EDUCATION

A medical student's guide to flexible nasal pharyngoscopy

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Abstract

Flexible nasopharyngoscopy (FNP) is a specialized skill commonly used by otolaryngologists as an important component of the head and neck examination. FNP can be diagnostic and therapeutic for many head and neck pathologies. Mastering this skill facilitates the effective performance of other specialized skills and procedures such as fibreoptic nasal intubations and flexible bronchoscopies. During otolaryngology rotations and electives, medical students are exposed to a high volume of FNP. Often, they are also asked to perform this procedure in clinic and on-call. There is currently no widely available simulation tool for medical students to practice using FNP, and medical students at our institution do not receive any formal training prior to performing FNP. The following is an introductory guide for medical students to become proficient at performing FNP while on their otolaryngology rotation.

Introduction

Background

Flexible nasopharyngoscopy (FNP) is also called fiberoptic nasoendoscopy, flexible nasolaryngoscopy, and flexible fiberoptic nasopharyngolaryngoscopy[1]. After the advent of fibreoptic technology in the 1950s, Hirschowitz was the first to use it for the purposes of clinical endoscopy in the early 1960s[2]. This procedure has evolved into a well-tolerated, low-risk, and integral part of the head and neck examination. It can be successfully performed in adults, cooperative children, and even neonates[3].

Types of endoscopes

Undergraduate medical students identify the transitio-Trans-nasal endoscopy can be performed using rigid or flexible endoscopes. Rigid nasal telescopes can provide endoscopists with a high-definition view of the nasal cavity, post-nasal space, and nasopharynx. Flexible nasal endoscopes are typically 30 cm in length and can 'bend' or 'flex' to maneuver into the lower pharynx. Various scope sizes are available, with diameters ranging from 1.9 mm (pediatric) to 6 mm (adult). Typical scope tip diameters are 2.7mm for pediatric scopes and 4mm for adult scopes.

Optical FNP uses a portable light source and requires users to look through the eyepiece or connect to an external camera. Distal chip FNP uses a separate light source located on the tower and projects the image onto a screen.

Diagnostic use

FNP offers a detailed and direct examination of the nasal cavity, sinuses, pharynx, and larynx. Visualizing these structures may be otherwise difficult by direct visualization or mirror laryngoscopy[4]. The indication for FNP is as an adjunct to a comprehensive head-and-neck physical examination for a wide variety of clinical presentations. In the nasal cavity, FNP can be used to diagnose pathologies such as polyps or adhesions and localize sources of bleeding in acute epistaxis. It can also be used for functional evaluation of swallowing, breathing, or voicing complaints originating from the pharynx and glottis, including those with impending upper airway compromise. FNP is a routine part of the initial workup for patients with suspected head-and-neck cancers as well as oncologic surveillance[1].

Therapeutic uses

Some endoscopes are equipped with side ports or working channels that enable the surgeon to perform endoscopic procedures using a wire and grasper inserted through the endoscope. The working channel provides access for application of topical anesthetics and suctioning of blood or secretions to improve visualization. This helps to retrieve foreign bodies and perform biopsies. FNP provides adequate visualization for targeted treatments of the larynx; such as performing vocal cord injections in patients with vocal cord paralysis[4]. More recently, FNP has paved the way for office-based laser procedures, which can be used in the treatment of a variety of laryngeal pathologies, including (but not

limited to) recurrent respiratory papillomatosis and early vocal cord dysplastic lesions.

Contraindications

FNP is a low-risk procedure and carries no absolute contraindications. Acute epiglottitis and croup have been cited as potential contraindications, as manipulation of the pharynx may induce laryngospasm1. The only reported relative contraindication is coagulopathy, though it is commonly used in these settings on a case-by-case basis. Vascular lesions such as telangiectasias or angiofibromas may also be traumatized by the scope and result in hemorrhage[4].

Risks

FNP is a well-tolerated procedure with rare complications. The most common adverse effects are sneezing, gagging, mucosal tearing, and bleeding secondary to local abrasion[1,4]. Serious complications and anatomical damage such as severe epistaxis, perforation, and laryngospasm are reported but are rare[5]. With training and practice, these risks can be minimized, making FNP a safe procedure.

