



FEES I – Introduction & Standard FEES protocol

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A decorative graphic in the top left corner consisting of a vertical stack of horizontal bars in various shades of blue, green, and yellow.

Getting the presentations

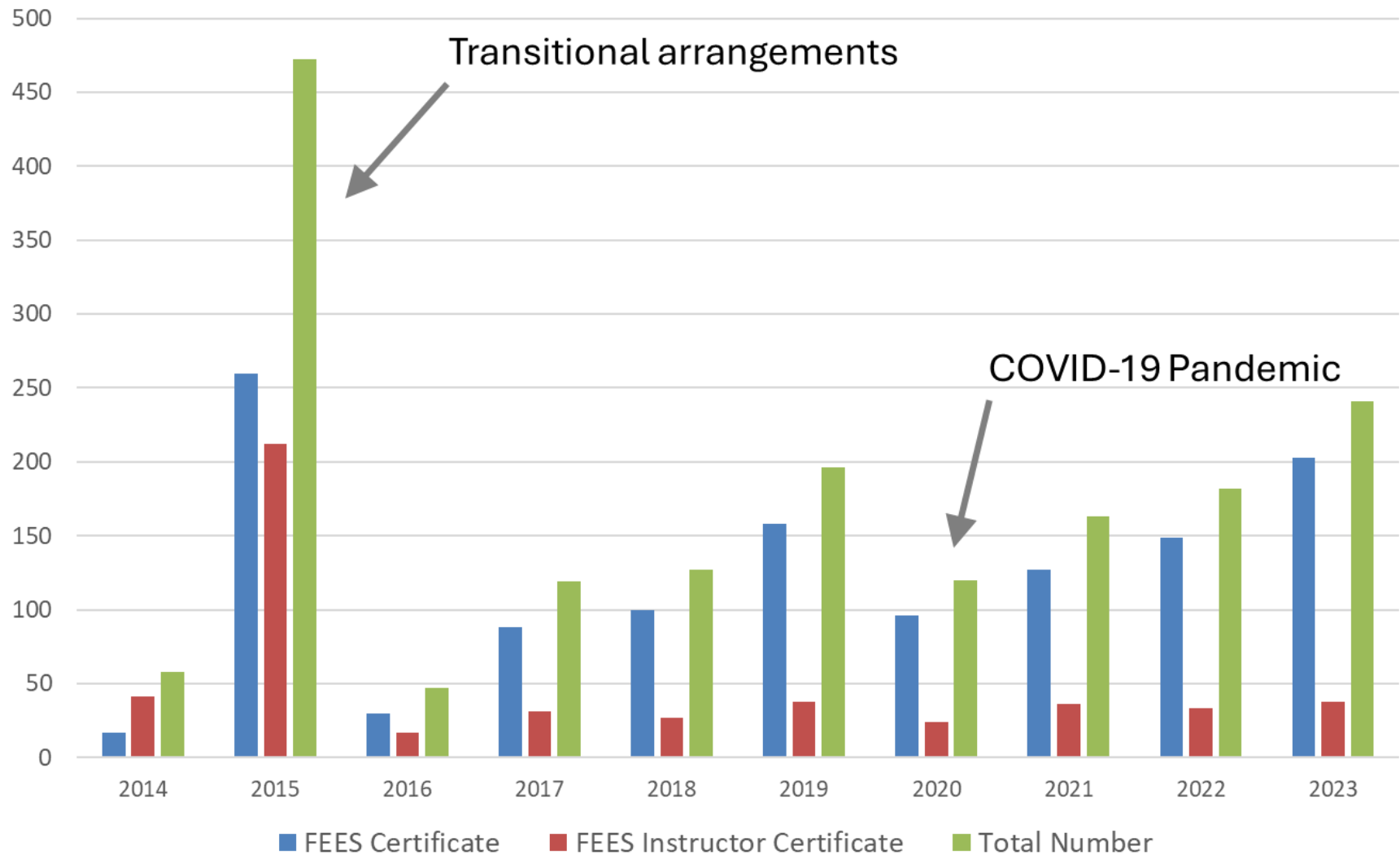
E-Mail to:
essd@kuonitumlare.com



FEES Milestones

- 1988 Susan Langmore: „Fiberoptic endoscopic examination of swallowing safety: a new procedure“ *Dysphagia* 1988;2:216-219
- 2001 „Endoscopic Evaluation and Treatment of Swallowing Disorders“ by Susan Langmore is published by Thieme
- 2008 Guidelines „Neurogenic Dysphagia“ of the German Neurological society refer to VFSS and FEES as most important instrumental methods to investigate the swallow.
- 2010 OPS Code 1-613: to document that an endoscopic swallowing examination has been performed
- 2014 FEES curriculum of the German Neurological Society and German Stroke society is published
- 2015 FEES service is required on certified stroke units in Germany.
- 2017 FEES educational program of the ESSD is published
- 2018 ESPEN guidelines „Clinical nutrition in Neurology“
- 2019 FEES registry study published
- 2021 ESO-ESSD guidelines „Management of Post-stroke dysphagia“ recommends FEES in stroke patients
- 2021 FEES phenotypes for neurogenic dysphagia are published
- 2023 Guidelines of the German Neurological society for Stroke, PD, Myasthenia gravis and inflammatory myopathies recommend FEES.
- 2024 Paper on the integrated FEES report summarising knowledge accumulated across >20 years is published

FEES education in Germany



Dziewas et al. *BMC Medical Education* (2016) 16:70
DOI 10.1186/s12909-016-0587-3

BMC Medical Education

DEBATE

Open Access



CrossMark

Flexible endoscopic evaluation of swallowing (FEES) for neurogenic dysphagia: training curriculum of the German Society of Neurology and the German stroke society

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Dysphagia
DOI 10.1007/s00455-017-9828-9



EDITORIAL

European Society for Swallowing Disorders FEES Accreditation Program for Neurogenic and Geriatric Oropharyngeal Dysphagia

R. Dziewas¹ · L. Baijens^{2,3} · A. Schindler⁴ · E. Verin⁵ · E. Michou⁶ ·
P. Clave⁷ · The European Society for Swallowing Disorders

- Aims
 - Definition of quality standards
 - Valorization of FEES and of its users
 - Improve communication and collaboration between professionals involved in doing FEES
- Target group
 - All health care professionals involved in the care of dysphagic patients
- Endorsement of other medical societies has been achieved:
 - **Neurology, Stroke, Physical Medicine and Rehabilitation**

- Prerequisites

- Two years of clinical practice focused on the care of neurological or geriatric patients.
- Three months of this period shall be completed in a neurological or geriatric department or a facility involving the care of these patients such as dysphagia or FEES units.

Online Learning
(12 hours)
&
Workshop
(16 hours)
or
Workshop
(24 hours)

Structure of the Programme

	Contents	Modalities	Examinations	Competences
FEES Certificate	➤ Theoretical background (facultative)	Online-course (12 hours)		
	➤ Theoretical background ➤ Practical skills: <ul style="list-style-type: none"> • Nasal passage on a medical dummy (10 ×) • FEES (5 ×) ➤ Independent diagnostics: <ul style="list-style-type: none"> • Video sequences (25 ×) 	Workshop (16 hours + preceding online-course or 24 hours without online-course)	Theoretical examination	
	30 FEES (a minimum of 5 complex cases)	Direct supervision		
FEES Instructor	30 FEES (a minimum of 5 complex cases)	Indirect supervision	Practical examination	➤ Heading the evaluation team
	150 FEES (a minimum of 30 complex cases)	Independent examination, indirect supervision if necessary	Practical examination	➤ Organisation and heading of: <ul style="list-style-type: none"> • Workshops • Work shadowing (direct supervision) • Indirect supervision • Theoretical & practical examinations for the FEES certificate

Topics of the Examinations

Theoretical examination
25 multiple-choice questions
(60% correct answers)

Practical examination (~45 minutes)

1. Performance of a FEES
 - Examination in the resting state
 - Anatomical-physiological examination
 - Evaluation of swallowing
 - Therapeutic manoeuvres
 - Diagnosis
 - Discussion regarding the planning of further diagnostic and therapeutic strategies
2. Evaluation of 2 FEES sequences
3. Discussion of a selection of diagnoses from the training manual

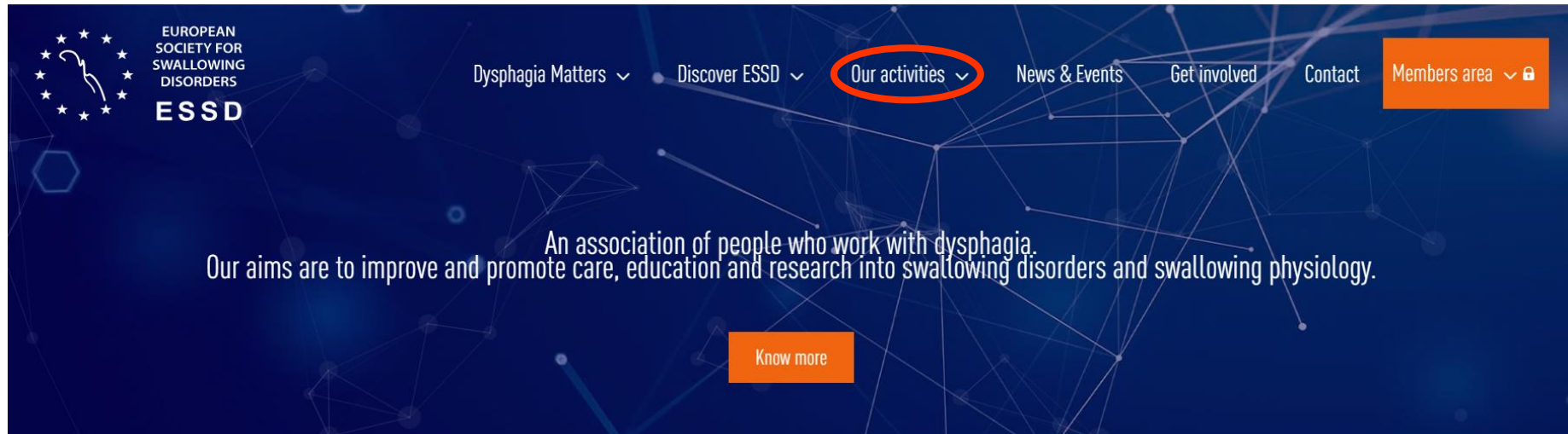
Practical examination (~90 minutes)

1. Performance of 2 FEES (1 complex case)
 - Implementation of the standard protocol
 - Modification of the evaluation protocol
 - Implementation of special protocols
 - Independent development of diagnostic and therapeutic strategies
2. Evaluation of 5 FEES sequences
3. Discussion of a selection of diagnoses from the training manual

FEES Certificate

FEES Instructor Certificate

Where to find what



The screenshot shows the header of the European Society for Swallowing Disorders (ESSD) website. The header has a dark blue background with a network diagram. The navigation menu includes: 'Dysphagia Matters' with a dropdown arrow, 'Discover ESSD' with a dropdown arrow, 'Our activities' with a dropdown arrow (highlighted with a red circle), 'News & Events', 'Get involved', 'Contact', and 'Members area' with a dropdown arrow and a lock icon. The main content area features the ESSD logo on the left, which includes a circular emblem with a stylized 'S' and the text 'EUROPEAN SOCIETY FOR SWALLOWING DISORDERS' and 'ESSD'. The main text reads: 'An association of people who work with dysphagia. Our aims are to improve and promote care, education and research into swallowing disorders and swallowing physiology.' Below this text is an orange button labeled 'Know more'.

EUROPEAN SOCIETY FOR SWALLOWING DISORDERS
ESSD

Dysphagia Matters ▾ Discover ESSD ▾ **Our activities ▾** News & Events Get involved Contact Members area ▾ 🔒

An association of people who work with dysphagia.
Our aims are to improve and promote care, education and research into swallowing disorders and swallowing physiology.

Know more

Who we are

The European Society for Swallowing Disorders is an international non-profit association aiming to improve the quality of care for those affected by swallowing disorders. The Society brings together health care professionals and researchers from multiple disciplines to promote excellence in care, education, and research into swallowing and swallowing disorders.

Know more

Where to find what



EUROPEAN
SOCIETY FOR
SWALLOWING
DISORDERS
ESSD

Dysphagia Matters ▾

Discover ESSD ▾

Our activities ▾

News & Events

Get involved

Contact

Members area ▾ 🔒

Education

📖 Webinars

📖 Courses

📖 Certification

📖 Mentorship

Research

📖 Members Research Archive

Outreach

📖 Congress

📖 World Swallowing Day

📖 Public Newsletter Archive

Partnerships

📖 Society Partners

📖 Industry Partners

📖 Partner with us

Who we are

The European Society for Swallowing Disorders is an international non-profit association aiming to improve the quality of care for those affected by swallowing disorders. The Society brings together health care professionals and researchers from multiple disciplines to promote excellence in care, education, and research into swallowing and swallowing disorders.

Know more

Where to find what

ABOUT FEES

ESSD FEES education program →

The ESSD FEES accreditation program pursues three aims: →

Qualification Levels →

Prerequisites for starting the ESSD-FEES education →

For professionals with FEES-expertise →

ESSD FEES training record book for download →

Task assignment and delegation →

FEES Certification Program for Neurogenic and Geriatric Oropharyngeal Dysphagia →

FEES-Registry Design and Endpoints

Dziewas et al. *Neurological Research and Practice*
<https://doi.org/10.1186/s42466-019-0021-5>

(2019) 1:16

Neurological Research
and Practice

RESEARCH ARTICLE

Open Access

Safety and clinical impact of FEES – results of the FEES-registry



- Prospective multicentre observational trial at 23 sites in Germany and Switzerland from 9/2014 to 5/2017.
- Recording of
 - Epidemiological and clinical data
 - Qualification and experience of the examiner
 - Side-effects
 - Cardiorespiratory parameter
 - Severity of dysphagia
 - Impact of FEES on dysphagia management

FEES-Registry

Patient Characteristics

Main Diagnosis	
Stroke	1465 (61.0)
Parkinson's Disease	157 (6.5)
CIP	135 (5.6)
MND	75 (3.1)
Dementia	64 (2.7)
Malignoma	48 (2.0)
Movenent Disorders (other)	41 (1.7)
Enzephalopathia	37 (1.5)
TBI	36 (1.5)
Meningitis/Enzephalitis	36 (1.5)
Myasthenia gravis	35 (1.5)
Immune-mediated neuropathy	34 (1.4)
Psychogenic dysphagia	34 (1.4)
Seizure	33 (1.4)
Myopathy	29 (1.2)
Cervical spine surgery	20 (0.8)
Multiple Sclerosis	18 (0.7)
Pneumonia	13 (0.5)
Esophageal diseases	12 (0.5)
Other/Missing	79 (3.3)

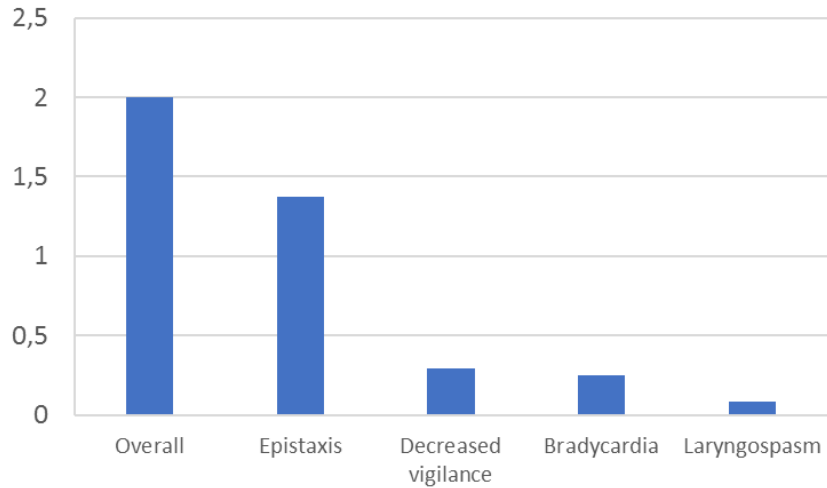


FEES-Registry Environment & Expertise

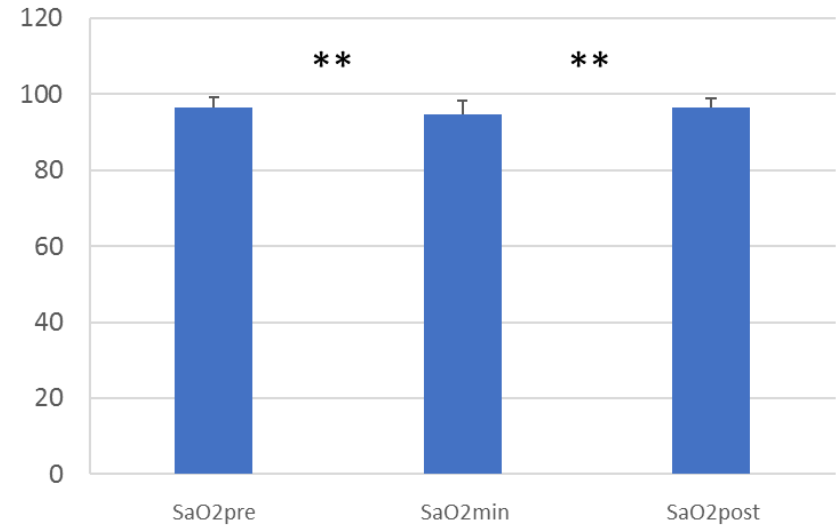
Setting	
Outpatient service	216 (9.0)
Acute care facility	1692 (70.5)
Rehabilitation facility	493 (20.5)
Examiner's profession	
Physician involved	1404 (58.5)
SLT involved	2282 (95.0)
SLT alone	985 (41.0)
Examiner's experience	
<30 FEES	420 (17.7)
30-200 FEES	609 (25.6)
201-500	389 (16.4)
>500	960 (40.4)
Examination time (min)	9.8 (5.9)

FEES-Registry Results

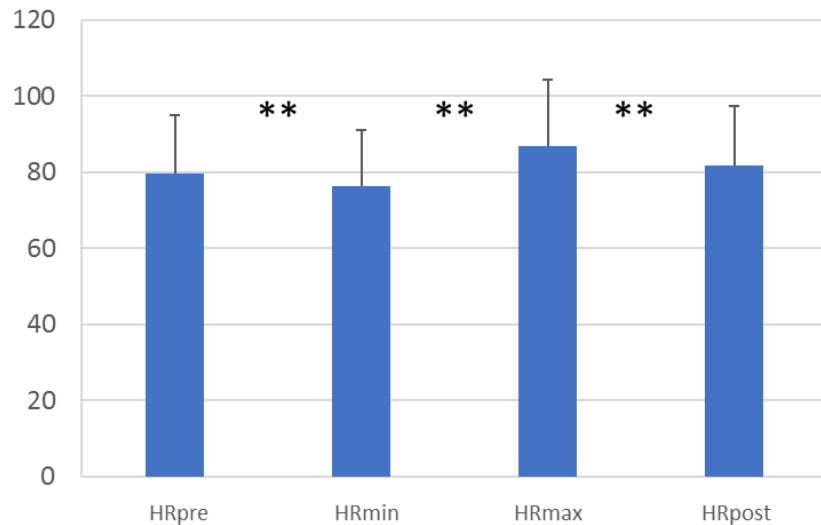
Complications (%)



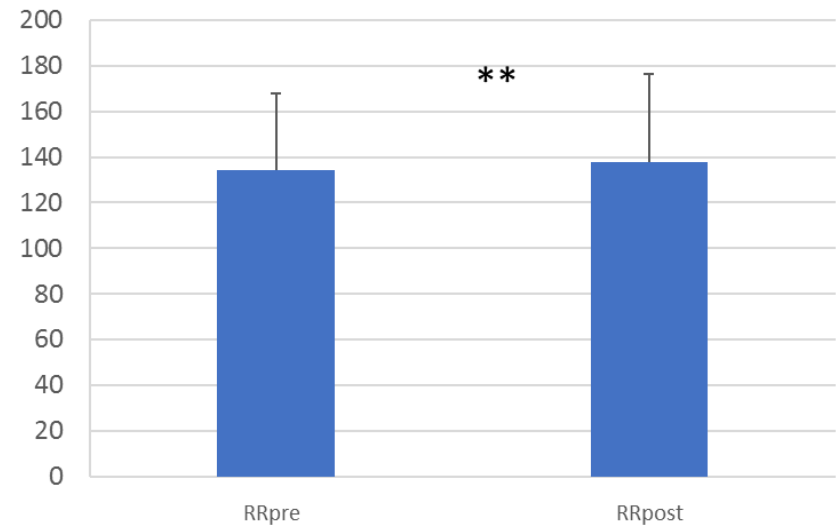
SaO2 (%)



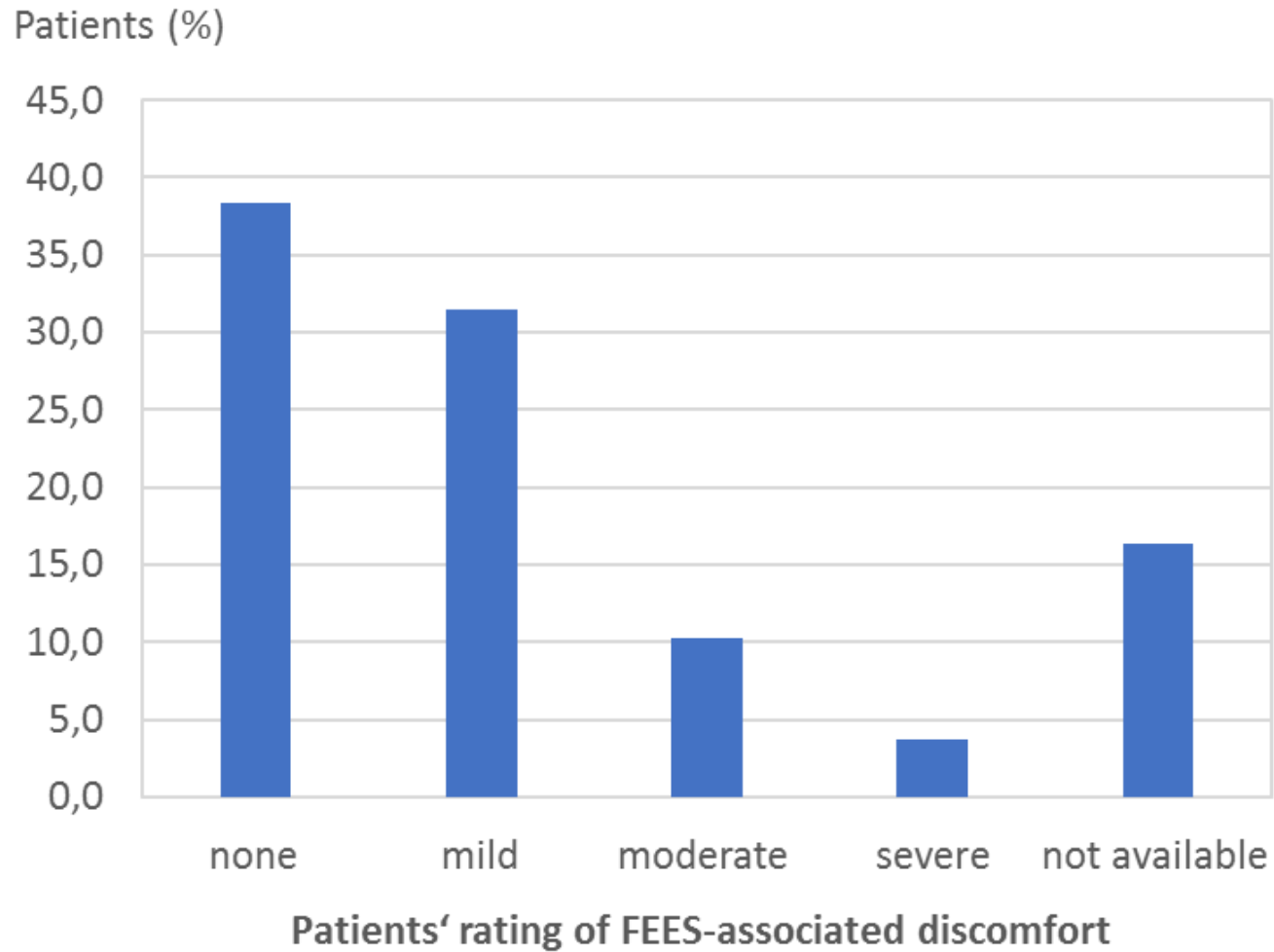
HR (B/min)



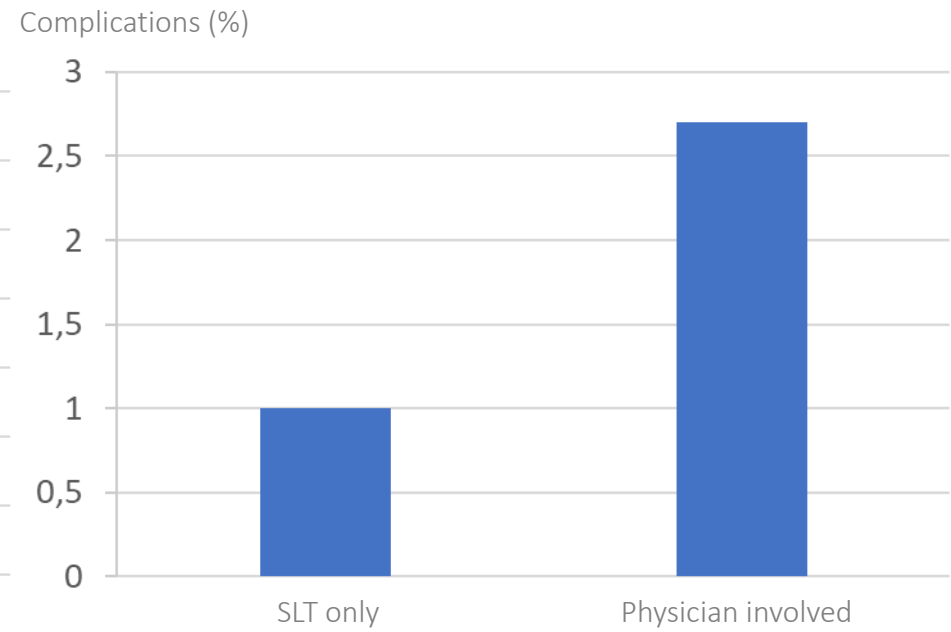
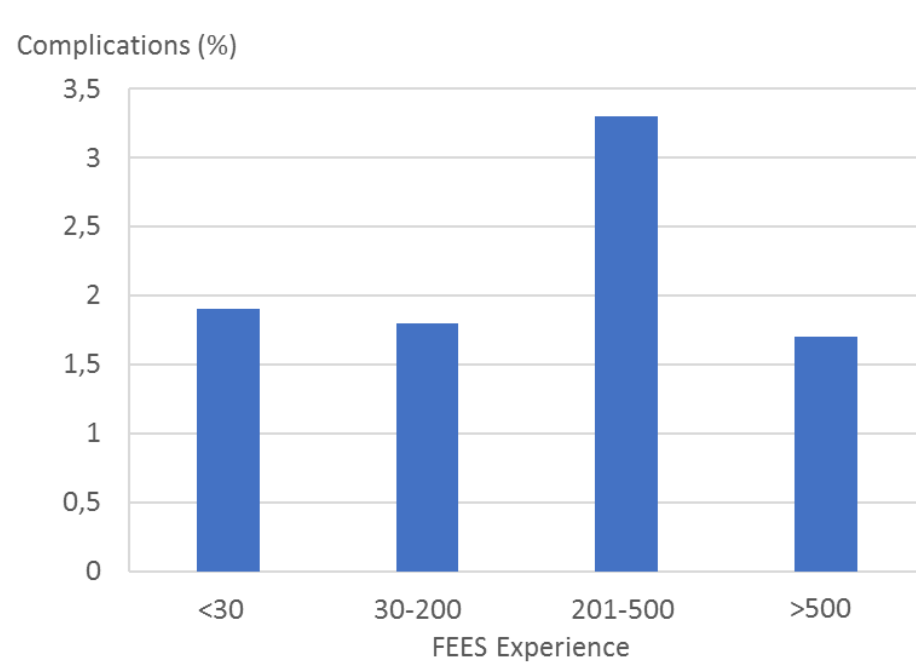
RRsys (mmHg)



FEES-Registry Results



FEES-Registry Complications

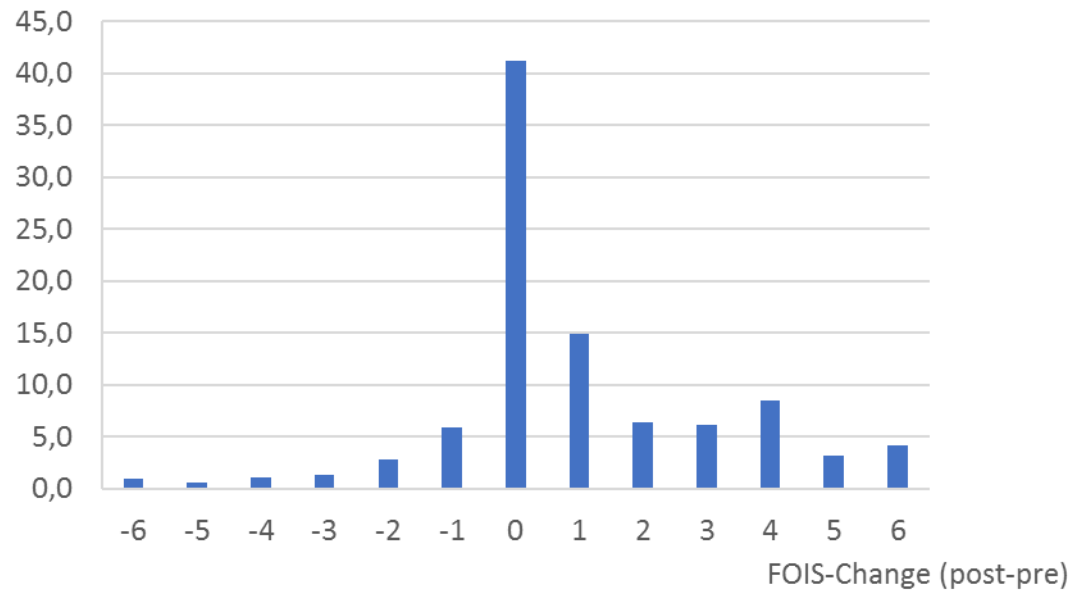


FEES-Registry FOIS Scale

1	No oral intake
2	Tube dependent with minimal/inconsistent oral intake
3	Tube supplements with consistent oral intake
4	Total oral intake of a single consistency
5	Total oral intake of multiple consistencies requiring special preparation
6	Total oral intake with no special preparation, but must avoid specific foods or liquid items
7	Total oral intake with no restrictions

Crary MA et al. Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients.
Arch Phys Med Rehabil 2005;86:1516-1520.

FEES-Registry Results



- Side-effects similar to previously published studies.
- All complications were self-limited and resolved without sequelae
- No increased risk of complications if FEES was performed by less experienced clinicians.
- Cardiorespiratory alterations were not clinically relevant.
- FEES impacted on feeding strategy in >50% of patients.
- Decannulation after FEES in >25% of trach-patients.

- in numerous older studies with sequential examinations high concordance between FEES and VFSS for detection of penetration and aspiration [Wu et al. Laryngoscope 1997, Crary et al. Dysphagia 1997, Leder et al. Dysphagia 1998]
- in more recent studies with simultaneous examinations FEES proved to be even superior to VFSS in detecting aspiration and residues [Kelly et al. Laryngoscope 2007, Kelly et al. Clin Otolaryngol 2006]

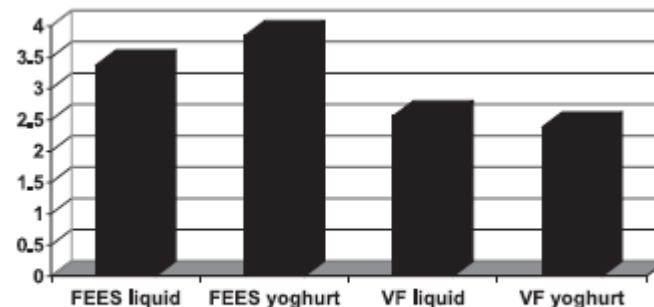


Fig. 2. Mean videofluoroscopy (VF) and fiberoptic endoscopic evaluation of swallowing (FEES) Penetration Aspiration Scale scores.

- High inter-rater and intra-rater reliability [Leder et al. Dysphagia 1998]

VFSS or FEES?

JAMDA 23 (2022) 1360–1366

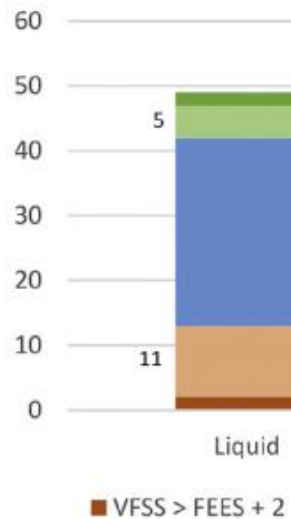


JAMDA

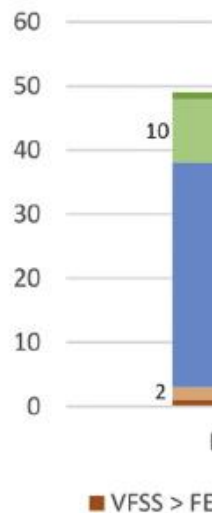
journal homepage: www.jamda.com



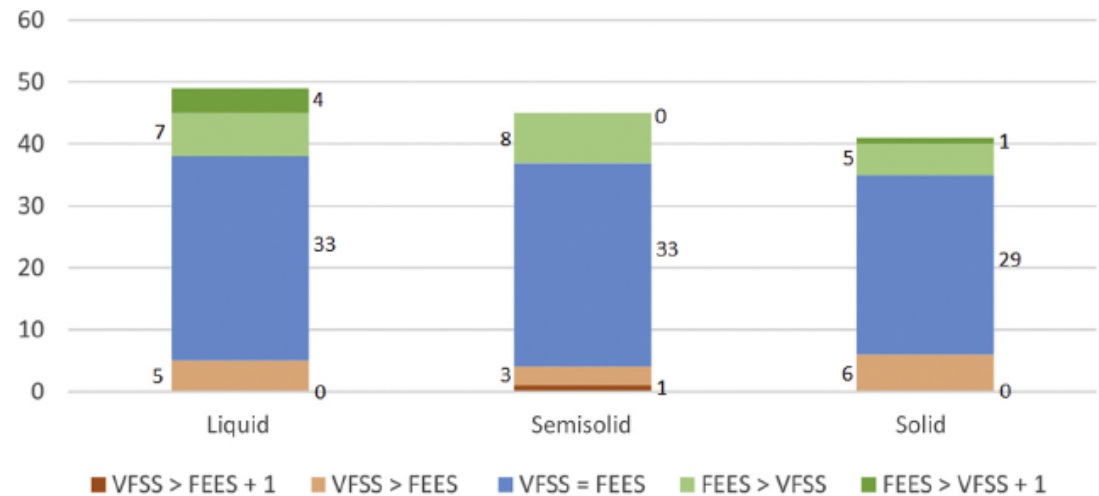
Frequency of PAS ratings



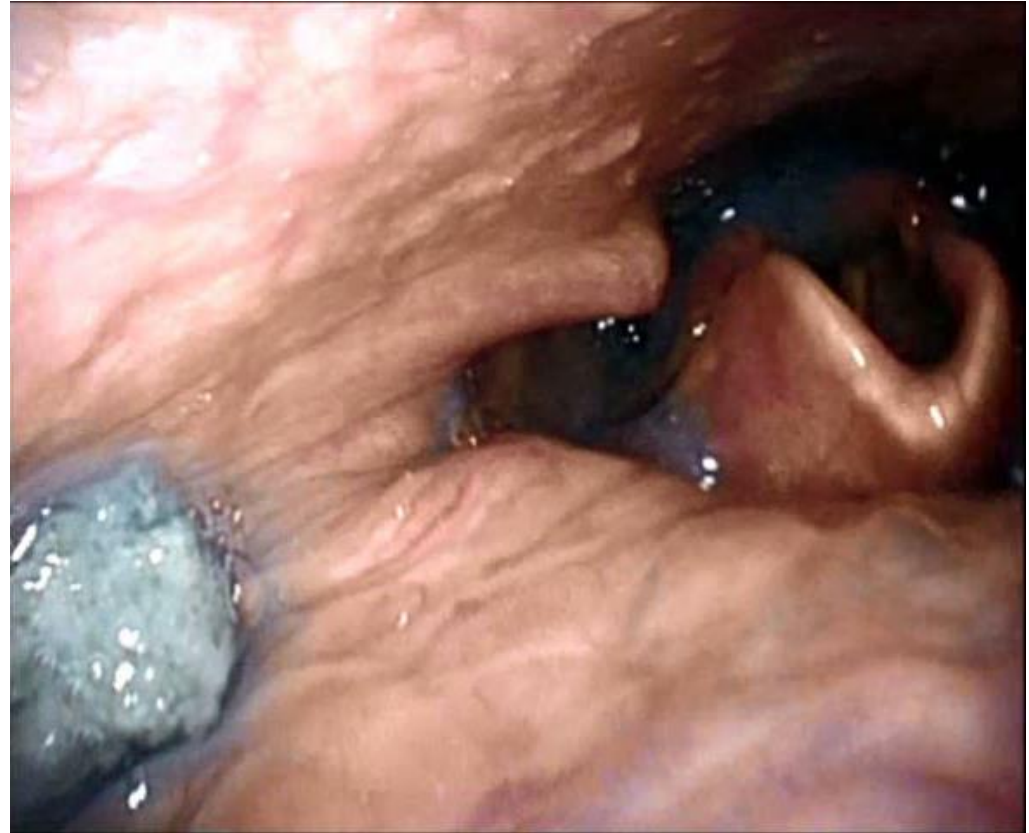
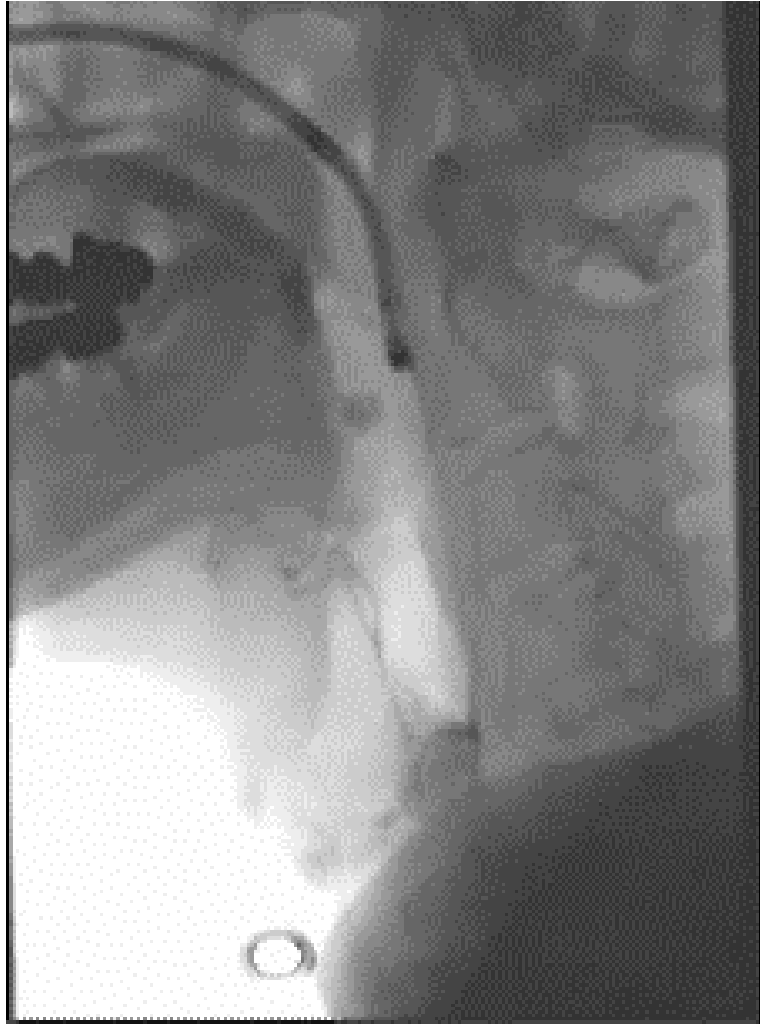
Frequency of vallecula residue ratings



Frequency of piriform residue ratings



Simultaneous VFSS-FEES



FEES in dysphagia guidelines

Dziewas et al. *Neurological Research and Practice*
<https://doi.org/10.1186/s42466-021-00122-3>

(2021) 3:23

Neurological Research
and Practice

GUIDELINES

Open Access

Diagnosis and treatment of neurogenic dysphagia – S1 guideline of the German Society of Neurology



- 6 of 53 recommendations related to FEES, for example:
- **Recommendation 10:** FEES and VFSS are complementary methods of instrumental dysphagia assessment and should therefore, ideally, be both available.
- **Recommendation 11:** FEES should preferably be used for bedside examinations in severely motor-impaired, bedridden or uncooperative patients.
- **Recommendation 12:** FEES should preferably be used for the assessment of pharyngeal secretion management and for the assessment of laryngeal and pharyngeal sensitivity.

FEES in stroke guidelines

Guideline

European Stroke Organisation and European Society for Swallowing Disorders guideline for the diagnosis and treatment of post-stroke dysphagia

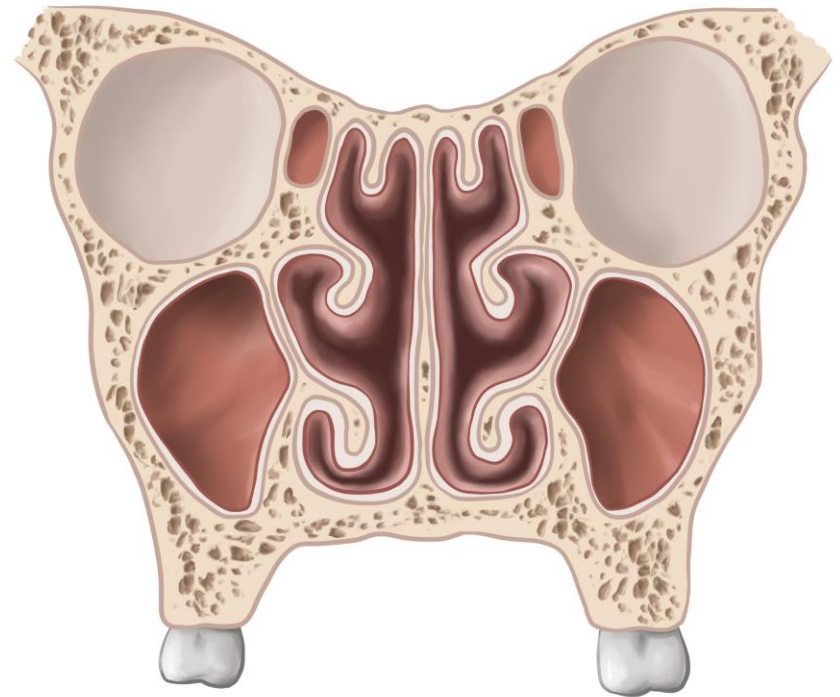
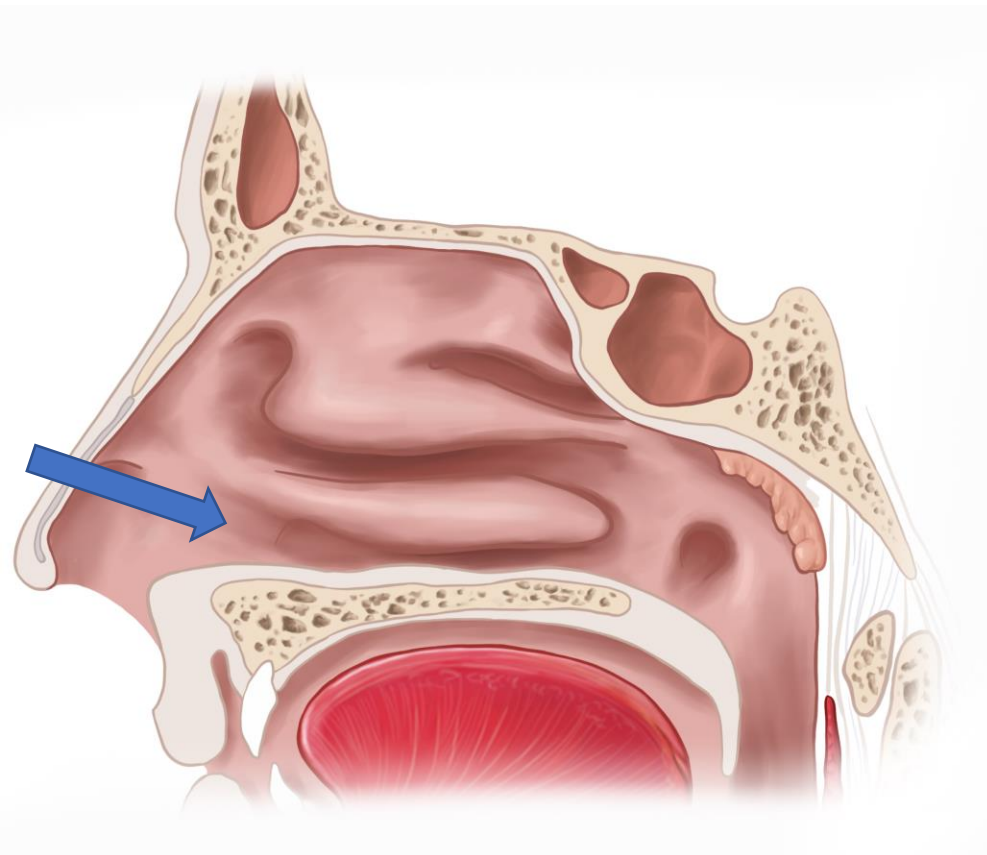
EUROPEAN
STROKE JOURNAL

European Stroke Journal
2021, Vol. 6(3) LXXXIX–CXV
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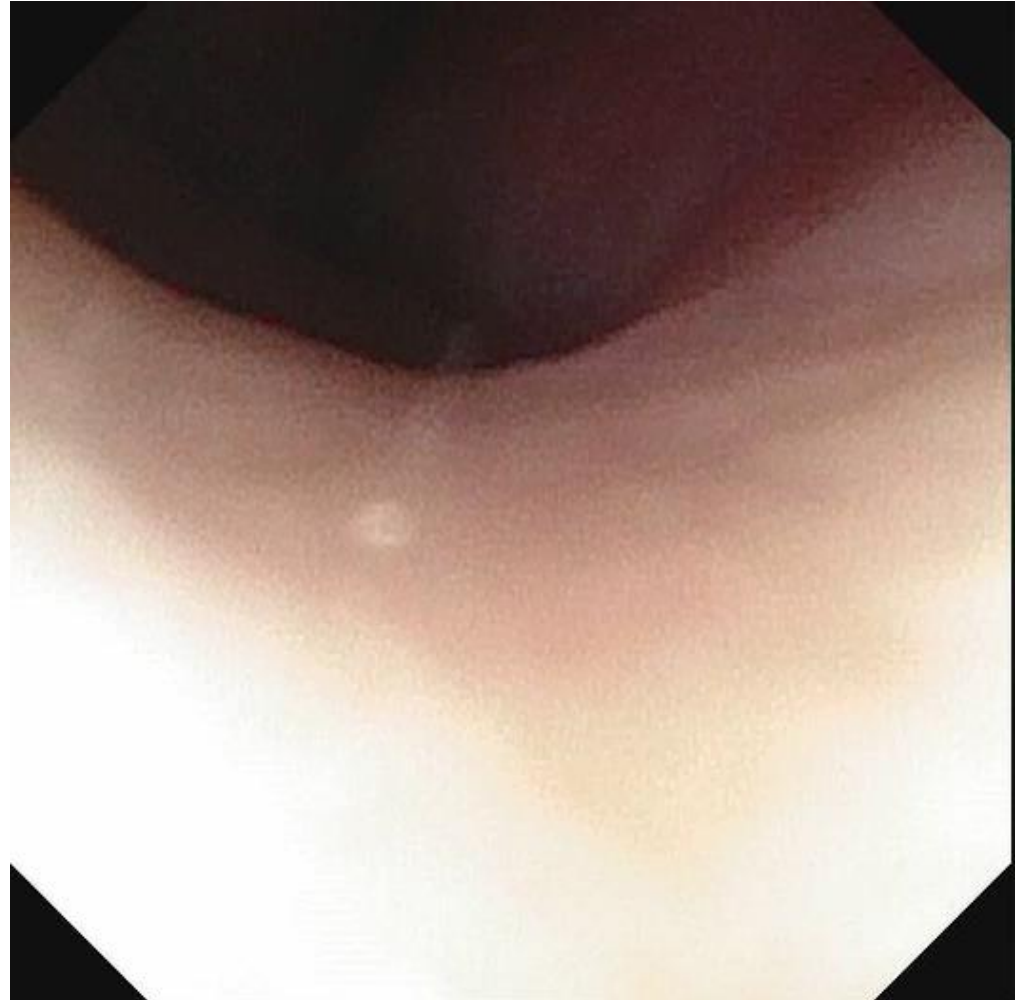
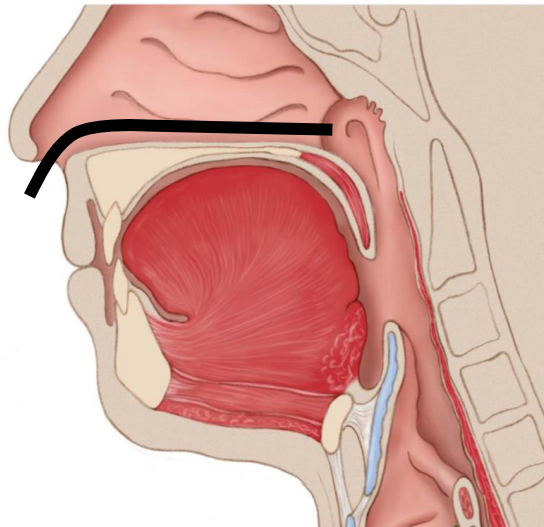
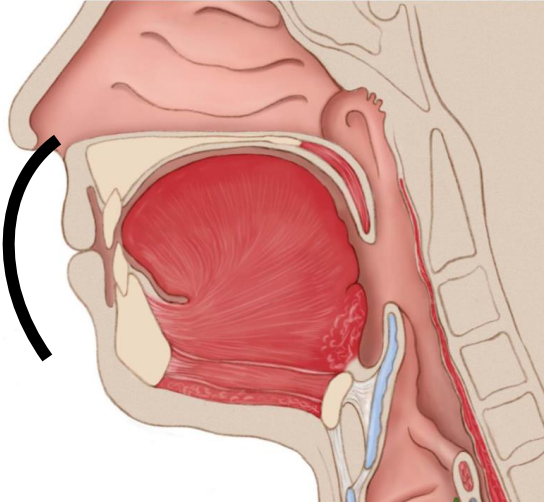
Rainer Dziewas^{1,2} , Emilia Michou^{3,4}, Michaela Trapl-Grundschober⁵ , Avtar Lal⁶,
Ethem Murat Arsava⁷, Philip M Bath⁸, Pere Clavé⁹, Jörg Glahn¹⁰, Shaheen Hamdy⁴,
Sue Pownall¹¹, Antonio Schindler¹², Margaret Walshe¹³, Rainer Wirth¹⁴, David Wright¹⁵
and Eric Verin¹⁶

- **Recommendation 3:** We suggest a dysphagia assessment in all stroke patients failing a dysphagia screen and/or showing other clinical predictors of post-stroke dysphagia, in particular a severe facial palsy, severe dysarthria, severe aphasia or an overall severe neurological deficit (NIH-SS ≥ 10 points). Dysphagia assessment should be done as soon as possible. **In addition to the clinical swallow examination, VFSS or, preferentially, FEES should be available.**
- Quality of evidence: Low
- Strength of recommendation: Weak for intervention \uparrow ?

