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Section 1 – NASAL CAVITY, NASOPHARYNX, AND SINUSES

Chapter 1 – Office-Based Diagnosis of Sinonasal Disorders

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The nasal endoscopes have revolutionized our approach to the diagnosis of disorders of the nose and sinuses. The following discussions (and accompanying videos) highlight some of the common disorders encountered in rhinology.

ALLERGIC RHINITIS (see Video 1-1)

Allergic rhinitis afflicts between 15% and 30% of the population depending on age. It is often characterized as either seasonal allergic rhinitis or perennial allergic rhinitis. Patients with longstanding congestion and postnasal drainage may be unaware that they have allergies because of the chronicity of the symptoms. On physical examination, the physical findings may mimic that of a cold; however, the duration of several weeks or months of persistent symptoms makes a viral etiology unlikely.

In this example, a 20-year-old man with longstanding nasal obstruction undergoes diagnostic endoscopy after his nasal cavity has been decongested with a vasoconstrictor (a few drops of 1 : 1000 adrenaline) and anesthetized with 4% Xylocaine. The left side is examined first; note the septal deviation and the thick white secretions. There is no purulence in the middle meatus. The findings in the right side are similar. Note secretions coming from both the inferior and middle turbinate and being transported to the back of the nose. Typically turbinates have a pale edematous appearance. Red mucosa suggests other etiologies, such as exposure to tobacco smoke, irritants, or food allergy.

VIEW OF THE COMMON COLD (see Video 1-2)

The physical findings associated with the common cold often mimic those of allergic rhinitis. In this patient, there is a septal excoriation on the right side. As we look into the right middle meatus, white mucoid secretions are present. A sample of these secretions is aspirated for culture. It is also possible for the secretions during a cold to be purulent in nature. Postinflammatory infectious upregulation of mucus production is common, and in this case we see the tenacious character of this mucus several days after the primary symptoms of a cold have resolved.

RHINITIS MEDICAMENTOSA (see Video 1-3)

Rhinitis medicamentosa is a consequence of overuse of a topical vasoconstrictor, most commonly oxymetazoline (Afrin). This patient had been using Afrin two or three times a day for several months. Note the upregulation of seromucinous glands characterized as “cobblestoning” along the septum and the inferior turbinate. On the right side a similar appearance is noted, and this patient is endoscoped after the nasal cavity has been decongested to permit endoscopic visualization. The treatment of rhinitis medicamentosa is to stop use of the topical nasal decongestant. Treatment is often optimized by use of a nasal steroid spray.

ENDOSCOPICALLY GUIDED ASPIRATE CULTURE OF ACUTE BACTERIAL SINUSITIS (see Video 1-4)


In performing an aspirate culture, an economical method of obtaining the aspiration sample is to cut off the end of a tuberculin syringe and attach that end snugly to the suction tubing. A no. 7 Frazier suction is attached to the nozzle of the syringe. Once the aspirate is obtained, it is important to remove the contaminated end of the syringe adjacent to the suction hose by cutting it off before removing the aspirated sample to a culture tube.

ACUTE BACTERIAL SINUSITIS ILLUSTRATED THROUGH ENDOSCOPIC MIDDLE MEATAL ASPIRATION (see Video 1-5)


The suction tip is inserted into the nose with care to avoid touching the nasal vestibule. Under endoscopic visualization, purulent exudate from the middle meatus is aspirated. The correlation of this aspirate with endoscopic maxillary sinus taps is between 50% and 80%. Generally a Gram stain and aerobic culture is requested in acute sinusitis.

In some situations it is impossible to aspirate with a suction tip, because the secretions are too scant or the suction catheter cannot access a narrowed area that is lateral to the endoscope. In these situations, a Calgiswab can be gently bent to access this area. The Calgiswab is inserted carefully so as not to contaminate it with the nasal vestibule.

MAXILLARY SINUS TAP IN ACUTE BACTERIAL SINUSITIS (see Video 1-6)


In this case of acute bacterial sinusitis, the nasal cavity is being anesthetized for a maxillary sinus tap. A cotton pledget impregnated with 4% Xylocaine and a few drops of adrenaline 1 : 1000 is placed into the nasal cavity. After a few minutes, when the mucosa is partially decongested and anesthetized, this pledget is removed and a second pledget is placed under the inferior turbinate into the inferior meatus. An ear curette is useful in positioning the pledget under the inferior turbinate. Once this pledget has been in place for approximately 5 to 10 minutes, it is removed and 0.5 to 1 mL of 1% Xylocaine 1 : 100,000 adrenaline is injected into the mucosa of the inferior meatus using a 1.5-inch long 25-gauge needle. This is usually painless after the topical anesthetic has been in place for 5 to 10 minutes. Anesthetizing the inferior turbinate allows one to painlessly medialize the inferior turbinate, if needed, in the placement of either a 16- to 18-gauge spinal needle or a commercial antral tap trocar. The antral tap trocar or needle is introduced through the thin bone in the lateral inferior meatus into the maxillary sinus. The bone is usually easiest to penetrate in the more superior lateral aspects of the inferior meatus. Occasionally, very thick bone or nasal anatomy precludes inferior meatal antral tap. Once the needle or trocar is introduced through the bone into the sinus, the introduced trocar is removed and the purulent exudate is aspirated from the maxillary sinus with a syringe. The aspirated specimen obtained is sent for aerobic and anaerobic cultures and Gram stain. Depending on circumstances, such as immunocompromised status or allergies, fungal cultures should be obtained. After the culture specimen is obtained, the sinus can be irrigated. If the sinus tap is free of secretions, then a small amount of sterile saline is introduced into the maxillary sinus and reaspirated. To irrigate the sinus the patient is given a basin and asked to lean forward while the sinus is gently irrigated with 10 to 50 mL of sterile saline. If the procedure is uncomfortable to the patient, it should be stopped, because sometimes the outflow tract of the sinus is so obstructed with edema that the introduced fluid does not have an egress. Maxillary sinus tap and irrigation can be not only diagnostic but also therapeutic. At the end of the irrigation, air is usually introduced into the sinus cavity. Topical antibiotics can also be introduced, if desired.

