

## Other Clinical Applications of Flexible Fiberoptic Endoscopy

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The recent advent of the flexible fiberoptic nasopharyngolaryngoscope has revolutionized the ability to examine the ear, nose, nasopharynx, and larynx. Although several instruments have been available to the otolaryngologist for examination of these structures, none has been so universal in terms of ease of use and adaptability for photography. This article describes the versatility and practicality of flexible fiberoptic endoscopy with photodocumentation in clinical otolaryngologic practice.

The flexible fiberoptic nasopharyngolaryngoscope provides a one-instrument capability for examination and photodocumentation of the external auditory canal, tympanic membrane, anterior and posterior nares, nasopharynx, hypopharynx, and larynx. If a large enough natural ostium or a surgically created window is present, the maxillary sinus may be inspected as well.

High quality color transparencies and color and sound videotapes may be made of the normal and pathologic anatomy of these structures.

### **Use of the flexible fiberoptic nasopharyngolaryngoscope**

The scope's flexibility allows it to be used for otologic examination without risk of injury to an uncooperative patient such as a very young child.

Intranasal examination is done easily and thoroughly because the distal tip deflection permits entry into the meati. The ability to demonstrate pus in one of the meati will

confirm a diagnosis of sinusitis, and will almost always avert the necessity for obtaining X-rays. If a large enough natural ostium or a surgically created window is present, the maxillary sinus may be inspected as well. A bleeding point in cases of epistaxis may be readily located. Allergic versus infective rhinitis and sinusitis may be distinguished. The use of phenylephrine 1/4% causes nasal decongestion and provides additional working room in the nose.

In respect to the nasopharynx, so much has been published regarding study and photodocumentation of the velopharyngeal port that the author will not repeat the observations made in this regard. The scope is useful to study eustachian tubal function in cases of serous otitis.

The quintessence of usefulness of the flexible fiberoptic nasopharyngolaryngoscope is demonstrated by study of the larynx in continuous phonation. The traditional laryngeal examination permits study of only the "EE" vowel, while the flexible scope permits examination and photodocumentation while the patient phonates sounds, words, sentences, and passages. The patient may even sing in full voice as examination and photodocumentation proceed.

Disorders of speech based on functional mechanisms may be studied. Speech pathologists, voice teachers, and otolaryngol-

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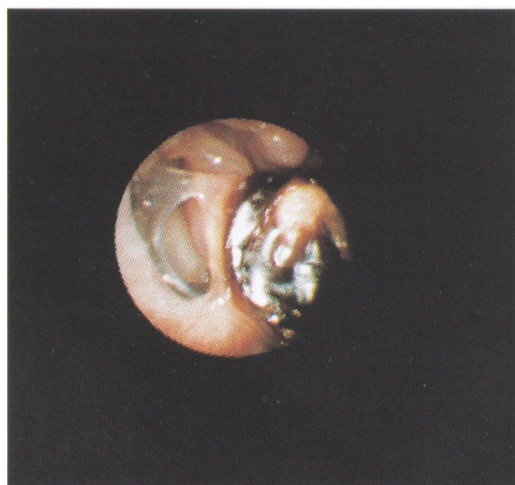
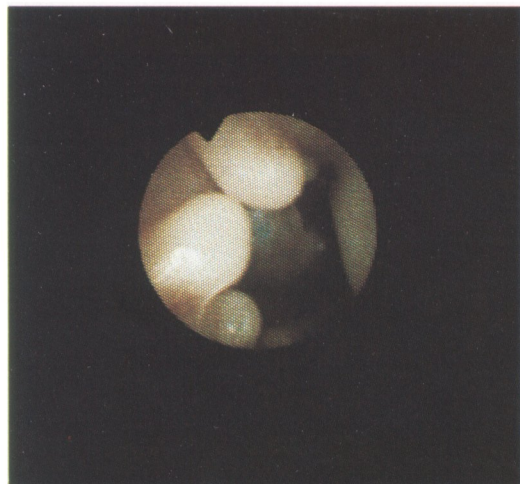


FIGURE 1 (Top left) Exostosis of external auditory canal; FIGURE 2 (Top right) Tympanosclerosis; FIGURE 3 (Bottom left) Purulent rhinitis; FIGURE 4 (Bottom right) Intranasal concretion.

ogists may work together for the benefit of the patient. Because proprioception of the larynx and its surrounding structures is so important for speech to occur in the unaltered state, no topical anesthesia is used for flexible fiberoptic examination.

Because it is necessary for the endoscopist to feel when the patient is becoming uncomfortable during examination, the author does not use assistants to hold either the scope or the camera.

### Photography

The 35 mm. Single Lens Reflex camera is ideally suited for photography through the flexible fiberoptic nasopharyngolaryngoscope. A clear glass focusing screen must be used on the camera in order to permit enough light to enter the camera's eyepiece.

