of Communication and Swallowing disorders

# FEES Vs VFES (MBS)

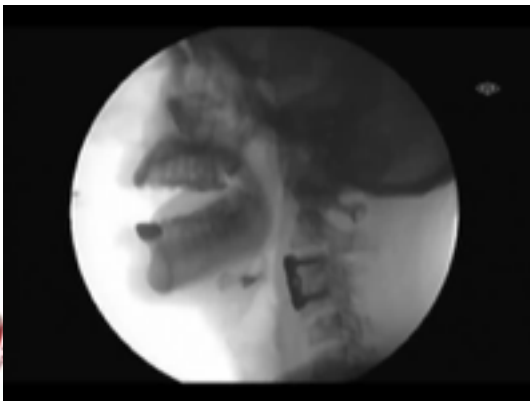
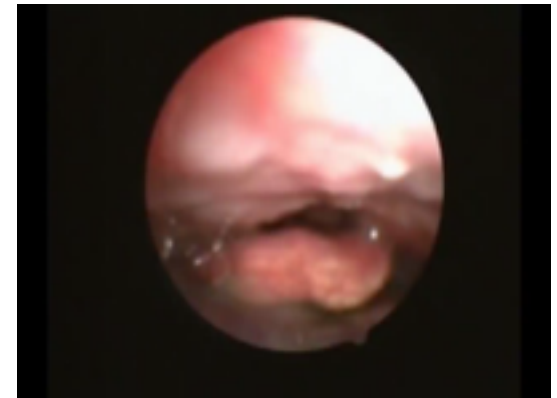
# MBS



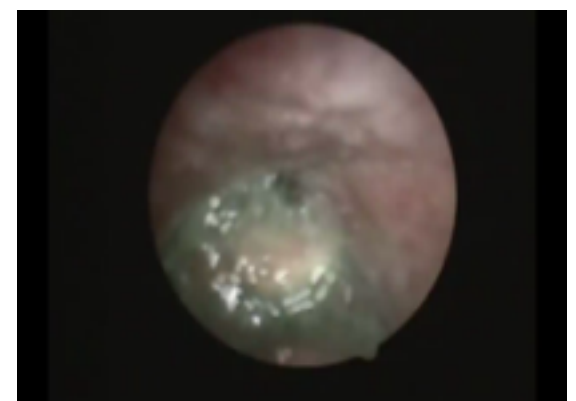
## Thin Liquids



## Semi solids



## Solids





### Functional Information Provided by Techniques Used to Assess Swallow Function

	Defines Anatomy	Detects Aspiration	Quantifies Aspiration	Detects Etiology	Availability	Cost*
MBS	+	++	+	+	+	3
FEES	++	+	-	+	++	2
U/S	±	-	-	-	±	4
Bedside Evaluation	-	± <sup>†</sup>	-	±	++	1
Scintigraphy	-	++	++	-	±	5

\*Order from least to most expensive

† Can detect actual aspiration in patients with tracheotomies

**“The critical findings of dysphagia were detected as often with FEES as with MBS”** (*Langmore et al, 1991; Willging et al, 1996; Wu et al, 1997; Kaye et al, 1997; Crary abd Baron, 1997; Leder et al, 1998; Longemann et al, 1998; Perie et al, 1998*).

**“The underlying causes of these findings usually can be determined by using either tool”** (*Langmore, 2001*).

# Unique findings

## Only MBS

- visualizes bolus during height of the swallow
- Oral phase (esophageal phase)
- Tongue retraction
- UES opening
- Laryngeal elevation, extent of aspiration
- Submucosal changes (osteophytes, metal plates from surgery, etc.).

## Only FEES

- Secretions
- Sensation
- Surface anatomy
- Mucosal abnormalities (edema, erythema)
- Effect of altered anatomy on bolus flow and airway protection
- Glottic closure
- Path of the bolus clearly
- Location of bolus within the hypopharynx.