Passing the Scope



Passing the Scope



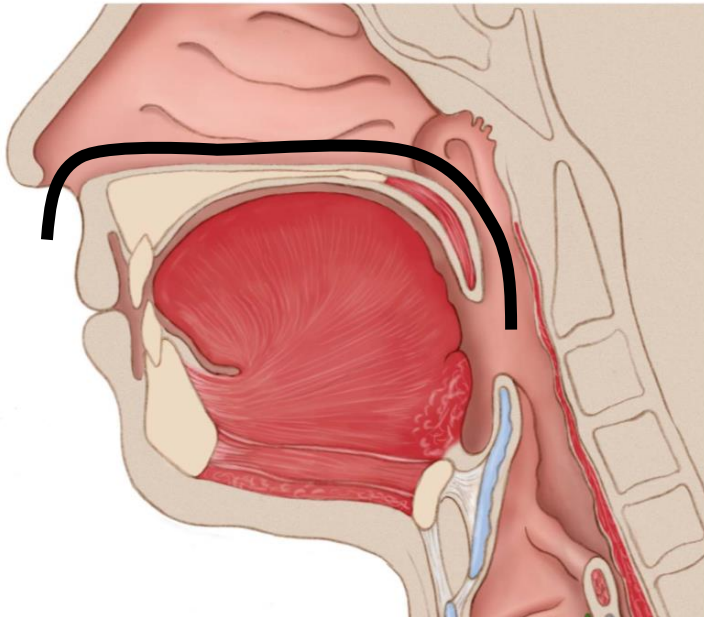
Passing the Scpe

Nasenpassage

Reaching the Home Position

Home Position:

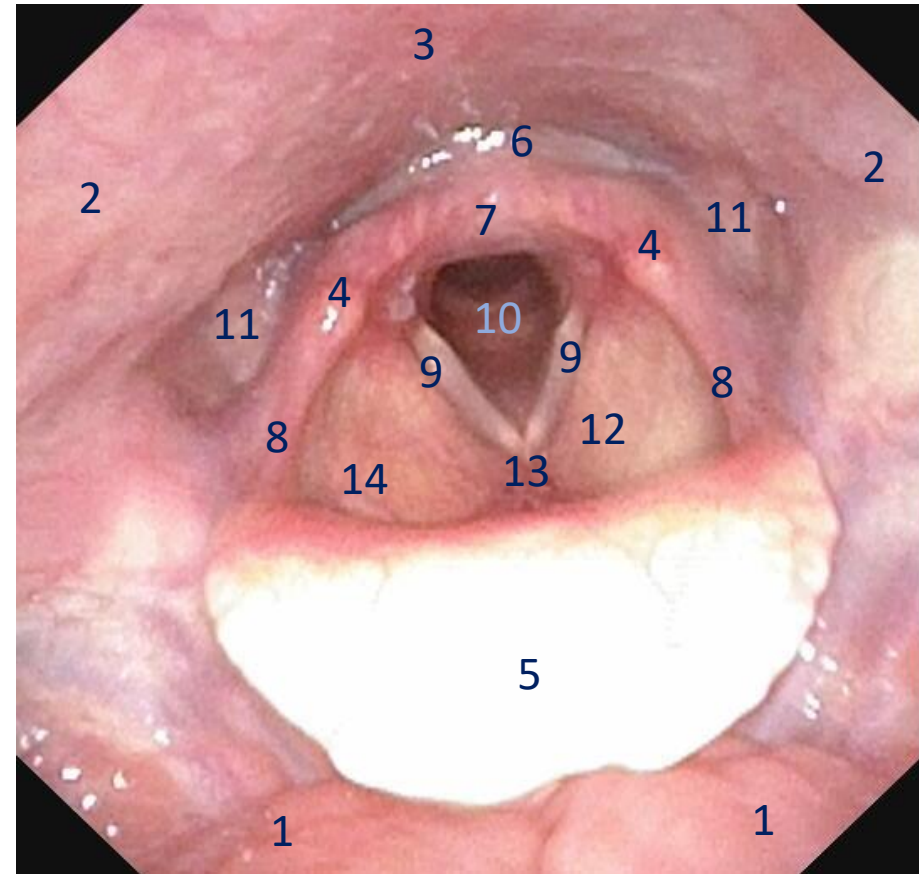
Overview of Pharynx & Larynx



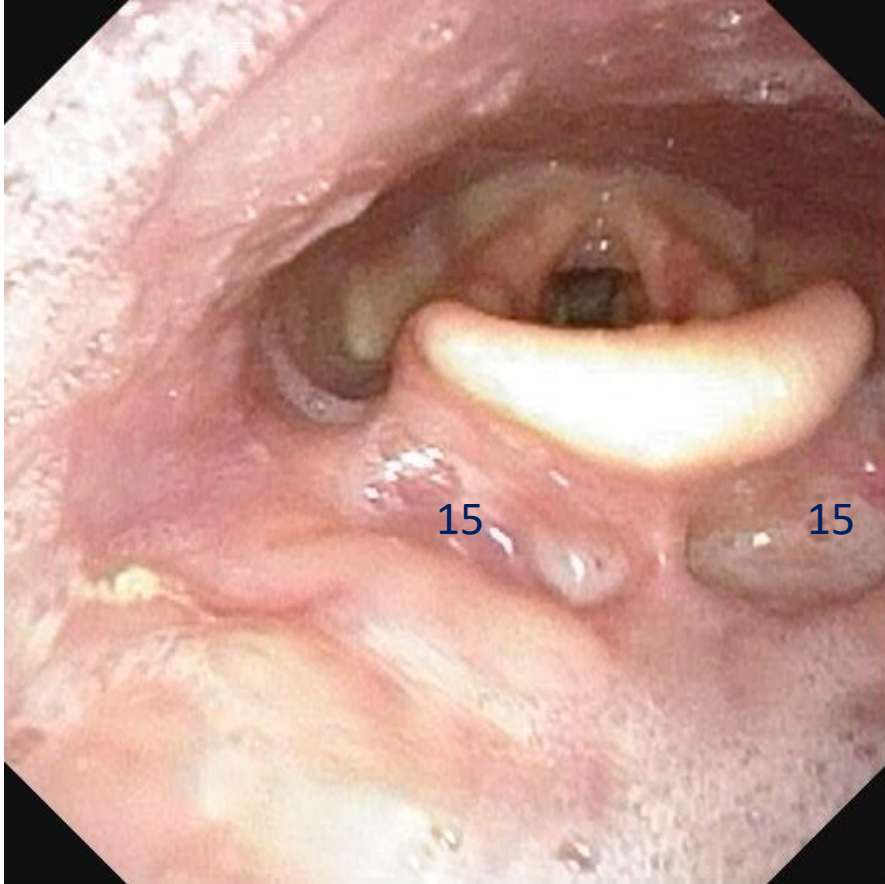
**Nasenpassage + Home
position**

Getting the anatomy right

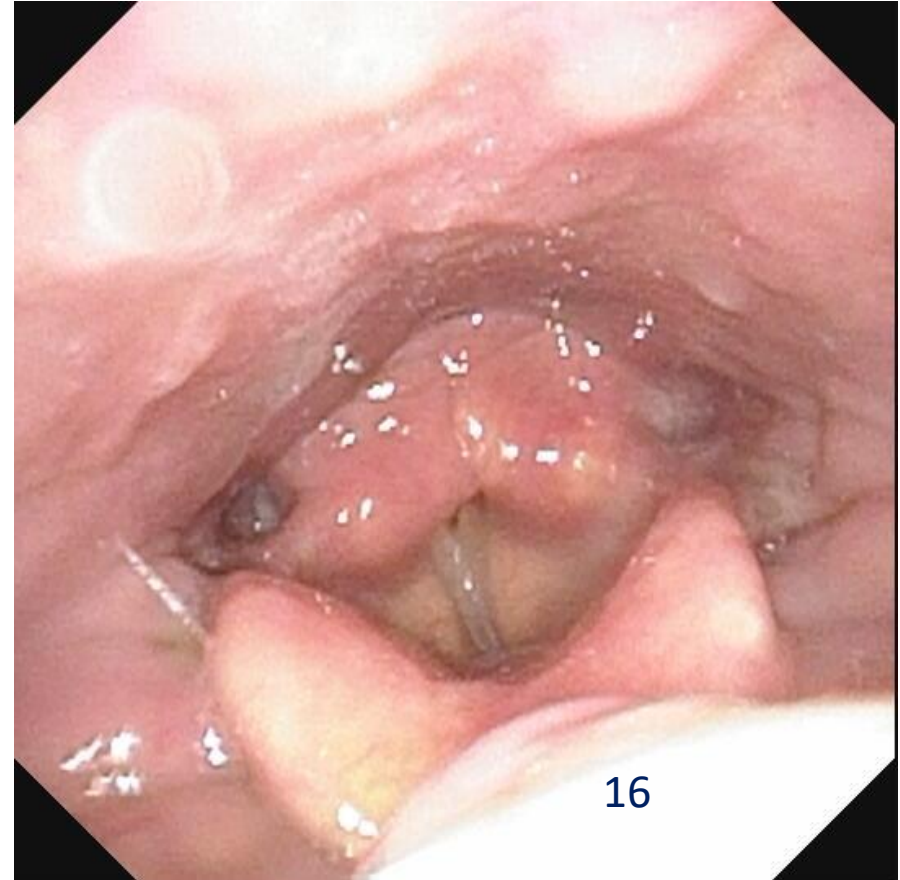
- 1 Base of the tongue
- 2 Lateral pharyngeal wall
- 3 Posterior pharyngeal wall
- 4 Arytenoid
- 5 Epiglottis
- 6 Upper esophageal sphincter
- 7 Plica interarythaenoidea
- 8 Plica aryepiglottica
- 9 Vocal cord
- 10 Trachea
- 11 Sinus piriformes
- 12 Vestibular folds
- 13 Commissura anterior laryngis
- 14 Aditus laryngis



Getting the anatomy right

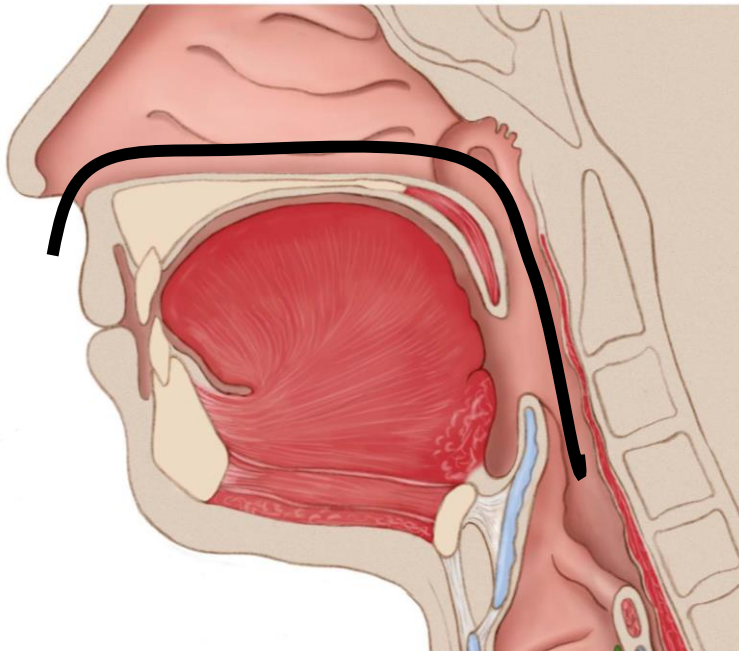


15 Valleculae

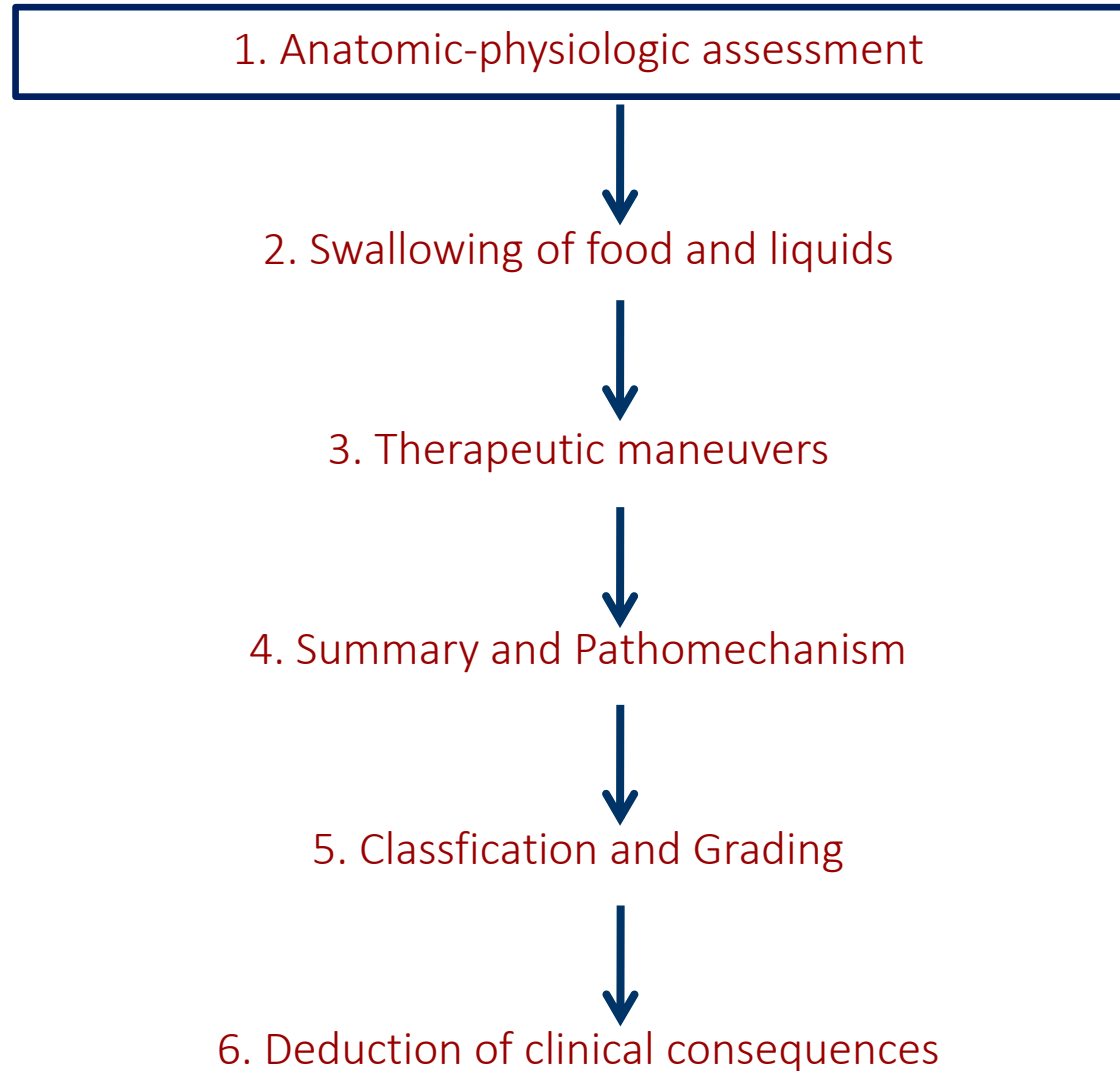


16 Uvula

Close View



FEES standard protocol (Langmore protocol)



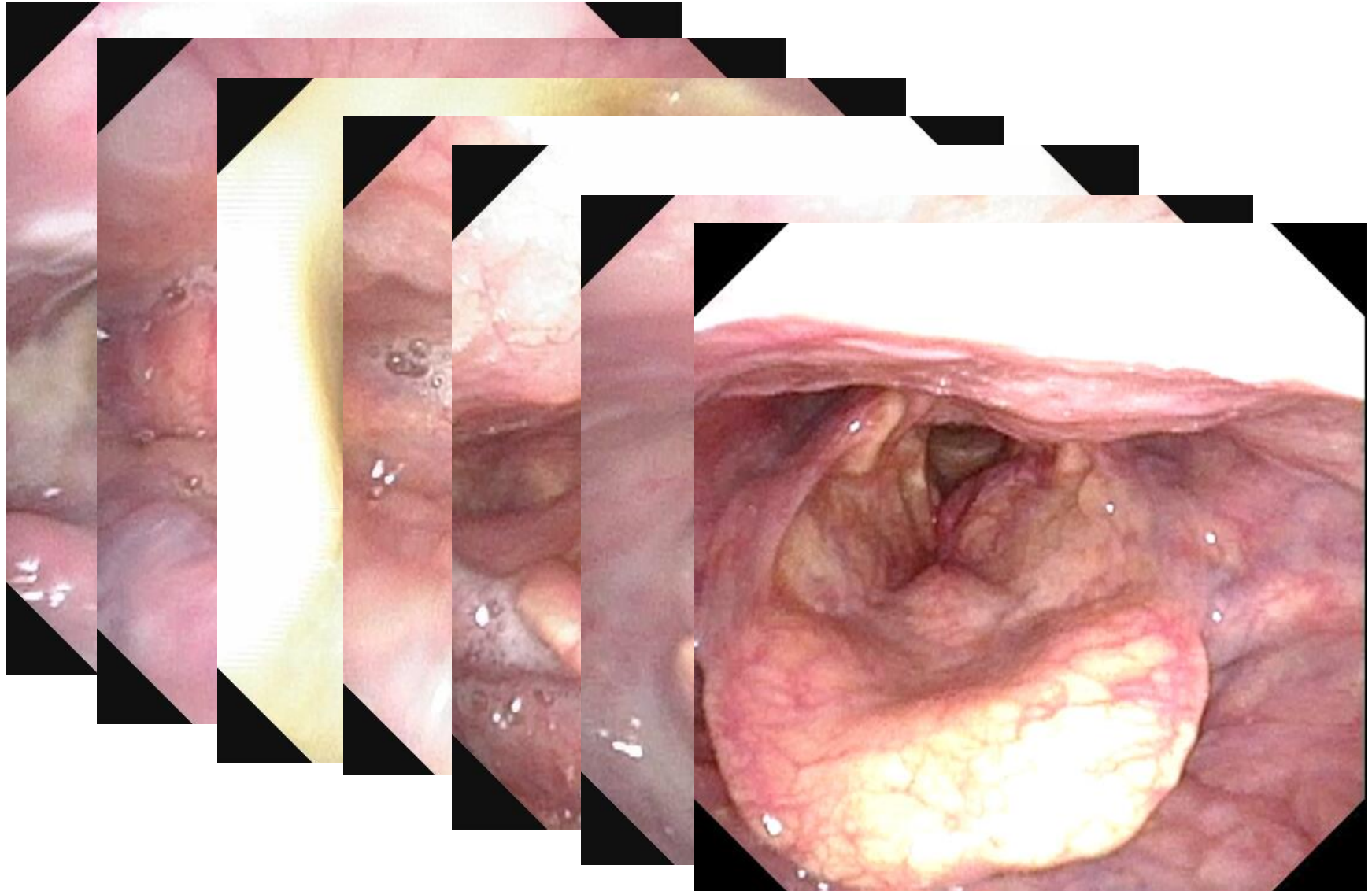


Anatomic-physiologic assessment

Resting state examination

- Mucosal texture
- Symmetry and asymmetry
- Structural changes/abnormalities
- Unvoluntary movements
- Positioning of vocal cords, arytenoids and epiglottis
- Accumulation of saliva and secretions
- Spontaneous swallowing rate (2-4 per minute)
- Positioning of nasogastric tubes

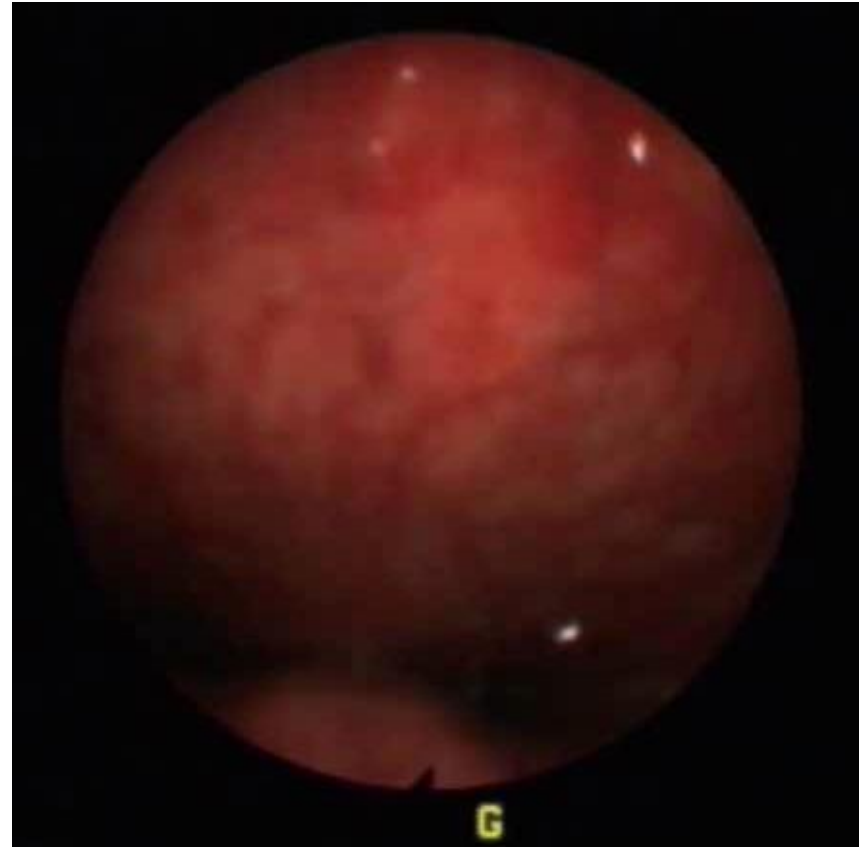
Resting state examination structural abnormalities



Resting state examination

Structural changes

- 73 yr old male patient
- Subjective swallowing problems since 10 years
- Weight loss > 15 kg (BMI 17 kg/m²)
- Psychogenic dysphagia suspected by treating physicians
- Neurological exam unremarkable

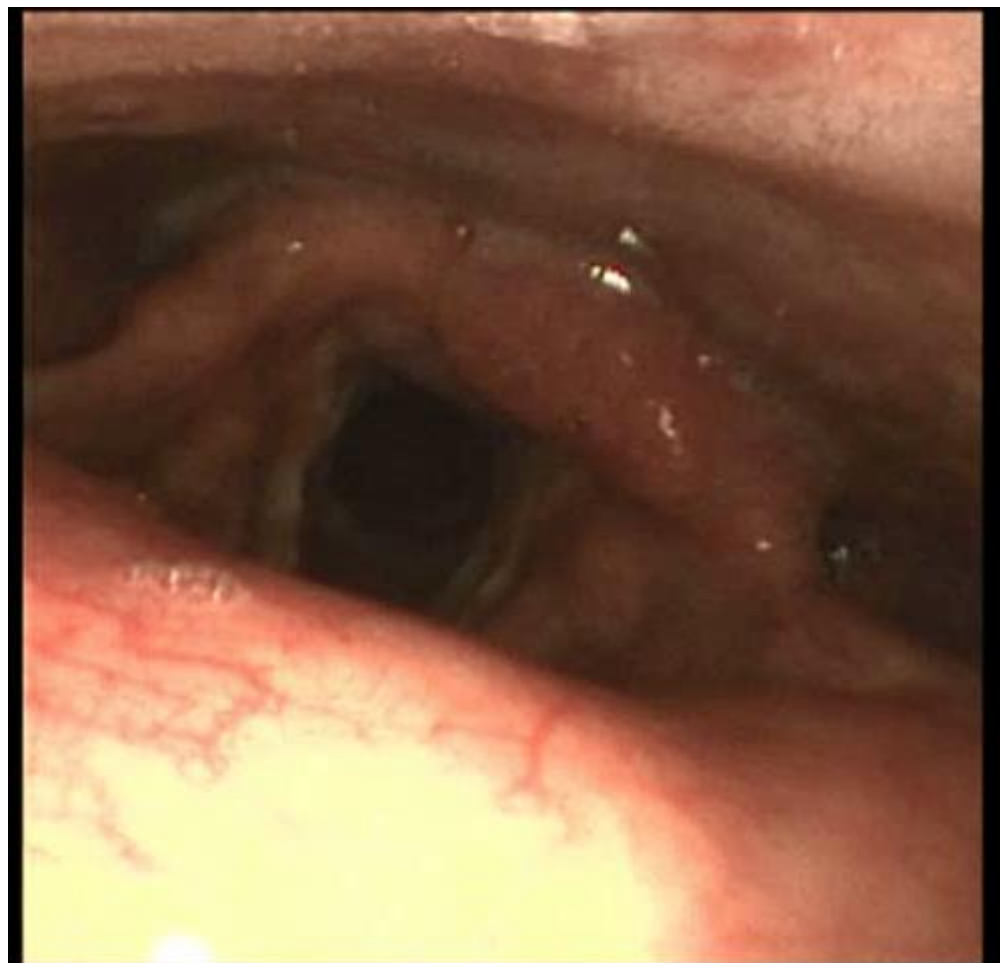


Forestier's disease = Diffuse idiopathic skeletal hyperostosis (DISH)

Resting state examination

Structural changes

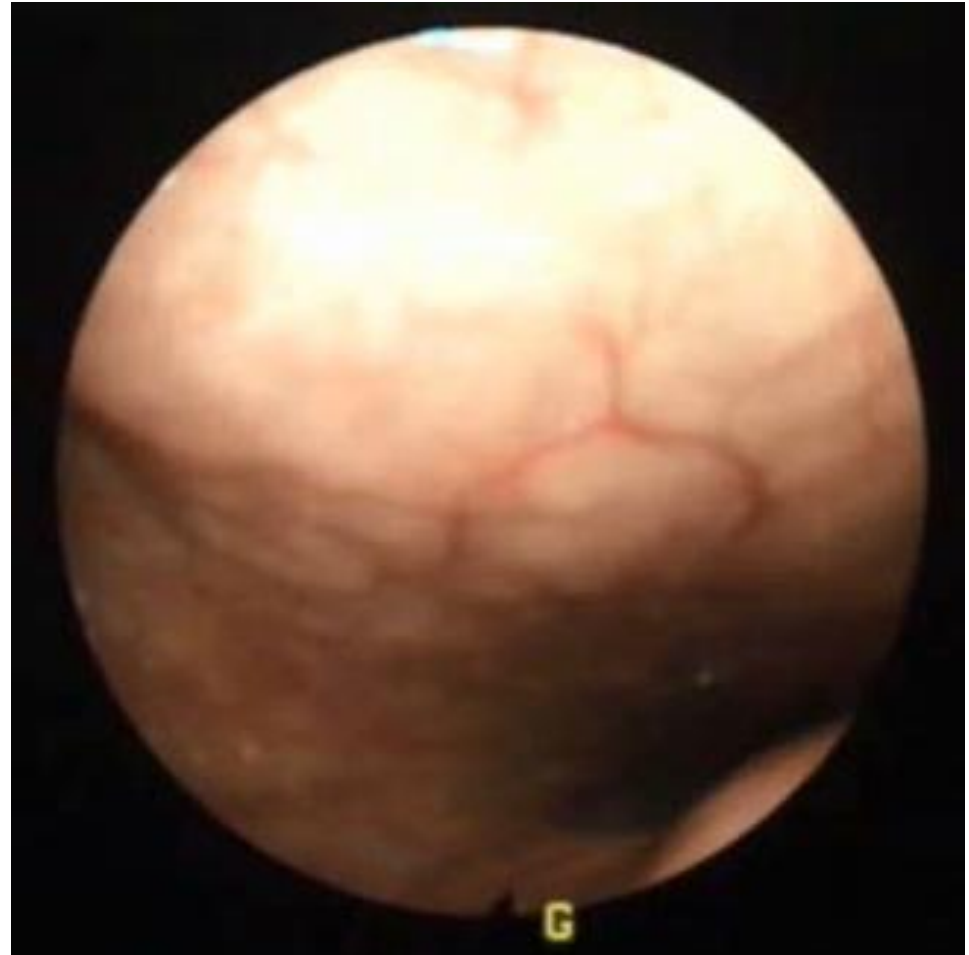
- 67 male patient
- Main complaint:
 - Pain during the swallow
- GI:
 - normal, go to ENT
- ENT:
 - normal, go to neurologist
- Neurologist (first idea):
 - Psychogenic problem use antidepressants



Resting state examination

Involuntary movements

- 63 yrs old patient
- ALS since 1 year
- Increasing dysphagia



Resting state examination

Involuntary movements

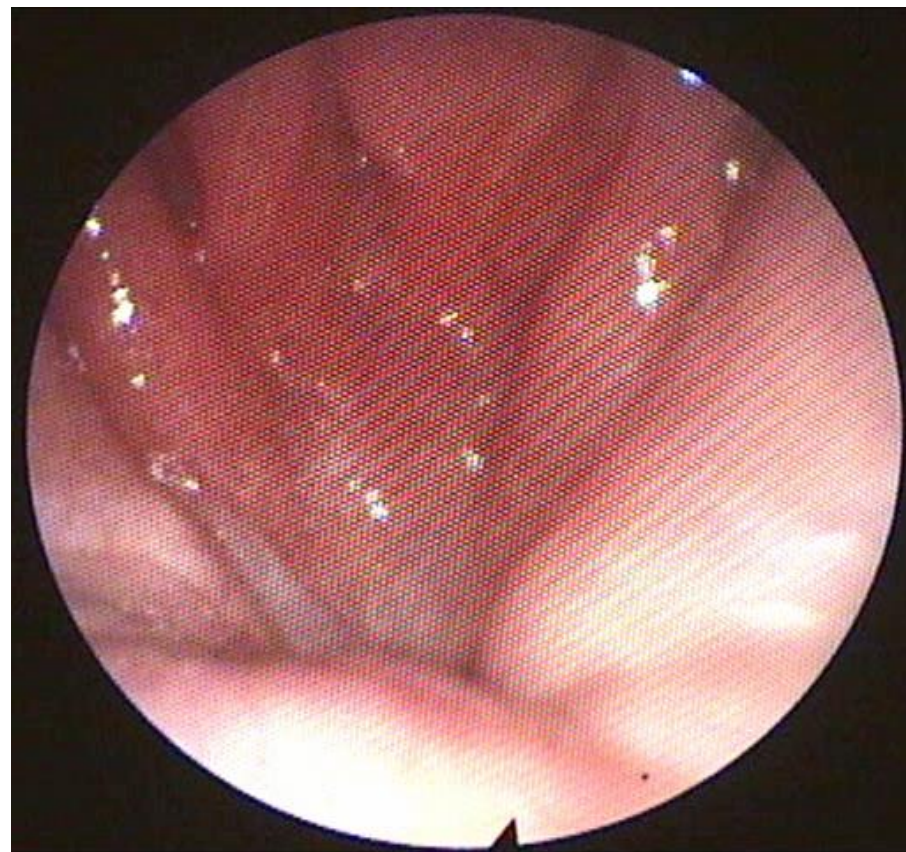
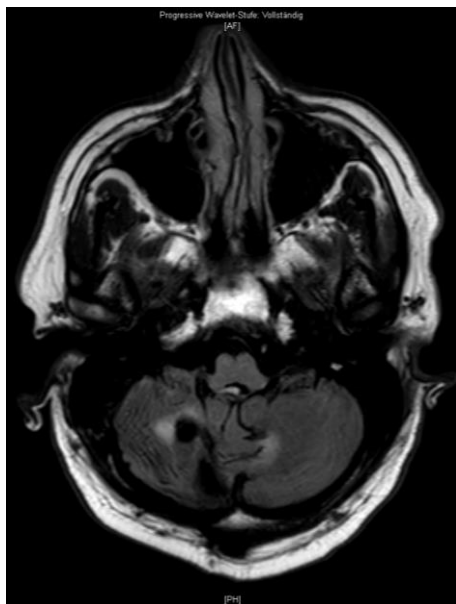
- 39 yrs old patient
- Chronic inflammatory brainstem lesion due to NMOSD
- Only mild dysphagia



Resting state examination

Involuntary movements

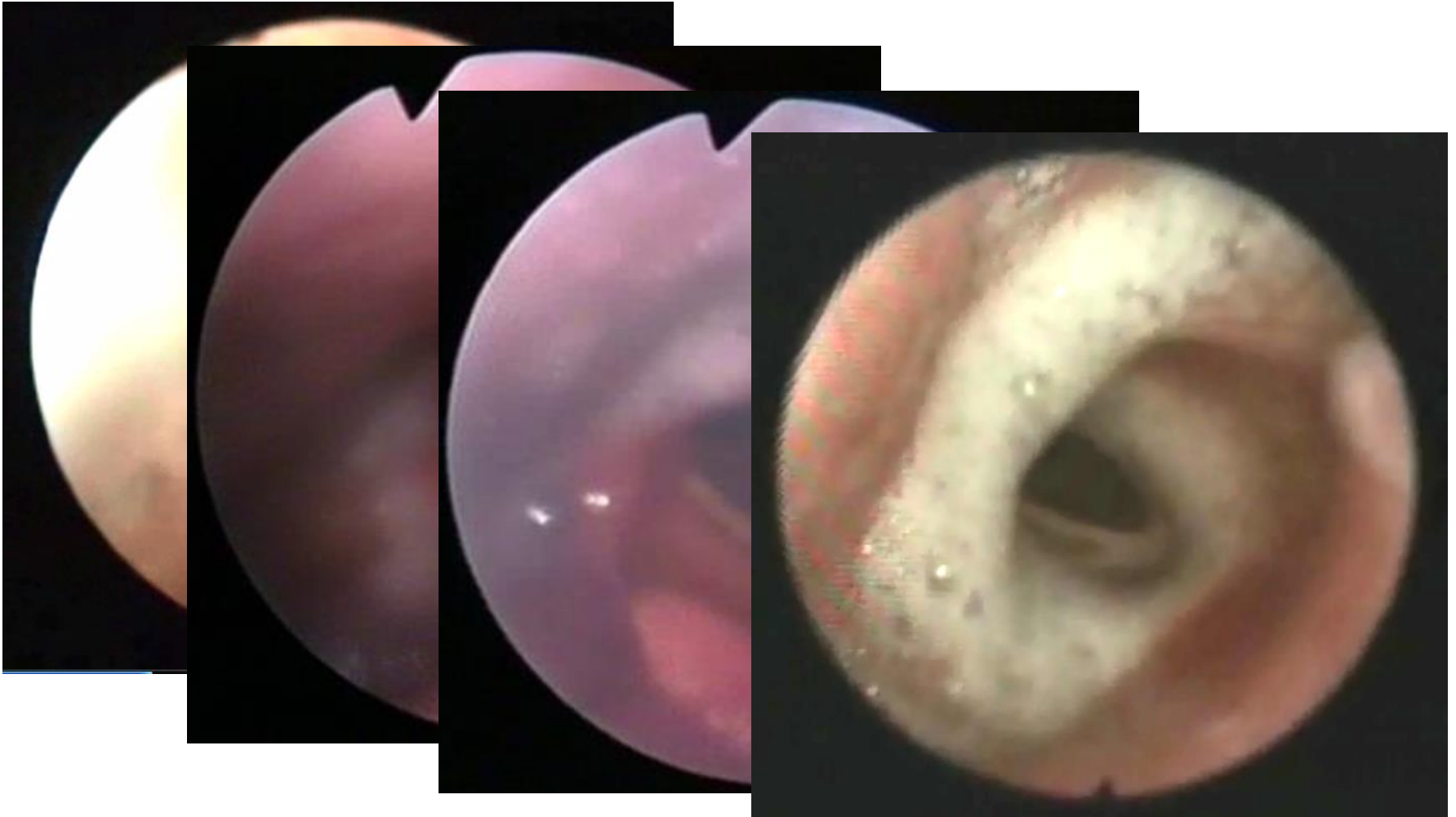
- 54 yrs old male patient
- Traumatic cerebellar hemorrhage 1 year ago
- Complaint of dysphagia and involuntary pharyngeal movements



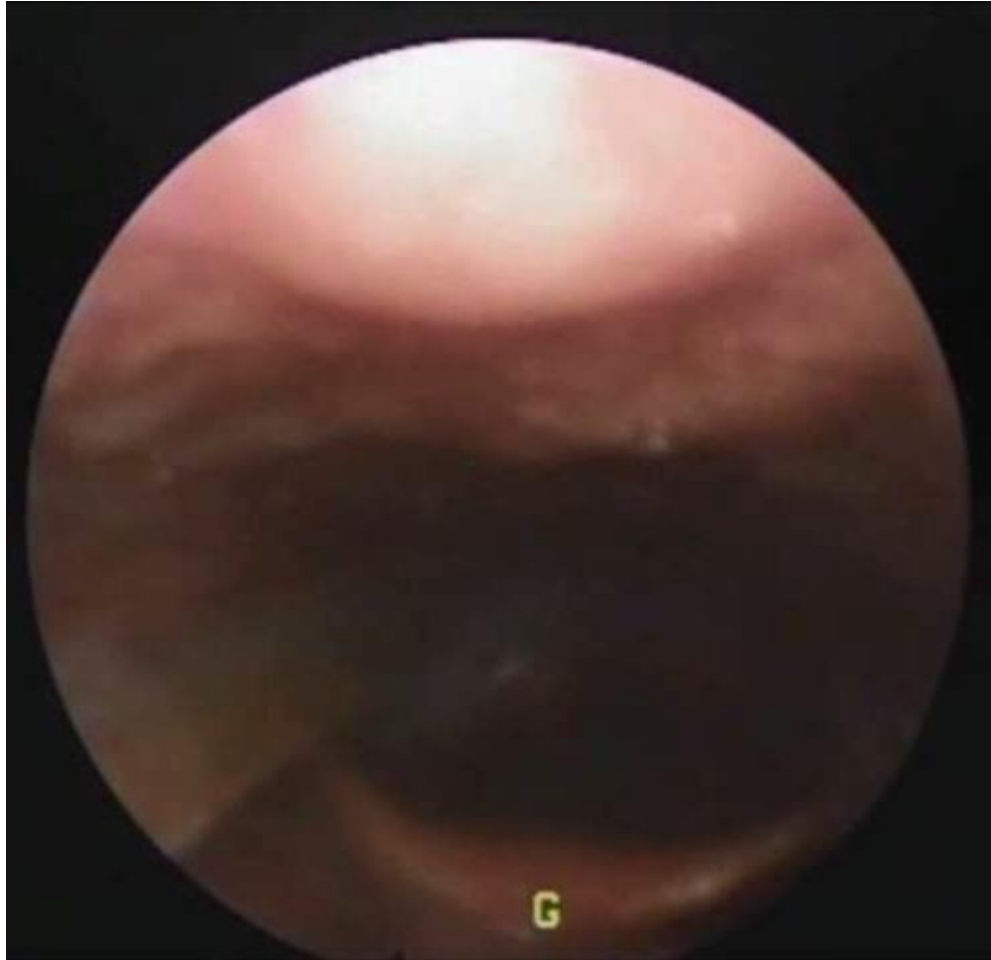
- Murray Secretion Severity Scale

Grade	Finding
0	Normal (moist)
1	Valleculae/sinus piriformes
2	Transient pooling in the laryngeal vestibule
3	Permanent poolin in the laryngeal vestibule

Secretion Rating



Anatomic-physiologic assessment Secretion Rating

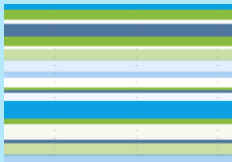


Anatomic-physiologic assessment

Secretion Rating

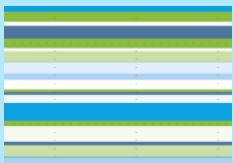
- 39 yr old male patient
- Polyneuritis cranialis
- Bilateral facial palsy and tongue palsy
- Gurgling voice
- Massive distress



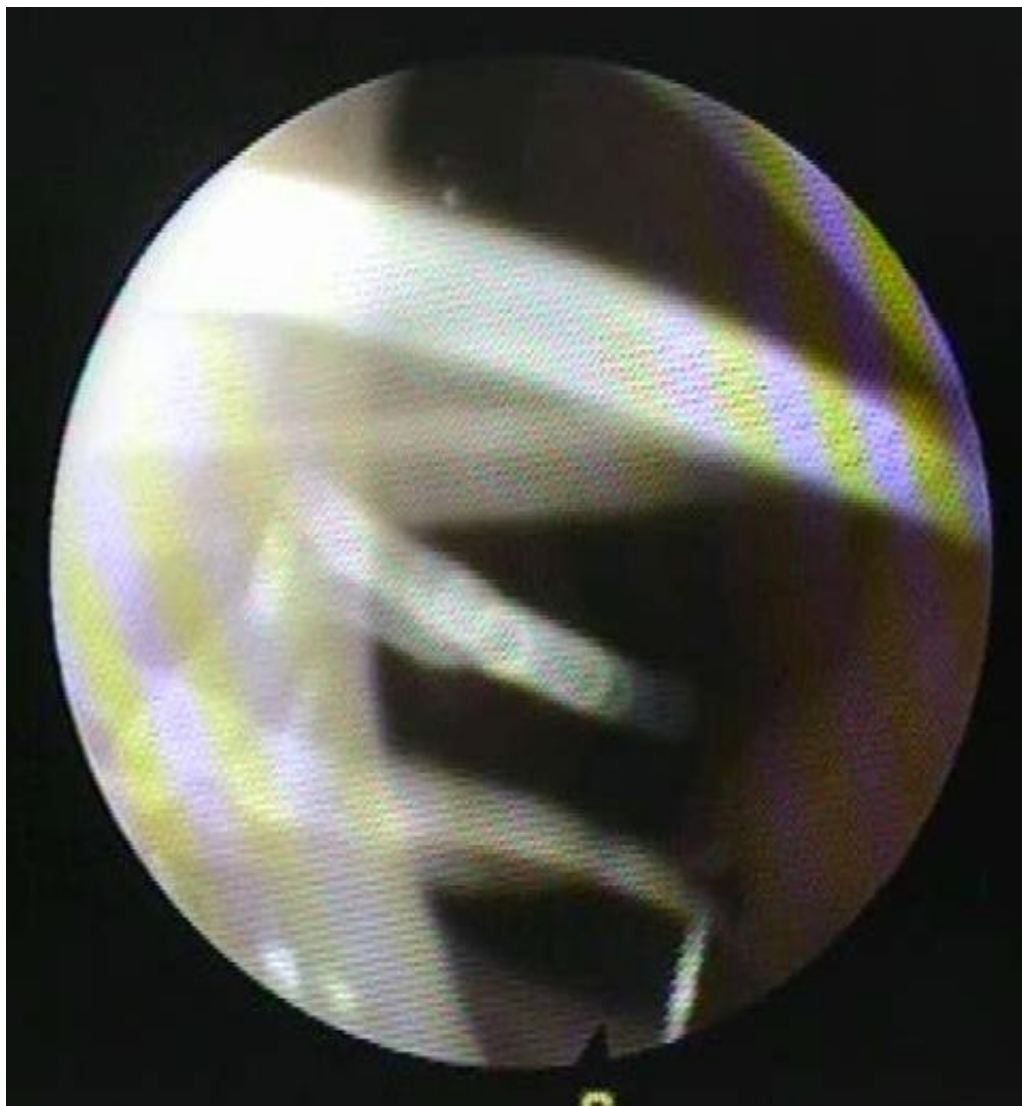


Anatomic-physiologic assessment Motor Examination

Task	Motor Function
Dry swallow, phonate [k]	Velopharyngeal closure
Phonation [eee]	Glottic closure
Repetitive phonation [e-e-e], volitional cough	Diadochokinetic movement of vocal folds and arytenoids
High pitch phonation	Pharyngeal wall recruitment
Sniffing	Vocal fold abduction
Hold breath tight	Ventricular fold adduction
Phonation of postvocalic „l“ words („earl“, „ball“, „call“)	Base of tongue retraction