Procedure

Preparation

1. Obtain consent from the patient for the procedure, thoroughly explaining the benefits, risks, and what to expect. The procedure lasts approximately 30 – 60 seconds, it is not painful but may be slightly uncomfortable. Simple verbal consent is sufficient, similar to a patient consenting to any means of physical examination.

2. FNP is considered an aerosol-generating medical procedure (AGMP), and all necessary precautions should be followed according to local infection control practices. Wearing gloves is recommended for this procedure.

3. Gather the instruments required for the procedure: tower or handheld scope, lidocaine spray, decongestant, alcohol pad, and water-based lubricant gel (Figure 1).

4. A few minutes before the procedure, local anesthetic can be administered into each nostril to minimize discomfort. Lidocaine spray (10mg/metered dose) is commonly used. Alternatively, 1-2 mL of 4% lidocaine on a cotton ball can be gently inserted into the nasal

Table 1. Anatomy and pathology.

	Normal Findings	Abnormal Findings
Nasal Cavity	External and internal nasal valves Nasal septum Turbinates	Fluid (purulence, blood, secretions) Polyps Adhesions Crusting Septal perforations Septal deviations Bony Spurs Mucopurulent debris Sinus drainage Mucosal edema Cerebrospinal fluid (CSF) rhinorrhea
Nasopharynx	Eustachian tube orifices Fossa of Rosenmüller Adenoidal pad	Obstruction Masses
Oropharynx	Base of tongue Tonsils Vallecula	Masses Cysts
Hypopharynx	Piriform sinus Post-cricoid space	Pooling of secretions Fullness Masses Foreign body
Supraglottis	Arytenoid cartilages False cords Epiglottis	Omega-shaped epiglottis Shortened aryepiglottic folds (laryngomalacia)
Glottis	Posterior commissure Anterior commissure True cords	Abnormal or asymmetric vocal cord movements Swelling Edema Masses Mucosal changes

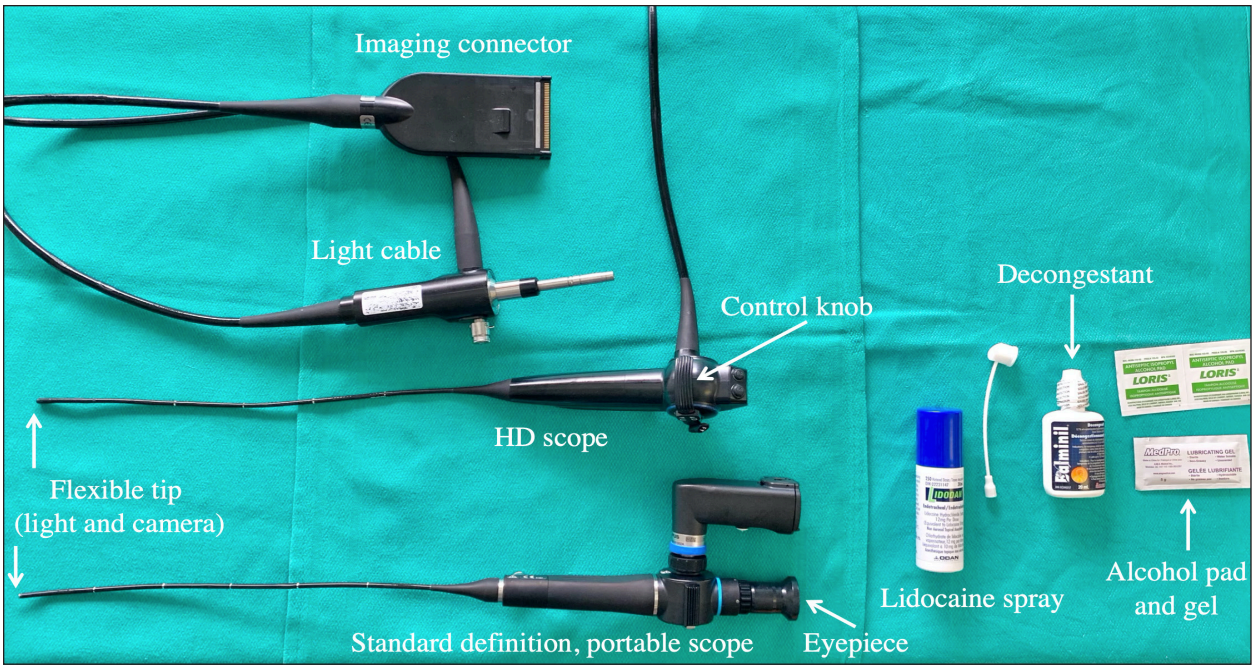

Figure 1. Setup on tray with a tower scope and handheld scope.

