Flexible Fiberoptic Workshop: Advanced Course

Marti Felder, PA-C

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Flexible Fiberoptic Workshop: Advanced Course

- Basic Instruction
- Demonstration
- Hands-On Practice

Learn by doing

- Identify abnormal pathology
- Perform flexible endoscopy adult
- Perform flexible endoscopy child/infant
- Perform rigid endoscopy
Introduction

There are multiple methods and techniques available to successfully complete all the topics presented in this workshop. Some are based on patient request, available equipment or supervising physician’s preference.

The goal of this workshop is to correctly demonstrate the most common methods and give participants time for hands on training.
Objectives

Learning Objectives

• Identify normal anatomy, normal variants and abnormal findings visible via flexible fiberoptic nasopharyngoscopy.

• Understand indications and perform flexible and rigid scope examination adult.

• Understand indications and perform flexible scope examination child/infant.

• Perform intranasal culture and sinus debridement using rigid scope adult.
Indications for Fiberoptic Endoscopy (FOE)

- Strong gag reflex*
- Failed mirror exam*
- Nasal obstruction
  - Foreign Body
  - Septal deviation
  - Adenoid hypertrophy
  - Nasal mass
  - Unilateral otitis media
  - Polyps
- Sinusitis
- Chronic throat pain
- Chronic cough
- Dysphonia
  - Presbylarynx
  - VC paralysis
  - VC Nodules
  - LPR
  - Neoplasms
- Dysphagia
  - Cadidiasis
- Odynophagia
- Symptoms of aspiration
  - Laryngomalacia
  - Angioedema

*Documentation of a strong gag reflex and failed mirror exam should be included in note to justify procedure for billing purposes.
Contraindications

• Epiglottitis (by inexperienced)
• Relative:
  – Coagulopathy
  – Craniofacial trauma
Know Your Anatomy

- Forehead
- Nose
- Lips
- Tongue
- Voicebox
- Uvula
- Neck
- Inferior nasal turbinate
- Tongue
- Vallecula
- Epiglottis
- Vocal cords
- Hyoid
- Hyoepiglottic ligament
- Thyroid cartilage
- Trachea
- Cricoid cartilage
- Esophagus
Laryngeal Anatomy (Mirror*)

1. True vocal cords
2. False cords
3. Epiglottis
4. Aryepiglottic folds
5. Arytenoids
6. Pyriform sinuses
7. Base of Tongue

*Mirror Laryngoscopy, image is inverted.
Laryngeal Anatomy (FOE*)

True Vocal Cords abducted  True Vocal Cords adducted

*Fiberoptic endoscopy, image is true.
Review Tips For Starting the Exam

• Patient informed of the procedure (obtain consent)
• Proper positioning
  – Sniffing, head supported, use non-dominant hand to steady the pts. Head
  – Choose the most patent of the nares
• Appropriate equipment
  – Adult vs Pedi
  – Decongestant/anesthetic
  – Gloves
  – Chair
  – Photographic/video accessories
  – Biopsy materials if needed
  – Lubricant +/-
Preparation for FOE

- May want patient to blow nose.
- Assess most patent of nares.
- Antifogging solution.
- Apply topical decongestant
  - 0.05% Oxymetazoline
  - 0.25% -2 % Phenylephrine
- Apply topical anesthetic
  - 4% Lidocaine
  - Pontacaine

Photo Courtesy Bernadine Sonnier 2011
Normal FOE

Video

Video Courtesy J. Mercado
Causes of Nasal Obstruction

Nasal Foreign Body
Septal deviation
Synechiae
Turbinate hypertrophy
Sinusitis
Adenoid hypertrophy
Nasopharyngeal masses
Nasal polyps
Septal Deviation/
Turbinate Hypertrophy
• Fused intranasal tissue is called an adhesion or synechiae.
• Adhesions are a common, usually minor complication of nasal or sinus surgery and nasal packing.
• They also may develop because of trauma (nose-picking or cocaine use) and such conditions as syphilis, tuberculosis, lupus, or sarcoidosis.
Nasal Polyps

Video Courtesy J. Mercado
Nasal Polyps

- Nasal polyps are common, noncancerous, teardrop-shaped growths that form in the nose or sinuses, usually around the area where the sinuses open into the nasal cavity.
- Mature nasal polyps look like seedless, peeled grapes

Top image polyps viewed via nasal speculum.
Bottom image polyps viewed via fiberoptic intranasal exam.
Sinusitis

Video

Video Courtesy J. Mercado
Sinusitis
Sinusitis

- Sinusitis is diagnosed by history and physical examination.
- Fiberoptic endoscopy (flexible or rigid) is ideal for evaluating the osteomeatal complex.