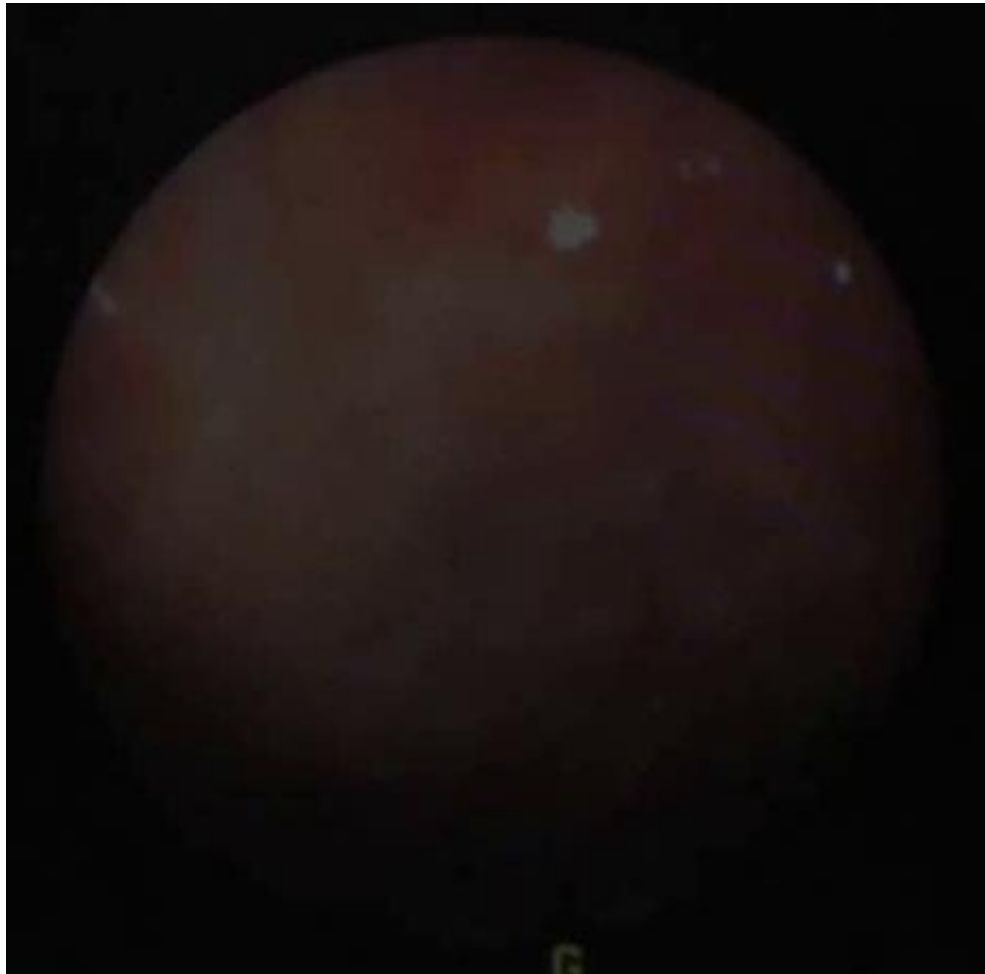
Anatomic-physiologic assessment Motor Examination



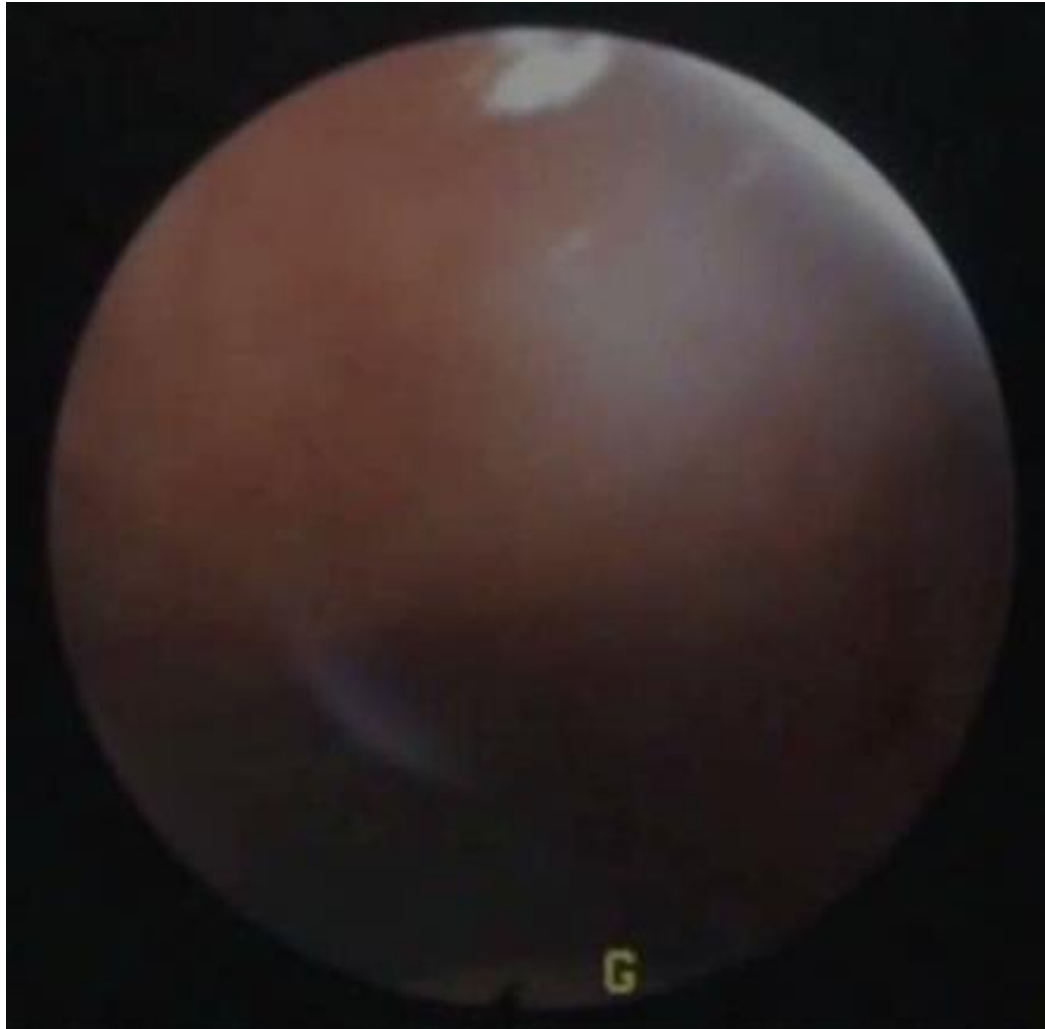
Anatomic-physiologic assessment

Velopharyngeal Closure

Task	Motor Function
Dry swallow, phonate [k]	Velopharyngeal closure



Anatomic-physiologic assessment Incomplete Velopharyngeal Closure



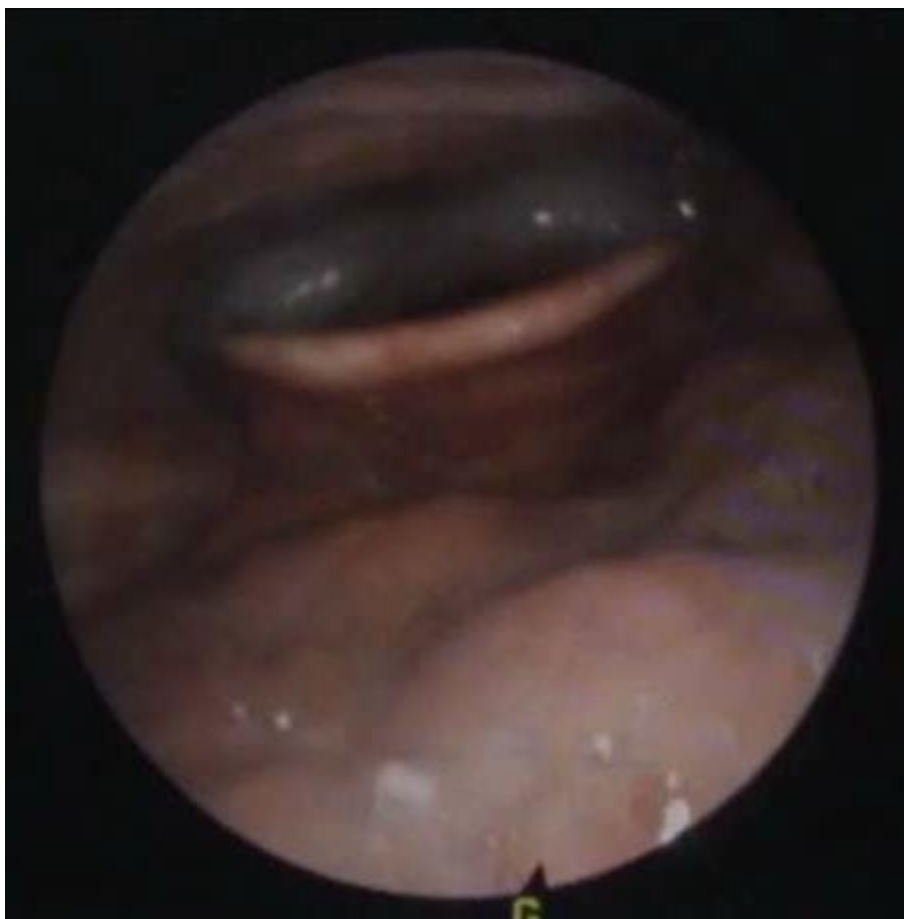
Anatomic-physiologic assessment Incomplete Velopharyngeal Closure



Anatomic-physiologic assessment

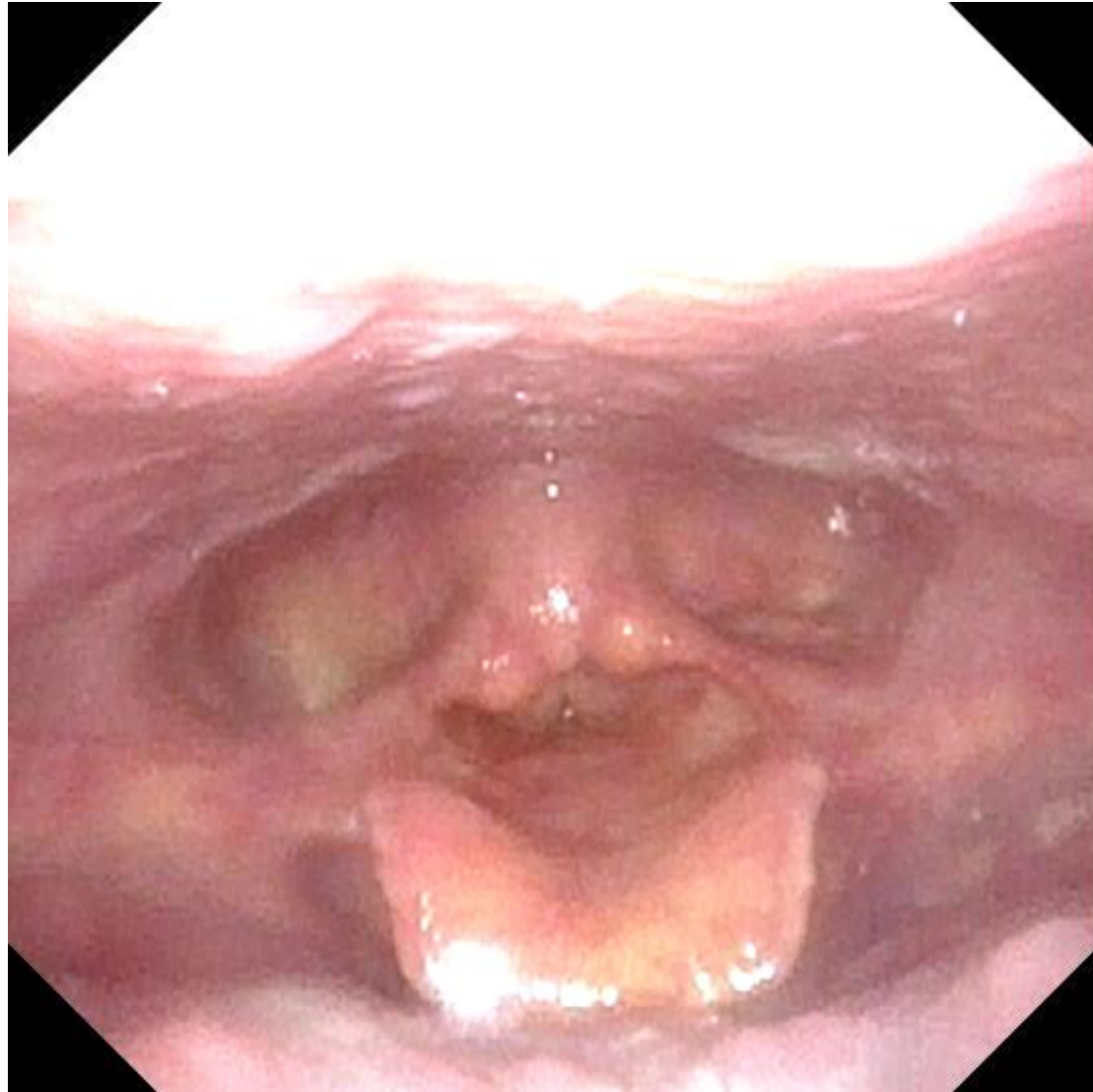
Tongue Base Retraction

Task	Motor Function
Phonation of postvocalic „l“ words („earl“, „ball“, „call“)	Base of tongue retraction



Anatomic-physiologic assessment

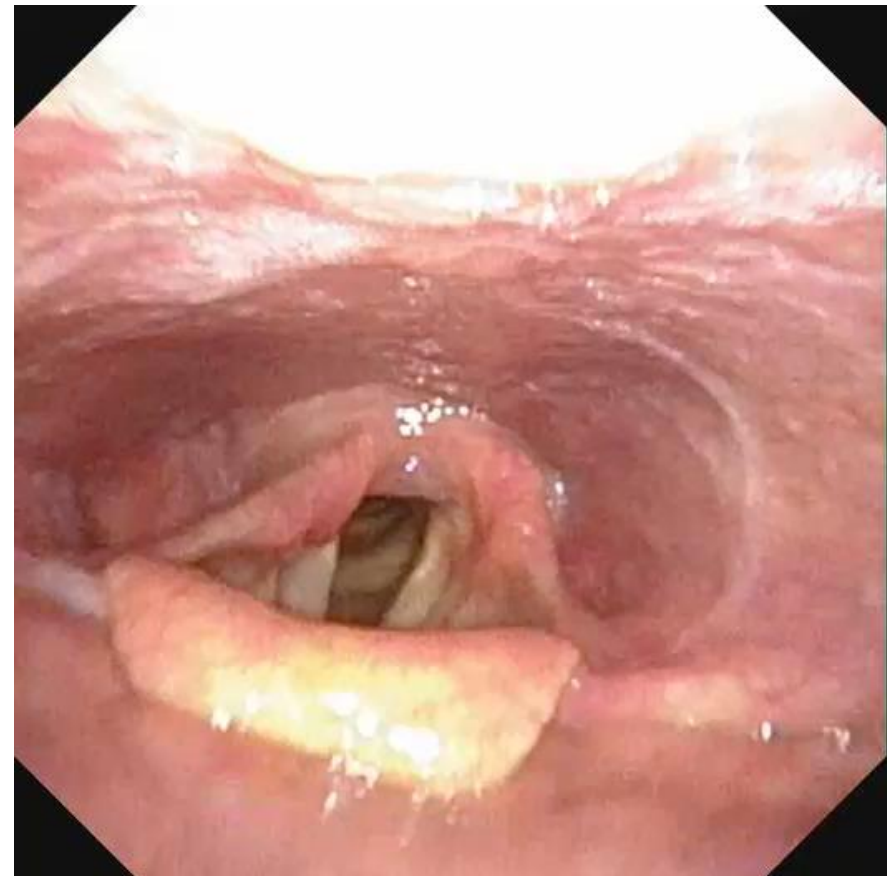
Tongue Base Retraction



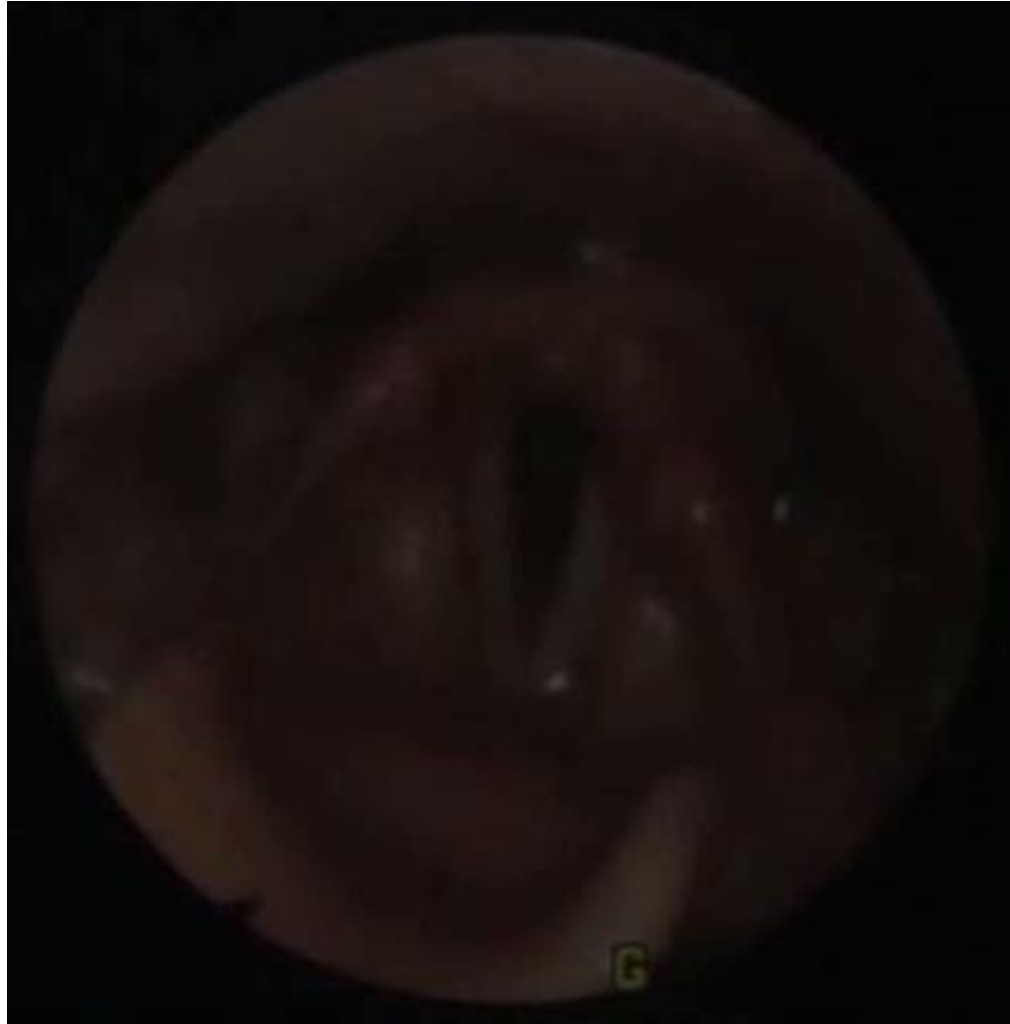
Anatomic-physiologic assessment

Pharyngeal Wall Contraction

Task	Motor Function
High pitch phonation	Pharyngeal wall recruitment



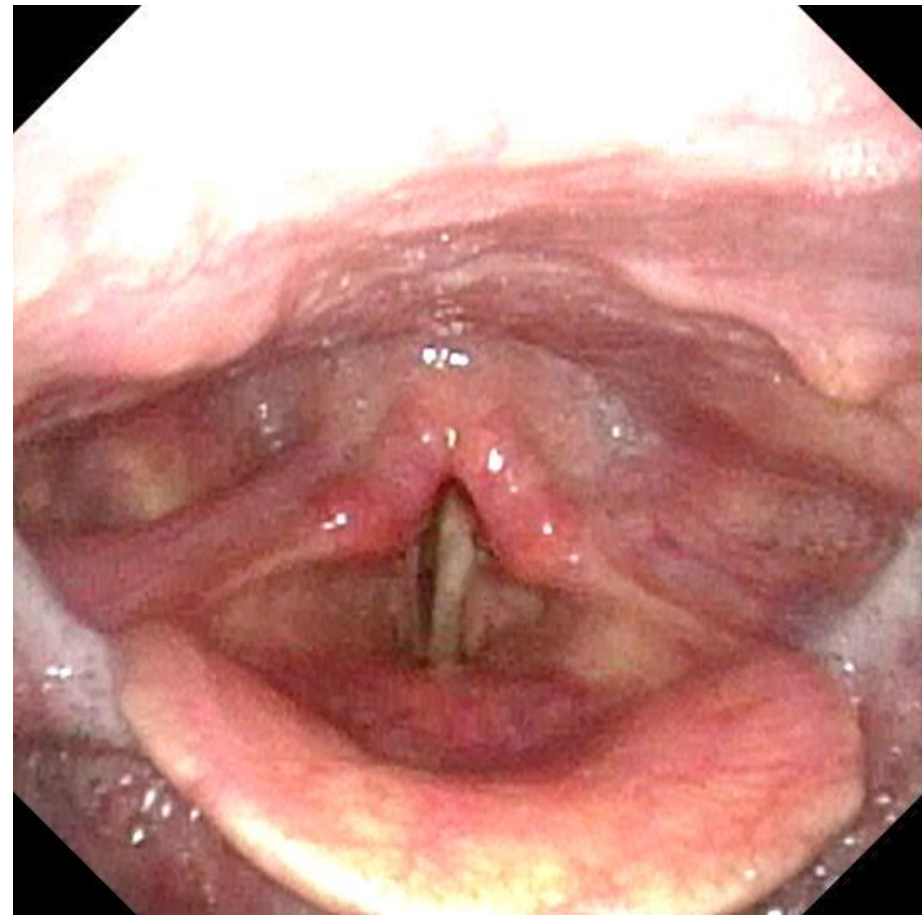
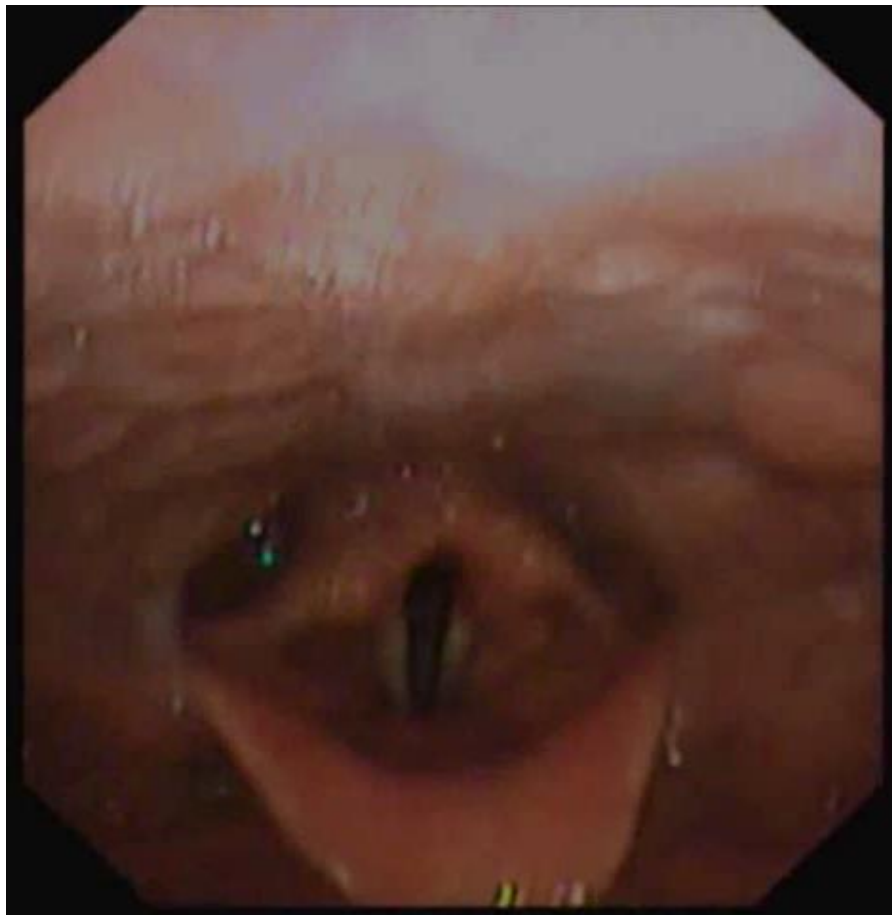
Anatomic-physiologic assessment Pharyngeal Wall Contraction



Anatomic-physiologic assessment

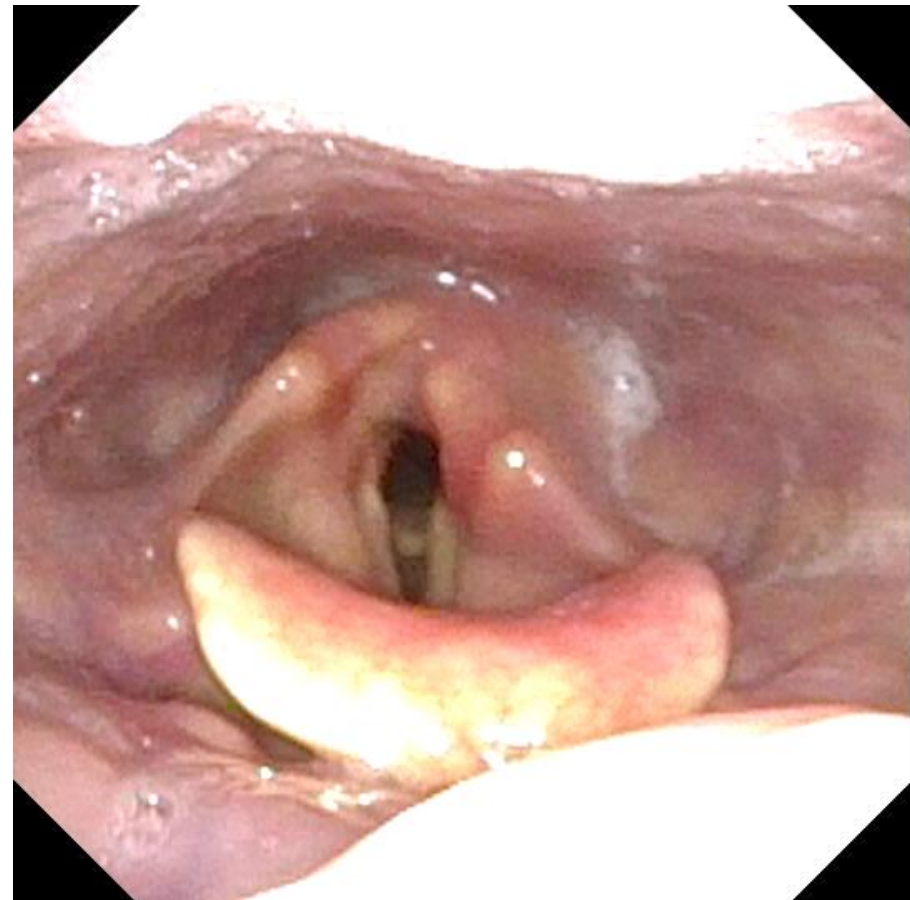
Vocal Cord adduction

Task	Motor Function
Phonation [eee]	Glottic closure



Anatomic-physiologic assessment

Vocal Cord adduction

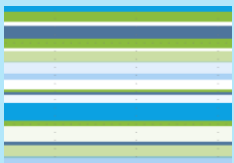


Anatomic-physiologic assessment

Repetitive vocal cord adduction

Task	Motor Function
Repetitive phonation [e-e-e], volitional cough	Diadochokinetic movement of vocal folds and arytenoids





Anatomic-physiologic assessment

Vocal fold abduction

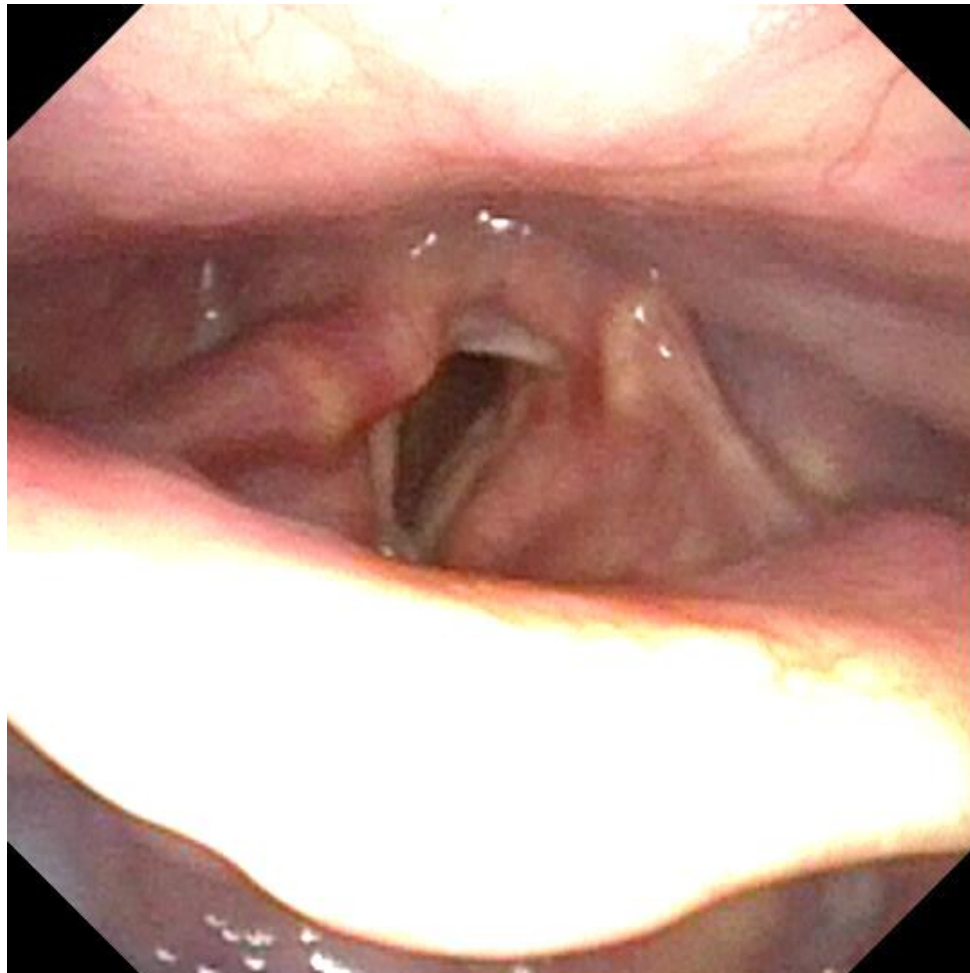
Task	Motor Function
Sniffing	Vocal fold abduction



Anatomic-physiologic assessment

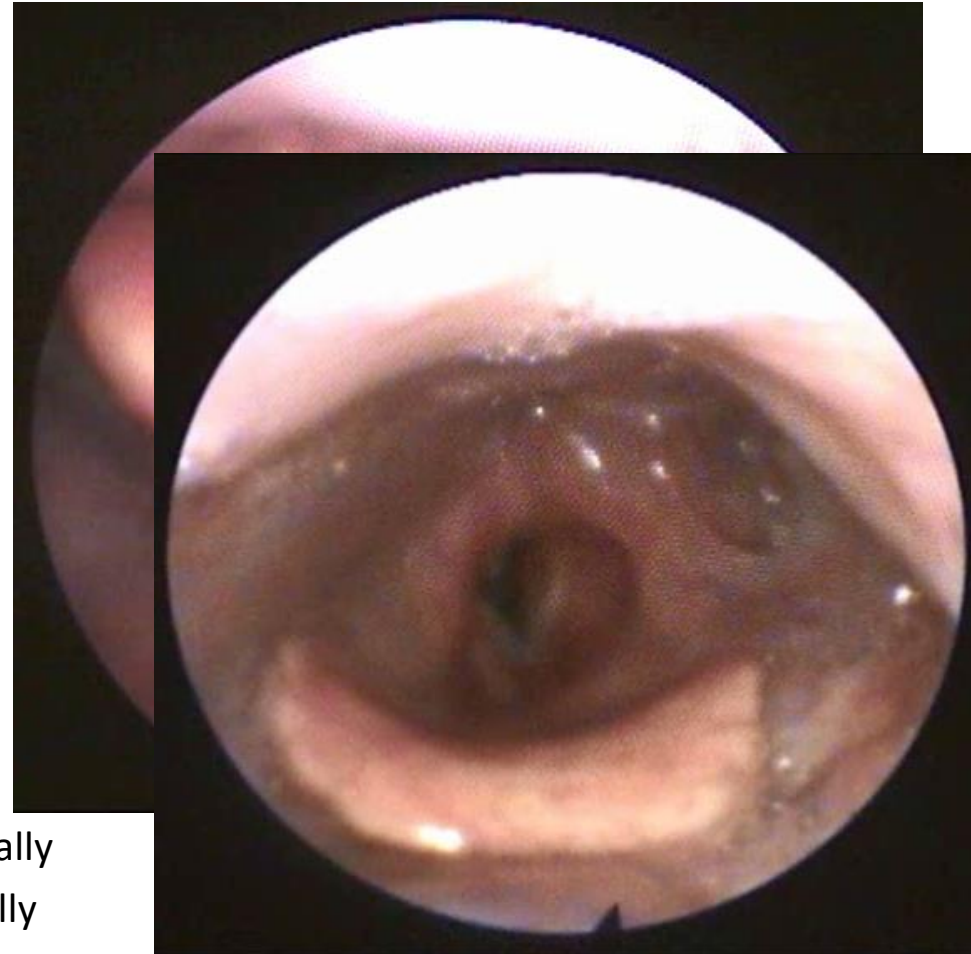
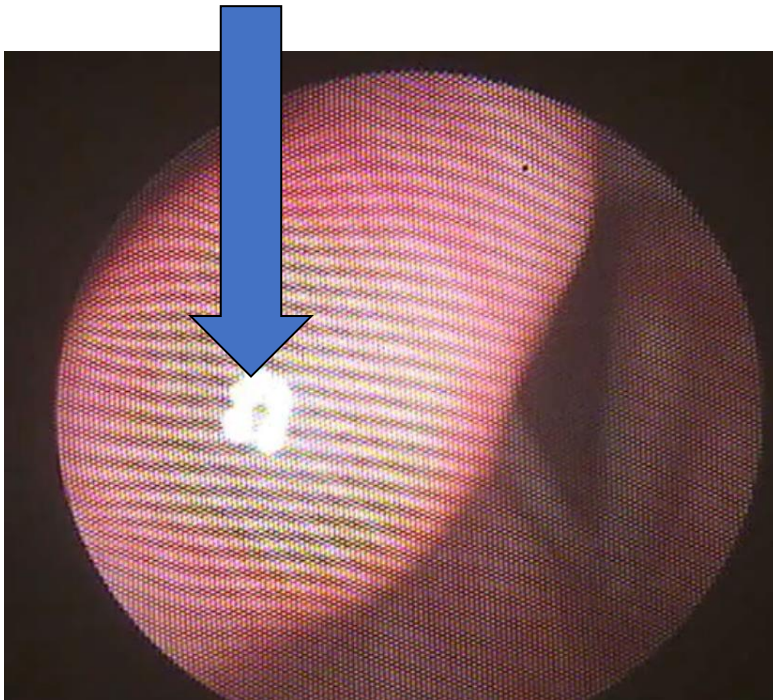
Glottal closure

Task	Motor Function
Hold breath tight	Ventricular fold adduction



Anatomic-physiologic assessment

Laryngeal sensitivity



- 3-point rating:

- | | |
|-----------|-------------------------------|
| – Normal | – Normal |
| – Reduced | – Reduced/absent unilaterally |
| – Absent | – Reduced/absent/bilaterally |

- 2-point rating:

- Normal
- abnormal

Step 2 - Swallowing of Food & Liquids

The normal swallow viewed endoscopically



1: Larynx in resting position

2: Bolus enters pharynx at the end of the oral stage; the swallow reflex is elicited.

3: Maximum contraction of pharyngeal constrictors; tip of the scope is surrounded by pharyngeal mucosa causing whiteout phenomenon

4: Pharyngeal constrictors are relaxing, epiglottis still inverted (so called post-swallow-stage); bolus has already passed into the esophagus

5: Reconfiguration of hyolaryngeal complex finished, end of pharyngeal swallow



Step 2 - Swallowing of Food & Liquids

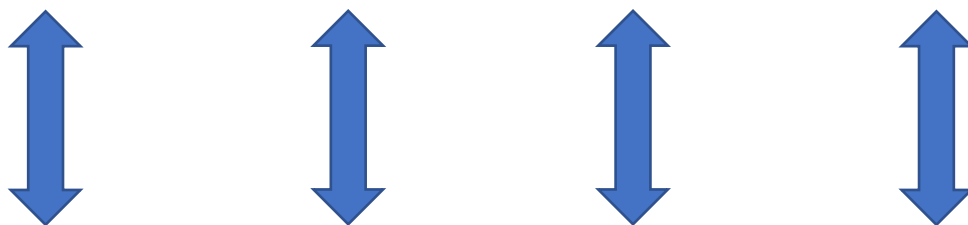
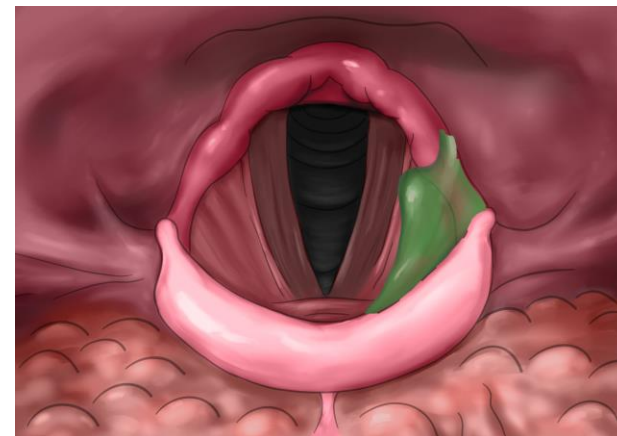
Salient Findings

Finding	Definition
Primature spillage	Oral stage problem; poor oral bolus control leads to premature bolus flow from the oral cavity into the pharynx
Delayed/absent swallow reflex	Pharyngeal stage problem; at the end of the oral stage the swallow reflex is not triggered wherupon bolus enters hypopharynx
Residues	(Part of the) bolus left in the hypopharynx after the swallow due to insufficient bolus propulsion
Penetration	Bolus enters the laryngeal vestibule but stays above or at vocal cords
Aspiration	Bolus enters subglottic region/trachea
Silent Penetration/Aspiration	Penetration or Aspiration without a reflexive cough

Step 2 - Swallowing of Food & Liquids Salient Findings

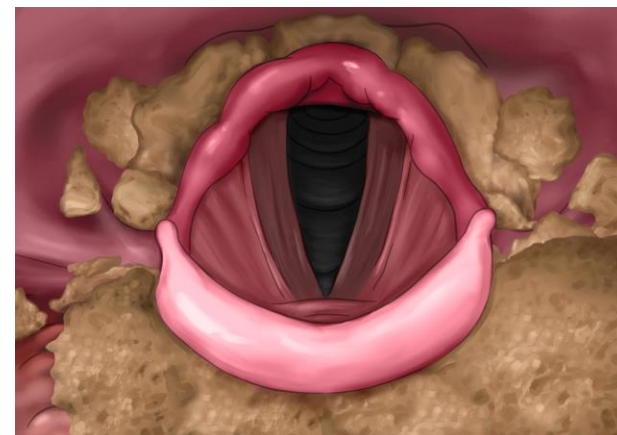
- Swallowing safety:

- Protecting the airway during swallowing
 - Risk of airway invasion & related complications



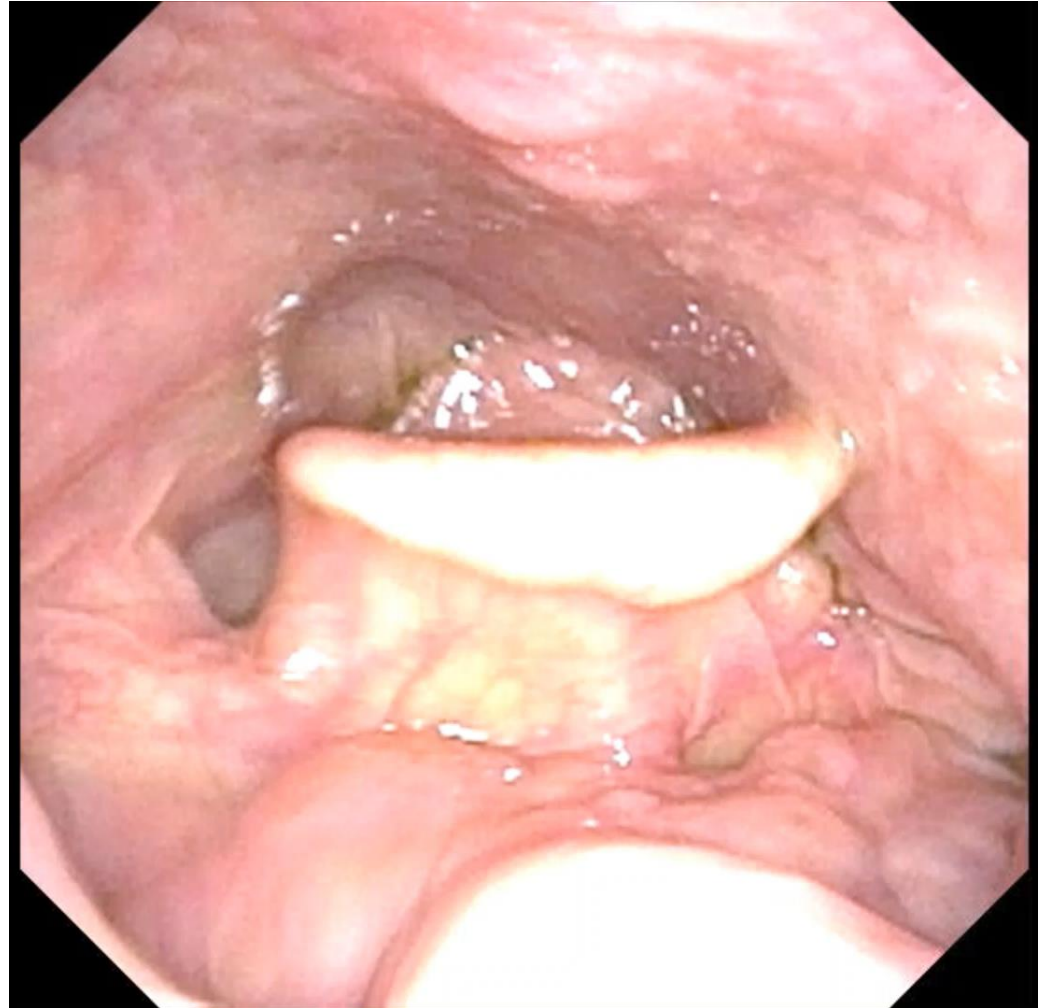
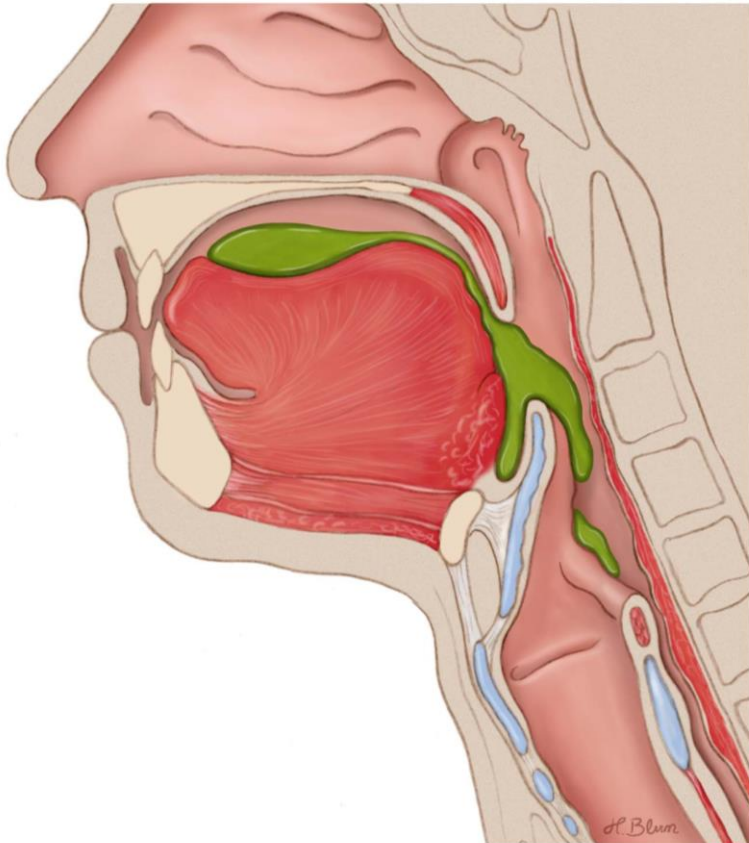
- Swallowing efficiency:

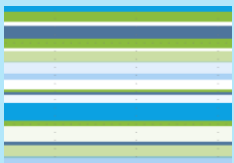
- Clearing the bolus into the esophagus
 - Longer times for taking meals, insufficient oral intake, malnutrition