cavity, or 4% lidocaine jelly may be applied on the end of the scope. Some surgeons administer a vasoconstrictor such as xylometazoline (Otrivin®) on a cotton ball, or sprayed directly, to help reduce nasal mucosal swelling for easier navigation of the endoscope through the nasal cavity.

a. Application of topical preparations can be surgeon-dependent, as studies have not shown a clear advantage for reducing pain or discomfort with local anesthetic or vasoconstrictor prior to the use of FNP[6].

b. Some patients may prefer to forego the topical anesthetic, as it can create a globus sensation that is uncomfortable for patients; however, normal sensation returns after about 15 minutes.

5. Examine the endoscope.

a. If using a distal chip scope, the video input and light source input will need to be connected to the tower. Simply turn the tower on, ensuring the light source is on as well. The white balance may need to be adjusted by pressing the button when visualizing something white (i.e., gauze or paper).

b. If using an optical scope, ensure the batteries are fully charged (green LED indicator) and that light is on at the tip of the endoscope. Visualize the eyepiece and focus the image appropriately by centering it on an object 2-3 mm away from the tip of the endoscope and turning the focus dial at the eyepiece.

6. Apply anti-fog solution to the tip of the endoscope. Any liquid can suffice, such as decongestant spray or saline. An alcohol swab can also be used to wipe the tip of the scope.

7. Gel can be applied on the end of the scope for patient comfort. Some surgeons may consider the lidocaine lubricant.

8. Position the patient in an upright sniffing position, with the head protruding forward with the neck in slight flexion. This position expands the pharynx in an anterior-posterior dimension, allowing for more complete visualization. It also reduces the risk of inadvertently contacting the mucosa and causing discomfort or gagging. This positioning is critical and can make a significant difference in visualizing hypopharyngeal and laryngeal structures. Placing a pillow behind the patient's shoulders may help them maintain this position. Describe the procedure as it unfolds. Remind the patient to breathe gently through their nose.

9. Hold the body of the endoscope in the dominant hand with the thumb on the control (Figure 2).

10. Pushing the control switch up will steer the tip down, and vice versa. This motion, combined with rotation of the right hand on the endoscope body, will allow ma-