*Image of fungal sinusitis. Note thick debris vs purulent secretions in previous images.*
Adenoid Hypertrophy

Video

Video Courtesy J. Mercado
Adenoid Hypertrophy

Adenoids are described based on % of obstruction
  - No obstruction
  - Partial (percentage) obstruction
  - Complete obstruction

• Endoscopic view of the nasopharynx showing adenoidal obstruction of the choana.
Angiofibroma

Video

Video Courtesy J. Mercado
Juvenile Angiofibroma

Juvenile angiofibroma – benign, highly vascular invasive mass that occurs in the posterior nasal cavity in less than 0.5% of head and neck tumors.

Almost always found in adolescent boys.

Presents with epistaxis and nasal congestion or both.

CT Scan w/contrast confirmed nasopharyngeal mass measuring 4.0 cm x 3.8 cm consistent with a juvenile angiofibroma.
A Tornwaldt cyst is a midline pouch within the posterior roof of the nasopharynx which is caused by an adherence of the notochord to the pharyngeal ectoderm during development, resulting in the outpouching of ectoderm into the pharyngobasilar fascia.

They are typically asymptomatic but may present with middle ear symptoms (eustachian tube obstruction), halitosis (when associated with a leaking sinus tract), foul taste in mouth, and, rarely, occipital headaches.

These lesions will demonstrate low to increased signal on T1-weighted images depending on the protein content of the mucus. They will be high signal on T2-weighted images and will not enhance.
Unilateral Otitis Media

Unilateral Otitis Media in adults should raise suspicion of Nasopharyngeal mass blocking Eustachian Tube orifice which can cause unilateral middle ear effusion.

- 1.5:100,000 patients, more common in Asian and Alaskan people 20:100,000
- Top image normal Torus Tubarius
- Bottom image opening covered with mucosal tissue (squamous cell carcinoma).
Voice Change

Voice overuse/misuse
Vocal cord nodules/polyps
Laryngopharyngeal Reflux
Vocal Cord Paralys
Presbylarynx
Laryngeal neoplasms
Vocal Cord Paralysis

Video Courtesy M. Mitrani
Vocal Cord Nodules, LPR

Video Courtesy J. Mercado
Laryngeal Cancer

Video

Video Courtesy J. Mercado
Cervical Osteophyte
Cervical osteophytes are bone spurs that grow on any of the seven vertebrae in the cervical spine (C1 - C7 vertebrae).

More than half of people over the age of 60 have osteophytes somewhere in their bodies. Osteophytes in the spine are a normal sign of aging and usually do not cause symptoms. However, neurological symptoms or pain may occur if the osteophytes encroach upon the individual spinal nerves, the spinal cord itself, the vertebral discs, or the blood vessels in the region of the cervical vertebral column.

The inflamed or damaged tissue that stimulates cervical osteophyte growth is often caused by cervical osteoarthritis, a degradation in the neck joints that occurs in many older people. These joints include the disc spaces themselves (a modified joint) and the facet joints, and this condition of cervical osteophyte formation is referred to as cervical spondylosis.
Adult Mannequin

Advanced airway and custom mannequins available to practice flexible fiberoptic endoscopy technique.
Task: Practice flexible endoscopy


2. Position patient.

3. Apply topical anesthetic & decongestant nose.

4. Perform flexible naso/laryngeal endoscopy.

5. Direct laryngoscopy provides detail view of nasal passage and vocal cord function.

6. Remove endosheath and maintain clean technique.

Fiberoptic Laryngoscopy, image is true.
Respiratory Complications

Children
• Must rule out foreign body aspiration
  • Choanal Atresia
  • Laryngomalacia
  • Subglotticstenosis

Adults
• Angioedema
Flexible fiberoptic exam on children.