Step 2 - Swallowing of Food & Liquids Salient Findings

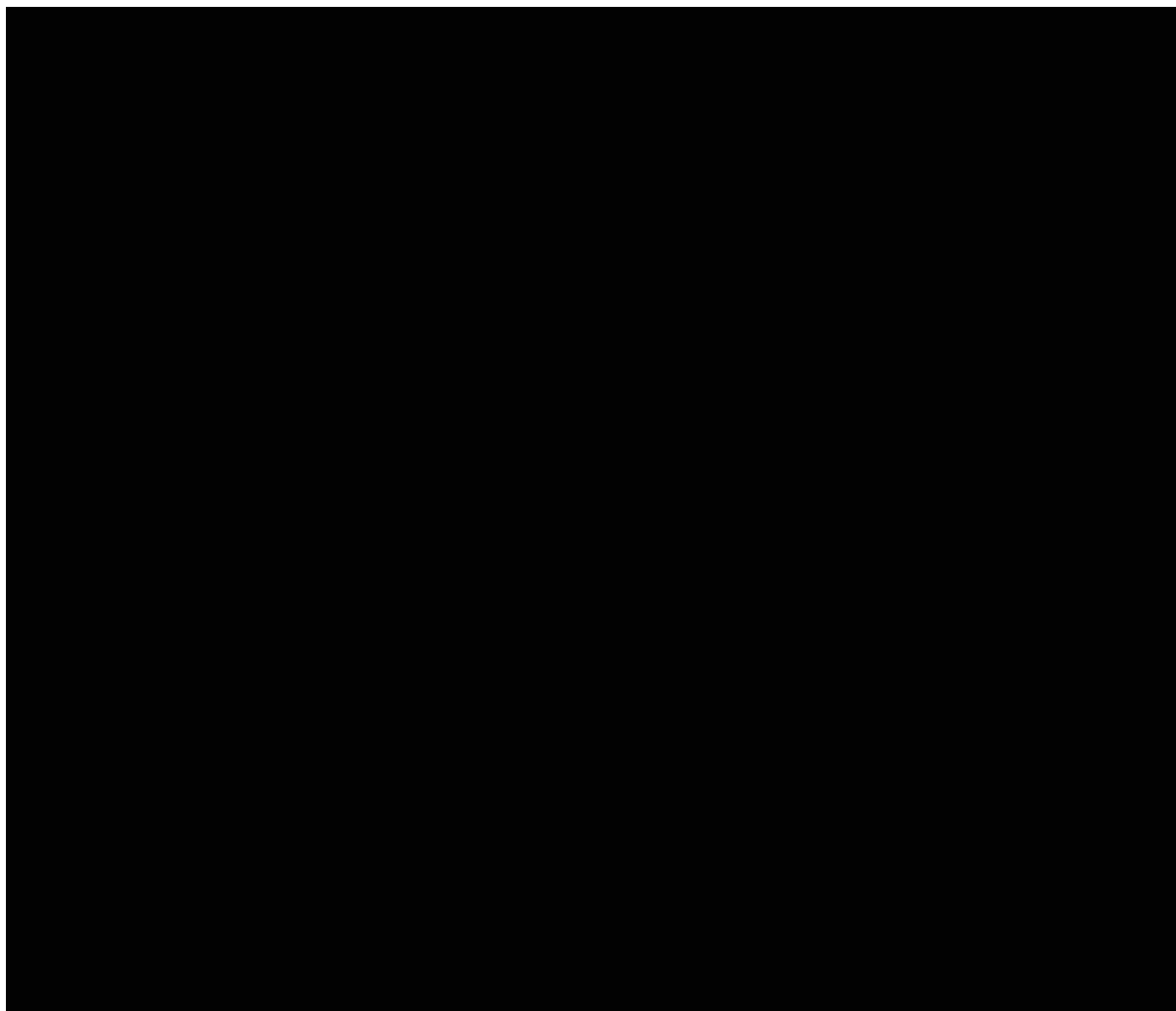
Premature Spillage





Step 2 - Swallowing of Food & Liquids Salient Findings

Primature Spillage





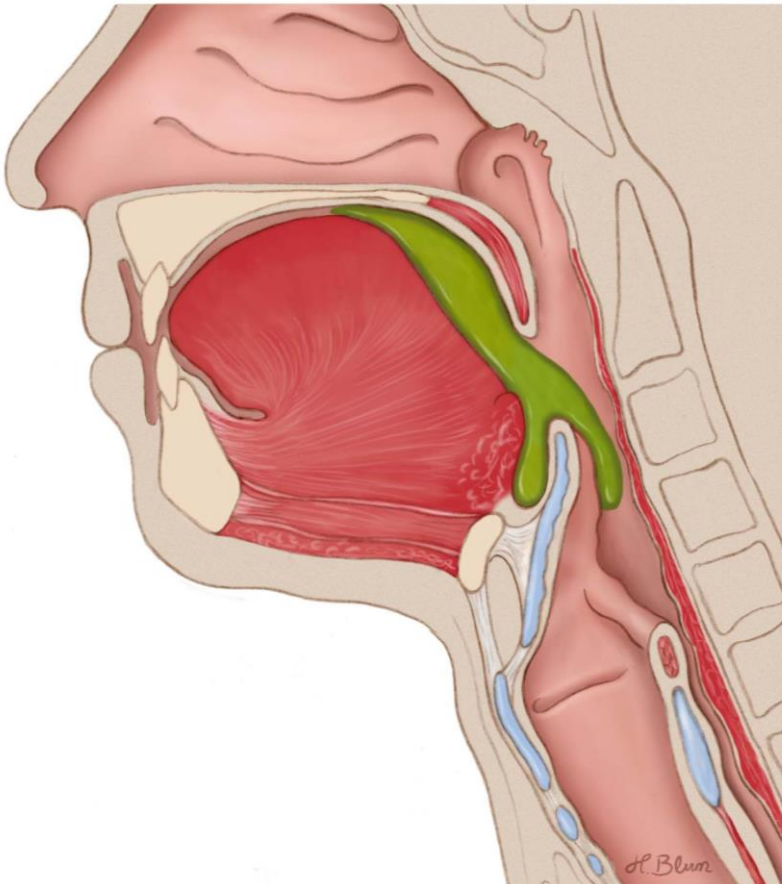
Step 2 - Swallowing of Food & Liquids Salient Findings

Primature Spillage

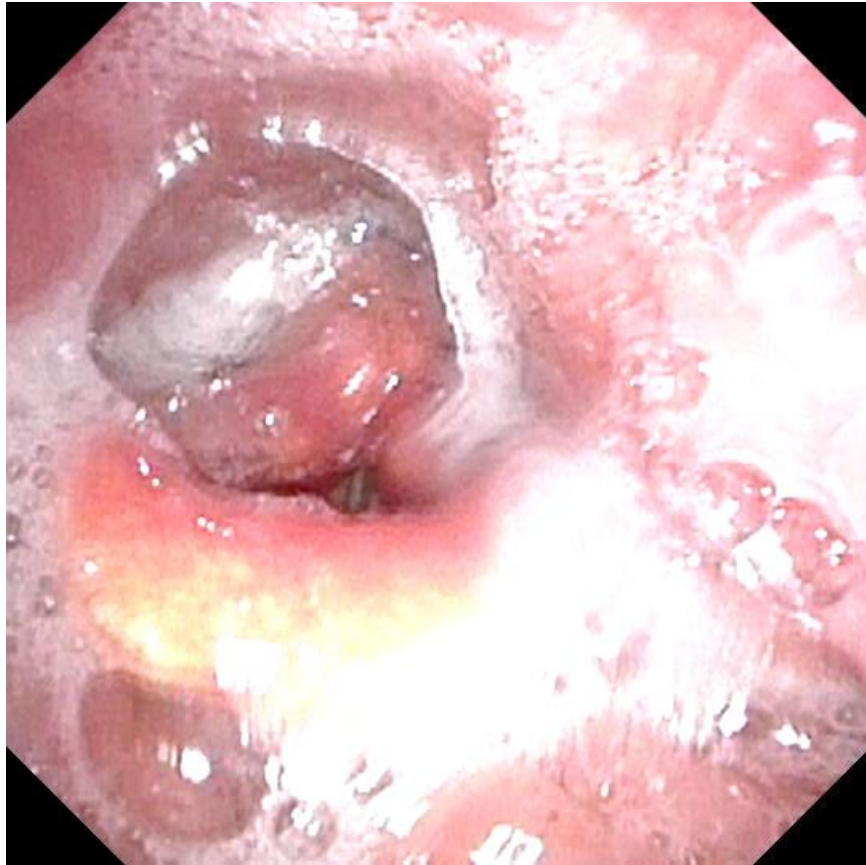
Grade	Finding
0	Base of the tongue
1	Valleculae
2	Tip of the epiglottis
3	Sinus piriformis
4	Laryngeal vestibule

Step 2 - Swallowing of Food & Liquids Salient Findings

Delayed Swallow Reflex

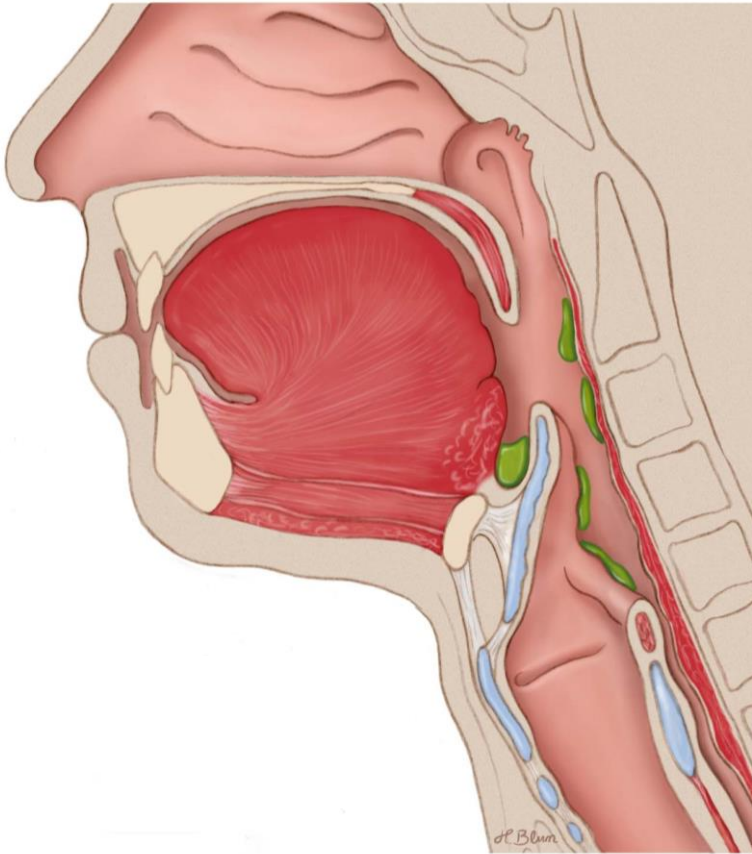


Step 2 - Swallowing of Food & Liquids Salient Findings



Step 2 - Swallowing of Food & Liquids Salient Findings

Residue





Step 2 - Swallowing of Food & Liquids Salient Findings

Residue => Swallowing efficiency

Grade	Finding 1 (Valleculae)	Finding 2 (Piriform sinus)
0	None (0%)	None (0%)
1	Trace (1–5 %, trace coating of the mucosa)	Trace (1–5 %, trace coating of the mucosa)
2	Mild (5–25 %, epiglottic ligament visible)	Mild (5–25 %, up wall to quarter full)
3	Moderate (25–50 %, epiglottic ligament covered)	Moderate (25–50 %, up wall to half full)
4	Severe (50 %, Filled to epiglottic rim)	Severe (50 %, filled to aryepiglottic fold)



Step 2 - Swallowing of Food & Liquids Salient Findings

Residue

Valleculae	Inadequate tongue retraction & impaired hyoid elevation
Lateral channels	Delayed/reduced laryngeal elevation & pharyngeal shortening
Pyriforms	Inadequate pharyngeal contraction & mistimed UES opening
Pharyngeal walls	Reduced pharyngeal contraction
Laryngeal surface of epiglottis	Delayed/reduced epiglottic inversion
Arytenoid rim	Delayed/reduced arytenoid tilt
laryngeal vestibule/subglottic region	Inadequate/late airway closure

Step 2 - Swallowing of Food & Liquids Salient Findings

Residue



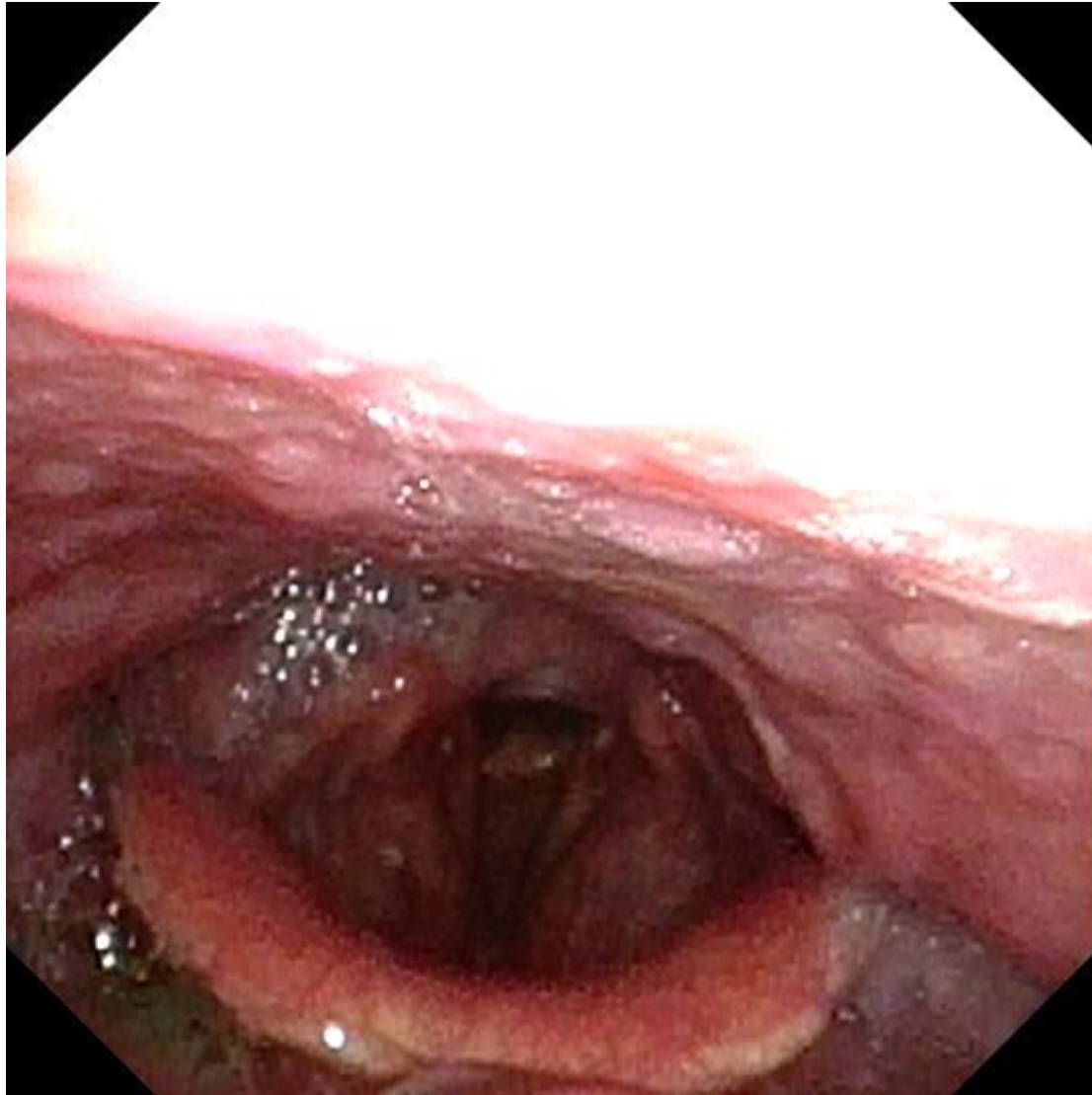
Step 2 - Swallowing of Food & Liquids Salient Findings

Residue



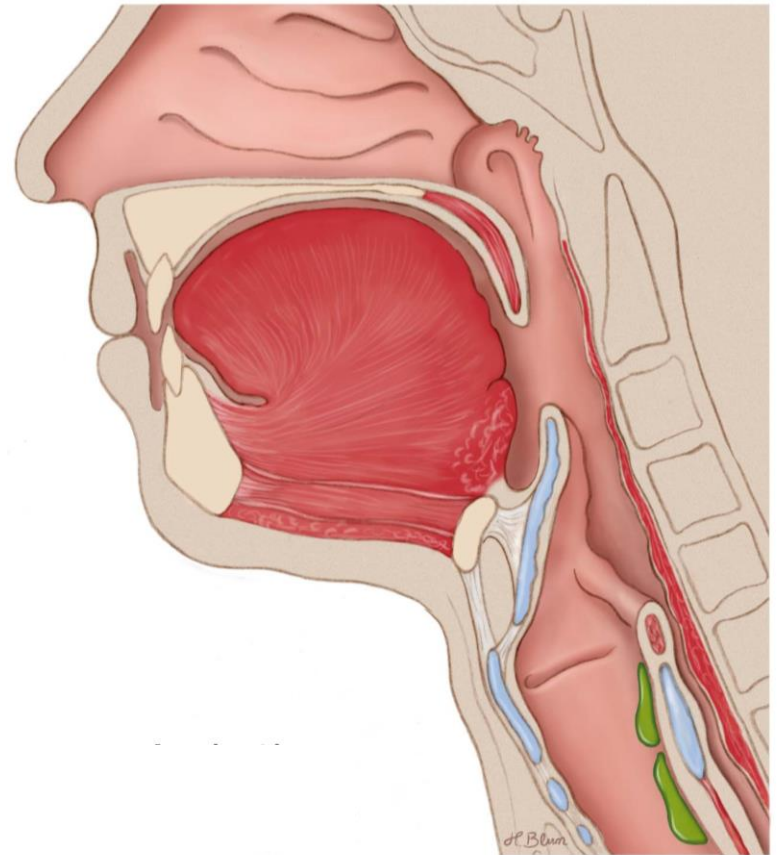
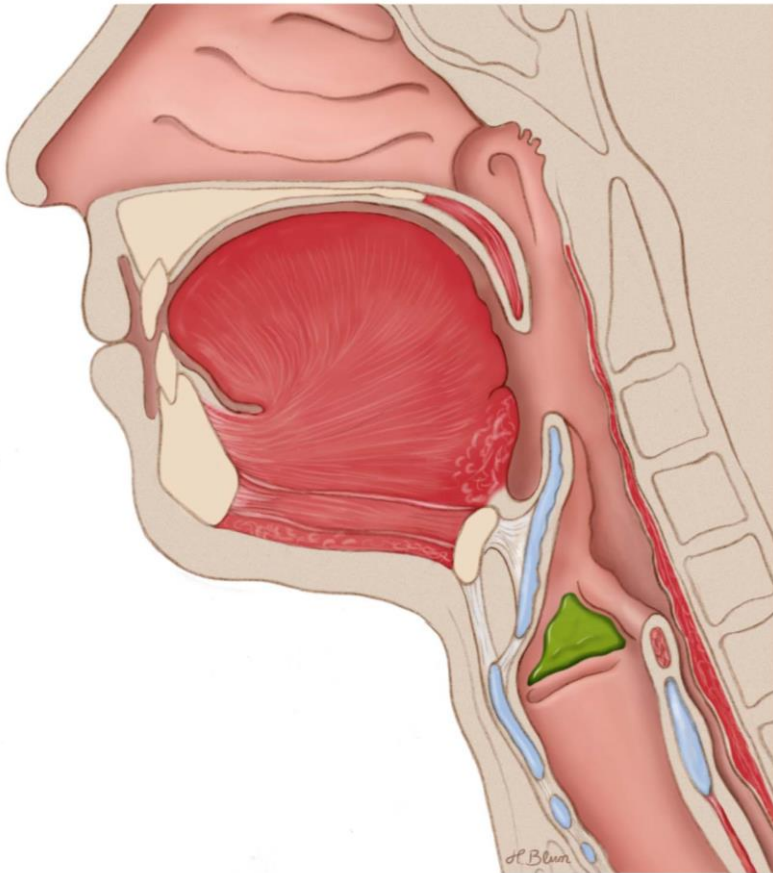
Step 2 - Swallowing of Food & Liquids Salient Findings

Residue



Step 2 - Swallowing of Food & Liquids Salient Findings

Penetration/Aspiration





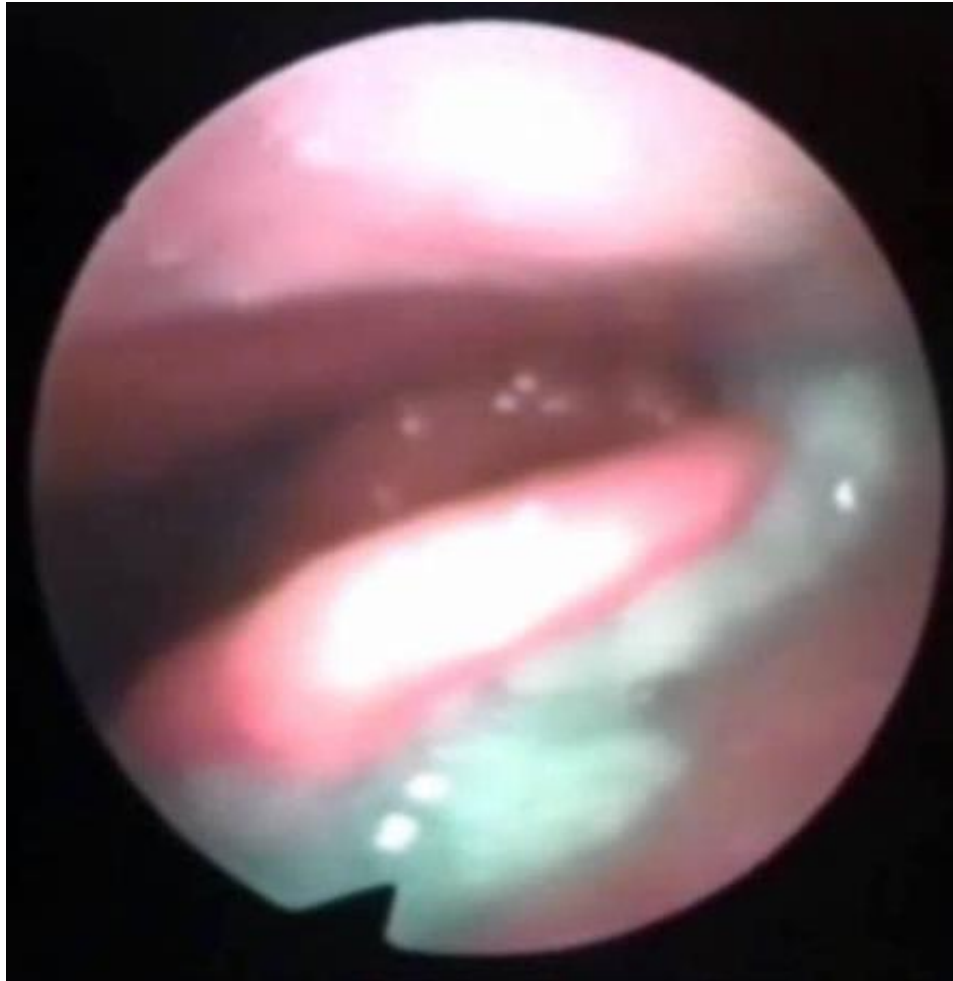
Step 2 - Swallowing of Food & Liquids Salient Findings

Penetration/Aspiration => Swallowing Safety

Category	Score	Findings
No Pen./Asp.	1	Contrast does not enter the airway
Penetration	2	Contrast enters the airway, remains above vocal folds, no residue
	3	Contrast remains above the vocal folds, residue remains
	4	Contrast contacts vocal folds, no residue
	5	Contrast contacts vocal folds; visible residue remains
Aspiration	6	Contrast passes glottis; no subglottic residue
	7	Contrast passes glottis; visible subglottic residue despite patient's response
	8	Contrast passes glottis; visible subglottic residue; absent patient response

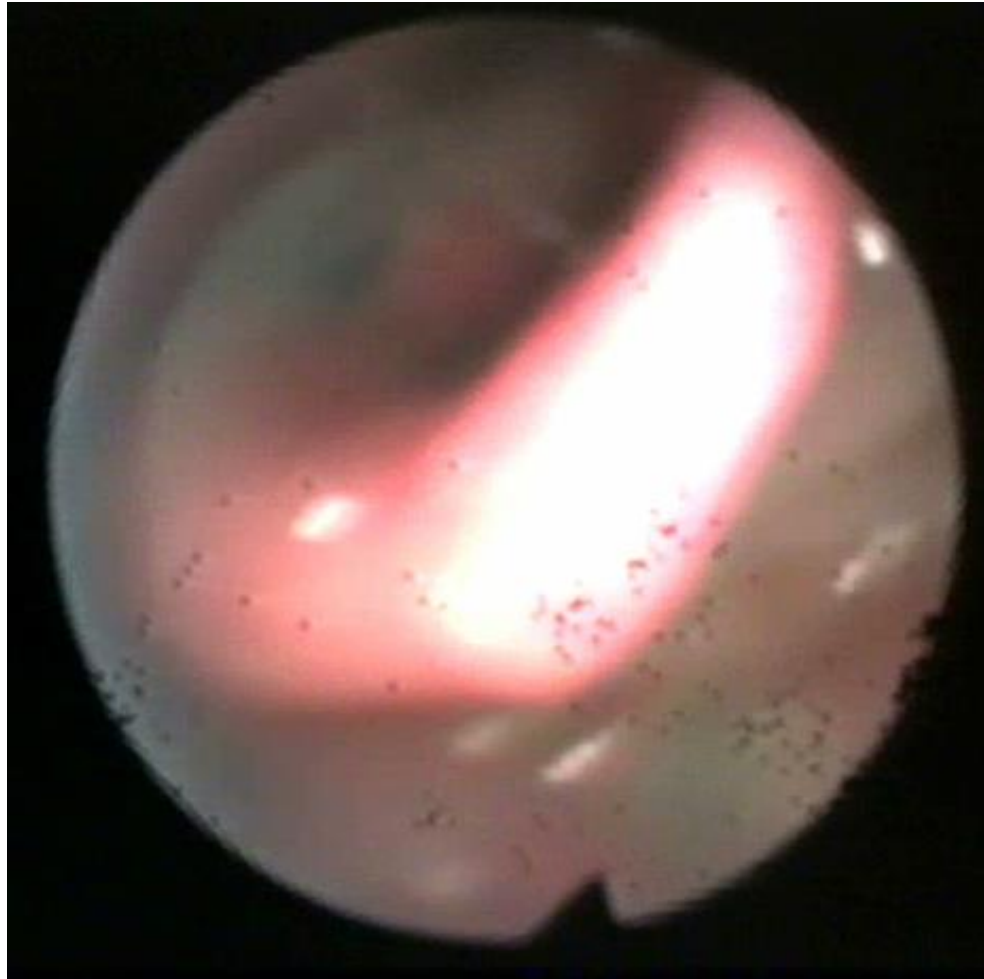
Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration



Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration



Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration



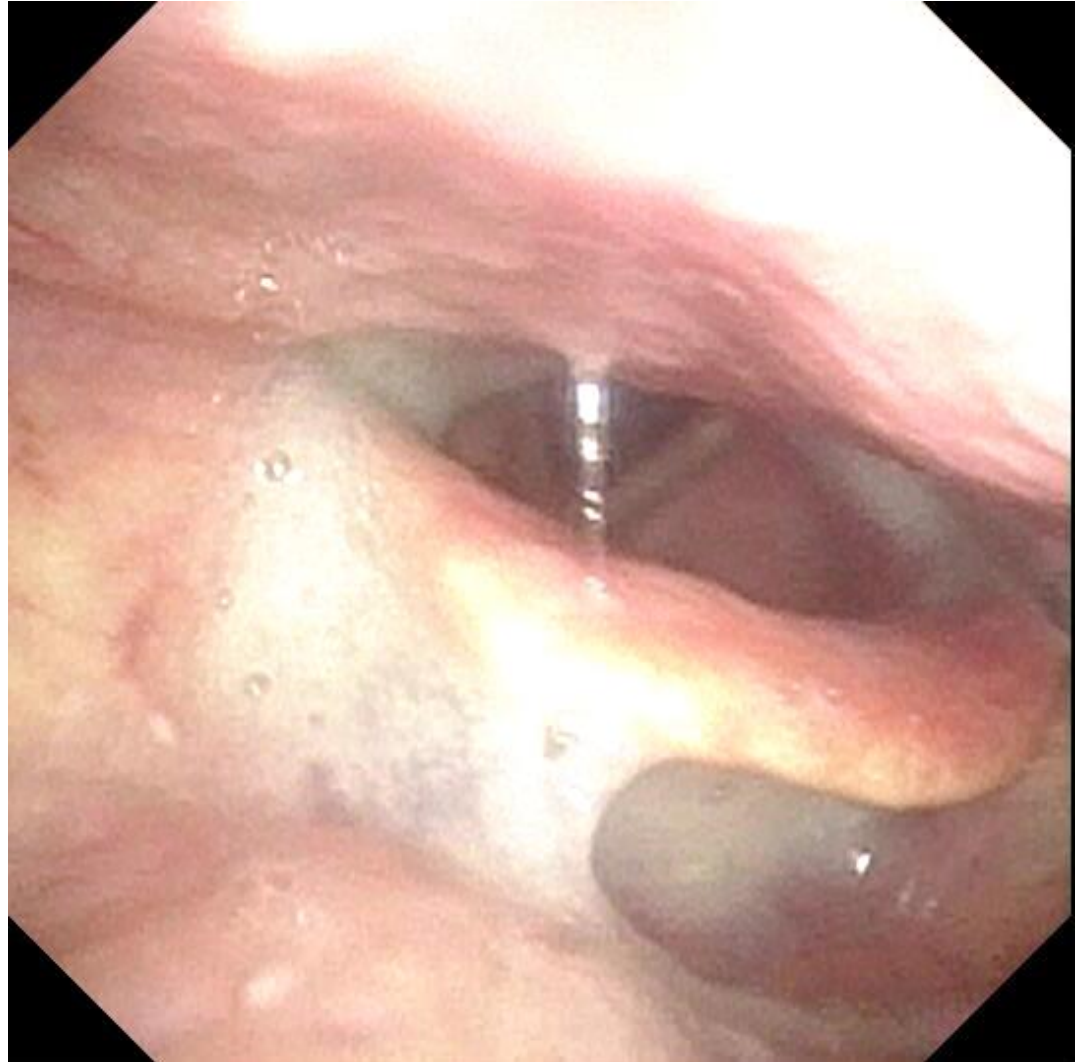
Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration



Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration



Step 2 - Swallowing of Food & Liquids Salient Findings

Aspiration

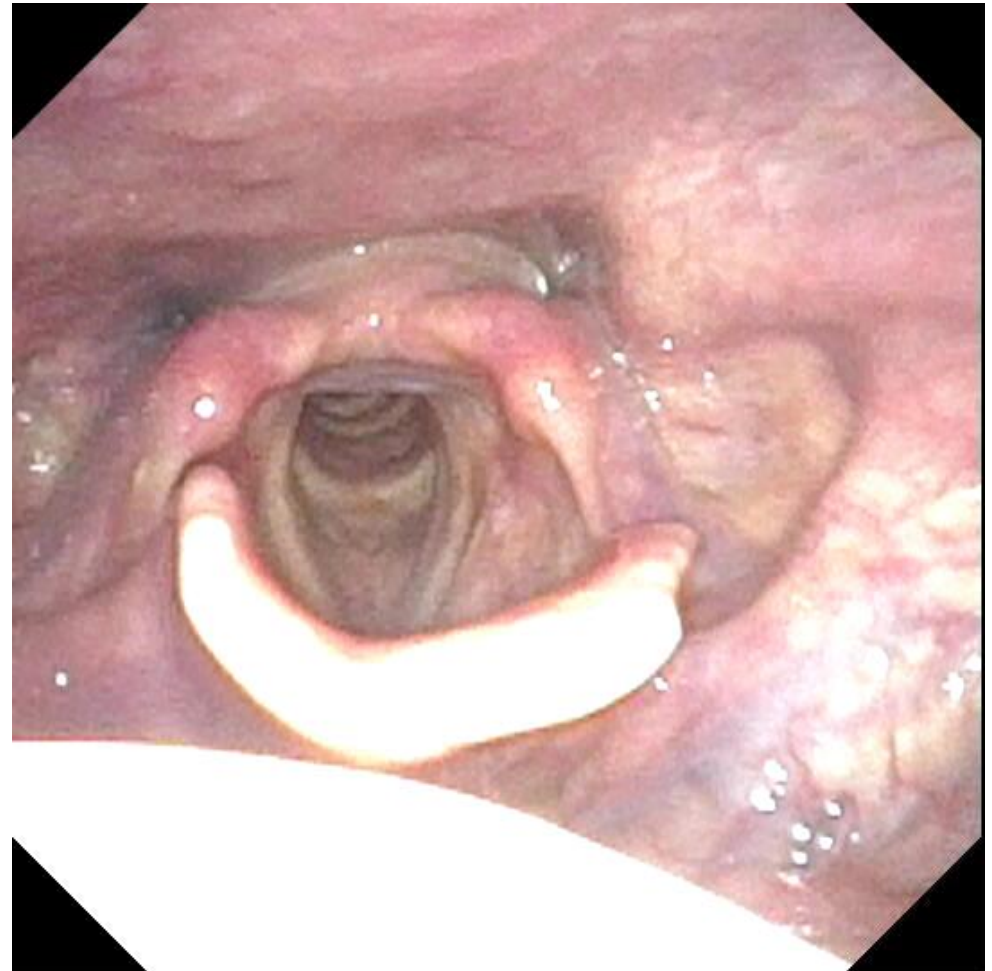


Step 3 - Therapeutical Interventions

- Food and Fluid adaptation
 - Liquid thickening
 - Purreed food
 - ...
- Posture changes
 - Chin tuck
 - Head turn
 - ...
- Swallowing Maneuvers
 - Effortful swallow
 - Supraglottic swallow
 - ...

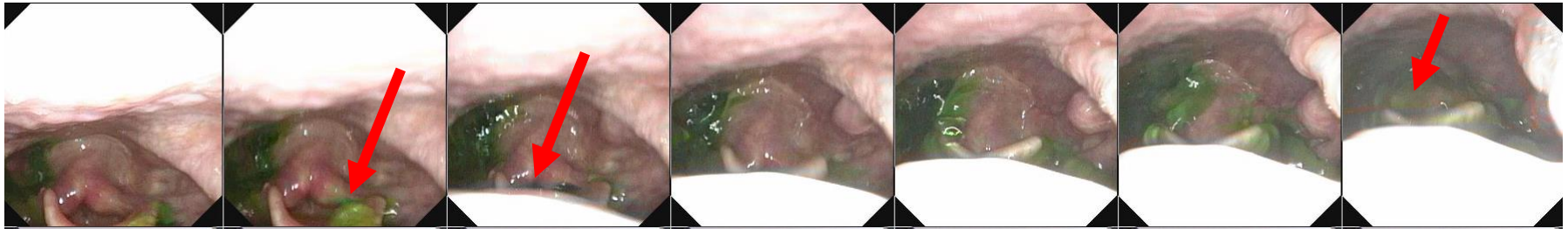
Step 3 - Therapeutical Interventions

- 78 years, male patient
- IPS since 8 years
- No subjective complaints of swallowing impairment
- No dietary restrictions
- Clinical exam:
 - Coated voice
 - Frequent coughing and throat clearing



Fluid

Step 3 - Therapeutical Interventions

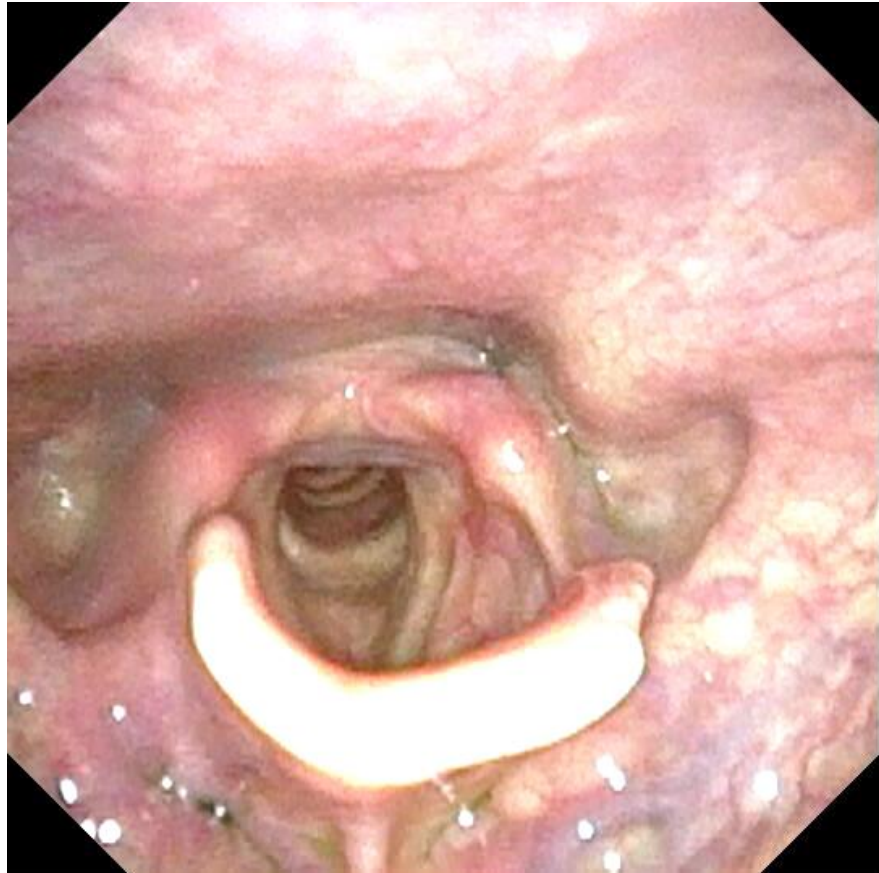


Frame-by-Frame analysis:

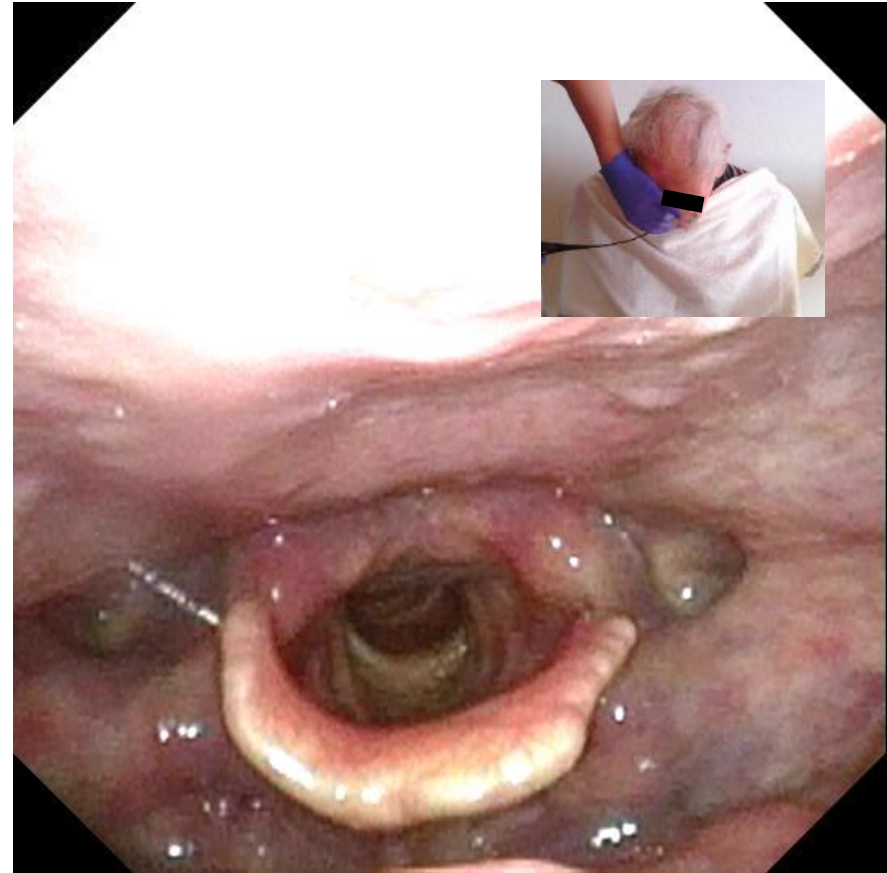
Premature spillage with penetration/aspiration along the laryngeal epiglottis and the aryepiglottic fold

Step 3 - Therapeutical Interventions

Liquid thickening



Chin-tuck maneuver



Step 4 - Summary & Pathomechanism

- Anatomy:
 - No secretions, no structural abnormalities
- Physiology:
 - Velo-pharyngeal closure intact
 - Symmetrical vocal cord adduction
 - Symmetrical pharyngeal wall contraction during high pitch phonation
 - Complete and multilevel closure of the laryngeal vestibule during valsalva maneuver
 - Forceful tongue base retraction
 - Effective volitional cough

Step 4 - Summary & Pathomechanism

- Swallowing assessment:
 - Consistency 1:
 - Normal oral transfer
 - Swallowing reflex initiated at the tongue base
 - White out normal
 - Postdeglutitive no residues
 - Consistency 2:
 - Normal oral transfer
 - Swallowing reflex initiated at the tongue base
 - White out normal
 - Postdeglutitive no residues
 - Consistency 3:
 - ...



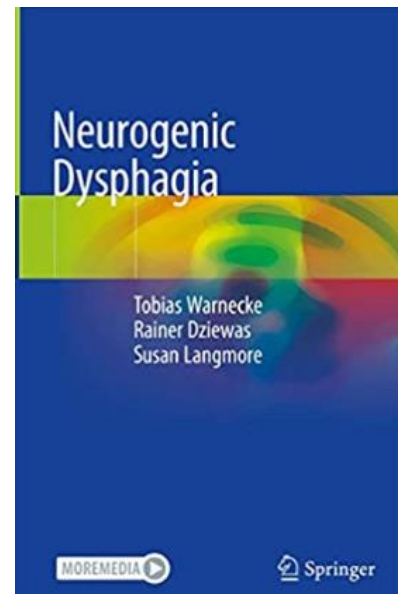
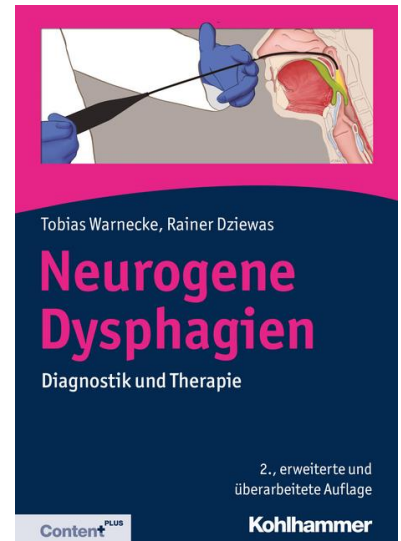
Step 4 - Summary & Pathomechanism

- Effect of swallowing maneuvers and food/fluid adaptation:
 - Improvement of oral bolus control/pharyngeal bolus clearance/swallowing safety by employing specific swallowing maneuvers.
- **Pathomechanism:**
 - **Give the main salient findings**
 - **Suggest the most relevant pathomechanism**

Thank you!



rainer.dziewas@klinikum-os.de
dziewas@uni-muenster.de





Specific FEES-protocols for neurogenic dysphagia

Rainer Dziewas

Department of Neurology and neurological rehabilitation
Academic Teaching Hospital of the University Münster
Klinikum Osnabrück



European Society for
Swallowing Disorders
ESSD



ESO EUROPEAN
STROKE
ORGANISATION



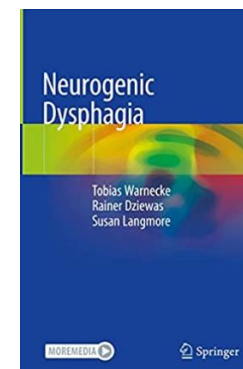
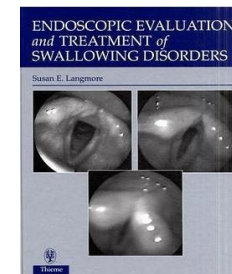
- Rainer Dziewas has received honoraria for serving as a speaker from:
 - Abbvie, Bayer healthcare, BMS, CSL Behring, Boehringer Ingelheim, Daiichi Sankyo, Fresenius, Merz, Nestle, Nutricia, Olympus, Pfizer
- Rainer Dziewas has worked as a consultant for:
 - Bayer healthcare, BMS, Boehringer Ingelheim, Covidien, Daiichi Sankyo, Fresenius, Infecto Pharm, Nestle, Nutricia, Pfizer
- Rainer Dziewas is member of the clinical advisory board of Phagenesis Ltd.