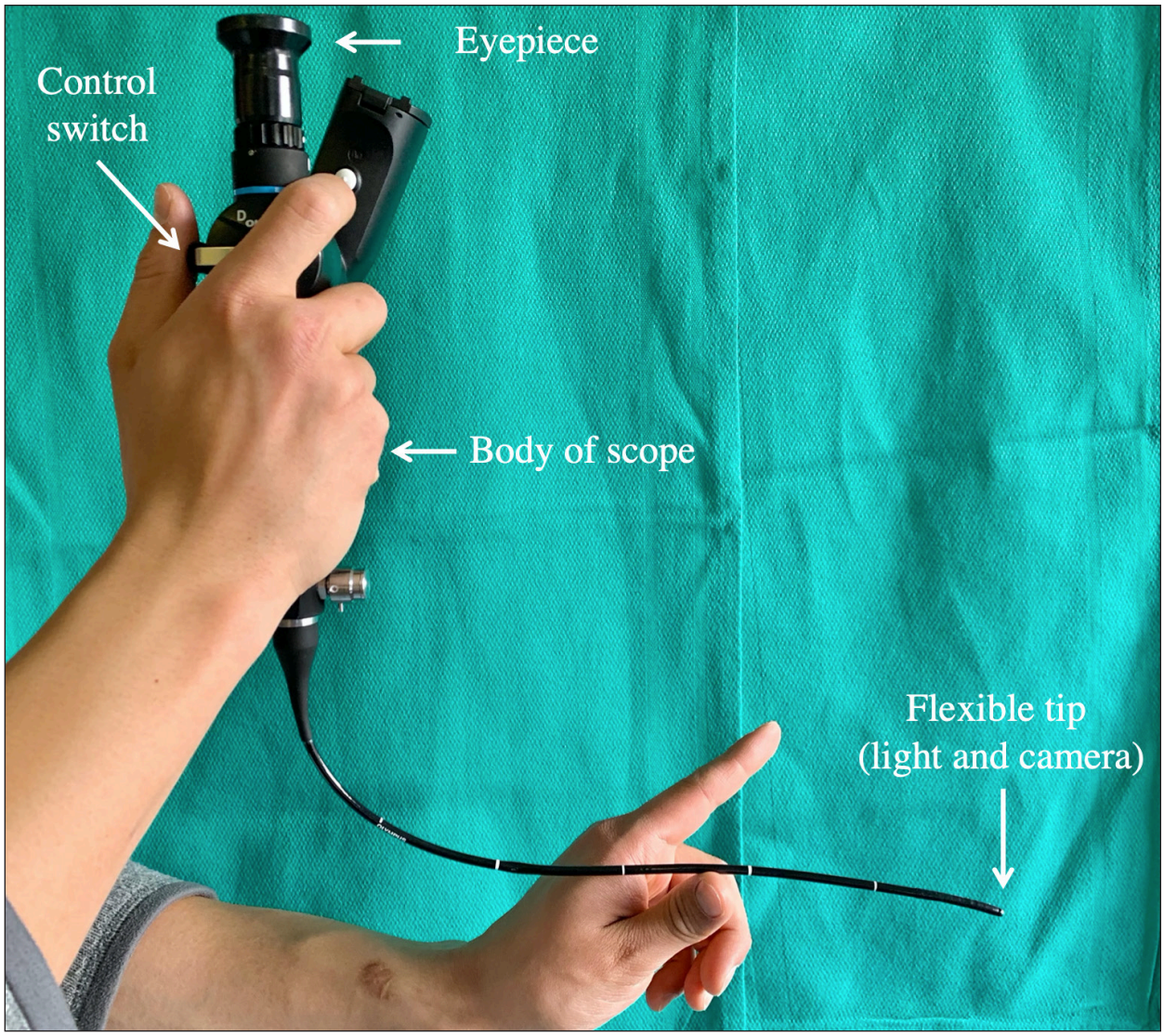

Figure 2. How to hold the handheld scope.

nipulation of the endoscope throughout a 360 degree range. For example, to look leftward, one could angle the tip upward and turn their wrist counter-clockwise, or alternatively, angle downward and turn their wrist clockwise. This skill, simultaneous movement of the control switch, along with rotation of the endoscope, requires some practice to become second nature.

11. The picture will be visible through the eyepiece lens, attached to the control body, or on the monitor if connected to a tower.

Performing the procedure

12. Holding the flexible tip of the endoscope with the index finger and thumb, approach the nose with the little finger resting on the patient's nose or face for stability and pass the tip into the nose. The patient may prefer you enter through a specific nostril if they have experience with this procedure. Otherwise, start with the patient's right nostril, and then the left.

13. Guide entry into the nose with your fingers placed a few centimeters from the distal tip of the endoscope. This can be done in many ways, but the key is to avoid excessive manipulation, as this may increase patient discomfort.

14. Looking up at the nose, enter the nasal vestibule and then direct the tip downward to stay along the nasal floor.

15. Straighten the scope as you advance toward the in-

ferior turbinate.

16. At this point you can assess: the inferior turbinate superiorly, the floor of the nose inferiorly, and the septum medially. The middle turbinate is visible above and more posterior to the inferior turbinate. Note any turbinate enlargement, or any significant septal deviation. If significant septal deviation obstructs passage of the scope, the contralateral side can be approached (Figure 3).

17. Guide the tip of the scope under the inferior turbinate medially and advance deeper into the nose, avoiding the septum. It is more comfortable to contact the turbinate with the scope than the septum. Keep the tip straight until the posterior nasal passage.

18. Examine the area between the inferior and middle turbinates (the middle meatus), and the lateral nasal wall in that area for any masses, mucopurulent drainage, or polyps.

19. As the scope approaches the nasopharynx, you will first notice the choana and the eustachian tube orifices. Carefully examine the nasopharynx for any masses, cysts, or adenoid tissue, paying close attention to the divot immediately posterior to the eustachian tube orifice, known as the Fossa of Rosenmüller. Malignant masses can be found in that location (Figure 4).