- Generally well tolerated by children.
- Explain procedure in detail.
- Secure patient (papoose vs. cradle).
- Anesthesia vs. decongestant?
- Give adequate time for anesthesia/decongestant.
- Provides better visualization
Flexible fiberoptic exam on infants.

- Generally well tolerated by infants.
- Explain procedure in detail.
- Secure patient (papoose vs. cradle)
- Anesthesia vs. decongestant?
- Give adequate time for anesthesia/decongestant.
- Provides better visualization
Flexible fiberoptic exam on infants and children

Evaluating pediatric airway via flexible fiberoptic

• Assess nares/choanae (choanal atresia)
• Assess adenoid and lingual tonsil (hypertrophy)
• Assess Airway
  – Epiglottis (laryngomalacia)
  – TVC mobility (paralyzed vocal cords)
  – Assess laryngeal structures (stenosis)
  – Foreign bodies
Flexible fiberoptic exam on infants and children

• A child's airway differs from that of an adult in that the child's tongue is proportionately larger in the oropharynx compared to that of an adult.

• A child's airway is smaller, softer and more prone to foreign body obstruction.

• The trachea is usually about the diameter of a pencil.
Flexible fiberoptic exam on infants and children

### Difference Pediatric vs Adult Airway

<table>
<thead>
<tr>
<th>Relatively larger tongue</th>
<th>Angled vocal cords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively larger tongue</td>
<td>Infant’s vocal cords have more angled attachment to trachea, whereas adult vocal cords are more perpendicular</td>
</tr>
<tr>
<td>Obstructs airway</td>
<td></td>
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<tr>
<td>Obligate nasal breathers</td>
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<tr>
<td>Difficult to visualize larynx</td>
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</tbody>
</table>

- Infant’s vocal cords have more angled attachment to trachea, whereas adult vocal cords are more perpendicular.
Laryngomalacia

Video

Video Courtesy J. Mercado
Laryngomalacia

- Most common congenital abnormality of the larynx.
- Most prominent SX – **inspiratory stridor**.
- Immature development results in soft laryngeal walls that close airway.
- Child outgrows, Usually, No treatment necessary,
- Omega Shaped epiglottis
Subglottic Stenosis

Narrowing of subglottis can be congenital or acquired in etiology. Its nature can be membranous, cartilaginous, or mixed, with or without combination of glottic or upper tracheal stenosis.

The lower limit of normal subglottis dimension in full term infant is 4.0 mm and in premature infant 3.5 mm. Circumferential edema of 1mm reduces its cross-sectional area by 60%.

Myer-Cotton grading system is a useful classification for mature circumferential subglottic stenosis. It is divided into 4 grade as below:

- **Grade I** - Obstruction of 0-50% of the lumen obstruction
- **Grade II** - Obstruction of 51-70% of the lumen
- **Grade III** - Obstruction of 71-99% of the lumen
- **Grade IV** - Obstruction of 100% of the lumen (ie, no detectable lumen)

http://www.drrahmatorlummc.com/congenitaldevelopmental.htm
Infant/Child Mannequin

Practice mannequins available to practice flexible fiberoptic endoscopy technique.
Task: Practice flexible endoscopy child/infant


2. Position patient papoose vs. cradle.

3. Apply topical anesthetic & decongestant nose.

4. Perform flexible naso/laryngeal endoscopy

5. Direct laryngoscopy provides detail view of nasal passage (choanal atresia, adenoid hypertrophy, laryngomalacia, subglottic stenosis and vocal cord function.

6. Remove endosheath and maintain clean technique.
Angioedema

Vascular leakage beneath the dermis and subcutanis. Response is mediated by vasoactive mediators, i.e., histamine, serotonin, and kinins (eg, bradykinins), which cause the arterioles to dilate while inducing a brief episode of vascular leakage in the venules, where the junction between the endothelial cells appears looser than in the capillaries and arterioles.

Angioedema with or without urticaria, is classified as allergic, hereditary, or idiopathic. Complications range from dysphonia or dysphagia to respiratory distress, complete airway obstruction, and death. Symptoms - Severe facial/oral edema, Urticaria – (hives) food allergy, erythema.