- **General protocols:**

- FEES-Standard-Protocol [Langmore, 2001]
- Ice-Chip-Protocol [Langmore, 2001]

- **Disease- and/or task-specific protocols:**

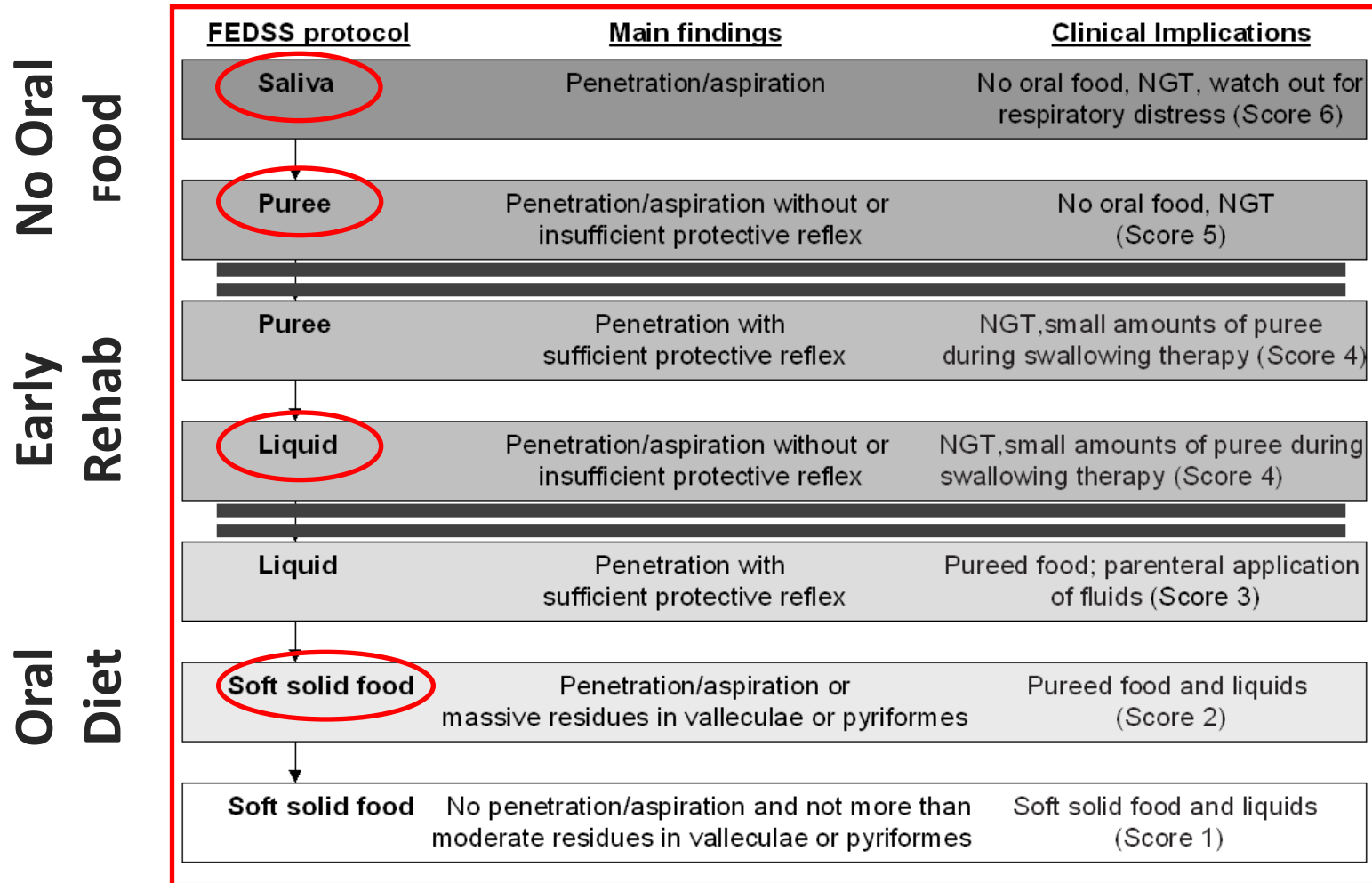
- FEDSS (Flexible Endoscopic Dysphagia Severity Scale; **acute stroke**) [Dziewas et al., Cerebrovasc Dis 2008; Warnecke et al., Cerebrovasc Dis 2009]
- FEES-L-Dopa-Test (**Parkinsonian syndromes**) [Warnecke et al., Movement Disord 2010]
- FST & FEES-Tensilon-Test (Fatigable Swallowing Test; **myasthenic syndromes**) [Dziewas et al., J Clin Neuromusc Dis 2006; Warnecke et al., J Neurol 2008; Im et al., Eur J Neurol 2017; Warnecke et al., Ther Adv Neurol Disord 2021]
- SESETD-Protokoll (Standardized Endoscopic Swallowing Evaluation for Tracheostomy Decannulation; **tracheotomized patients**) [Warnecke et al., Crit Care 20113; Warnecke et al., Neurol Res Pract 2020; Muhle et al, Neurol Res Pract 2021]
- FEES-LSR-Test (Laryngeal Swallow Response; **Critical Care**) [Labeit et al., Neurogastroenterol Motil 2019]
- Dual-Task Paradigm (**Movement Disorders, Dementias**) [Muhle et al., Sci Rep 2020; Labeit et al., Eur J Neurol 2021]
- MSA-Protocol (**Laryngeal Movement Disorders in multiple system atrophy**) [Gandor et al., Movement Disord 2020; Vogel et al., Movement Disord 2021]
- Medication-Dysphagia (**Parkinsonian syndromes; overarching scoring system**) [Labeit et al.; under review]



- Background:
 - >50% of acute stroke patients affected
 - Dysphagia increases risk of
 - Pneumonia
 - ICU-treatment and mechanical ventilation
 - Bad outcome and mortality
- Needs and Challenges regarding dysphagia assessment:
 - Easy to use
 - Risk stratification
 - Deduction of clinical consequences
 - Protective strategies
 - Rehabilitative strategies

Specific Protocols

Flexible Endoscopic Dysphagia Severity Scale



Specific Protocols

Flexible Endoscopic Dysphagia Severity Scale

- FEDSS:
 - Acute stroke patients within 72 hours of stroke onset
 - Interrater reliability: κ coefficient 0,89 ($p < 0,001$)
 - Strong and independant predictor of complications and 3-month outcome
 - Used as primary endpoint in interventional stroke trials

	Odds ratio	p value
<i>Occurrence of pneumonia</i>		
Sex	0.47 (0.16 to 1.41)	0.18
Age	1.01 (0.96 to 1.06)	0.69
NIH-SS	1.10 (1.01 to 1.21)	<0.05
FEDSS	2.30 (1.61 to 3.27)	<0.001
<i>Necessity of endotracheal intubation</i>		
Sex	0.83 (0.22 to 3.07)	0.78
Age	0.95 (0.90 to 0.99)	<0.05
NIH-SS	1.18 (1.05 to 1.32)	<0.05
FEDSS	2.38 (1.54 to 3.68)	<0.001
<i>Dependency at 3 months</i>		
Sex	0.70 (0.32 to 1.52)	0.37
Age	1.05 (1.02 to 1.09)	<0.05
NIH-SS	1.16 (1.07 to 1.27)	<0.001
FEDSS	1.49 (1.13 to 1.97)	<0.05

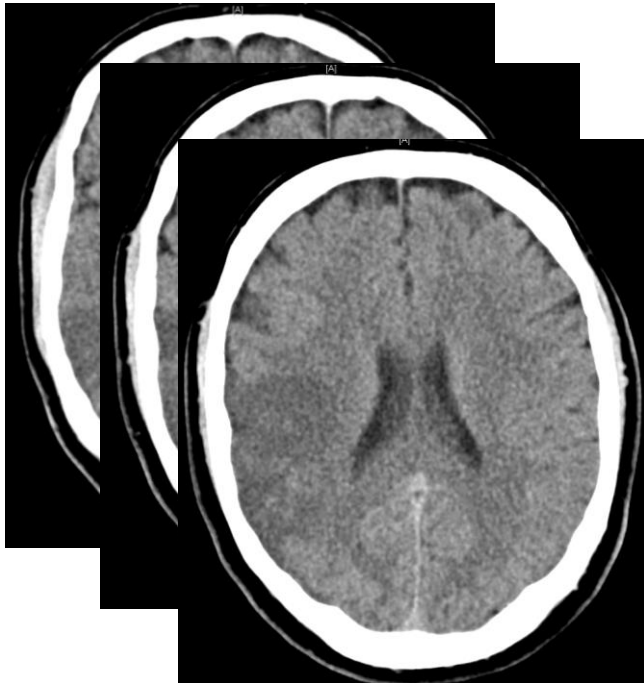
Table 1. Results of multivariate logistic regression analysis looking for variables significantly associated with endotracheal intubation

	OR (95% CI)	
Age	0.96 (0.89–1.03)	n.s.
NIHSS score	0.97 (0.87–1.20)	n.s.
Saliva penetration/aspiration	10.58 (3.38–33.10)	$p < 0.001$

Dziewas et al., Cerebrovasc Dis 2008;
Warnecke et al., Cerebrovasc Dis 2009

Illustrative Case

- 59-year-old male patient
- Right MCA-Infarction
- NIH-SS 18
- Increased demand for O₂



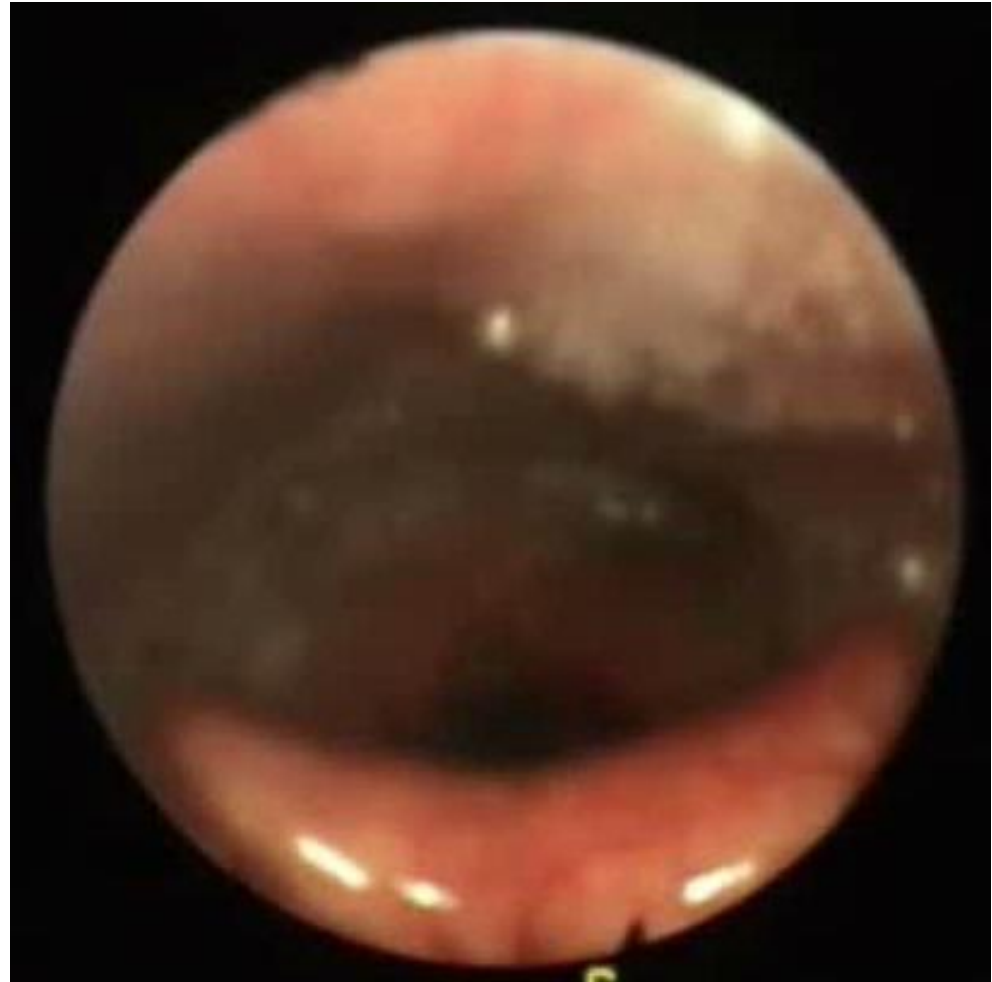
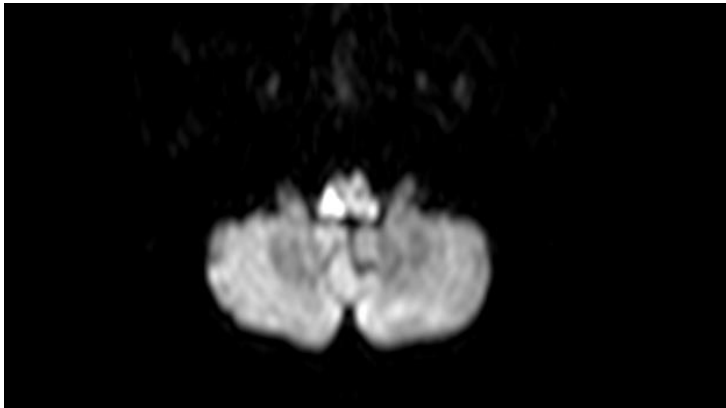
Illustrative Case

<u>FEDSS protocol</u>	<u>Main findings</u>	<u>Clinical Implications</u>
Saliva	Penetration/aspiration	No oral food, NGT, watch out for respiratory distress (Score 6)
Puree	Penetration/aspiration without or insufficient protective reflex	No oral food, NGT (Score 5)
Puree	Penetration with sufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration/aspiration without or insufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration with sufficient protective reflex	Pureed food; parenteral application of fluids (Score 3)
Soft solid food	Penetration/aspiration or massive residues in valleculae or pyriformes	Pureed food and liquids (Score 2)
Soft solid food	No penetration/aspiration and not more than moderate residues in valleculae or pyriformes	Soft solid food and liquids (Score 1)

Illustrative Case

Case history:

- 70yrs old female patient
- Sudden onset of dysarthria, right sided Horner's syndrome, dissociated sensory deficit of the left side
- MRI: dorsolaterale infarction of the medulla oblongata
- FEES at day 2

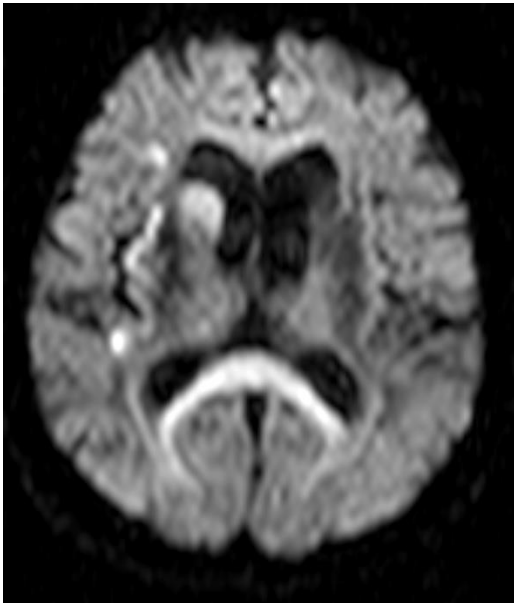


Illustrative Case

<u>FEDSS protocol</u>	<u>Main findings</u>	<u>Clinical Implications</u>
Saliva	Penetration/aspiration	No oral food, NGT, watch out for respiratory distress (Score 6)
Puree	Penetration/aspiration without or insufficient protective reflex	No oral food, NGT (Score 5)
Puree	Penetration with sufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration/aspiration without or insufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration with sufficient protective reflex	Pureed food; parenteral application of fluids (Score 3)
Soft solid food	Penetration/aspiration or massive residues in valleculae or pyriformes	Pureed food and liquids (Score 2)
Soft solid food	No penetration/aspiration and not more than moderate residues in valleculae or pyriformes	Soft solid food and liquids (Score 1)

Illustrative Case

- Case history:
 - 76 yrs old female patient
 - right sided MCA-infarction
 - NIH-SS 11
 - FEES at day 1



Illustrative Case

<u>FEDSS protocol</u>	<u>Main findings</u>	<u>Clinical Implications</u>
Saliva	Penetration/aspiration	No oral food, NGT, watch out for respiratory distress (Score 6)
Puree	Penetration/aspiration without or insufficient protective reflex	No oral food, NGT (Score 5)
Puree	Penetration with sufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration/aspiration without or insufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
Liquid	Penetration with sufficient protective reflex	Pureed food; parenteral application of fluids (Score 3)
Soft solid food	Penetration/aspiration or massive residues in valleculae or pyriformes	Pureed food and liquids (Score 2)
Soft solid food	No penetration/aspiration and not more than moderate residues in valleculae or pyriformes	Soft solid food and liquids (Score 1)

Illustrative Case

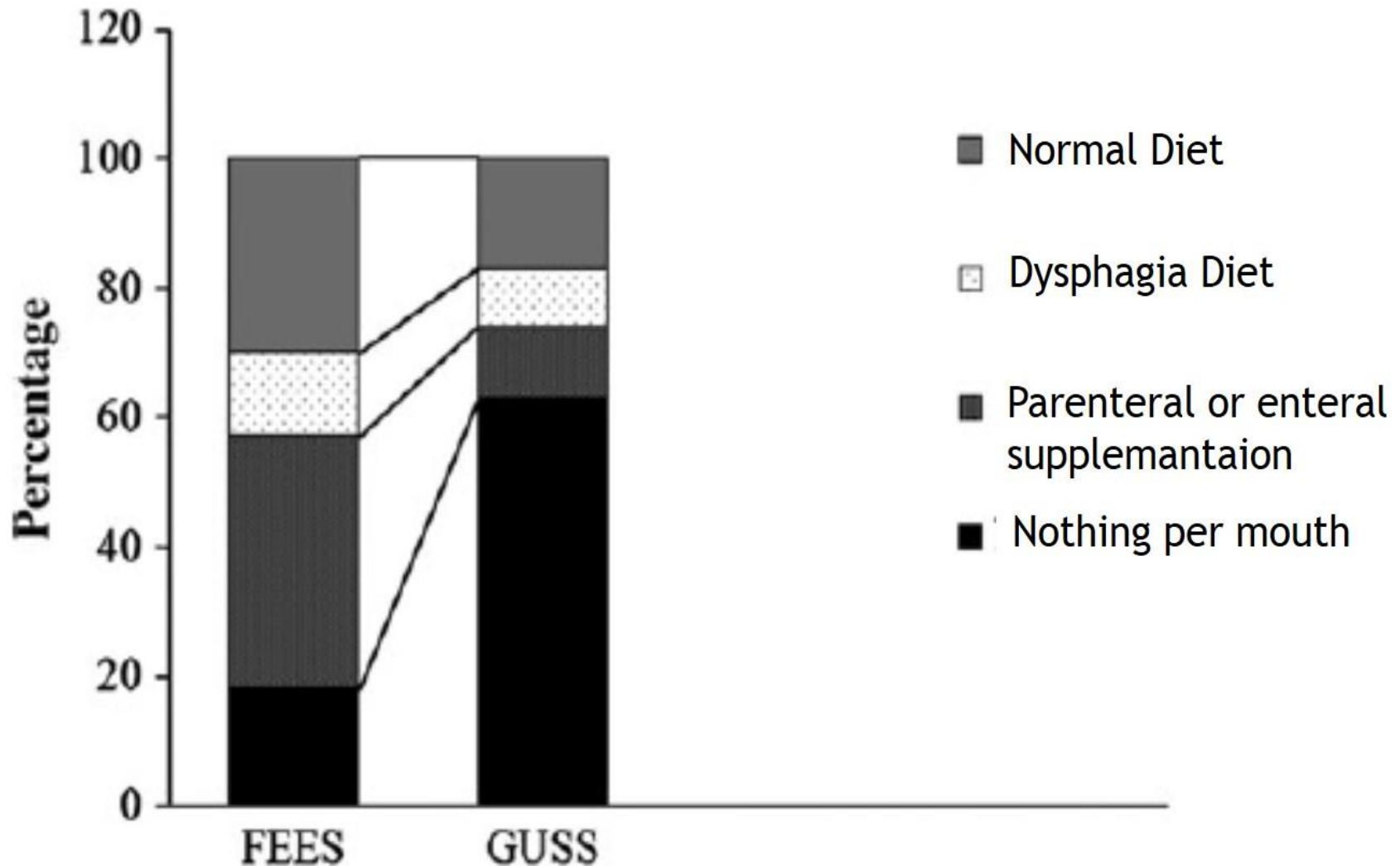
- Case history:
- 72 yrs. male patient
- Right-sided MCA infarction
- NIHSS 5
- FEES at day 2
- Normal diet already ordered



Illustrative Case

<u>FEDSS protocol</u>	<u>Main findings</u>	<u>Clinical Implications</u>
Saliva	Penetration/aspiration	No oral food, NGT, watch out for respiratory distress (Score 6)
↓		
Puree	Penetration/aspiration without or insufficient protective reflex	No oral food, NGT (Score 5)
↓		
Puree	Penetration with sufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
↓		
Liquid	Penetration/aspiration without or insufficient protective reflex	NGT, small amounts of puree during swallowing therapy (Score 4)
↓		
Liquid	Penetration with sufficient protective reflex	Pureed food; parenteral application of fluids (Score 3)
↓		
Soft solid food	Penetration/aspiration or massive residues in valleculae or pyriformes	Pureed food and liquids (Score 2)
↓		
Soft solid food	No penetration/aspiration and not more than moderate residues in valleculae or pyriformes	Soft solid food and liquids (Score 1)

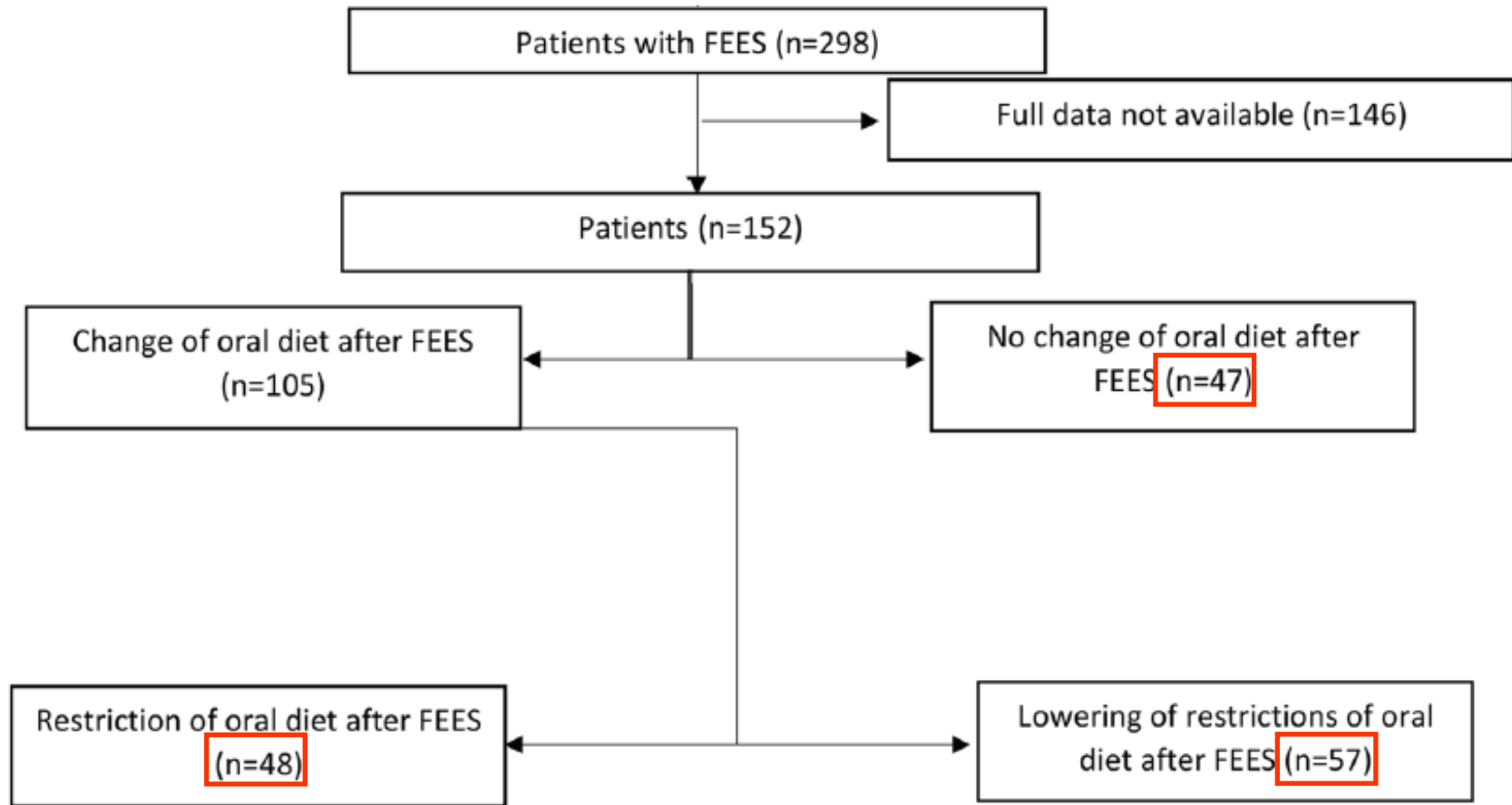
FEDSS - impact on dysphagia management



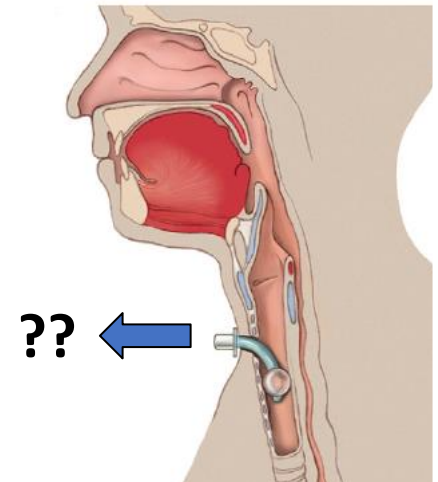
FEDSS - impact on dysphagia management

Braun et al. BMC Neurology (2019) 19:282
<https://doi.org/10.1186/s12883-019-1499-8>

BMC Neurology



- Tracheotomy is a frequent procedure on the ICU (10-15% of patients) and even more frequent in stroke patients (15-35%)
- Indications:
 - Prolonged artificial ventilation
 - Demand to clear pulmonary secretions
 - Inability to protect the airway
- Decannulation:
 - In the neurologically ill dysphagia is the main obstacle to decannulation
 - Precise assessment of airway safety is of critical importance to enable safe decannulation without any delay.



Specific Protocols

SESETD

SESETD protocol

(Standardized Endoscopic Swallowing Evaluation for Tracheostomy Decannulation)

FEES PROTOCOL STEPS

MAIN FINDINGS

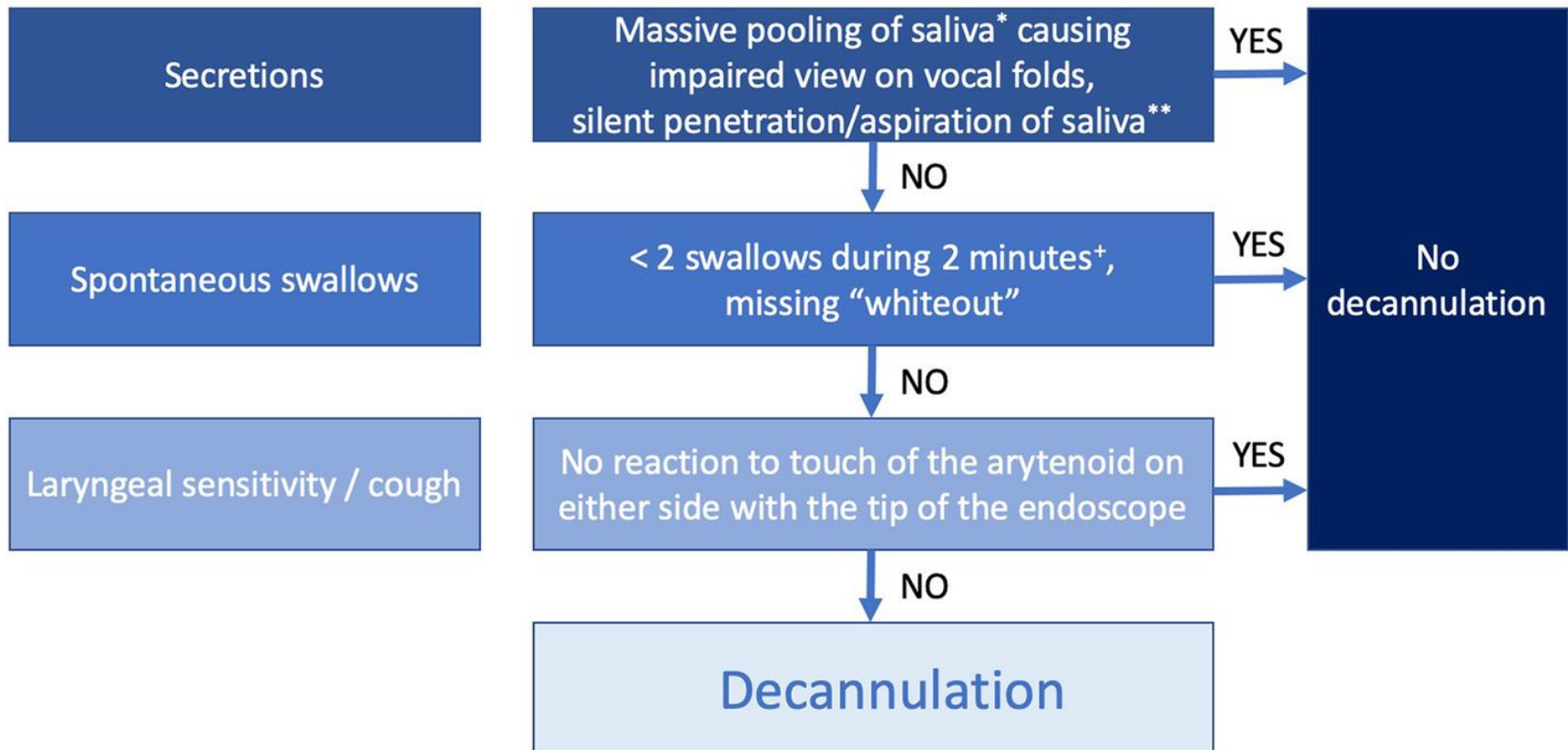


Table 1 Inter-rater reliability in a group of 'experts' and 'non-experts' (*Krippendorff's α ; **Cronbach's α)

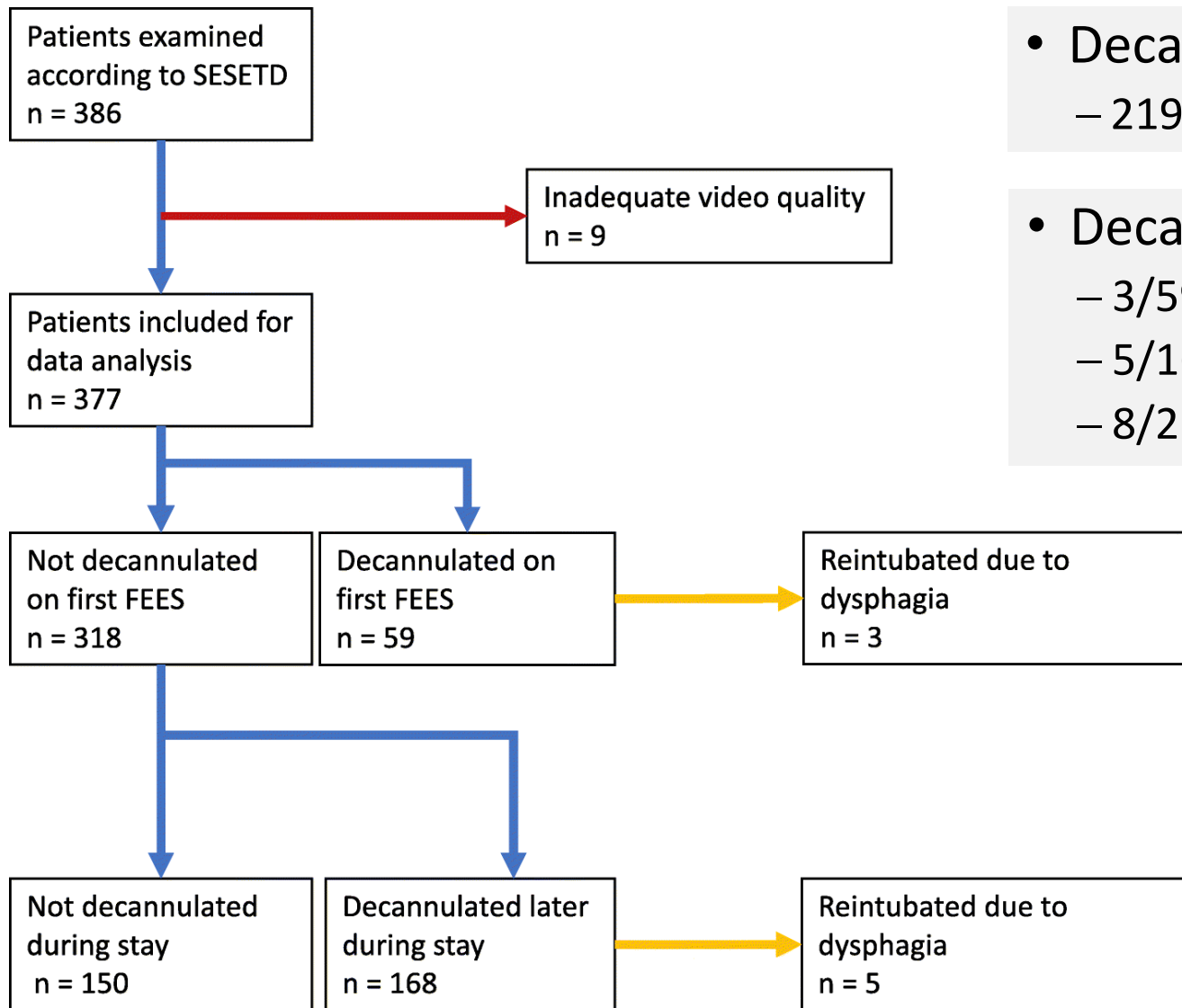
Item tested	α in the group of 'experts' (95%-confidence interval)	α in the group of 'non-experts' (95%-confidence interval)
Secretion	0.92 (0.84–1.00)*	0.88 (0.78–0.96)*
Spontaneous Swallows	1.00 (1.00–1.00)*	0.87 (0.78–0.96)*
Laryngeal Sensibility/Cough	0.73 (0.59–0.86)*	0.68 (0.54–0.82)*
Decannulation	0.87 (0.76–0.96)*	0.77 (0.63–0.89)*
Sum score	0.94 (0.87–0.98)**	0.91 (0.77–0.99)**

Table 2 Test-retest reliability in a group of 'experts'

Item tested	Light's κ (95%-confidence interval)
Secretion	1.0 (1.00–1.00)
Spontaneous Swallows	0.93 (0.81–1.05)
Laryngeal Sensibility/Cough	0.76 (0.41–1.11)
Decannulation	0.86 (0.64–1.09)

SESETD

Decannulation Failure

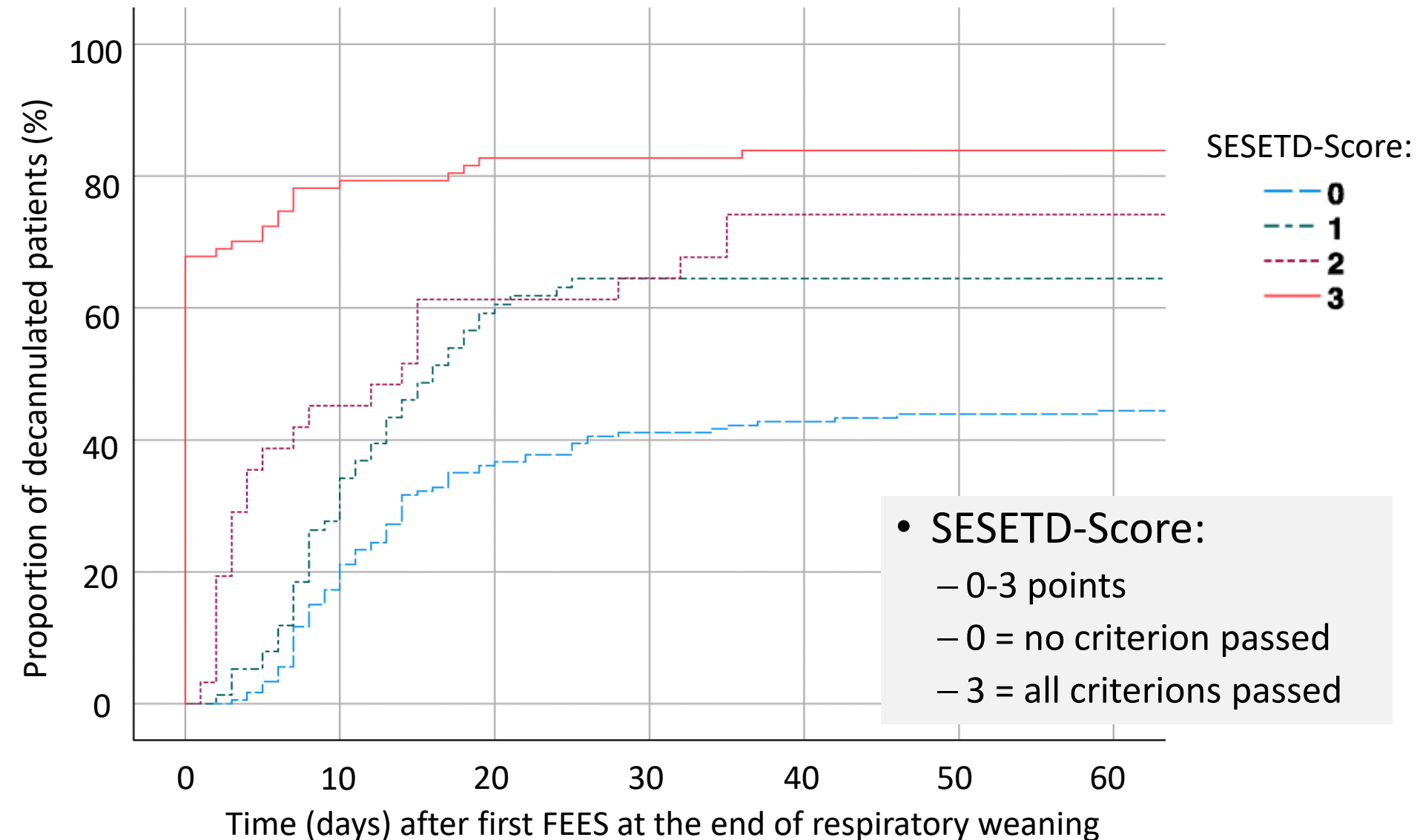


- Decannulation:
 - $219/377 = 58.1\%$

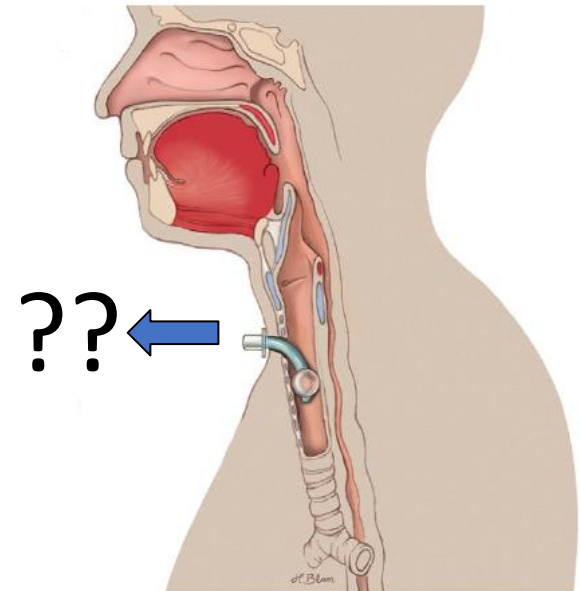
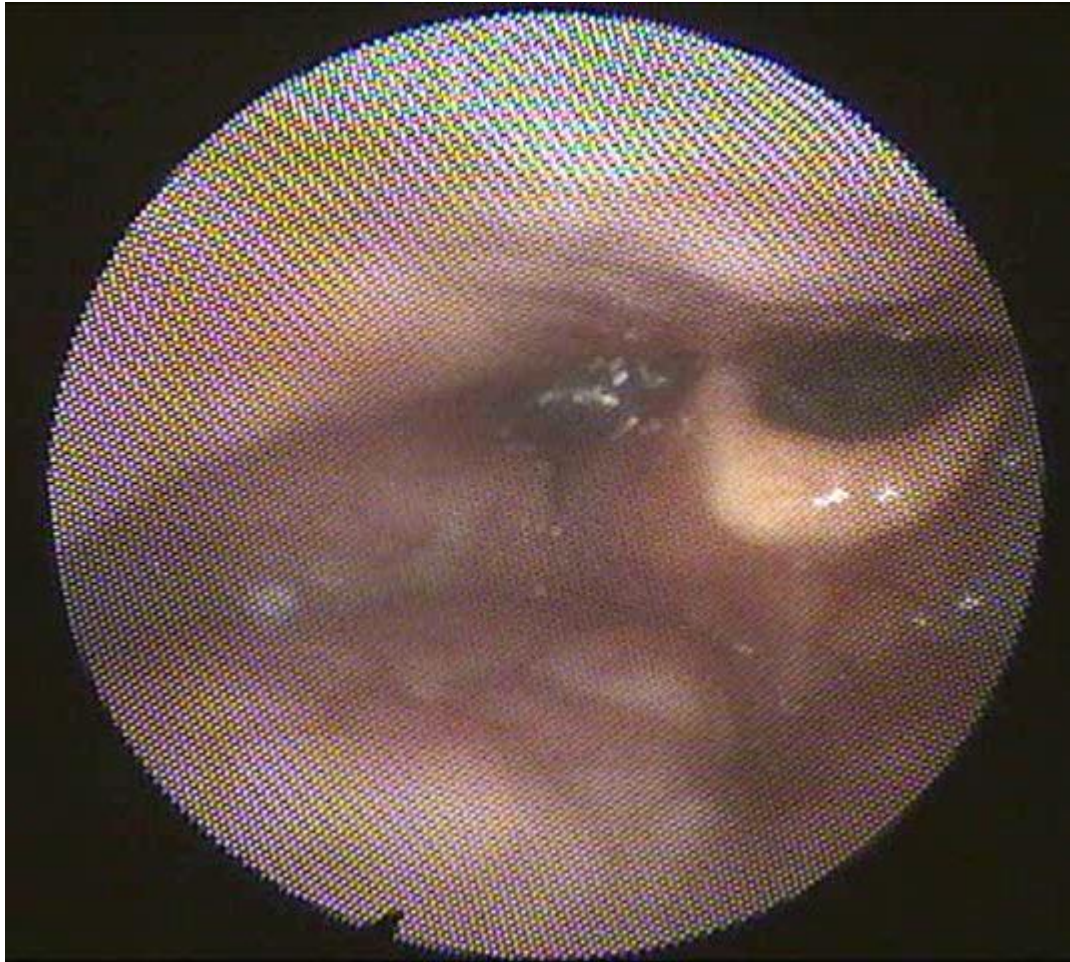
- Decannulation Failure:
 - $3/59 = 5.1\%$
 - $5/168 = 3.0\%$
 - $8/227 = 3.6\%$

SESETD

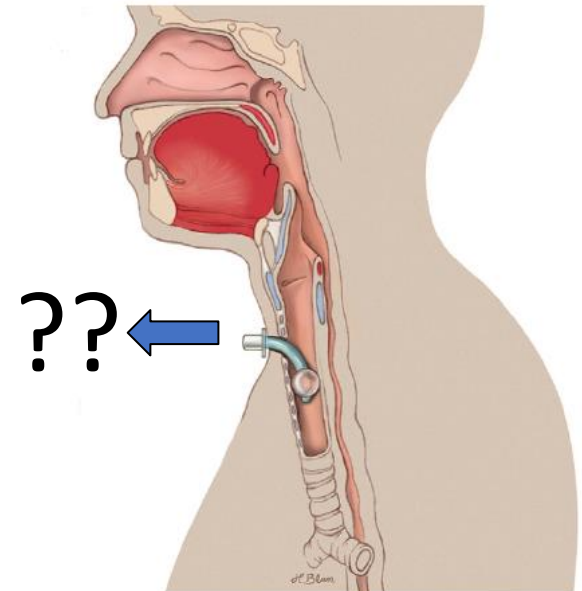
Prognosis according to FEES



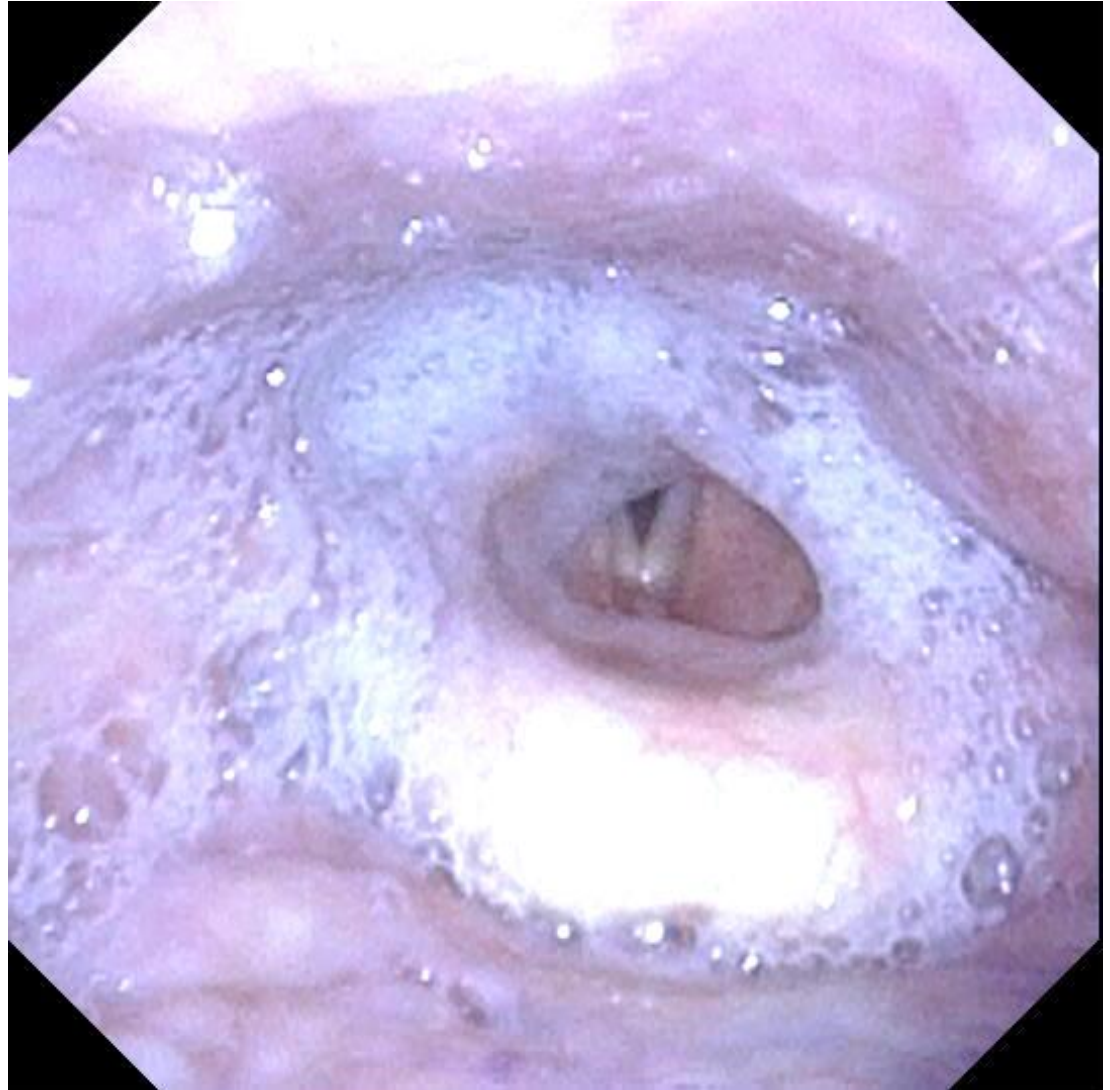
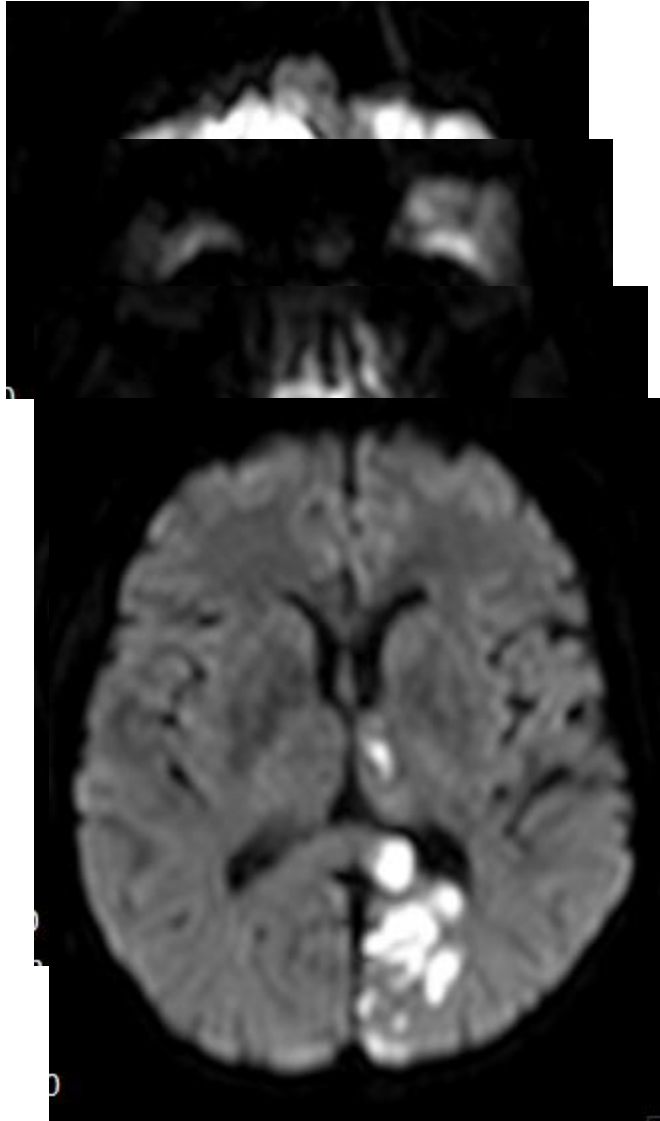
Illustrative Case