20. Passing the scope further posteriorly, point the tip downwards guiding it into the oropharynx. Instruct the patient to breathe through their nose in order to drop the soft palate. Examine the superior surface of the soft palate. As the scope is advanced further, examine the posterior pharyngeal wall, and the lateral pharyngeal walls as well as the tonsils. The base of tongue should be visible, as well as the epiglottis. The vallecula is the space between the base of tongue and the epiglottis. This is best visualized by asking the patient to stick out their tongue. Observe this space for pooled secretions or debris such as food residue (Figure 5).

21. The hypopharynx is the space lateral and posterior to the supraglottis and includes the piriform sinuses and post-cricoid space. These spaces can be expanded with a Valsalva maneuver by asking the patient to "puff out [their] cheeks". Observe these areas for pooled secretions, debris and masses.

22. The structures of the supraglottis should next be assessed. The epiglottis should be at the bottom of your view, the arytenoid cartilages near the top of your view, and the false and true vocal cords anterior-inferiorly.

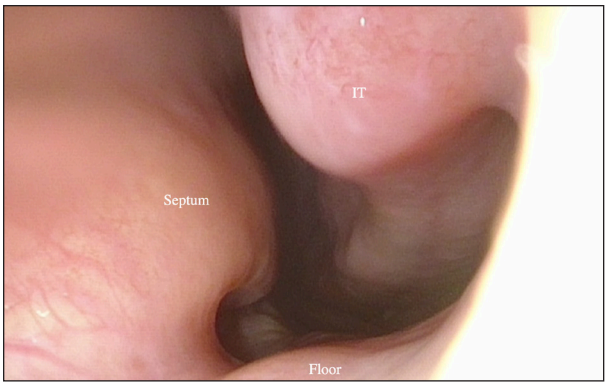

Figure 3. Initial view at the anterior nasal passage. IT: Inferior Turbinate..

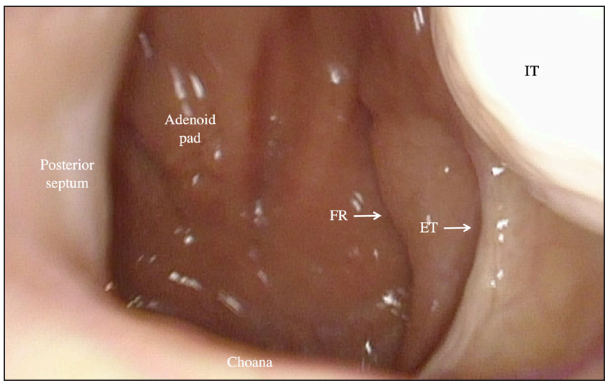

Figure 4. Posterior nasal passage and nasopharynx. NP: Nasopharynx. FR: Fossa of Rosenmuller. ET: Opening of Eustachian Tube.

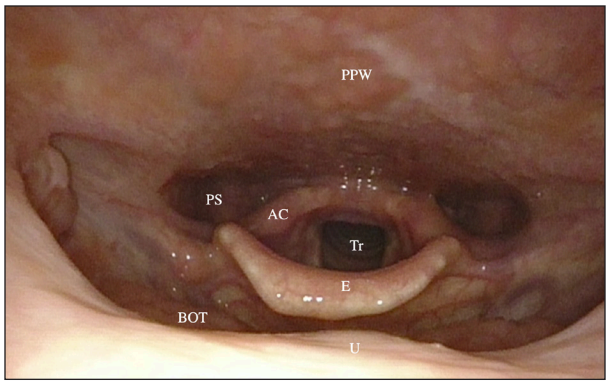

Figure 5. Looking down at the oropharynx. PS: Pyriform Sinus. AC: Arytenoid Cartilages. Tr: Trachea. E: Epiglottis. T: Tongue base.

Examine the aryepiglottic folds on either side, which connect the epiglottis to the arytenoid cartilages (Figure 6).

23. With careful advancement beyond (distal to) the epiglottis, the subglottic space and trachea may be observed (Figure 7).