Most common cause - ACE Inhibitor sensitivity, Food allergies such as fresh berries, shellfish, fish, nuts, tomatoes, eggs, milk, chocolate, food additives, and preservatives

Treatment - H 1 (antihistamine), H 2 (antacid), Steroids. Fresh Frozen Plasma, Protect airway.
Angioedema

Edema floor of mouth

Edema uvula

Edema epiglottis

Edema arytenoid
Rigid Scope
Rigid Scope

The rigid endoscope provides superior image clarity, facilitates culture and tissue sampling, controls epistaxis, and affords the endoscopist the ability to perform surgery.

Rigid endoscopes for the nose come in diameters of 2.7-4 mm and have tips of different angles (generally 0-70°), allowing the clinician to visualize various sinuses and areas within the nasal cavity. This facilitates culture of the sinuses and debridement postoperatively.
Complications

- Tearing
- Epistaxis
- Coughing
- Laryngospasm – rare
- Bleeding

Advise patient not to eat or drink anything 1 hour after procedure.
Nasal endoscopic examination and culture for definitive diagnosis best accomplished with rigid scope.

Small culturette used to obtain mucous & pus sample from hiatus semilunaris. Be sure not to touch other tissue as this may contaminate specimen.
Nasal Cultures

- Nasal cultures are not routinely indicated in first-line management of Acute Rhinosinusitis.

- Endoscopically guided microswab or suction aspiration culture of a draining sinus ostium are a strong consideration in Chronic Rhinosinusitis, especially when poorly responsive to prior antibiotics.
Post operative debridement following FESS is best accomplished with rigid scope.

Rigid scope allows clinician to visualize area and suction or use forceps.
Rigid Endoscopy

Interactive, live demonstration of rigid fiberoptic endoscopy
Rigid Scope Practice

Demonstration of Rigid Endoscopy technique. Custom made models available to practice Post-FESS Debridement and C/S of sinus
Task: Practice rigid nasal endoscopy

1. Explain Procedure. Prepare supplies

2. Position patient

3. Apply topical anesthetic & decongestant nose.

4. Perform rigid nasal endoscopy and sinus debridement.

5. Perform rigid nasal endoscopy and obtain culture.

6. Remove endosheath and maintain clean technique.
Care of Scope
Endosheaths

Loosen endosheath
Pull endosheath from distal end
Cold Sterilization

• Flexible scopes are non-autoclavable.
• Rigid scopes can be autoclaved.
• Clean length of scope with an enzymatic detergent solution like ENZOL® to remove debris and reduce bacterial burden before instruments are disinfected or sterilized. DO NOT ALLOW debris to dry.
• Soak scope in a glutaraldehyde solution like Cidex® which provides quick high-level disinfection.
• Noncorrosive solution reduces instrument damage and associated repair costs.
• Soaking times vary by product.
Leak Testing

1. Routine leak testing in accordance with specific manufacture depending on volume of use.
2. Introduce air pressure via attached bulb (DO NOT overinflate) and submerge looking for leaks.
3. Leaks can slowly damage fiberoptics and internal parts causing expensive yet preventable damage.
Review of Scope Care

• Avoid bending scope in tight angles.
• Clean lens with lens cleaner/paper.
• Pre-clean with enzymatic cleaner.
• Soak only for required period depending on brand and manufacture.
• Store in dry safe place.
• Perform regular leak testing to avoid damage.
Flexible Fiberoptic Workshop: Advanced Room Set Up

Station 5 Video Tower Adult examination

Station 4 Video Tower Rigid

Station 3 Video Tower Rigid

Station 2 Adult examination

Station 1 Pediatric

Proctors
Flexible Fiberoptic Workshop: Advanced Evaluation

Score cards will be used for admission to workshops and attendance. Credit will only be awarded for completed score cards.