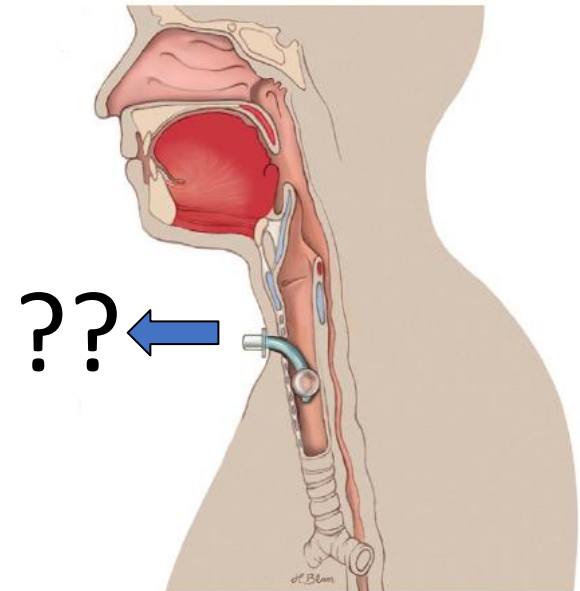
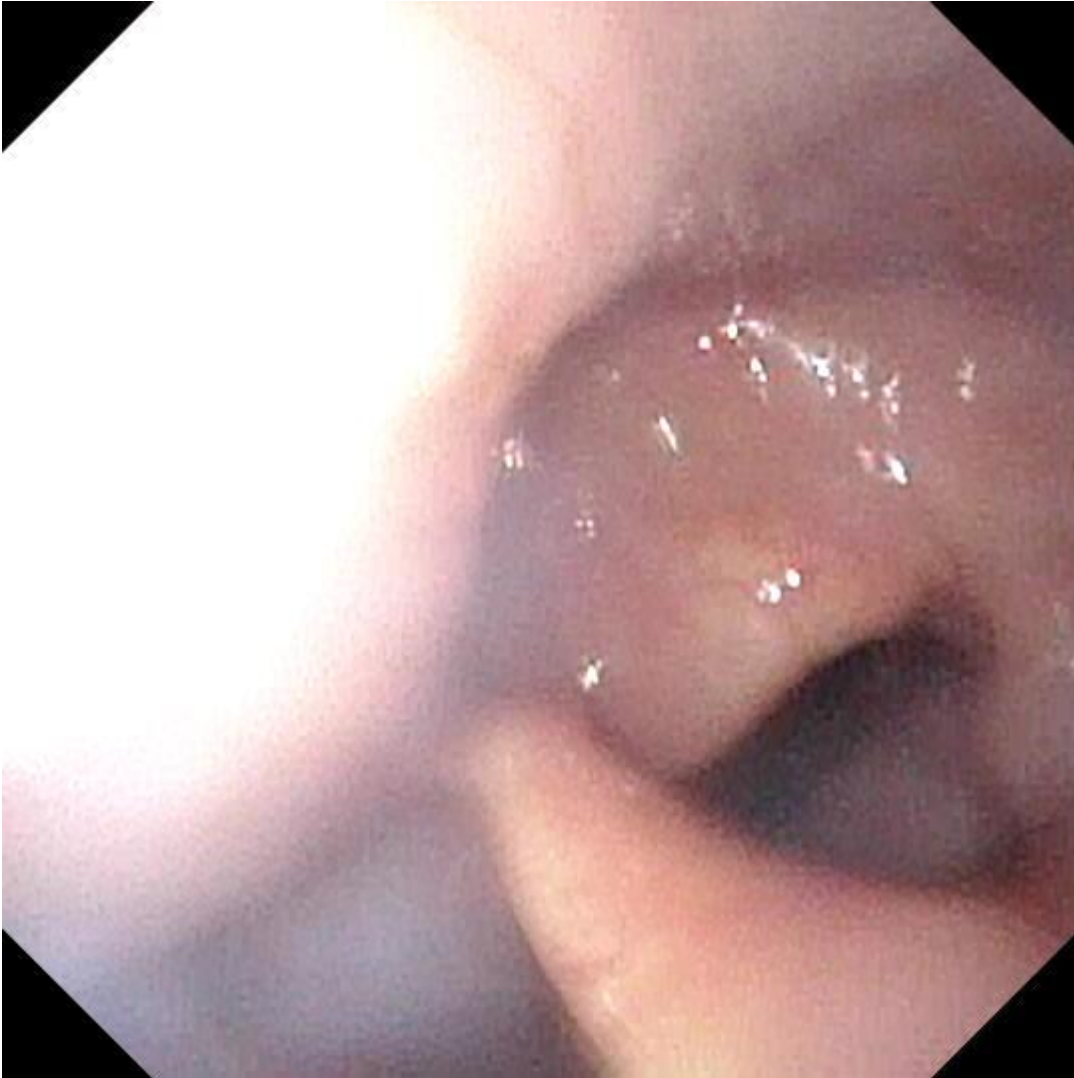
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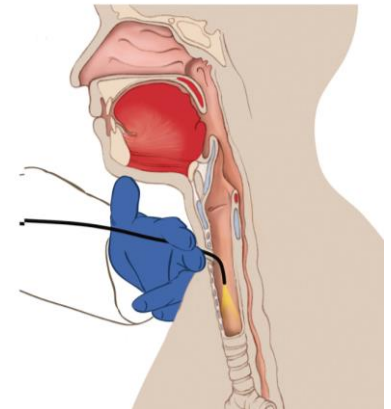
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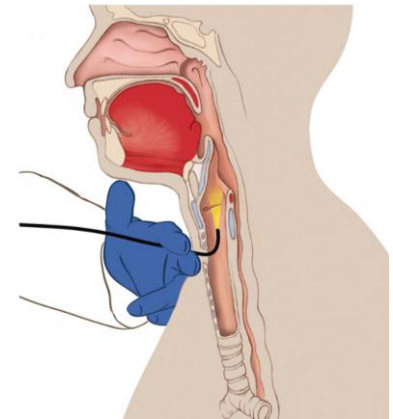
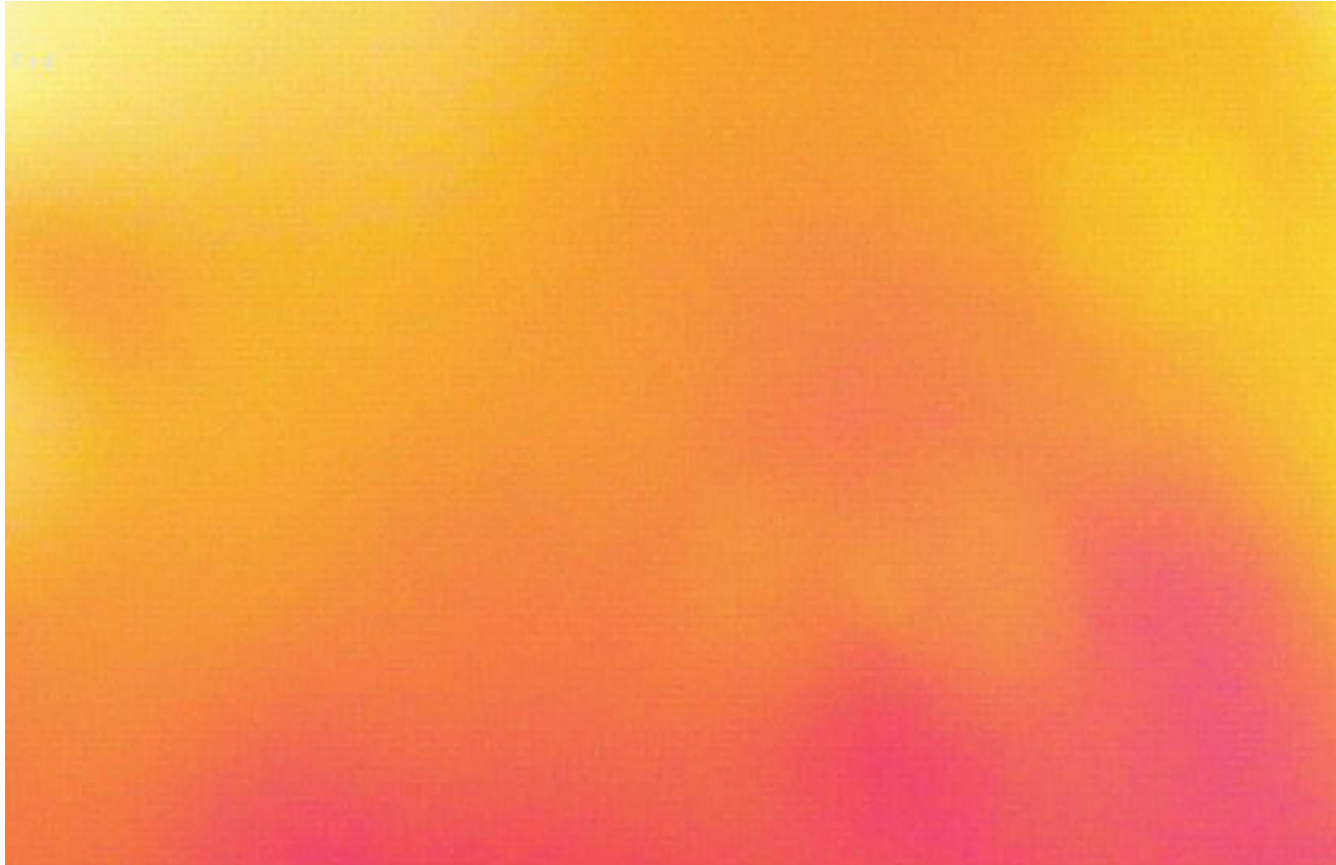
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Illustrative Case



Illustrative Case



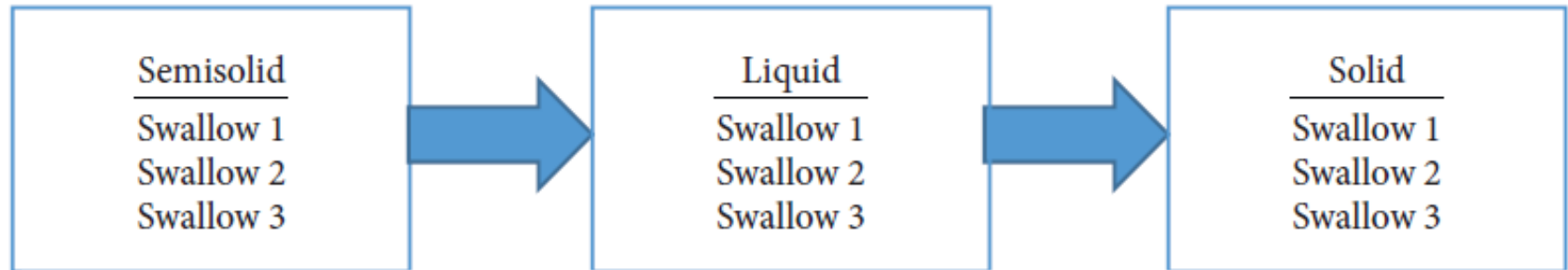


FEES in Parkinson's Disease

Response to dopaminergic treatment?

- 50-70% of patients suffer from dysphagia
 - Silent aspiration of saliva in 10-30% of patients
 - Manifestation of dysphagia:
 - 10 years after disease-onset in PD
 - 5 years in APD
 - Survival after onset of dysphagia: 1 to 2 years
 - Malnutrition and aspiration pneumonia are the major causes of death
- PD-related dysphagia is known to be responsive to L-Dopa in part of the patients.

Specific Protocols FEES-L-Dopa-Test



Rating for every swallow:

Premature spillage:

- 0: The bolus is behind the tongue
- 1: The bolus is at the base of tongue or valleculae
- 2: The bolus moves to lateral channels or the tip of the epiglottis
- 3: The bolus is in the piriforms or touches the laryngeal rim
- 4: The bolus falls into the laryngeal vestibule

Penetration/aspiration

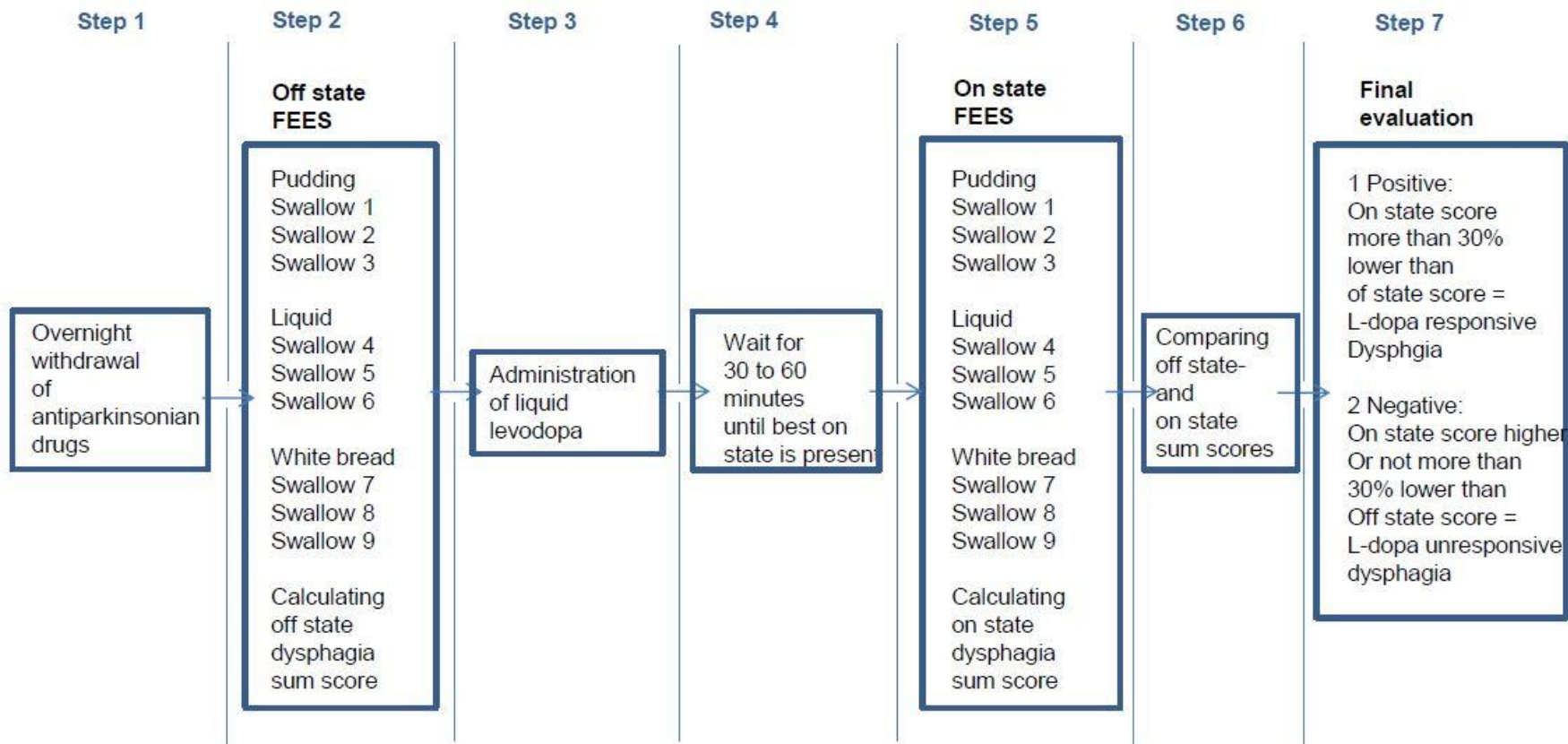
- 0: No penetration-aspiration event
- 1: Penetration with protective reflex
- 2: Penetration without protective reflex
- 3: Aspiration with protective reflex
- 4: Aspiration without protective reflex

Pharyngeal residue

- 0: No residues
- 1: Coating, no pooling
- 2: Mild pooling, less than half of the cavities
- 3: Moderate pooling, fills the cavities
- 4: Severe pooling, overflows the cavities

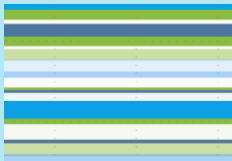
Test is done twice: **First** without (off-state condition) and **second** with L-Dopa (on-state condition)

Specific Protocols FEES-L-Dopa-Test



Definition of L-Dopa-responsive Dysphagia:

On-state score \geq Off-state score + 30%



Specific Protocols FEES-L-Dopa-Test

FEES-Levodopa-Test
Off state condition

FEES-Levodopa-Test
On state condition

Specific Protocols

FEES-L-Dopa-Test

Table 3
Results of all FEES-Levodopa tests.

PD patients	Dysphagia score	Description of swallowing dysfunction in the off state condition	Dysphagia score	Levodopa responsiveness
	Off state		On state	
1	15	Mild dysphagia with vallecular residue of solid consistencies	8	positive
2	58	Severe dysphagia with aspiration of liquid and semisolid consistencies	55	negative
3	47	Moderate dysphagia with liquid aspiration and vallecular residue of semisolid and solid consistencies	17	positive
4	84	Severe dysphagia with aspiration of all consistencies	86	negative
5	80	Severe dysphagia with aspiration of all consistencies	78	negative
6	17	Mild dysphagia with vallecular residue of solid consistencies	17	negative
7	59	Severe dysphagia with aspiration of all consistencies	22	positive
8	24	Mild dysphagia with vallecular residue of solid consistencies	12	positive
9	31	Mild dysphagia with vallecular residue of semisolid and solid consistencies	14	positive
10	39	Mild to moderate dysphagia with premature spillage of liquid and vallecular residue of semisolid and solid consistencies	46	negative
11	63	Severe dysphagia with aspiration of all consistencies	62	negative
12	32	Mild to moderate dysphagia with premature spillage of liquid and vallecular residue of semisolid and solid consistencies	14	positive
13	44	Moderate dysphagia with premature spillage of liquid and solid consistencies as well as vallecular residue of semisolid and solid consistencies	43	negative
14	55	Severe dysphagia with aspiration of liquid and semisolid consistencies as well as vallecular residue of solid consistencies	47	negative
15	26	Mild dysphagia with premature spillage of liquid and vallecular residue of solid consistencies	11	positive

Dysphagia scores in the off state and on state condition were calculated from the results of the final analysis after joint discussion. See method section for description of rating the overall severity of swallowing dysfunction in the off state condition; FEES = fiberoptic endoscopic evaluation of swallowing; PD = Parkinson's disease; UPDRS = Unified Parkinson Disease Rating Scale.

Multiple System Atrophy Specific Laryngeal Movement Disorders

RESEARCH ARTICLE

CME Laryngeal Movement Disorders in Multiple System Atrophy: A Diagnostic Biomarker?



Florin Gandor MD,^{1,2*} Annemarie Vogel MSc,¹ Inga Claus MD,³ Sigrid Ahring BSc,³ Doreen Gruber MD,^{1,2}
Hans-Jochen Heinze MD,² Rainer Dziewas MD,³ Georg Ebersbach MD,¹ and Tobias Warnecke MD³

TABLE 2. Demographic data of cohorts

Clinical Characteristics	MSA, n = 57	PD, n = 57	<i>P</i>
Women:Men	35 : 22	28 : 29	0.19
Age, y	64 (59–71)	67 (60–73)	0.06
Disease duration, y	4 (3–5)	7 (5–10)	<0.0001
Disease severity, Hoehn & Yahr stage	4 (3–4)	3 (2–4)	<0.0001
UPDRS I	3 (2.0–4.3)	4 (1–7)	0.09
UPDRS II	17.5 (13.8–24)	12 (7–17)	<0.0001
UPDRS III	35.5 (29.8–41.8)	28 (19–36)	<0.01

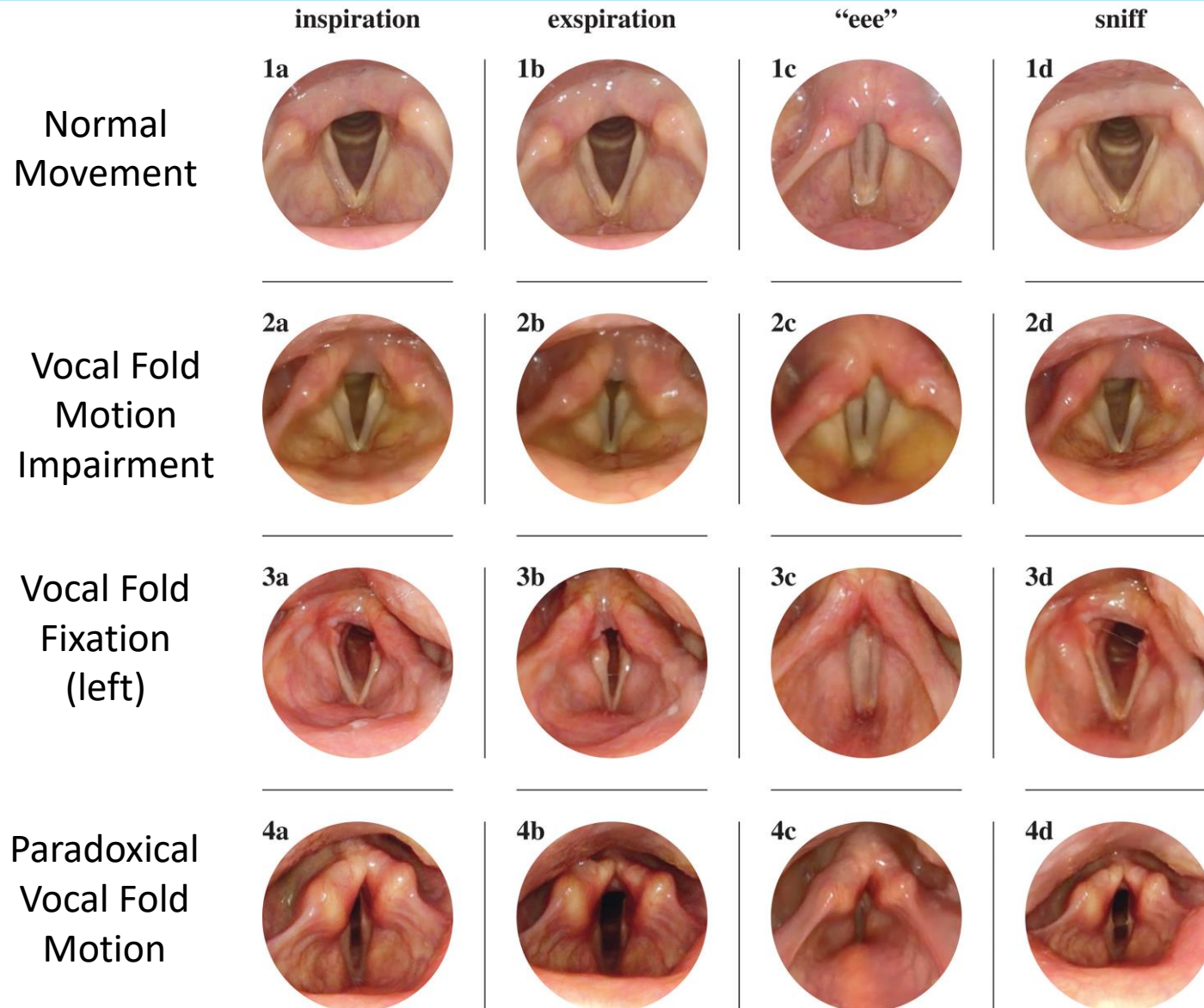
Data are median (interquartile range).

MSA, multiple system atrophy; PD, Parkinson's disease; UPDRS, Unified Parkinson's Disease Rating Scale.

TABLE 3. Characteristics of the MSA cohort

n	57
MSA phenotype, n (%)	
Parkinsonian	43 (75.4)
Cerebellar	14 (24.6)
Diagnostic certainty, n (%)	
Probable	24 (42.1)
Possible	33 (57.9)

Specific Protocols Laryngeal Movement Disorders



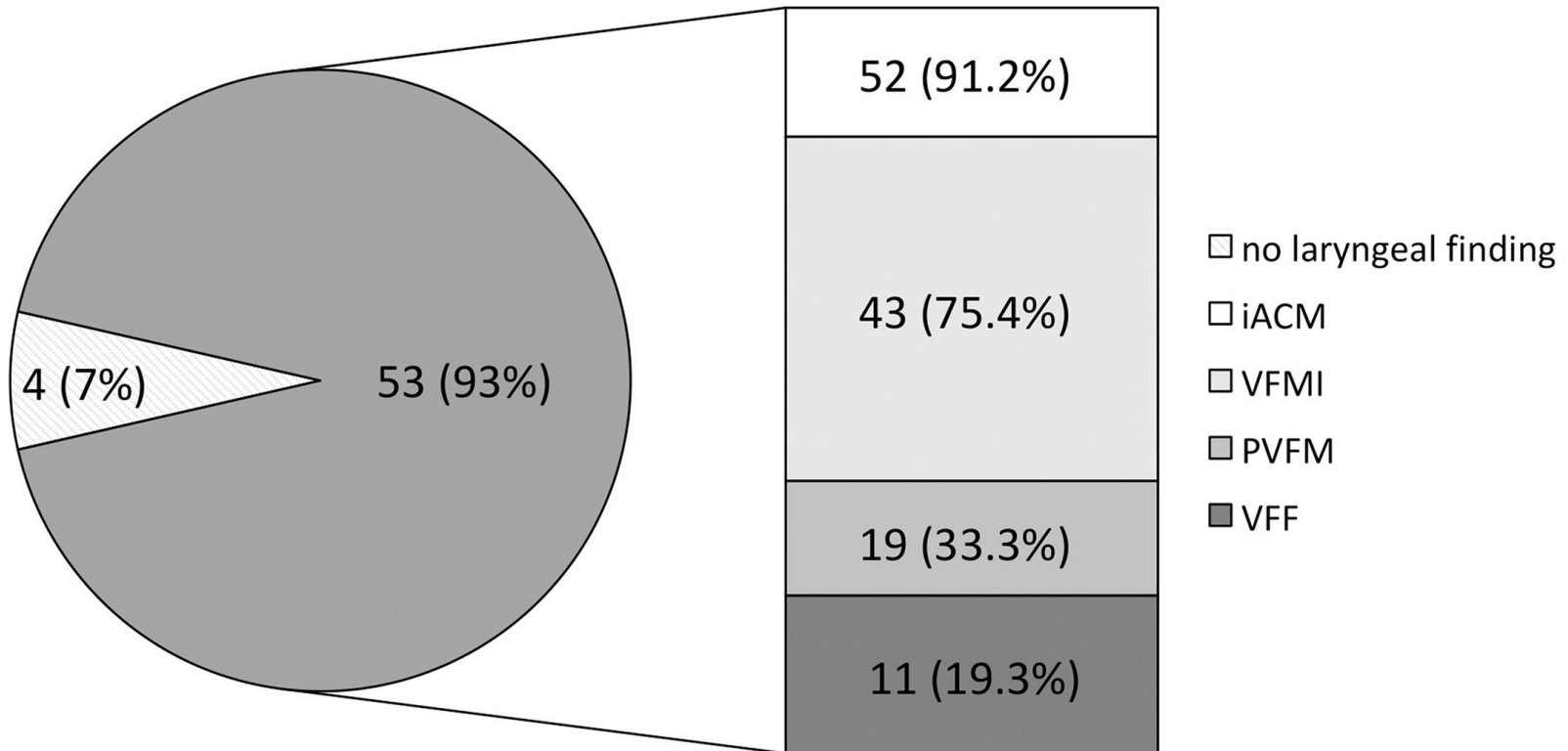
A decorative graphic in the top left corner consisting of several horizontal stripes in shades of blue, green, and yellow.

Specific Protocols

Laryngeal Movement Disorders

Specific Protocols

Laryngeal Movement Disorders



iACM = irregular arythenoid cartilages movements

VFMI = vocal fold motion impairment

PVFM = paradoxical vocal fold motion

VFF = vocal fold fixation

Specific Protocols Dual-Task Paradigm

scientific reports

OPEN

Effects of dual-task swallowing in healthy

Paul Muhle^{1,2,4}, Inga Cla
Sonja Suntrup-Krueger^{1,2}

ORIGINAL ARTICLE

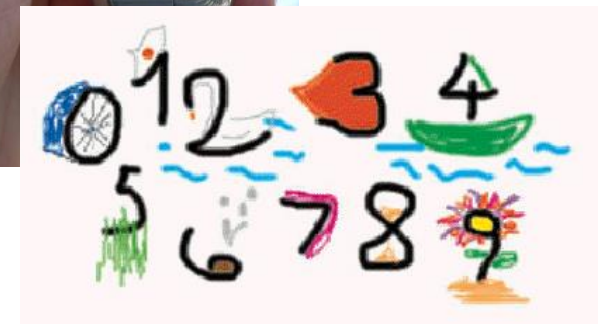
Effect of cognitive and motor dual-task on oropharyngeal swallowing in Parkinson's disease

Bendix Labeit^{1,2} | Inga Claus¹ | Paul Muhle^{1,2} | Liesa Regner¹ |
Sonja Suntrup-Krueger^{1,2} | Rainer Dziewas¹ | Tobias Warnecke¹

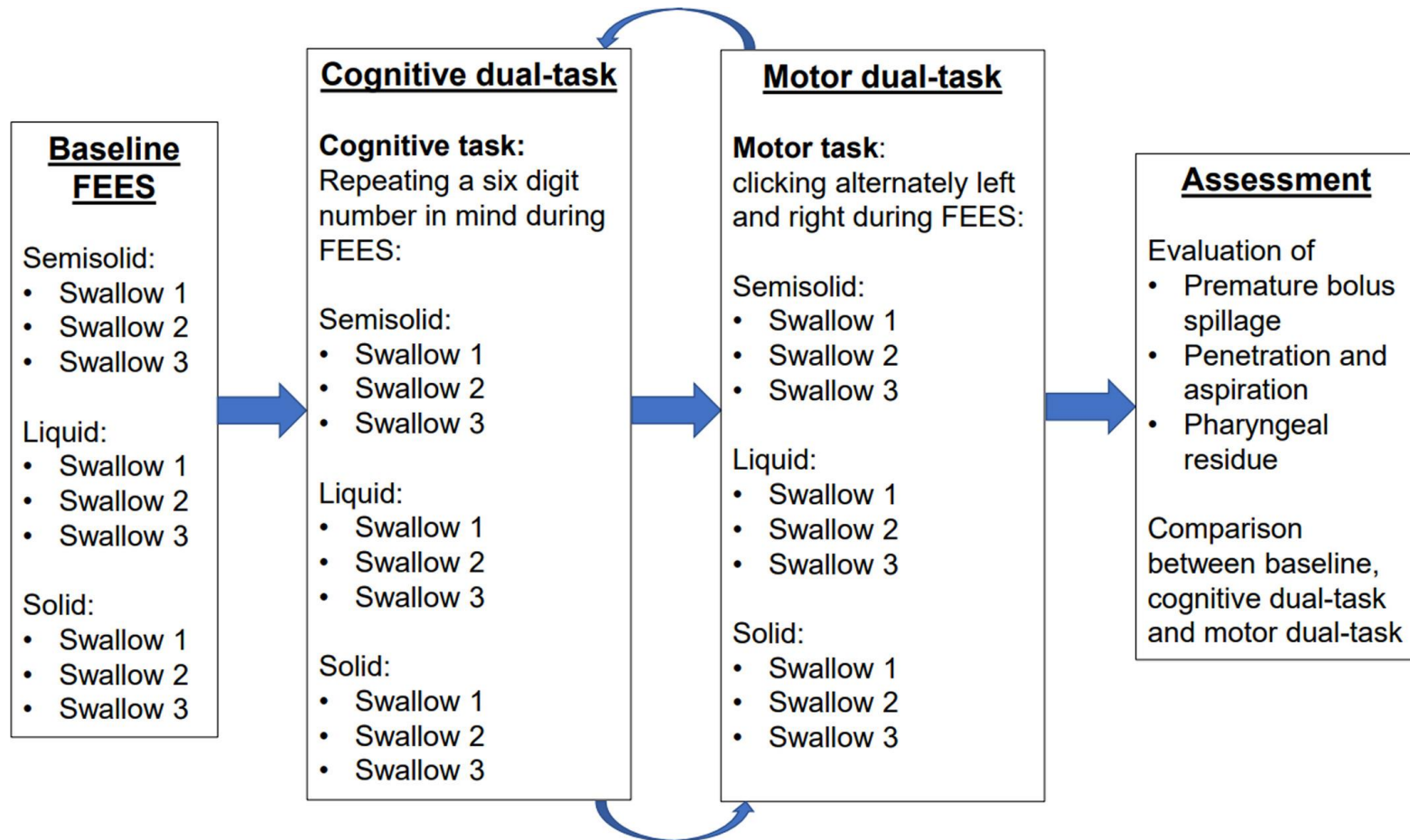
europaen journal
of neurology
the official journal of the european academy of neurology

TABLE 2 Clinical characteristics of the patient cohort

Age, mean in years \pm SD	65.90 \pm 9.32
Men, n (%)	23 (77%)
Disease duration, mean in years \pm SD	7.77 \pm 4.75
Hoehn and Yahr stage	
H&J 1, n (%)	1 (3)
H&J 1.5, n (%)	2 (7)
H&J 2, n (%)	8 (27)
H&J 2.5, n (%)	7 (23)
H&J 3, n (%)	7 (23)
H&J 4, n (%)	5 (17)
UPDRS, mean \pm SD	18.00 \pm 7.18
L-dopa daily dose, mean \pm SD	564.42 \pm 361.19



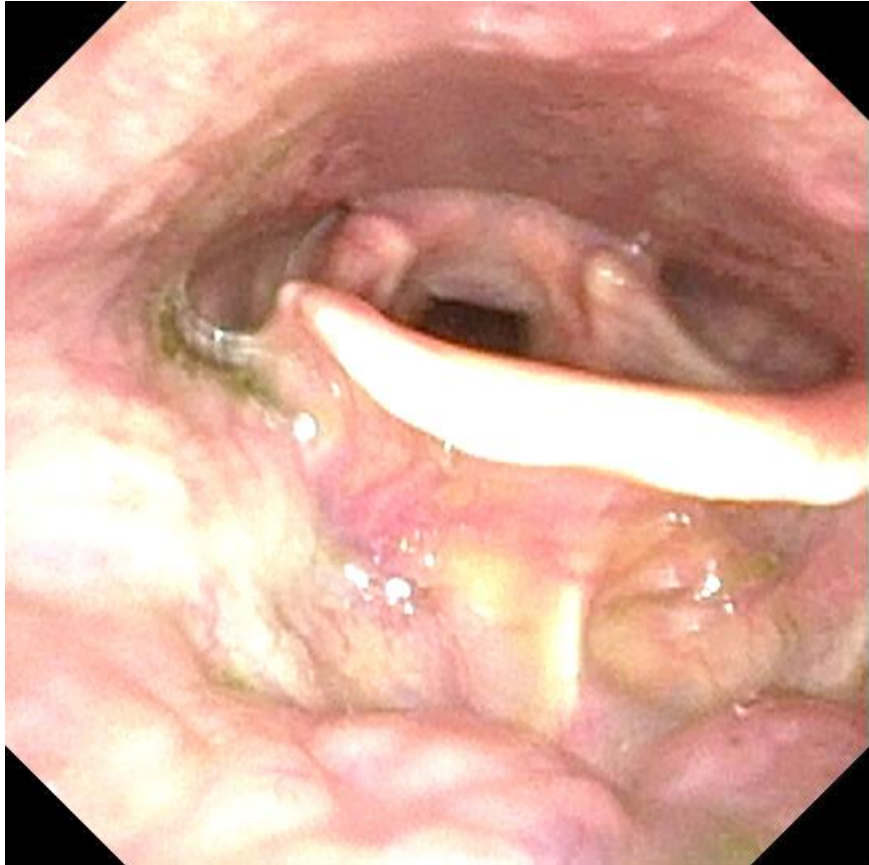
Specific Protocols Dual-Task Paradigm



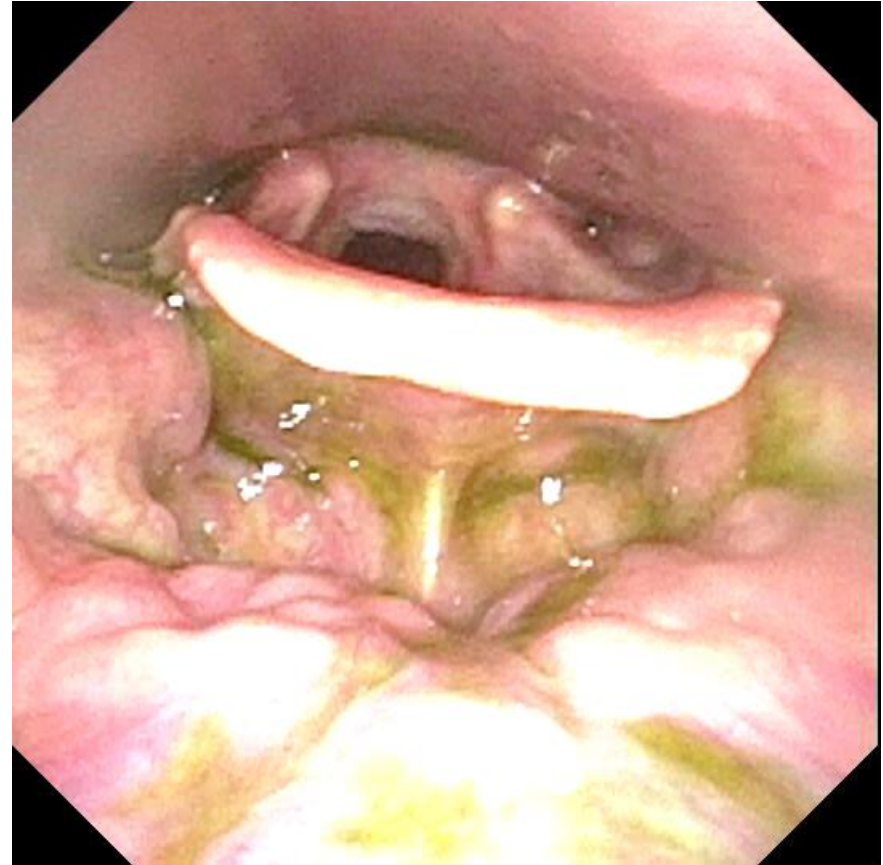
Specific Protocols Dual-Task Paradigm

	Baseline, n = 30	motor dual-task, n = 30	cognitive dual-task, n = 22
Total score	10.67 ± 5.89	15.97 ± 7.62	14.55 ± 7.49
Premature spillage	5.33 ± 3.75	8.27 ± 4.57	7.95 ± 3.57
Penetration/aspiration	0.07 ± 0.25	0.20 ± 0.48	0.14 ± 0.35
Pharyngeal residue	5.27 ± 4.94	7.50 ± 5.69	6.45 ± 5.17
Semisolid	3.03 ± 2.80	4.90 ± 3.45	3.36 ± 3.59
Liquid	2.83 ± 2.14	4.40 ± 3.11	5.18 ± 3.39
Solid	4.80 ± 3.40	6.67 ± 3.69	6.00 ± 4.12

Illustrative Case

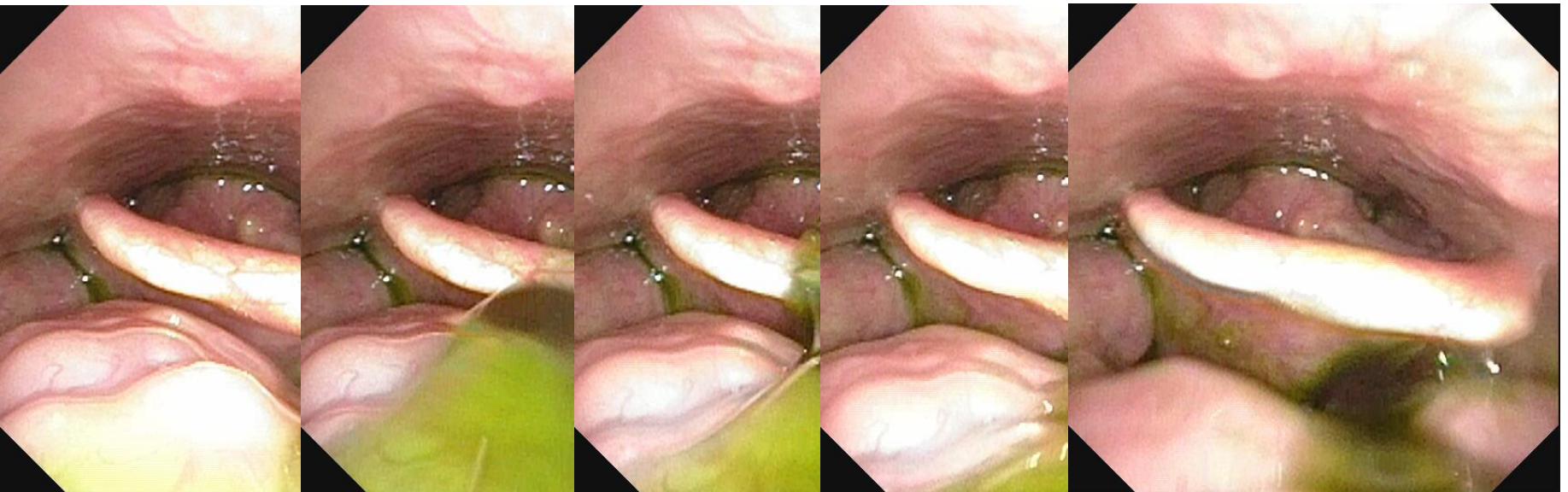
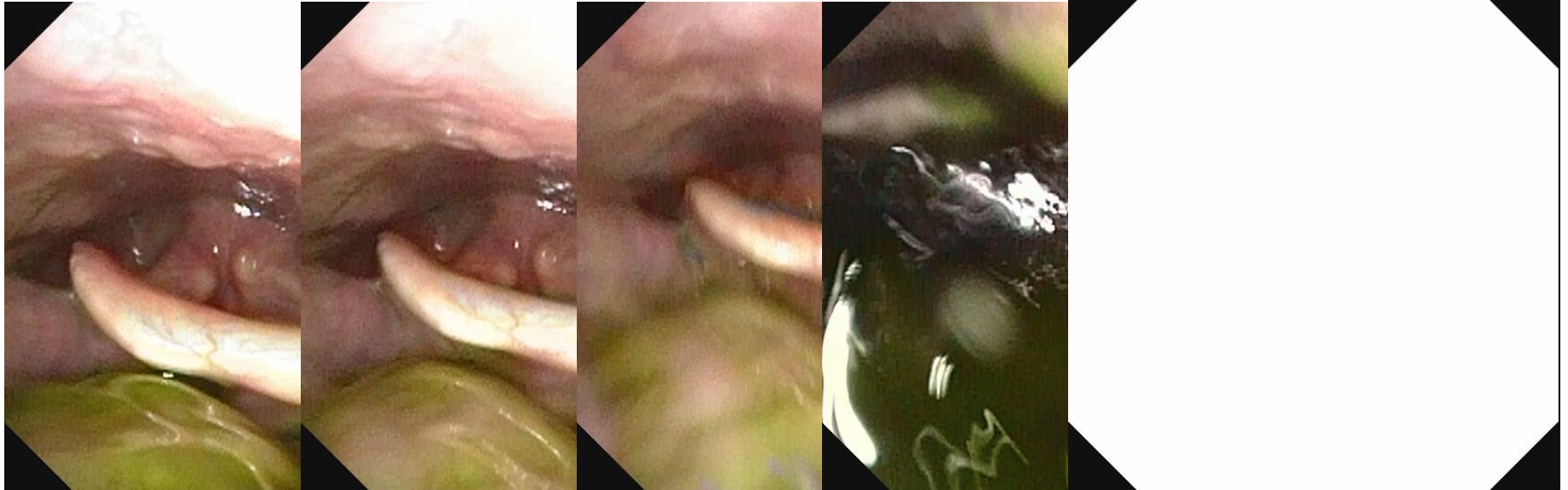