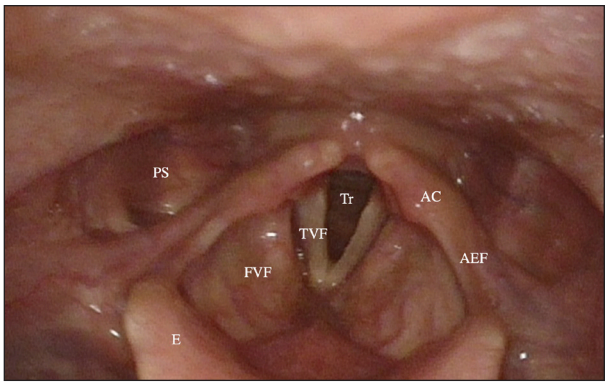

Figure 6a. View of the supraglottic structures with open vocal cords. TVF: True Vocal Fold. FVF: False Vocal Fold..

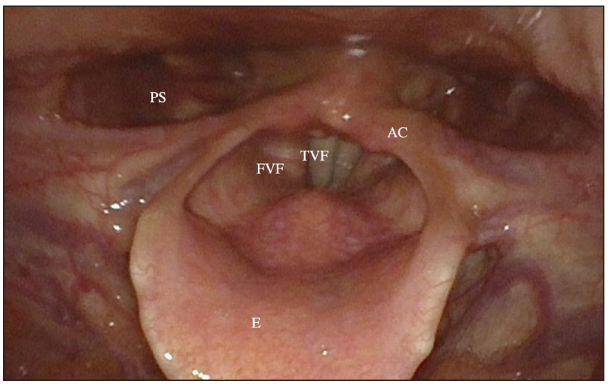

Figure 6b. View of the supraglottic structures with closed vocal cords.

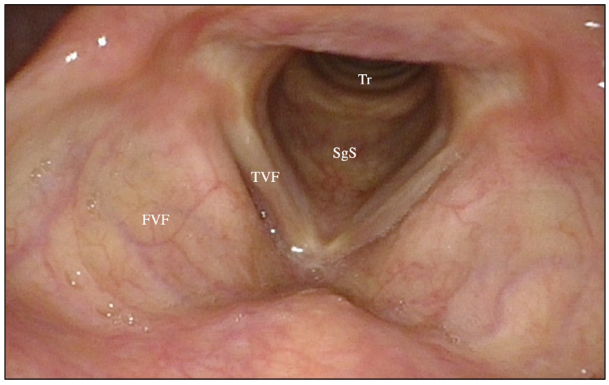

Figure 7. View of the subglottic space and trachea. SgS: Subglottic Space.

24. The glottis should be observed carefully and systematically.

a. Examine the vocal cords themselves, looking for areas of swelling, erythema, masses or atrophy, scarring, and asymmetry or abnormal-appearing tissue.

b. Next, consider the movement of the vocal cords. Ask the patient to breathe deeply through their nose to observe abduction of the cords. Ask the patient for natural laugh to witness the full extent and speed of their vocal cord movement. Having the patient sustain "EEE" in a regular pitch will result in the adduction of the vocal cords, causing them to pull together. Note any asymmetry in movement between either side. Once completed, withdraw the endoscope gently. Inform the patient that the procedure is complete.

Tips and Tricks

- Always move slowly and gently. Even with the anesthetic spray, sudden movements can cause discomfort.
- Rest the flexible scope on your left thumb and avoid gripping the scope with your thumb and index finger: this can cause a push-pull movement of the scope along the nasal floor, which can be irritating.
- Reassure the patient during the procedure, encourage slow calm nasal breathing.
- If the camera gets fogged up or covered with mucus, ask the patient to swallow if the tip is at or distal to the oropharynx. This should clear the camera lens.
- Be careful when the tip is close to the larynx. Accidentally touching the mucosa with the endoscope will be uncomfortable for the patient and may trigger a cough reflex.

Discussion

With the development of fibreoptic imaging technology, FNP has become a cornerstone of otolaryngology outpatient clinics, allowing for visualization of upper airway structures. In a head-and-neck cancer clinic, many patients will require FNP for disease surveillance, treatment response, or recurrence.

For medical students, understanding the indications and steps of FNP is a useful introduction to the procedure. Performing and interpreting FNP are important skills and require a learning curve, but when done properly and carefully, is a low-morbidity and efficient technique that provides valuable information about the anatomic structures. In addition, these skills are easily transferrable to flexible bronchoscopy, which has an identical control mechanism and is frequently performed by a wider range of medical and surgical specialties such as anesthesia, surgery, and critical care.

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