*Fiberoptic endoscopic evaluation of swallowing (FEES®) examination protocol (Susan E. Langmore, Ph.D., 2004) in Endoscopic evaluation of oral and pharyngeal phases of swallowing. GI Motility online (2006)*

# Diet recommendation from FEES and

## MBS are the same

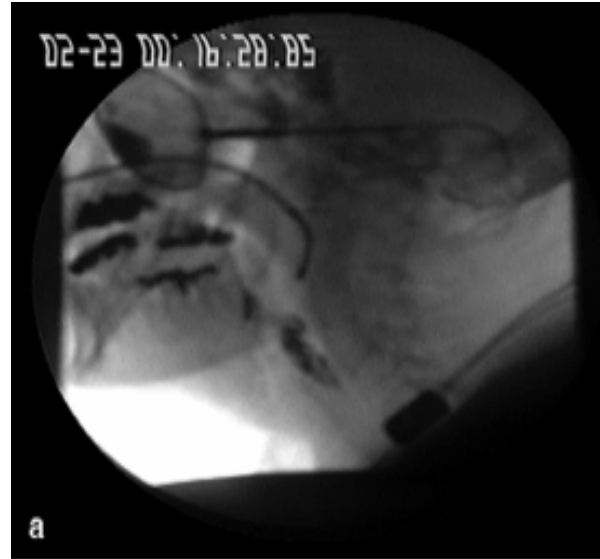
CONCLUSION: Whether dysphagic outpatients have their dietary and behavioral management guided by the results of MBS or of FEESST, their outcomes with respect to pneumonia incidence and pneumonia-free interval are essentially the same.

The Agency for Health Care Policy and Research (AHCPR, 1999) indicated that **MBS is not the gold standard in dysphagia assessment.**

Indeed, there is no gold standard in the field of oropharyngeal dysphagia because neither tool has been shown to be superior.

*Agency for Health Care Policy and Research, Diagnosis and Treatment of Swallowing Disorders (Dysphagia) in Acute-Care Stroke Patients. Summary, Evidence Report/Technology Assessment: Number 8, March 1999.*

# QUIZ





# FEEES in Treatment

## FEES can guide dysphagia treatment:

1. During the procedure by applying the therapeutic interventions.
2. Education tool for the patient and the family.
3. Biofeedback tool in dysphagia therapy sessions.
4. Re-evaluations to monitor improvements.

## FEES guides dysphagia treatment



*Fiberoptic endoscopic evaluation of swallowing (FEES®) examination protocol (Susan E. Langmore, Ph.D., 2004) in Endoscopic evaluation of oral and pharyngeal phases of swallowing. GI Motility online (2006)*





كرسي بحث  
أمراض الصوت واللغة والتخاطب

جامعة  
الملك سعود  
King Saud University



# Pediatric FEES



## Causes of Pediatric Dysphagia (Feeding and Swallowing Disorders):

- (1) Structural ... Craniofacial syndromes, ...
- (2) Neurogenic ... Arnold-Chiari malformations, ...
- (3) Cardiac ... Congenital heart diseases, ...
- (4) Respiratory ... Bronchopulmonary dysplasia, ...
- (4) Behavioral ... Food aversion, ...
- (5) Inflammatory ... GERD, ...
- (6) Metabolic ... Fructose intolerance, ...
- (7) Others ... Prematurity, ...



**“Pediatric FEES is a relatively new and effective diagnostic method to add to and to complement the current armamentarium of techniques for evaluation of pediatric dysphagia“** (*Miller et al, 1994; Willging et al, 1996; Langmore, 2001*).

Miller et al: Fiberoptic endoscopic examination of swallowing in infants and children with feeding disorders. *Dysphagia*. 1994;9:266.  
Willging et al: Fiberoptic endoscopic examination of swallowing in infants and children: a preliminary report of 100 procedures. *Dysphagia*. 1996;11:2.  
Langmore, S.E. (Ed.). (2001). *Endoscopic evaluation and treatment of swallowing disorders*. New York: Thieme.

## Pediatric FEES



## Pediatric FEES

- ☐ Time-consuming (usually more than adult's).
- ☐ Requires assistance to stabilize the child.
- ☐ Pediatric nasopharyngolaryngoscope.
- ☐ Requires knowledge of normal pediatric swallowing anatomy and physiology.
- ☐ Parents can bring the child's usual food and utensils.