Because the aperture is predetermined by the focal length of the camera's lens and by the optics of the scope, it is necessary to

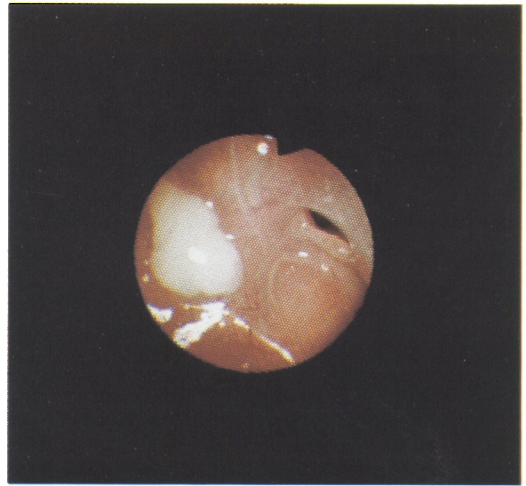
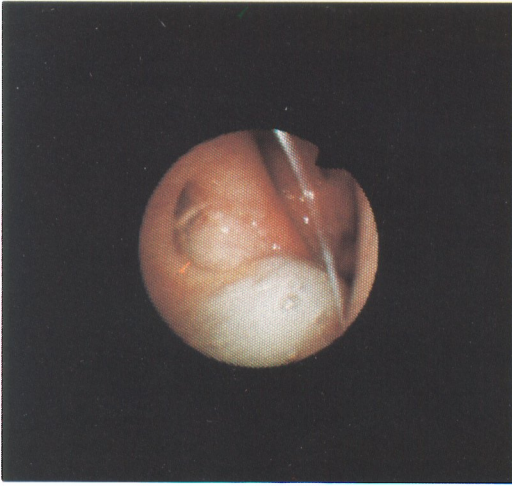


FIGURE 5 (Top left) Purulent tubotympanitis; FIGURE 6 (Top right) Chronic nasopharyngitis; FIGURE 7 (Bottom left) Parakeratosis of larynx; FIGURE 8 (Bottom right) Nodules of vocal cords.

determine and set the shutter speeds manually. All exposures should be bracketed. This means that they should be made at one speed faster, and one speed slower, as well as the calculated shutter speed.

The color temperature of the film must match that of the light source used for endoscopy. Thus, tungsten film must be used with quartz halogen (tungsten) lamps, and daylight film must be used with xenon lamps.

The scope must be set to zero diopters for photography. If the endoscopist requires a visual correction, it must be made on the camera's eyepiece or with eyeglasses.

An automatic winder provides an excellent means of grasping the camera and allows rapid sequential photography to occur—a necessity when photographing a moving larynx.

Videophotography does not require the use of expensive high gain cameras de-

signed for "medical use". A home video camera will be perfectly satisfactory and considerably more reliable.

The 3/4 inch U-Matic format provides far superior resolution and signal to noise ratio than the 1/2 inch Beta or VHS format. Sophisticated editing systems are available, and copies may be made with relatively little loss of quality. Cost is not really significantly greater than that of the 1/2 inch formats.

**Shutter speeds for still photography**

The shutter speeds are based on the use of: (1) a lens or endoscopic adapter of 50 mm. focal length; (2) film of ASA 640; and (3) a relatively new bulb, set to maximum intensity.

Suggested settings:

Tympanic membrane	1/500 sec.
Nose	1/250 sec.
Nasopharynx	1/125 sec.
Larynx	1/60 sec.

**Equipment for still photography**

Olympus ENF-P Flexible Fiber-optic Nasopharyngolaryngoscope	*
Olympus Fiberoptic Light Source ILK-3	*
Olympus SM-R Endoscopic Coupling Lens	*
Olympus OM IN 35 mm. Single Lens Reflex Camera	**
Winder I	**
Corrective eyepiece	**
Clear Glass Focusing Screen 1-9	**
3M 640 ASA Tungsten Slide Film	***

**Equipment for video photography**

Olympus ENF-P Flexible Fiber-optic Nasopharyngolaryngoscope	*
Olympus Fiberoptic Light Source ILK-3	*
Olympus AR-2 Endoscopic Coupling Lens	*
Sanyo 442 Video Camera	****
Endoscopic Camera Mount	*****
Sony 2610 U-Matic Video Tape Recorder	*****
Sony KV 1715 TV Receiver, 17 inch	*****

**Manufacturers**

Olympus Endoscopy America Inc., New Hyde Park, N.Y.	*
Olympus Camera Corp., Woodbury, N.Y.	**
3M Co., St. Paul, MN	***
Sanyo Electric., Compton, CA	****
Allied International Inc., Plainview, N.Y.	*****
Sony Corp. of America, New York, N.Y.	*****

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