Baseline



Cognitive Dual Task

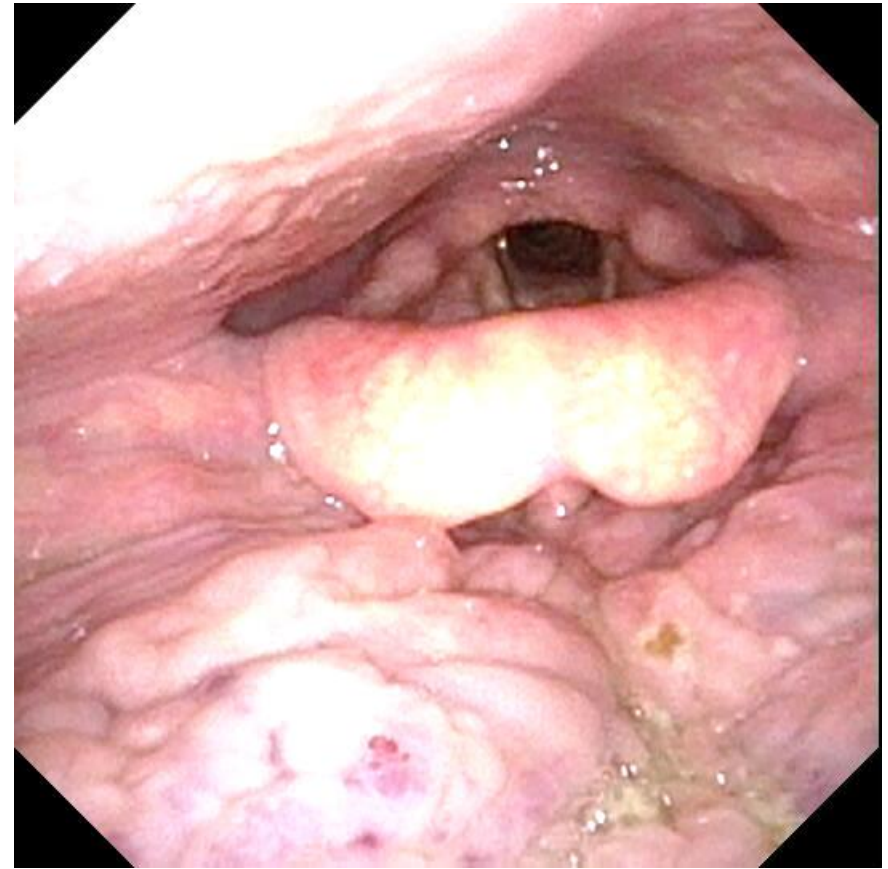
Illustrative Case Fram-by-Frame



Illustrative Case

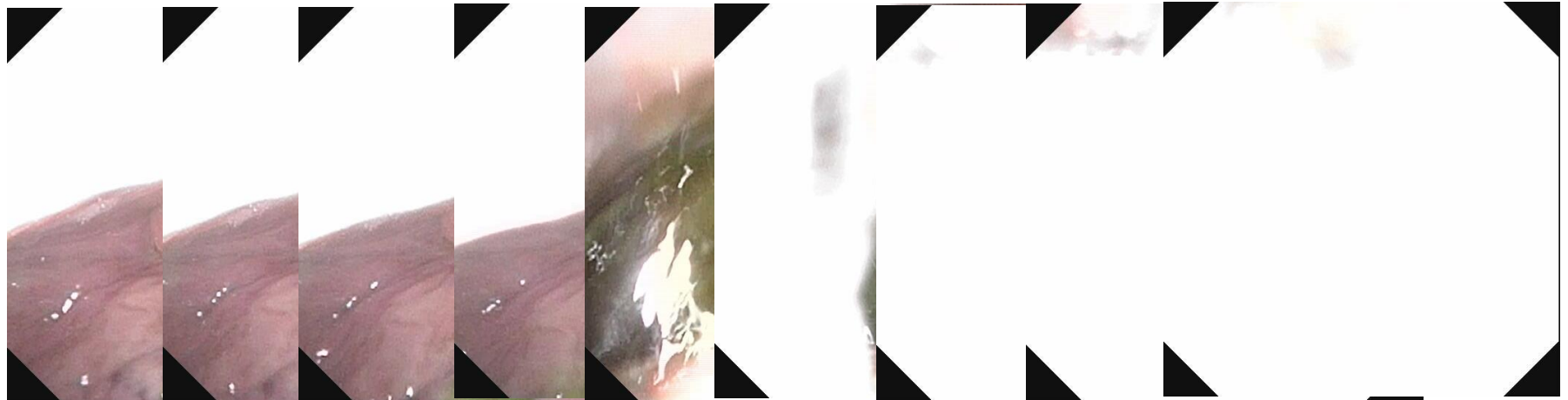
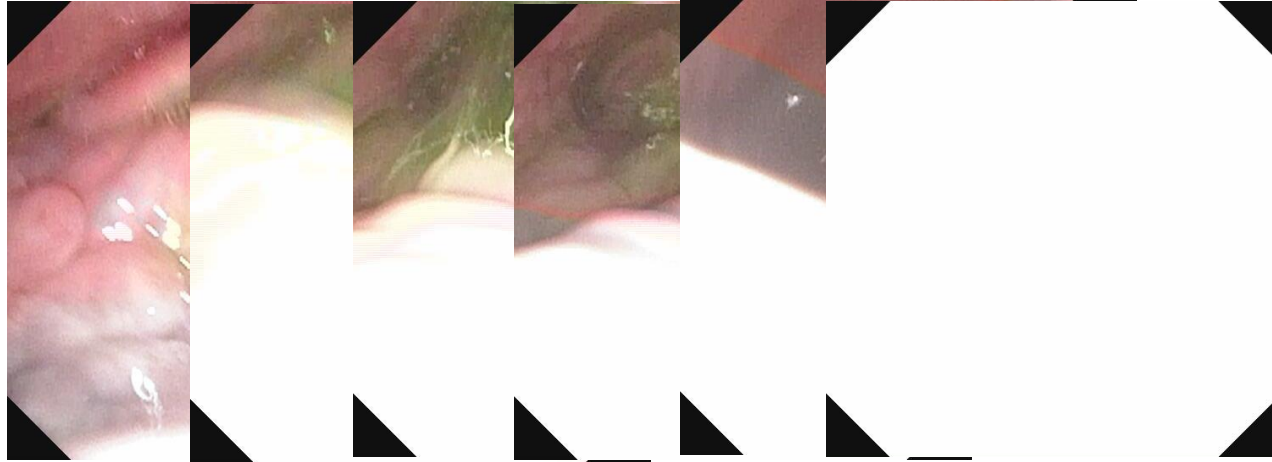


Baseline



Cognitive Dual Task

Illustrative Case Fram-by-Frame



- Dysphagia matters in myasthenia gravis (MG):
 - In 6-15% of patients dysphagia is the initial symptom
 - 50% of all MG patients suffer from dysphagia during the course of the disease
 - Dysphagia and aspiration pneumonia are indicative of a poor prognosis
- When dysphagia is the only or leading initial symptom, establishing the diagnosis is often difficult
- Key features of myasthenia:
 - Increasing muscle weakness (fatigability) with activity
 - Short-term increase of muscle strength with intravenous administration of edrophonium-chlorid
- Two specific tests:
 - Fatigable swallowing test
 - FEES-edrophonium-test

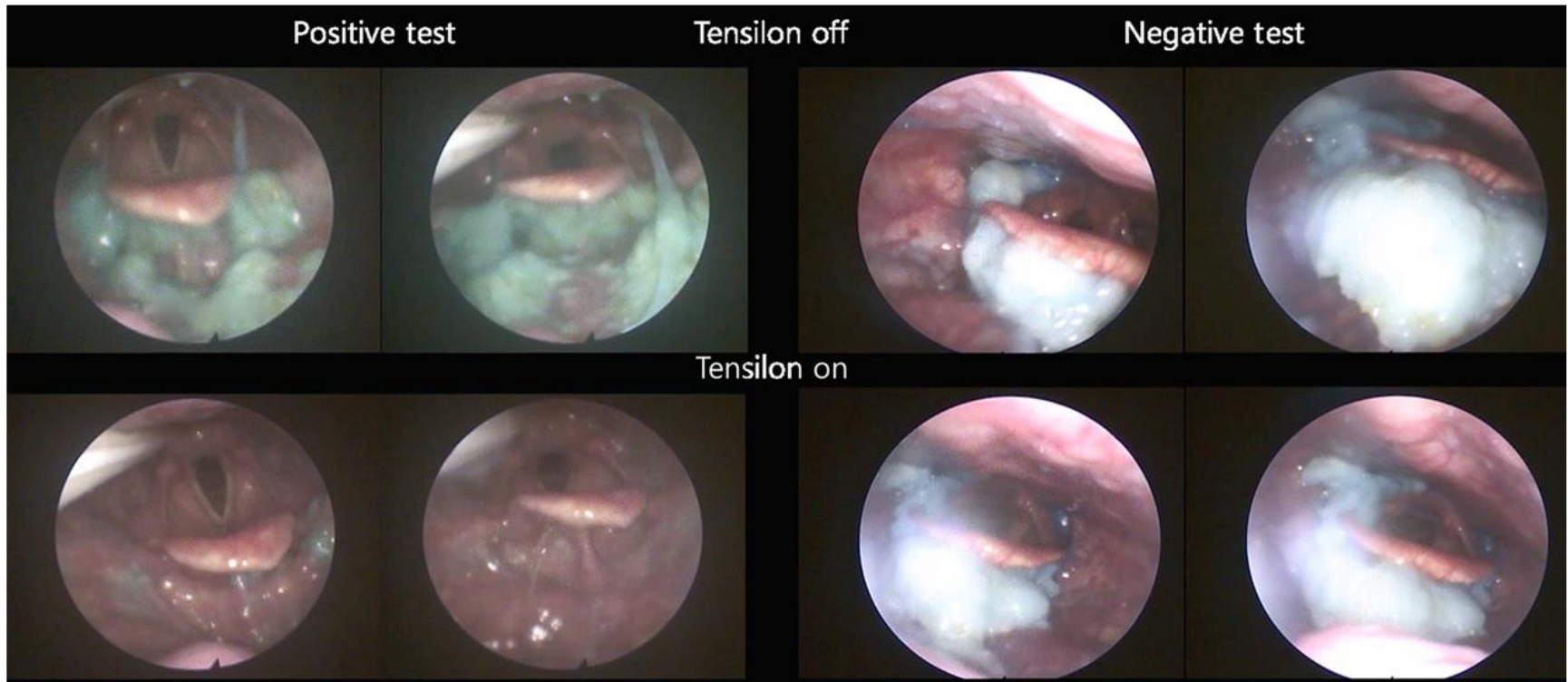


Myasthenia gravis

FST & FEES-Tensilon-Test

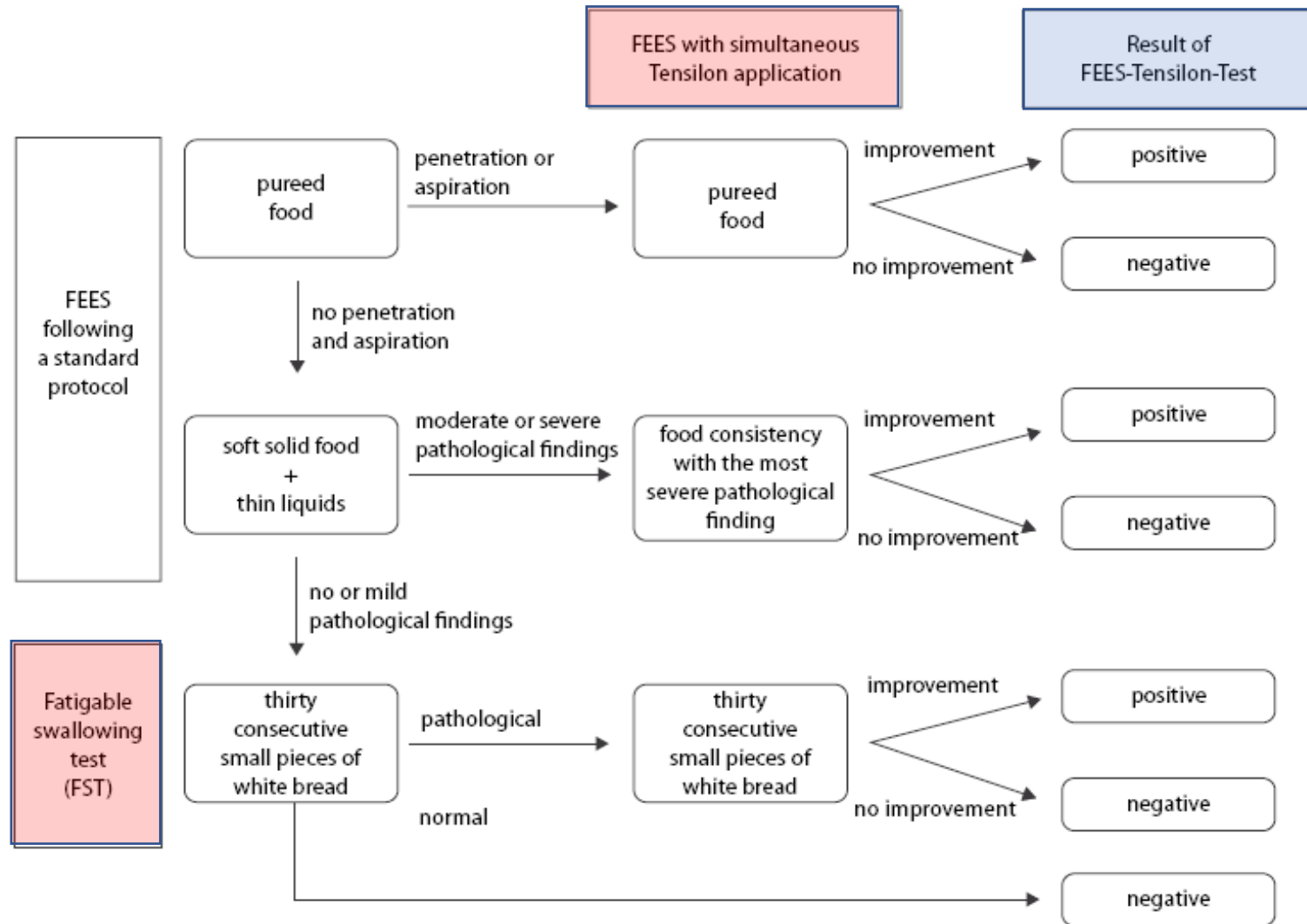
- **Fatigable-Swallowing-Test (FST)**
 - Effort related impairment of swallowing function?
 - Technique: During FEES successive swallowing of up to 20 pieces of bread (ca. 4,5 cm³).
- **FEES-Tensilon-Test**
 - Improvement of swallowing function after application of Edrophonium (Acetylcholin-esterase inhibitor)?
 - Technique: Application of 10 mg Tensilon during FEES.

FEES-Tensilon-Test



Specific Protocols

Fatigable Swallowing Test & FEES-Tensilon-Test



Specific Protocols

Fatigable Swallowing Test & FEES-Tensilon-Test

Case history:

- 16 year old female patient
- Increasing swallowing problems since 6 weeks,
- weight loss (3 kg)
- Already on a modified diet
- No other symptoms suggestive of underlying disease

Question:

- Extent and etiology of the dysphagia?



Specific Protocols

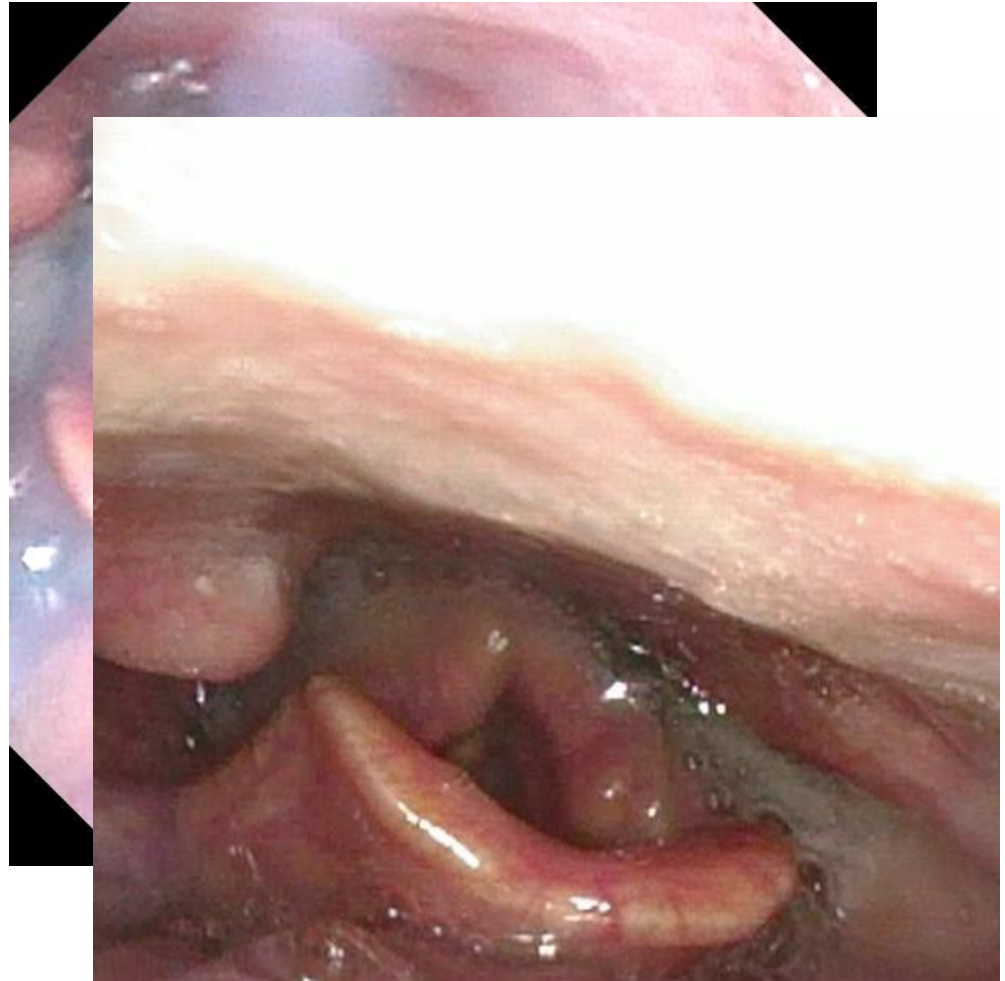
Fatigable Swallowing Test & FEES-Tensilon-Test

Case history:

- 83 year old widower, living alone, feeling depressed
- Reports of inability to swallow since 2 days
- Before that swallowing has also been difficult, interpreted as part of the ageing process
- At the moment he is only able to have fluids
- Needs to spit out saliva

Question:

- Extent and etiology of the dysphagia?



Specific Protocols

Fatigable Swallowing Test & FEES-Tensilon-Test

Table 2 Reliability and agreement levels of the flexible endoscopic evaluation of swallowing-Tensilon test

Item	Inter-rater reliability	Intra-rater reliability	Agreement level
Improvement after Tensilon application			
Overall swallowing performance ^a	0.925 (0.845–1.000)	0.987 (0.978–0.992)	0.967
Aspiration presence	0.580 (0.464–0.696)	0.694 (0.568–0.790)	0.669
Premature spillage	0.348 (0.131–0.565)	0.424 (0.186–0.605)	0.621
Residue normalization	0.922 (0.836–1.000)	0.981 (0.968–0.989)	0.963
Rater improvement scale (Scale 0–10) ^b	0.959 (0.939–0.979)	0.987 (0.978–0.992)	0.717
Rating of residue severity			
Vallecular	0.900 (0.858–0.941)	0.961 (0.945–0.974)	0.709
Epiglottis	0.884 (0.827–0.941)	0.947 (0.926–0.964)	0.671
Pyriform	0.935 (0.905–0.966)	0.965 (0.951–0.976)	0.588
Lateral channel	0.829 (0.762–0.895)	0.933 (0.905–0.954)	0.648

Results are presented as kappa (95% confidence interval) for the reliability levels or as proportion values for the agreement level. ^aPresence of normalization in any swallowing parameter. ^bRater improvement scale (Scale 0–10) was recategorized to five subscales.

Specific Protocols

Fatigable Swallowing Test & FEES-Tensilon-Test

Detecting myasthenia gravis as a cause of unclear dysphagia with an endoscopic tensilon test

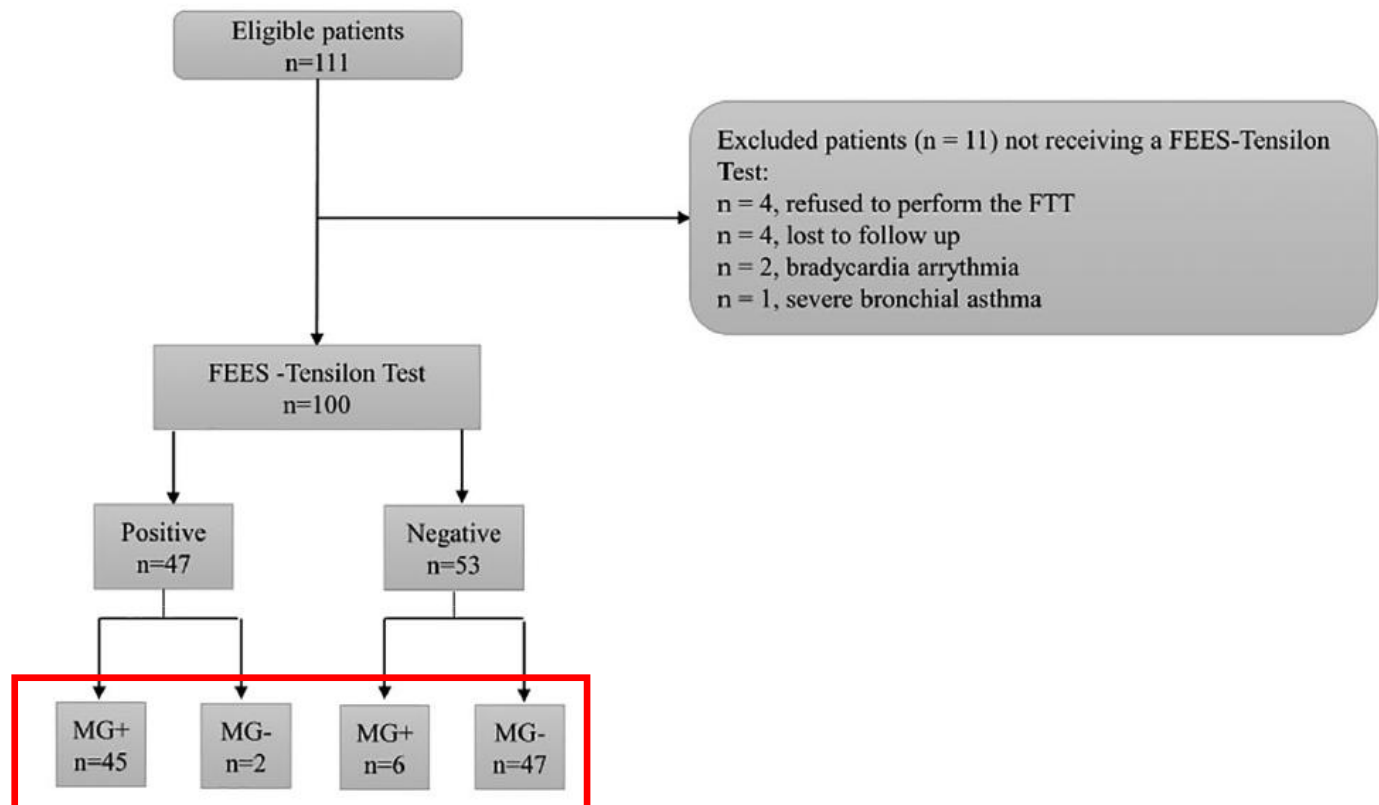
Tobias Warnecke*, Sun Im*, Bendix Labeit^{ID}, Olga Zwolinskaya, Sonja Suntrup-Krüger, Stephan Oelenberg, Sigrid Ahring, Matthias Schilling, Sven Meuth, Nico Melzer, Heinz Wiendl^{ID}, Tobias Ruck and Rainer Dziewas

Ther Adv Neurol Disord

2021, Vol. 14: 1–9

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17562864211035544

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Specific Protocols

Fatigable Swallowing Test & FEES-Tensilon-Test

Table 4. Diagnostic parameters (95% CI) of the FTT, serum antibody, RNS and fatigable swallowing test.

Diagnostic test		MG (+)	MG (-)	Sensitivity	Specificity	PPV	NPV
FTT	(+)	45	2	0.882	0.959	0.957	0.887
	(-)	6	47	[0.761–0.956]	[0.860–0.995]	[0.855–0.995]	[0.770–0.957]
Serum antibody test	(+)	48	0	0.941	1.000	1.000	0.942
	(-)	3	49	[0.8381–0.988]	[1.000–1.000]	[0.926–1.000]	[0.841–0.988]
RNS ^a	(+)	26	0	0.510	1.000	1.000	0.662
	(-)	25	49	[0.366–0.653]	[1.000–1.000]	[1.000–1.000]	[0.543–0.768]
Fatigable swallow	(+)	38	13	0.745	0.735	0.745	0.735
	(-)	13	36	[0.604–0.857]	[0.589–0.851]	[0.604–0.857]	[0.589–0.851]
^a Statistically different from the FTT, $p < 0.001$ (Cochran's Q test, <i>post hoc</i> McNemar's test). CI, confidence interval; FEES, flexible endoscopic evaluation of swallowing; FTT, FEES-tensilon test; MG, myasthenia gravis; NVP, negative predictive value; PPV, positive predictive value; RNS, repetitive nerve stimulation.							

- Taking oral medication, especially swallowing tablets, is difficult for many patients with dysphagia [Maiuri et al., 2018; Wirth & Dziewas 2019].
- Consequences:
 - Aspiration and resulting pneumonia
 - Discontinuation of medication and related adverse consequences
 - Unsuitable modifications of medication (for example crushing, breaking and opening of capsules and tablets) frequently occurs
 - Decreased accuracy of dose
 - Increased toxicity
 - Reduces pharmacological stability and alterations of pharmacokinetics

- ESO-ESSD-guideline

- Recommendation 4: We suggest that in acute stroke patients **swallowing of tablets should routinely be evaluated** as part of dysphagia assessment in addition to assessing the swallowing of liquid and different food consistencies and quantities.
- Quality of evidence: Low ⊕⊕
- Strength of recommendation: Weak for intervention ↑?

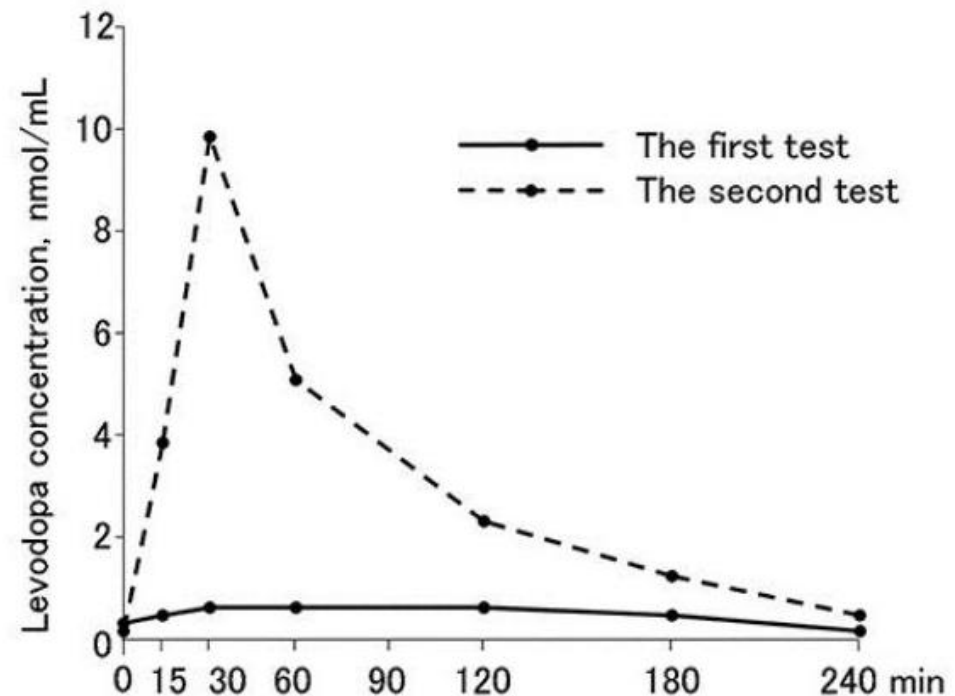
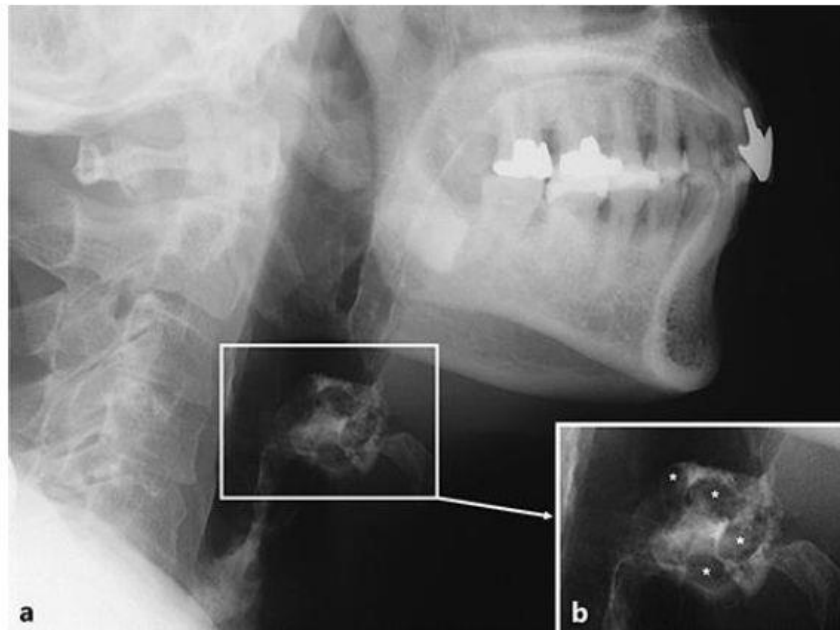
[Dziewas et al., European Stroke Journal 2021; DOI: [10.1177/23969873211039721](https://doi.org/10.1177/23969873211039721)]

- Guideline of the German Neurological Society

- Recommendation 20: In addition to assessing the swallowing of different food consistencies and quantities, in dysphagia patients in need of oral medication, **pill swallowing should be routinely evaluated** as part of instrumental diagnostics and the individually optimal formulation should be identified.

[Dziewas et al., Neurological Research and Practice 2020; DOI: [10.1186/s42466-021-00122-3](https://doi.org/10.1186/s42466-021-00122-3)]

- In patients with Parkinsonian Disease medication dysphagia has been linked to lack of medication efficacy and to motor fluctuations such as delayed on-phenomena [Umemoto et al., Neurology 2016; Fukae et al., Mov Disord 2020]



Medication Dysphagia Score

Ordinal level	Swallowing efficiency	Swallowing safety
0: no impairment	The medication is swallowed completely during the first swallowing attempt without dissolving.	The medication is swallowed without any risk of penetration or aspiration.
1: mild impairment	The medication is not swallowed during the first attempt but is easily swallowed with additional attempts without dissolving.	The medication or water spills prematurely into the pharynx before swallowing or remains there prolonged after swallowing, but no penetration or aspiration occurs.
2: moderate impairment	The medication is temporarily stuck in the oropharynx and can only be cleared with intensive swallowing attempts (≥ 5 attempts or additional water drinking) and/or there are minimal signs of dissolution (coating of the mucosa).	The medication or water penetrates into the laryngeal vestibule, but is effectively cleared by protective reflexes.
3: severe impairment	The medication cannot be swallowed completely and partially dissolves.	The medication or water penetrates into the laryngeal vestibule, despite protective reflexes it is not cleared.
4: very severe impairment	The medication cannot be swallowed at all and/or completely dissolves.	The medication or water penetrates into the laryngeal vestibule without attempts to clear it or is aspirated.



Medication Dysphagia Classification

- 0:** no signs of medication dysphagia.
- 1:** mild: signs of mild impairment of swallowing safety or/and swallowing efficiency in at least 1 of the tested medication trials.
- 2:** moderate: signs of moderate impairment of swallowing safety or/and swallowing efficiency in at least 1 of the tested medication trials.
- 3:** severe: signs of severe impairment of swallowing safety or/and swallowing efficiency in at least 1 of the tested medication trials.
- 4:** very severe: signs of very severe impairment of swallowing safety or/and swallowing efficiency in at least 1 of the tested medication trials.

Medication Dysphagia Classification

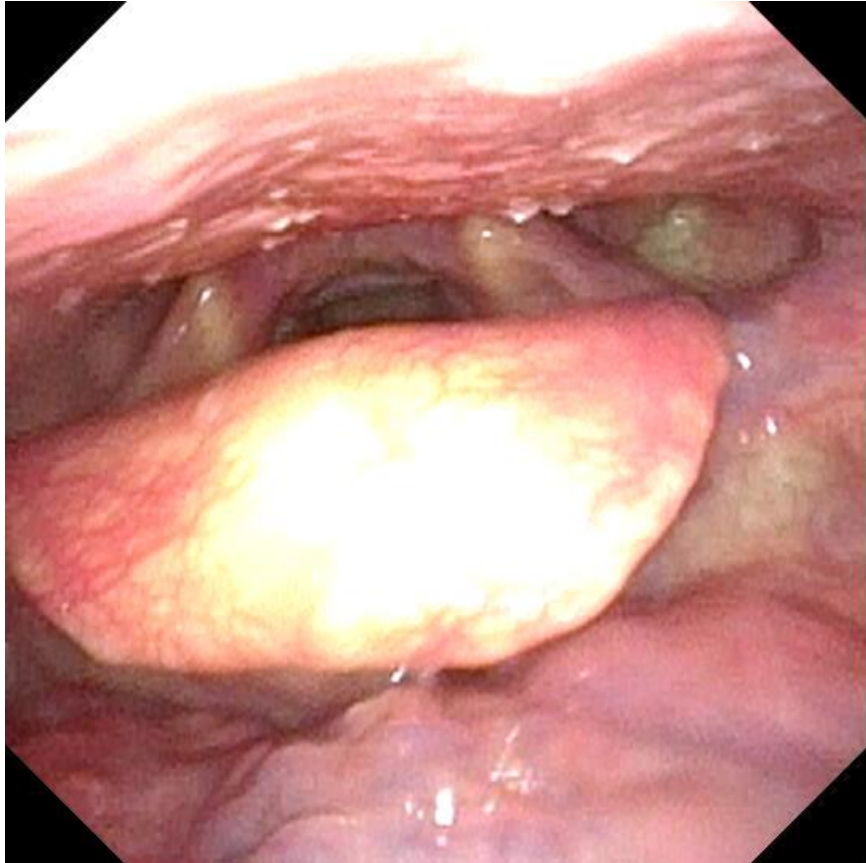
Parameter		value
mean age ± SD in years		68.4 ± 8.8
gender m/f		44/22
Hoehn & Yahr, n (%)		
	2	29 (43.9%)
	2,5	10 (15.2%)
	3	17 (25.8%)
	4	9 (13.6%)
	5	1 (1.5%)
normal bolus OD, n (%)		
	no signs	20 (30.3%)
	mild	38 (57.6%)
	moderate	5 (7.6%)
	severe	3 (4.5%)
mediation dysphagia, n (%)		
	no signs	22 (33.3%)
	mild	20 (30.3%)
	moderate	15 (22.7%)
	severe	3 (4.5%)
	very severe	6 (9.1%)



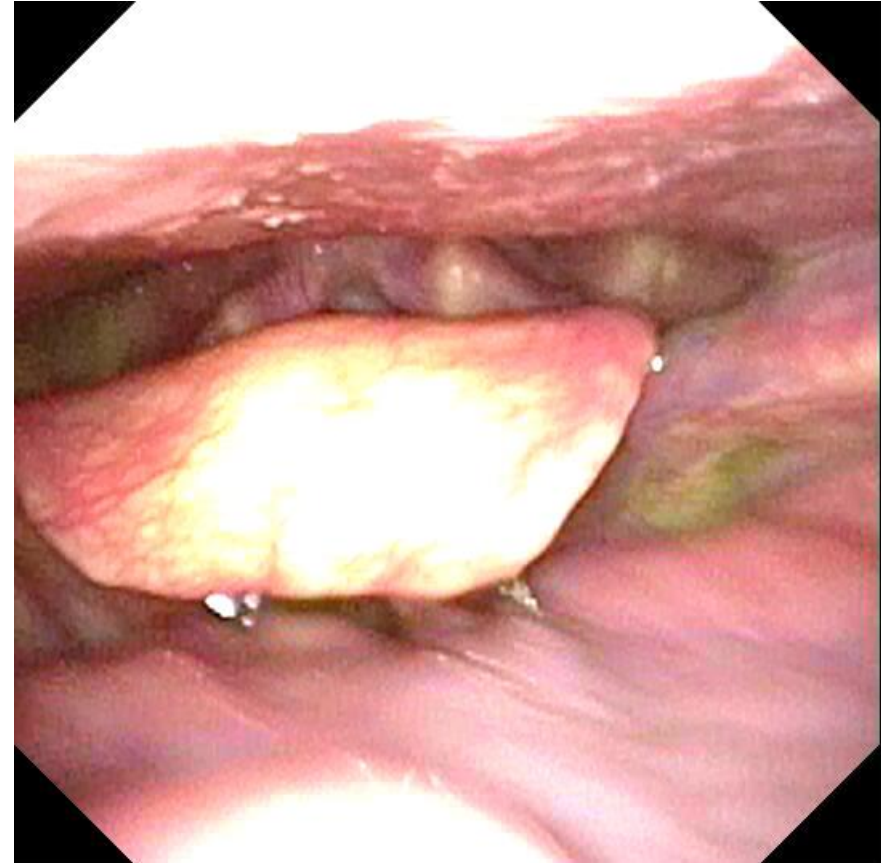
Medication Dysphagia Key Findings

- Interrater-Reliability:
 - swallowing efficiency: $\kappa=0.89$ ($p<0.001$)
 - swallowing safety $\kappa=0.86$ ($p<0.001$)
- Medication dysphagia predicted motor-complications in PD patients (beta-coefficient: 0.5; $p=0.006$).
- More severe difficulty with large tablet vs. small capsule and the small tablet.
- Moderate correlation between severity of normal bolus OD and medication dysphagia (Spearman's rho correlation coefficient: 0.39; $p=0.001$).
- 6 out of 9 subjects with severe or very severe medication dysphagia showed only mild or no normal bolus OD.

Illustrative Case

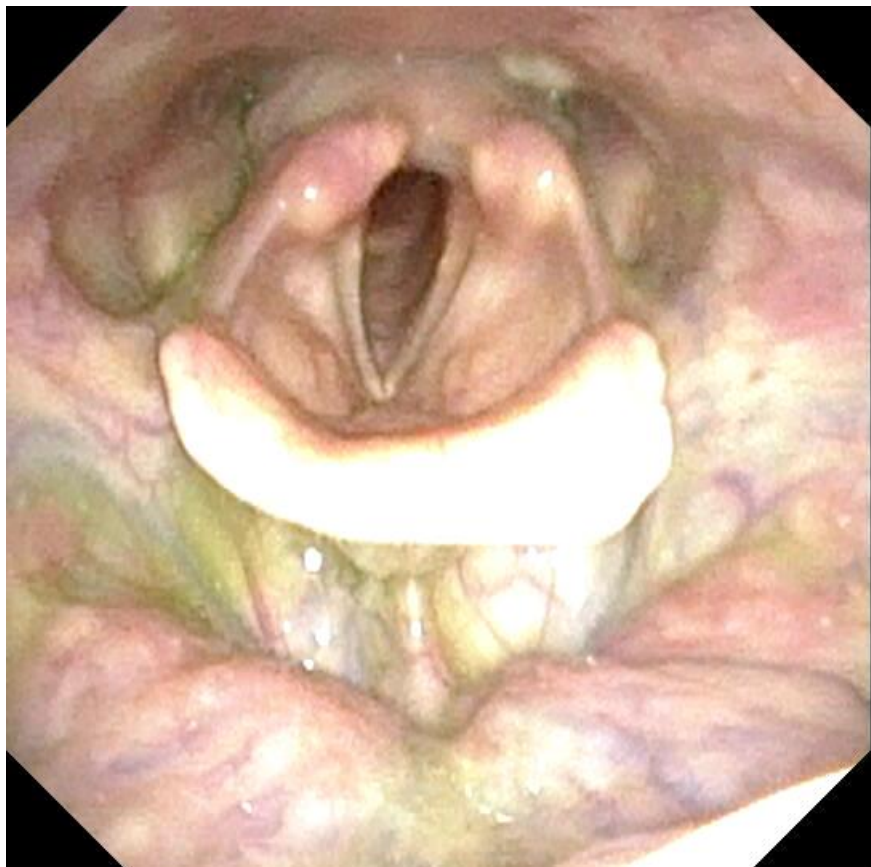


Impaired efficiency (1 = mild impairment)

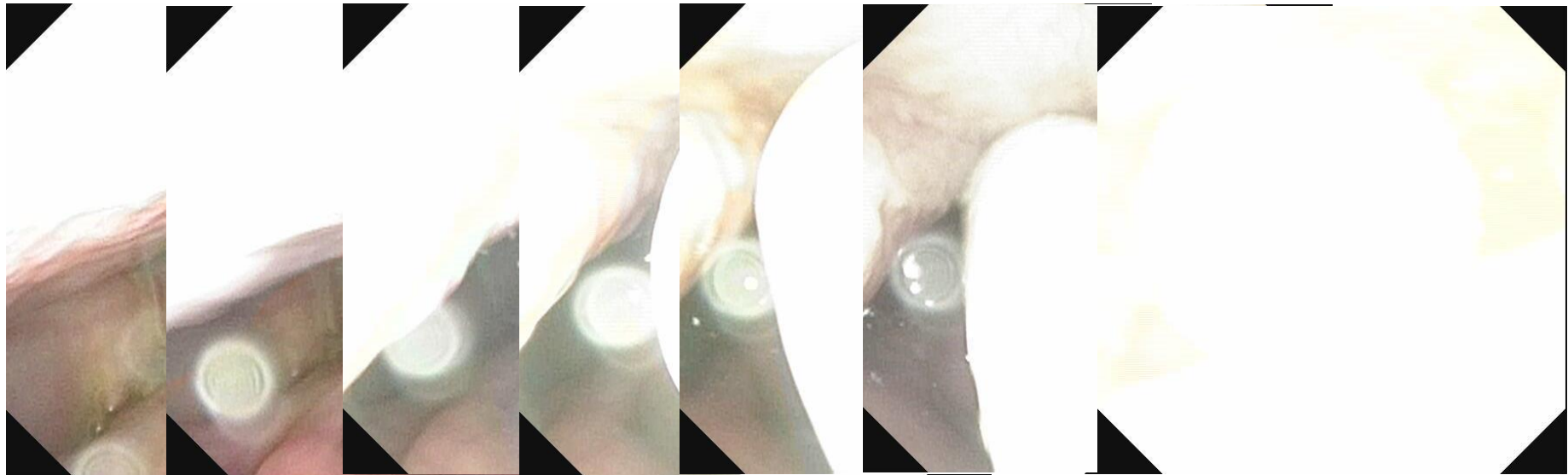


Impaired safety (2 = moderate impairment)

Final Question: In or Out?



Final Question: In or Out?

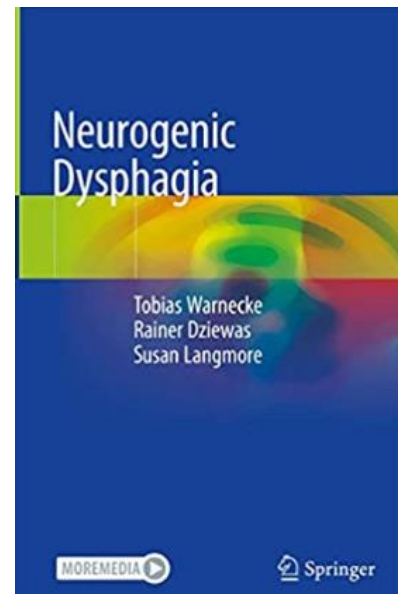
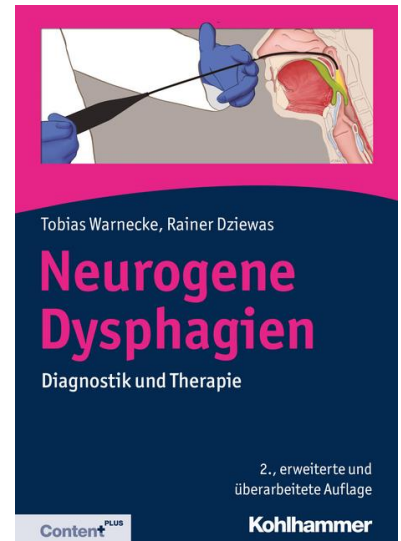


- The FEES-standard protocol outlines a general approach to comprehensively assess swallowing function.
- Specific protocols target particular clinical situations or patient groups, in particular
 - acute stroke (FEDSS)
 - tracheostomized patients (SESETD, FEES-LSR)
 - movement disorders (FEES-L-Dopa-Test, MSA-protocol, dual-task paradigm)
 - myasthenia gravis (Fatigable-Swallowing-Test, FEES-Tensilon-Test)
 - the ability to swallow medication (medication dysphagia score)
- These protocols focus on specific aspects of swallowing safety, swallowing efficiency and/or laryngeal movement patterns.
- Most of these protocols have been validated and have been used in the clinical context.

Thank you!



rainer.dziewas@klinikum-os.de





TECHNICAL PROCEDURES: CLEANING, STERILIZATION, AND PATIENT SAFETY

ESSD FEES Course
Münster September 23-24, 2024

Laura Baijens MD, PhD

Consultant Head & Neck Oncology Surgeon and Laryngologist

Department of Otorhinolaryngology, Head & Neck Surgery & GROW - Research
Institute for Oncology and Reproduction, Maastricht University Medical Center,
Maastricht, the Netherlands

DISCLOSURES

Financial disclosures or conflicts of interest of the speaker:

- Employee Maastricht UMC+
- Consultant for Phagenesis Limited, The Elms Courtyard, Bromesberrow, Ledbury, HR8 1RZ UK

OBJECTIVES OF THE PRESENTATION

- Describe steps to improve patient safety
- Identify cleaning & sterilization methods following FEES
- Describe new opportunities for sterilization

CARRY OUT FEES - PATIENT SAFETY – BASIC STEPS

- Standardization of FEES exam - check surface endoscope
- Gloves and close-fitting eyeglasses
- Do not apply topical anesthetic
- Insert and manipulate the endoscope to obtain the desired view
- Direct the patient through appropriate tasks
- Interpret and document findings in a written report
- Formulate treatment and management strategies
- Recording of FEES video and privacy protection



STANDARDIZATION CONSISTENCIES & SIP VOLUME



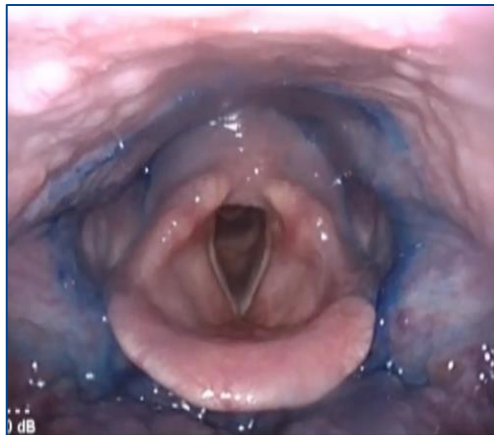
IDDSI 0 – 3 – 7 + 5% methylene blue

STANDARDIZATION ≠ RIGIDITY

- Setting
- Patient performance
- Clinical judgement
- Cognition
- Collaboration
radiology & clinician
-



SAFETY OF METHYLENE BLUE



METHYLENE BLUE IS SAFE

- ✓ Serious AEs (0.2%) related to high doses of methylene blue
- ✓ Non-serious AEs usually mild and dose-related
- ✓ MB for FEES is safe

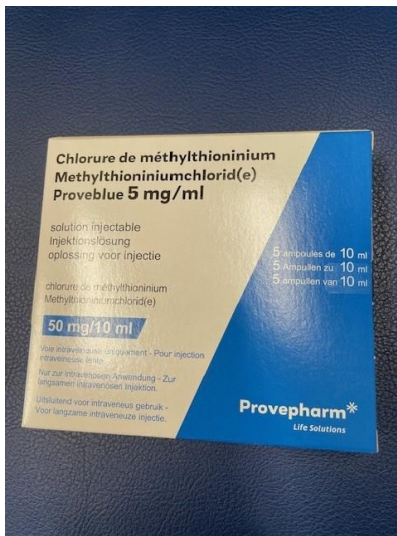
European Archives of Oto-Rhino-Laryngology
<https://doi.org/10.1007/s00405-020-06509-3>

REVIEW ARTICLE



Evaluating the safety of oral methylene blue during swallowing assessment: a systematic review

Bina Tariq¹ • Sorina R. Simon^{1,2,3} • Walmari Pilz^{1,4} • Andra Maxim¹ • Bernd Kremer^{1,2} • Laura W. J. Baijens^{1,2}



[Dysphagia](#). 2017; 32(6): 725–733.