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
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<tr>
<td>On scale of 1 through 5 with 5 being most likely</td>
<td>Scale 1-5</td>
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</tbody>
</table>

1. Were learning objectives met?

2. Was instruction free of commercial bias?

3. Was there adequate instruction before practice?

4. Was there adequate supervision during practice?

5. Were training aids useful/realistic in learning skill?

6. How likely are you to perform these skills in future?

7. Did this training improve your skills?

Comments:
### Flexible Fiberoptic Workshop: Advanced Score Card

Rotate and complete each station.  
“Go/No Go” for internal use only. 
Completion of workshop is NOT contingent on pass/fail.

<table>
<thead>
<tr>
<th>Task</th>
<th>Go</th>
<th>No Go</th>
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<tbody>
<tr>
<td>Perform flexible endoscopy child mannequin.</td>
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<tr>
<td>Perform flexible endoscopy infant mannequin.</td>
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</tr>
<tr>
<td>Perform flexible fiberoptic endoscopy on adult mannequin.</td>
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<tr>
<td>Perform flexible fiberoptic endoscopy on simulated patient.</td>
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<tr>
<td>Perform rigid endoscopy (culture collection)</td>
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<td></td>
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<tr>
<td>Perform rigid endoscopy  debridement.</td>
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<tr>
<td>Comments</td>
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Resources On-Line

New England Journal of Medicine Video
http://www.youtube.com/watch?v=3tbuF7Qwmps

Excellent pictures and videos by
Dr. Kevin Kavenaugh
http://www.entusa.com/larynx_photo.htm

Dr Rahmat Omar
http://www.drrahmatorlummc.com/

Direct Laryngoscopy video
http://www.airwaycam.com/video-library.html

Functional Voice Disorders
Neil N Chheda, MD
Recommend Reading

*Examination of the Larynx and Pharynx*

n engl j med 358;3
www.nejm.org january 17, 2008

**Laryngeal Evaluation** by Kendall & Leonard

Publication Date: August 2010
324 pp, 309 illustrations
hardcover & video
ISBN (Americas): 9781604062724
• Effective January 1, 2014, any payer requesting documentation for a scope procedure could either deny the service or reduce the payment if documentation doesn’t show that all areas were examined during the endoscopy and the findings noted.

• According to Medicare, documentation should identify specific anatomical landmarks. “form over substance”.

• CPT® guidelines state, “For endoscopic procedures, report appropriate endoscopy of each anatomic site examined.
  – 31575 Flexible Fiberoptic Laryngoscopy, 31505 Laryngoscopy, Indirect, 31515, Laryngoscopy, Direct, includes examination of the tongue base, larynx, and hypopharynx. If using operating microscope, telescope, or both, use the applicable code only once per operative session.
  – 31231 Nasal Endoscopy (diagnostic), and 31237 Debridement Endoscopy, Nasal should include mention of the superior turbinate, superior meatus and sphenoethmoid recess

• Clinicians need to clearly document each area’s examination and whatever findings were observed.
Sample Templates

Template should also include description of positioning of patient, application of topical anesthetic and any decongestants. If consent was obtained, verbal vs. written. Document indication for procedure. At completion of procedure note if patient tolerated procedure and if there were any complications.

**Fiberoptic Laryngoscopy Findings;**
- Nasopharynx - WNL
- Oropharynx - WNL
- Base of Tongue - WNL
- Vallecula – WNL*
- Lateral Pharyngeal Wall - WNL
- Posterior Pharyngeal Wall - WNL
- Epiglottis - WNL
- Aryepiglottic Folds – WNL*
- Pyriform Sinuses - WNL
- Interarytenoid - WNL
- Tracheal Rings - WNL
- Vocal Cords – WNL*
- False Cords – WNL*
- Ventricle – WNL*

* Denotes laterally i.e. Left side, Right side

**Fiberoptic Nasal Endoscopy Findings**
- Septum
- Right Side
  - Inferior Turbinates - WNL
  - Middle Turbinates - WNL
  - Middle Meatus - WNL
  - Mucosa - WNL
  - Mucous - WNL
  - Polyps - None
- Left Side
  - Inferior Turbinates - WNL
  - Middle Turbinates - WNL
  - Middle Meatus - WNL
  - Mucosa - WNL
  - Mucous - WNL
  - Polyps - None
- Nasopharynx - patent
- Sphenoid and ethmoid cavities-WNL