PMCID: PMC5674114

Published online 2017 Aug 4. doi: [10.1007/s00455-017-9828-9](https://doi.org/10.1007/s00455-017-9828-9)

PMID: [28779300](https://pubmed.ncbi.nlm.nih.gov/28779300/)

European Society for Swallowing Disorders FEES Accreditation Program for Neurogenic and Geriatric Oropharyngeal Dysphagia

[R. Dziewas](#),^{✉1} [L. Baijens](#),^{2,3} [A. Schindler](#),⁴ [E. Verin](#),⁵ [E. Michou](#),⁶ [P. Clave](#),⁷ and The European Society for Swallowing Disorders

► [Author information](#) ► [Article notes](#) ► [Copyright and License information](#) [Disclaimer](#)

COMPLICATIONS OF FEES

- >6 studies; N>6000 patients
- Epistaxis <2%
- Laryngospasm <2%
- Vasovagal syncope <2%
- Self-limiting, no sequela
- FEES is safe and well-tolerated



European Archives of Oto-Rhino-Laryngology (2022) 279:2727–2742
<https://doi.org/10.1007/s00405-021-07161-1>

REVIEW ARTICLE

Phoniatricians and otorhinolaryngologists approaching oropharyngeal dysphagia: an update on FEES

Antonio Schindler¹  · Laura W. J. Baijens^{2,3}  · Ahmed Geneid⁴  · Nicole Pizzorni¹ 

Received: 18 May 2021 / Accepted: 26 October 2021 / Published online: 15 November 2021

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CLASSIFICATION BIOFILM ENDOSCOPE

- Fungi, yeast, and spores
- Bacteria and mycobacteria
- Viruses
- Parasites



POTENTIALLY TRANSMISSIBLE INFECTIONS

- HIV, hepatitis B, hepatitis C, Salmonella or mycobacteria
- Creutzfeldt-Jakob disease - spongiform encephalopathy – Avoid FEES



EVIDENCE-BASED

Conclusion of review by Collins et al. Otolaryngol Head Neck Surg.
2009 Sep;141(3):307-10.

- Important steps: manual cleaning, leak testing, cleaning with an enzymatic agent, high-level disinfection, and drying with vertical storage
- Three techniques:
 - 1) manual disinfection - wipes
 - 2) disposable endosheath
 - 3) automated endoscope reprocessor

(AER)

WIPES

- Wipes cleaning/disinfection of endoscope surfaces at bedside
- No access to AER the Tristel® 3 Wipe System
- Record keeping and traceability
- Not allowed anymore in our hospital



DISPOSABLE ENDOSHEATHS



STEPS OF CLEANING OF ENDOSCOPES

- Visual check endoscope & pre-cleaned
- Leak test & flow control
- Disinfectant and its disposal
- Washing machine (AER) = Gold Standard
- Rinse with bacteria-free water
- Dry the endoscope

CHECK THE INTEGRITY OF THE ENDOSCOPE

- Visual check immediately for scratches and/or cracks
- Wipe the entry part and control housing with a moisture gauge
- Leak test
- Flow control for channel



CHECK THE INTEGRITY OF THE ENDOSCOPE

- Do not dry used endoscopes before they enter the washing machine
- Never roll an endoscope
in a loop smaller
than 40 cm diameter
- Use leak test cap



CLEANING BEFORE STERILIZATION

- Before entering the washing machine, endoscopes should be pre-cleaned
- Use only water, or a compatible enzymatic Ph-neutral detergent
- Before the endoscope goes into a washing machine all chemical residues must be rinsed

WASHING MACHINES - AER



RINSE WITH BACTERIA-FREE WATER

- Filters
- UV
- UV with small amount of disinfectants

After this step no more disinfection

DRYING

- In the washing machine
- In a drying and storage cabinet
- Without proper drying:
up to 4 hours between
examinations




RECORD KEEPING AND TRACEABILITY

- Patient identity
- Nature of the procedure
- Serial number of the endoscope
- Washing machine used
- Operator's name (=clinician)
- Name of the person responsible for the cleaning and disinfection



DISPOSAL OF DISINFECTANTS

- On the sewage disposal facility (take care of local authorities)
- To storage vessel (control concentration)

 [Home](#) > [Clinical Resources](#) > [Endoscopy](#) > [Endoscopy Guidance](#) > 2020 Guidance o...

2020 Guidance on Decontamination of Equipment for Gastrointestinal Endoscopy

The Report of a Working Party of the British Society of Gastroenterology Endoscopy Committee

Summary

1. Decontamination of endoscopes should be undertaken by staff trained and educated in the procedures within dedicated and well-designed rooms. There should be one- way flow of endoscopes between dirty returns and clean dispatch areas to prevent cross contamination. Best practice is that there should be physical separation of dirty and clean procedures and areas, each with its own detailed procedures. The washroom area, if separated dirty and clean rooms are used, should have a negative pressure in comparison to the clean side. See Health Technical Memorandum (HTM) 01-06 part B. If a single room procedure is used, the room must be well designed to ensure a good and safe flow is well managed. Units should be moving away from single-room facilities and all new designs should have split rooms with clearly segregated clean and dirty areas.

2. Staff training should be implemented using a competency framework and should be documented and revalidated annually. Training should include an awareness of the channel configuration of all endoscopes, manual cleaning procedures and of the endoscope washer disinfectors (EWD) and available irrigation adaptors, and any post cleaning processes (e.g. controlled environment storage cabinets [CESCs]) or portable storage systems, such as vacuum packing, that may be in use. See HTM 01-06 part D. These systems must be checked on a regular basis and validated by the

FLEXIBLE ENDOSCOPE CLEANING & DISINFECTION GUIDE

For use with ENF-VH, ENF-V3, ENF-XP, ENF-P4, ENF-GP, ENF-V2, ENF-VQ, LF-P

PRECLEANING

1. Wipe the insertion tube



Gently wipe the external surfaces of the insertion tube with a cloth moistened in detergent solution.



LEAKAGE TESTING

2. Attach the tester



Attach the leakage tester to the working connector on the endoscope.

3. Apply pressure

When using MB-155 with MB-1 or the light source



Connect MB-155 to the maintenance unit (MB-1) or the light source and turn the power switch on.

OR

When using MB-2070A or MB-2080A or B2277



Close the pressure release valve. Press the hand pump so that the pointer stops within the green area.

4. Observe



Inflate the entire endoscope in water, observe for 30 seconds while angulating the bending section and confirm that there is no continuous series of bubbles.

5. Detach the tester



Remove the endoscope from the water and release the air pressure in the endoscope. Detach the leakage tester from the endoscope.

MANUAL CLEANING

6. Clean the surfaces



Immerse the endoscope in detergent solution. Using a lint-free cloth, gently wipe all debris from the endoscope's external surfaces. Soak in detergent solution for the recommended time.

7. Rinse the endoscope



Immerse the endoscope in water. Using a clean, lint-free cloth, thoroughly rinse and wipe the endoscope.

8. Wipe the surfaces



Remove the endoscope from water. Use a soft lint-free cloth to remove excess moisture from the endoscope and cleaning accessories in preparation for disinfection.

DISINFECTION

9. Disinfect the endoscope



Immerse the endoscope in the disinfectant solution. Soak for the time specified by manufacturer.

RINSING

10. Rinse the surfaces



Remove the endoscope from the disinfectant solution and immerse in water. Using a sterile, lint-free cloth, thoroughly rinse and gently wipe all external surfaces.

11. Wipe the surfaces



Gently wipe and dry the endoscope with a sterile, lint-free cloth.

12. Wipe the surfaces with alcohol



Using a sterile, lint-free cloth moistened with alcohol, thoroughly and gently wipe the external surfaces of the endoscope.

NEW OPPORTUNITY: UV LIGHT REPROCESSING

- UV-C-disinfection of endoscopes without working channel
- Is being studied
- Less/no water, less electrical current, no chemicals, no CO₂
- Cost-effective



UV-C LIGHT

The Effectiveness of Ultraviolet Smart D60 in Reducing Contamination of Flexible Fiberoptic Laryngoscopes

Uche C. Ezech, MS ; Efstratios Achlatis, MD;
Tyler Crosby, MD; Paul E. Kwak, MD; Michael S. Phillips, MD; Milan R. Amin, MD

Objective: To compare the effectiveness of disinfection protocols utilizing a ultraviolet (UV) Smart D60 light system with Impelux™ technology with a standard Cidex *ortho*-phthalaldehyde (OPA) disinfection protocol for cleaning flexible fiberoptic laryngoscopes (FFLs).

Methods: Two hundred FFLs were tested for bacterial contamination after routine use, and another 200 FFLs were tested after disinfection with one of four methods: enzymatic detergent plus Cidex OPA (standard), enzymatic detergent plus UV Smart D60, microfiber cloth plus UV Smart D60, and nonsterile wipe plus UV Smart D60. Pre- and post-disinfection microbial burden levels and positive culture rates were compared using Kruskal-Wallis ANOVA and Fisher's two-sided exact, respectively.

Results: After routine use, approximately 56% (112/200) of FFLs were contaminated, with an average contamination level of $9,973.7 \pm 70,136.3$ CFU/mL. The standard reprocessing method showed no positive cultures. The enzymatic plus UV, microfiber plus UV, and nonsterile wipe plus UV methods yielded contamination rates of 4% (2/50), 6% (3/50), and 12% (6/50), respectively, with no significant differences among the treatment groups ($p > 0.05$). The pre-disinfection microbial burden levels decreased significantly after each disinfection technique ($p < 0.001$). The average microbial burden recovered after enzymatic plus UV, microfiber plus UV, and nonsterile wipe plus UV were 0.40 CFU/mL ± 2 , 0.60 CFU/mL ± 2.4 , and 12.2 CFU/mL ± 69.5 , respectively, with no significant difference among the treatment groups ($p > 0.05$). *Micrococcus* species (53.8%) were most frequently isolated, and no high-concern organisms were recovered.

Conclusion: Disinfection protocols utilizing UV Smart D60 were as effective as the standard chemical disinfection protocol using Cidex OPA.

Key Words: UV disinfection, flexible fiberoptic laryngoscope, semi-critical device.

Level of Evidence: NA

Laryngoscope, 133:3512-3519, 2023

UV-C LIGHT





Received: 2 June 2023 | Accepted: 21 September 2023

DOI: 10.1111/coa.14119

ORIGINAL ARTICLE

shutterstock.com · 1813929497

Is ultraviolet light disinfection fit to be the future standard for the disinfection of flexible endoscopes without a working channel?

Yana Halmans¹  | David J. Wellenstein¹  | Michael Romijn¹ | Suzan Cremers² | Jannie J. Smit³ | Joost Hopman⁴ | Robert P. Takes¹ | Guido B. van den Broek¹

UV-C LIGHT



Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin



Review

Shedding a light on ultraviolet-C technologies in the hospital environment

N. Demeersseman^a, V. Saegeman^a, V. Cossey^a, H. Devriese^b, A. Schuermans^{a,*}

^aDepartment of Infection Control and Prevention, University Hospitals Leuven and Catholic University Leuven, Leuven, Belgium

^bDepartment of Prevention and Environment, University Hospitals Leuven and Catholic University Leuven, Leuven, Belgium

ARTICLE INFO

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UV-C disinfection

Light source

Dose

Repair mechanism

Photoreactivation

Standards



SUMMARY

Ultraviolet (UV)-C light for disinfection has experienced a surge in popularity since the outbreak of COVID-19. Currently, many different UV-C systems, with varied properties that impact disinfection performance, are available on the market. **Therefore this review aims to bundle the available information on UV-C disinfection to obtain an overview of its advantages, disadvantages, and performance-influencing parameters.** A literature search was performed using the snowball search method in Google Scholar and PubMed with the following keywords: UV-C disinfection, UV-C dose, UV-C light source, UV-C repair mechanism, UV-C photoreactivation, and UV-C disinfection standards. The main parameters of UV-C disinfection are wavelength, dose, relative humidity, and temperature. There is no consensus about their optimal values, but, in general, light at a high dose and a spectrum of wavelengths containing 260 nm is preferred in an environment at room temperature with low relative humidity. This light can be generated by mercury-vapour, light-emitting diode (LED), pulsed-xenon, or excimer lamps. Multiple factors are detrimental to disinfection performance such as shadowing, a rough surface topography, a high level of contamination, repair mechanisms, and the lack of standardization. Also, there are health and safety risks associated with the UV-C technology when used in the proximity of people. **UV-C disinfection systems have promising features and the potential to improve in the future. However, clarifications surrounding the different parameters influencing the technologies' effectiveness in hospital environment are needed. Therefore UV-C disinfection should currently be considered for low-level rather than high-level disinfection.**

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Biadsee et al.
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<https://doi.org/10.1186/s40463-022-00610-9>

Journal of Otolaryngology -
Head & Neck Surgery

ORIGINAL RESEARCH ARTICLE

Open Access



Cost minimization analysis of nasopharyngoscope reprocessing in community practice

Ameen Biadsee^{1,2,3}, Lauren Crosby⁴, Winsion Chow⁵ and Leigh J Sowerby^{1,*}

Abstract

Background Reprocessing of nasopharyngoscopes represents a large financial burden to community physicians. The aim of this study was to perform a cost analysis of nasopharyngoscope reprocessing methods at the community level.

Methods Electronic surveys were distributed by email to community otolaryngologists. Surveys were comprised of 14 questions assessing clinic size, nasopharyngoscope volume, scope reprocessing method and maintenance. Four manual techniques were evaluated: (1) soak with ortho-phthalaldehyde solution (Cidex-OPA; Advanced Sterilization Products, Johnson and Johnson Inc., Markham, Canada), (2) soak with accelerated hydrogen peroxide solution (Revital-Ox; Steris Canada Inc., Mississauga, Canada), (3) disinfection with chlorine dioxide wipe (Tristel Trio Wipes System; Tristel plc, Cambridgeshire, UK), (4) UV-C light system (UV Smart, Delft, The Netherlands). All costs are reported in CAD, and consumable and capital costs for reprocessing methods were obtained from reported vendor prices. Time costs were derived from manufacturer recommendations, the Ontario Medical Association Physician's Guide to Uninsured Services, and the Ontario Nurses Association Collective Agreement. Cost analyses determined the most cost-effective reprocessing method in the community setting. Sensitivity analyses assessed the impact of reprocessing volume and labour costs.

Results Thirty-six (86%) otolaryngologists responded and answered the survey. **The cost per reprocessing event for Cidex-OPA, Revital-Ox, Tristel and UV system were \$38.59, \$26.47, \$30.53, and \$22.74 respectively when physicians reprocessed their endoscopes themselves.** Sensitivity analyses demonstrated that **Revital-Ox was the least costly option in a low volume**, however, the **UV system remained the most cost effective in higher volumes**. The cost per reprocessing event when done by clinic staff was \$5.51, \$4.42, \$11.23 and \$6.21 for Cidex-OPA, Revital-Ox, Tristel and the UV system.

SINGLE-USE ENDOSCOPES



TAKE HOME MESSAGE

1. Standardization of FEES examination and training
2. FEES is well tolerated and safe
3. Follow regulation of your country and protocols of your hospital
4. Ask the manufacturer to validate the process



VIDEO



THANK YOU VERY MUCH FOR YOUR ATTENTION





WHEN TO BE ALERT: IMPORTANT ENT-FINDINGS

ESSD FEES Course Münster September 23-24, 2024

Laura Baijens MD, PhD

Consultant Head & Neck Oncology Surgeon and Laryngologist

Department of Otorhinolaryngology, Head & Neck Surgery & GROW - Research
Institute for Oncology and Reproduction, Maastricht University Medical Center,
Maastricht, the Netherlands

DISCLOSURES

Financial disclosures or conflicts of interest of the speaker:

- Employee Maastricht UMC+
- Consultant for Phagenesis Limited, The Elms Courtyard, Bromesberrow, Ledbury, HR8 1RZ UK

SHINE THROUGH



Sometimes you can see
from the outside what
is happening inside

OBJECTIVES OF THE PRESENTATION

- Describe coincidental findings during FEES
- Identify red flags
- Quiz and award

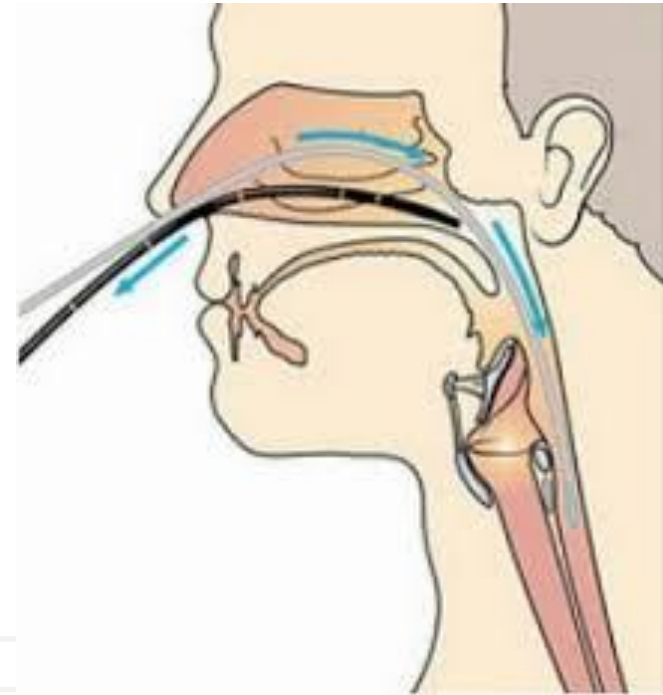


‘Knowledge is power;
Knowing what you don't know is
wisdom’

Adam Grant

EVALUATION ANATOMY UPPER AERODIGESTIVE TRACT

- (Para)nasal cavity
- Velum and nasopharynx
- Oropharynx and tongue base
- Hypopharynx
- Larynx
- Subglottic region



CLASSIFICATION OF FINDINGS

- Infection
- Congenital disorders
- Neoplasms
- Reflux disease
- Autoimmune disease
- Cervical spine degeneration
- Iatrogenic (postsurgical - postradiation presentations, etc.)
- Neurological diseases
- Spectrum of 'normal' anatomy

CLASSIFICATION OF FINDINGS

- Infection
- Congenital disorders
- **Neoplasms**
- Reflux disease
- Autoimmune disease
- Cervical spine degeneration
- Iatrogenic (postsurgical - postradiation presentations, etc.)
- Neurological diseases
- Spectrum of 'normal' anatomy

MALIGNANT NEOPLASMS

- Squamous cell carcinoma 80-85% (smokers - HPV)
- Adenocarcinoma (woodworkers)
- Nasopharyngeal carcinoma - EBV (East Asia - Africa)

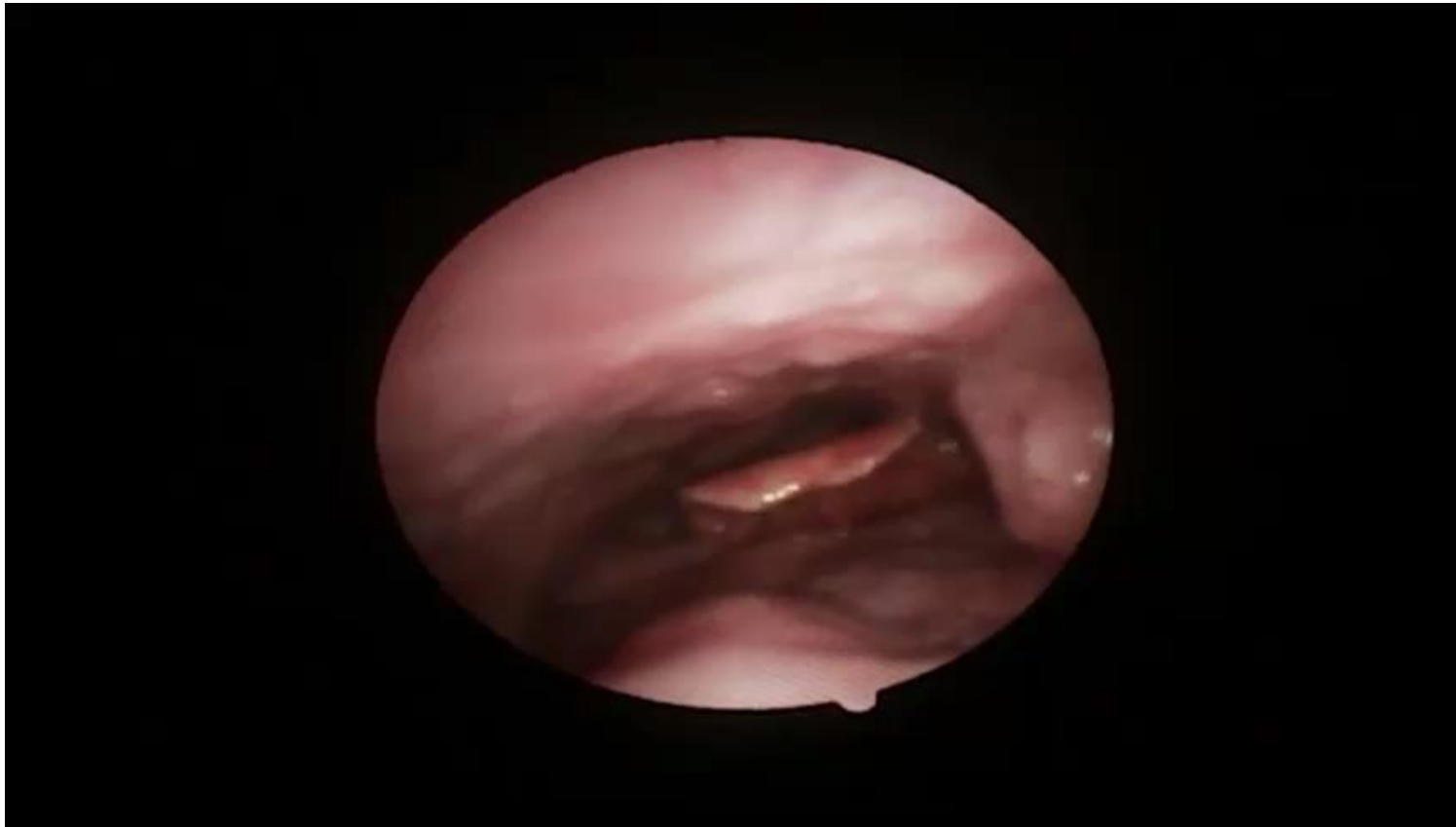
MALIGNANT NASAL NEOPLASMS



MALIGNANT PHARYNGEAL NEOPLASMS



OROPHARYNX CARCINOMA



OROPHARYNX CARCINOMA



LARYNX CARCINOMA



LARYNX CARCINOMA



LARYNX CARCINOMA

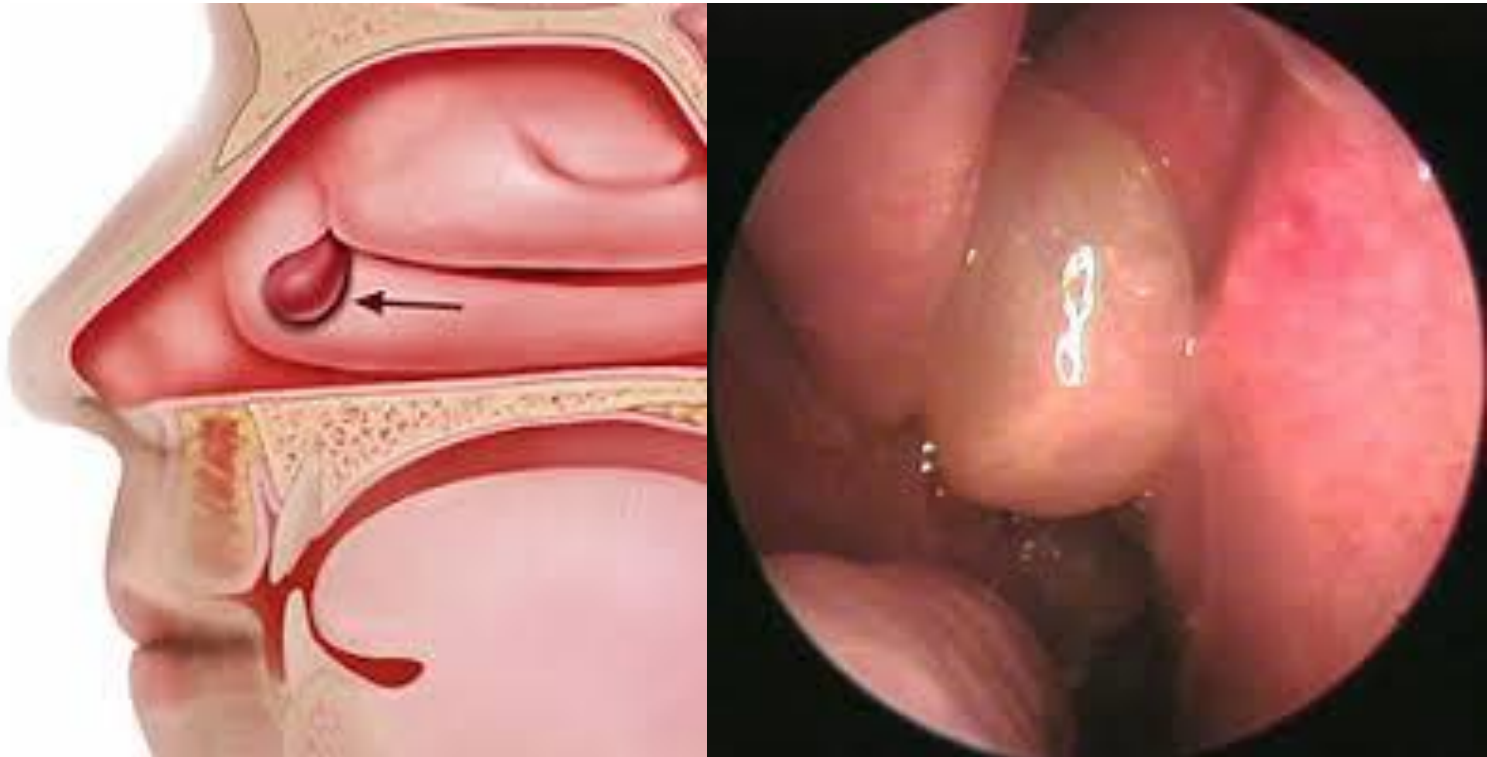


BENIGN NEOPLASMS

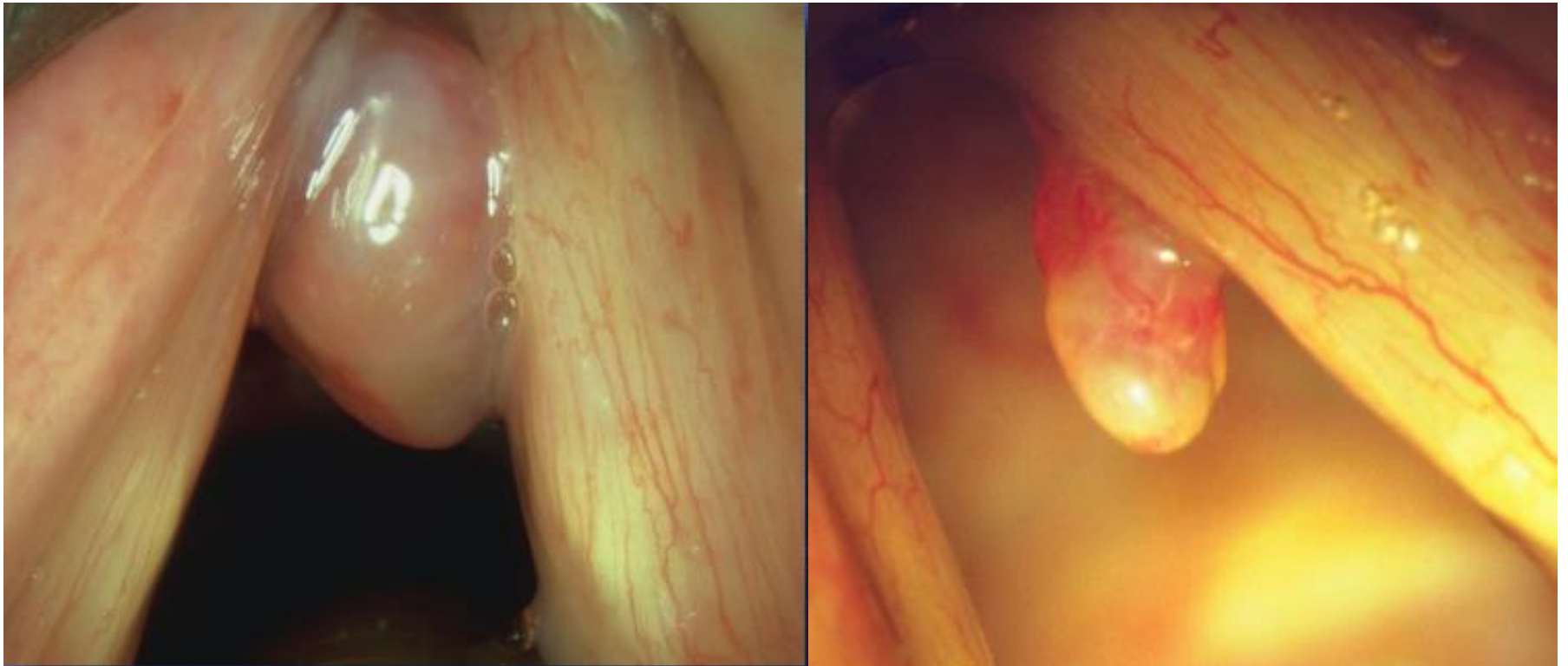
- Polyps
- Cysts
- Granulomas
- Papillomas
- Hypertrophic inferior turbinates
-

QUIZ

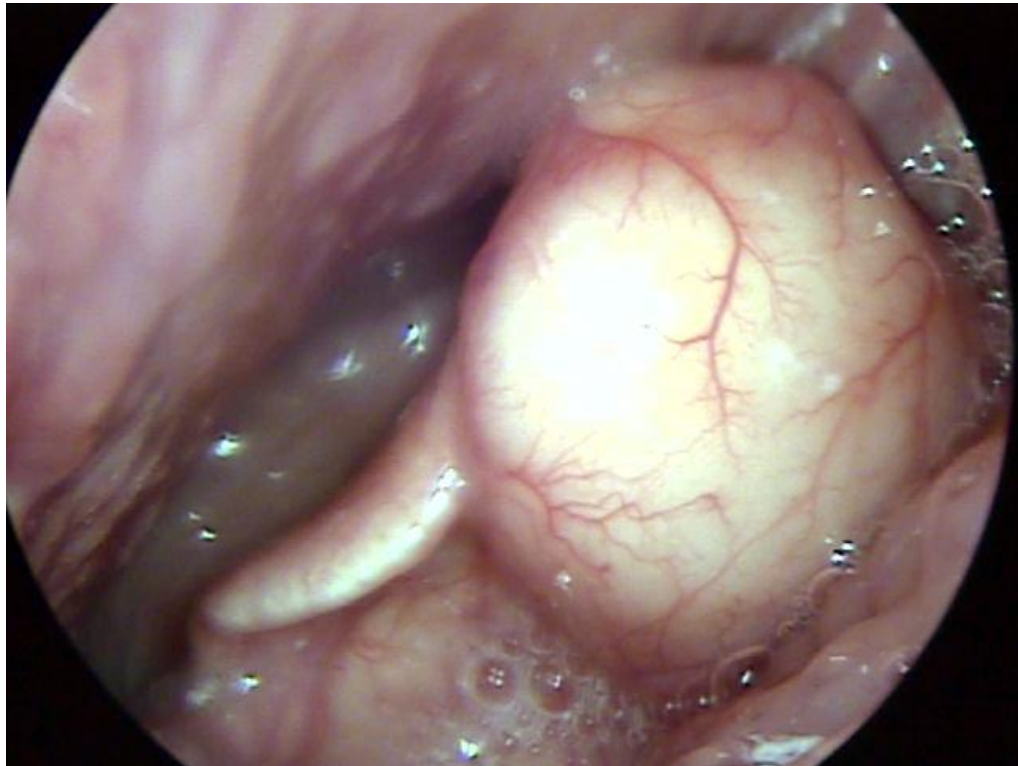
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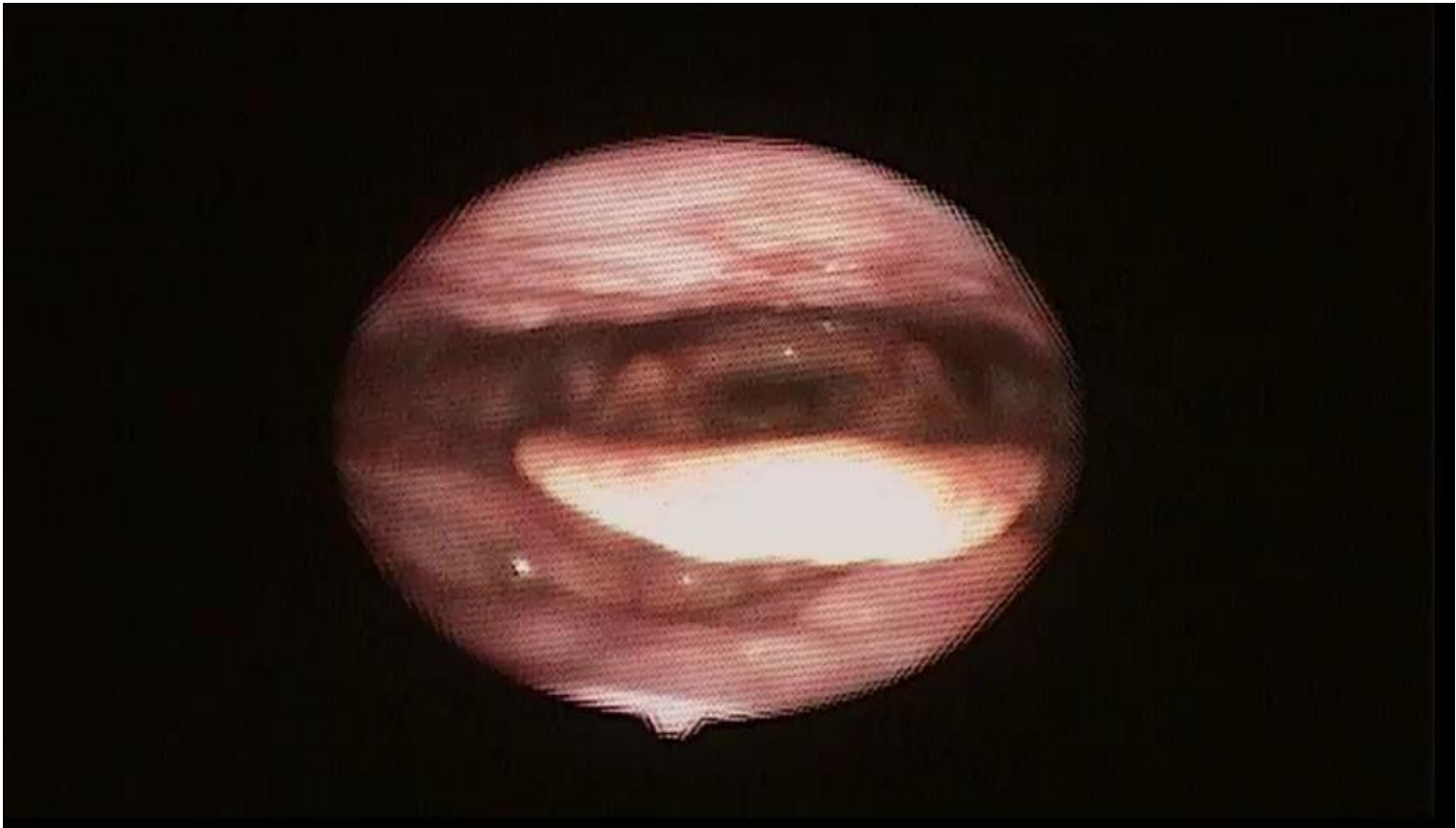
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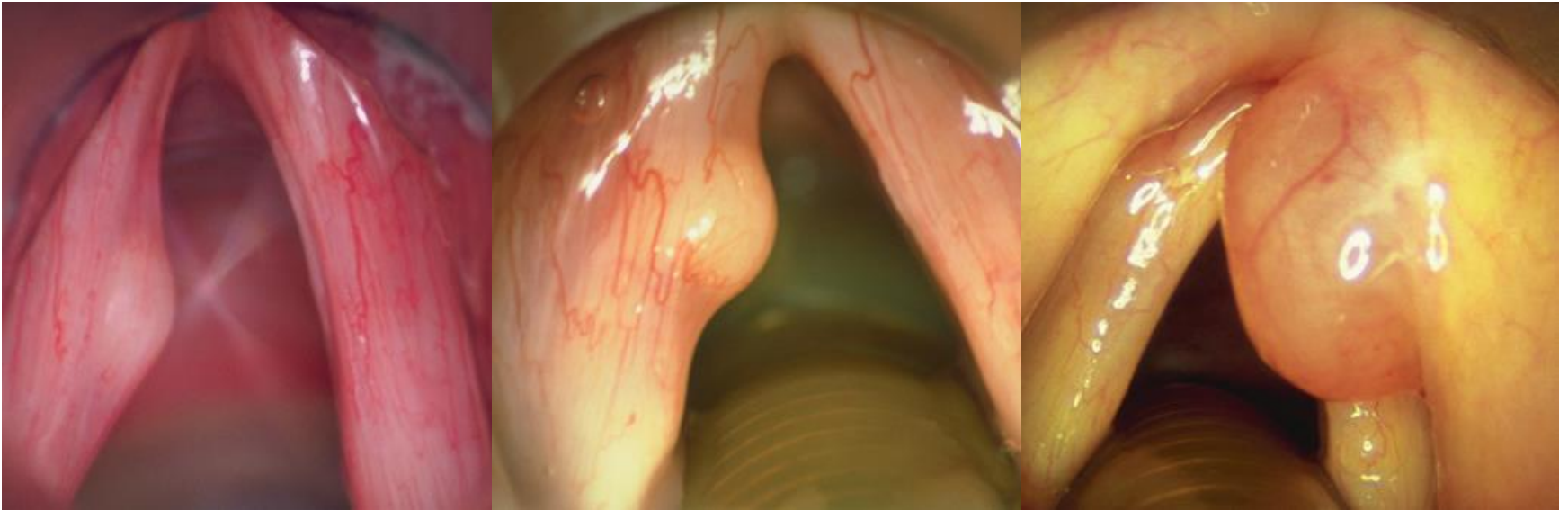
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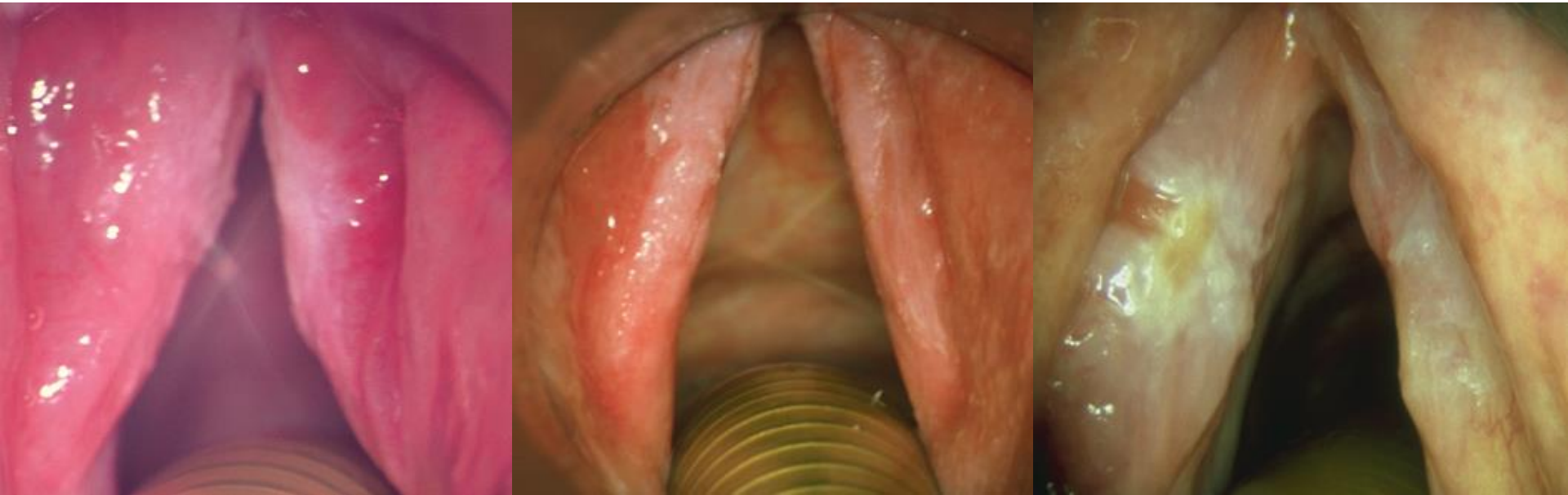
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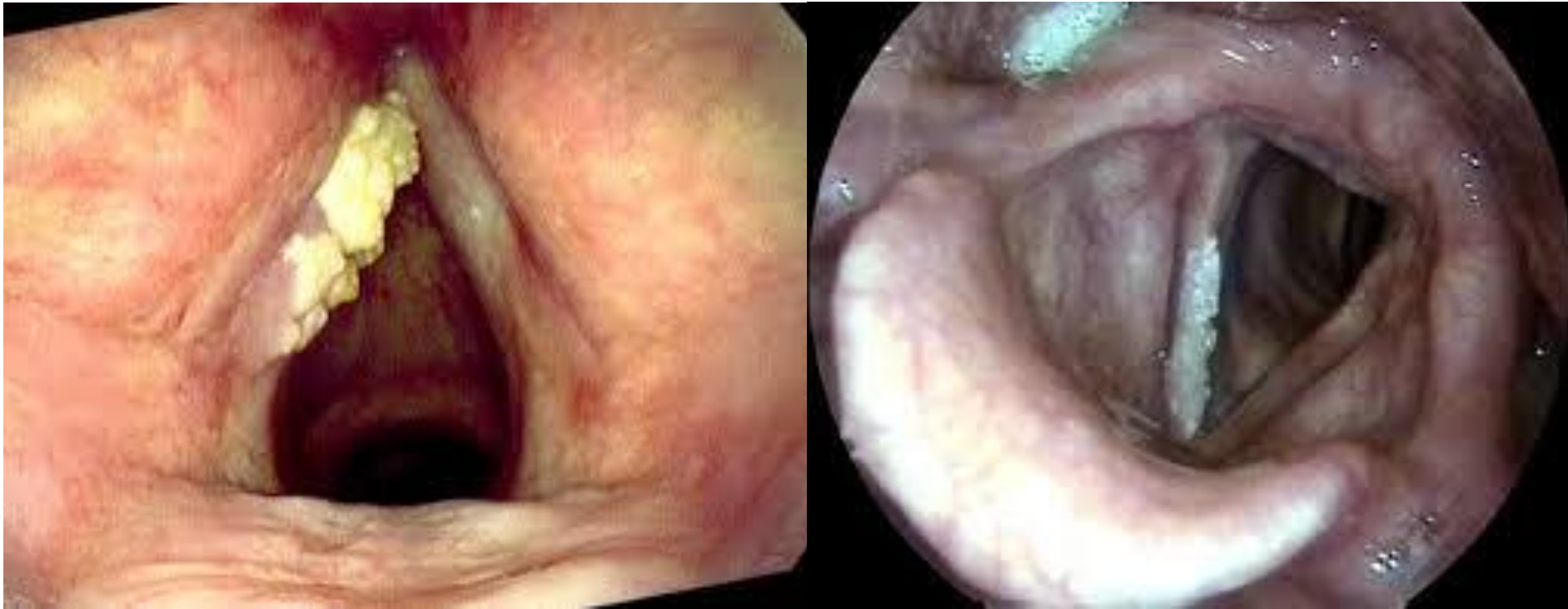
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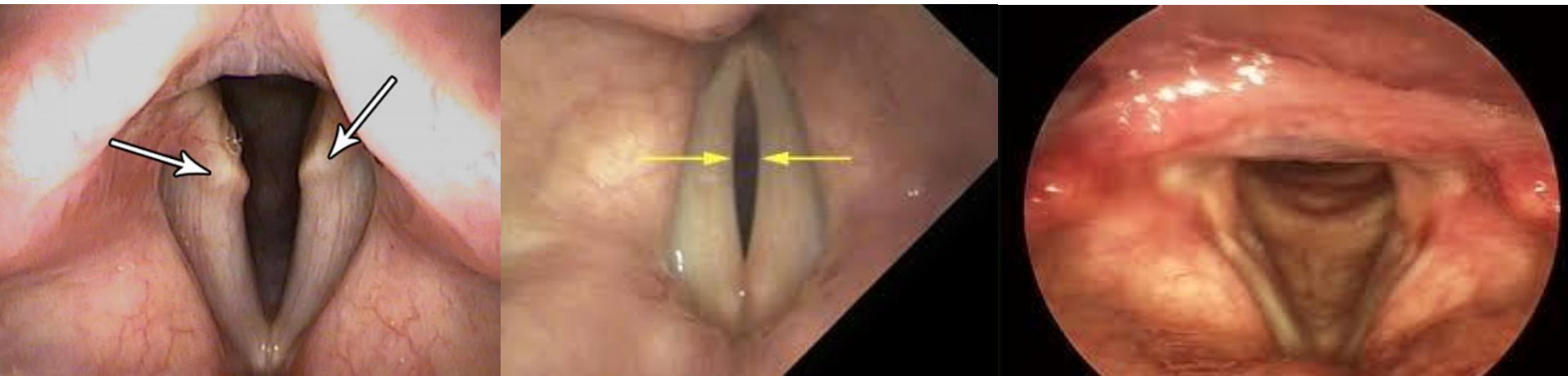


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TROPHY



TAKE HOME MESSAGE



- Stay alert to coincidental abnormalities on any topographic level (Cancer & Neurological disorders)
- Incorrectly interpreting endoscopic findings can endanger patient safety
- Interdisciplinary teamwork necessary!

Thank you very much for
your attention.

Questions?