UNUSUAL DIAGNOSES IN SINUS DISEASE

Cicatricial Pemphigoid (see Video 1-7)


In this patient with cicatricial pemphigoid, we see complete restenosis of the right side of her nose and well over 50% restenosis of the left side despite several prior surgical procedures. The left side of her nose is kept patent only with the insertion of a stent, which is removed only for cleaning and then is reinserted.

Complete Internal and External Nasal Valve Collapse with Inspiration (see Video 1-8)


This patient demonstrates collapse of the nasal valve with inspiration due to lack of support from the lower lateral cartilages. Surgery of the septum and the inferior turbinates would not successfully resolve this

situation. The condition was treated with cartilage battens added to the lower lateral cartilages to strengthen them in order to prevent closure with inspiration. The more rapidly a patient inspires, the more vigorous the closure of the nasal valve. This is due to the Bernoulli effect of a vacuum produced by increased velocity of the inspired air. Patients who complain of nasal obstruction and in whom no site of obstruction is detected on physical examination with the nasal speculum, should be evaluated for nasal valve collapse. In this patient, the entire upper airway was assessed with a flexible scope.

OFFICE-BASED PROCEDURES IN PATIENTS WITH SINONASAL DISORDERS

Control of Anterior Epistaxis (see Video 1-9)

Epistaxis occurs in up to 5% of the population per year but only a minority of cases requires medical attention. Ninety-five percent of epistaxis that does come to medical attention is due to bleeding from the plexus of vessels at the anterior nasal septum. This is often called Little's area or Kiesselbach's plexus. In such a patient, the nose should be anesthetized with pledgets, and impregnated with 4% Xylocaine and a vasoconstrictor. If the nose is bleeding, the point of active bleeding can be cauterized with silver nitrate. If no site of bleeding is seen, then any 1- to 3-mm domelike lesions should be gently touched with the silver nitrate stick. If this has been the site of bleeding, then brisk bleeding will occur with this gentle trauma to the telangiectasia or dilated vessel. The silver nitrate can then be applied with light pressure on the stick until bleeding stops. The patient should also be apprised of methods of preventing epistaxis such as using gels or cocoa butter créme inserted into the nasal vestibule and frequent use of humidification and saline sprays. Patients can control most episodes of epistaxis by blowing the blood clot out of their nose, leaning forward to prevent blood from going to the back of their throat, and applying digital pressure (squeezing) to the ala bilaterally. This should be held for 5 to 10 minutes. Nasal Cease is an over-the-counter product that the patient can use to stop bleeding by placing it in the nose for 30 minutes and then removing it. This temporary packing has a very high success rate in uncomplicated epistaxis.

Septal perforations often bleed from the raw surface at the posterior aspect of the perforation. The differential diagnosis of nasal bleeding, crusting, and perforation includes vasculitis, cocaine use, nasal steroid use (rare), nose picking, prior septoplasty, and overly vigorous cauterization for epistaxis leading to septal perforation. Occasionally, bacterial infection may cause crusting and even atrophic rhinitis and perforation. Although classically atrophic rhinitis is attributed to *Klebsiella ozaenae*, other bacteria may be involved as well. Rarely, invasive fungal infection leads to crusting and perforation. Patients with immunodeficiency are at risk for invasive fungal infection.

Eosinophilic Mucin Rhinosinusitis (see Video 1-10)

The most refractory patients are those with nasal polyps associated with eosinophilic mucin.

This patient is an adolescent with a 3-year history of nasal polyps and sticky eosinophilic mucin, which was not bacterial or fungal in etiology. Although she did have allergies, her symptoms were not responsive to allergy management. Note the tenacity of the mucous secretions. These should be sent for histopathologic evaluation with special note made to assess for the presence of fungi. Hyphae present in eosinophilic mucin in conjunction with elevated IgE to the cultured fungus is diagnostic of allergic fungal sinusitis.

Atrophic Rhinitis with Septal Perforation (see Video 1-11)

Atrophic rhinitis can be caused by bacteria other than *Klebsiella ozaenae*. *Citrobacter koseri* was cultured from this 80-year-old Cambodian woman with a 1-year history of a foul smell from her nose. Following extensive débridement of her nasal cavity, initiation of topical antibiotics directed toward the pathogen (gentamicin 80 mg per 500 mL of saline with 20 mL irrigations twice a day), and an oral fluoroquinolone, the patient's foul-smelling crusting resolved. Note the sticky mucus in the nasopharynx.

Biopsy of a Septal Perforation in a 20-Year-Old (see Video 1-12)

In a newly diagnosed septal perforation of unknown etiology, a biopsy should be obtained to evaluate for vasculitis and infectious etiologies such as tuberculosis or syphilis. Laboratory evaluation includes sedimentation rate, complete blood count with differential, circulating antineutrophil cytoplasmic antibody (C-ANCA), and antinuclear antibody (ANA). A biopsy is obtained at the margin of both the ulcerated and normal tissue and sent for histopathology. The pathologist should be apprised of the concerns leading to the biopsy and

specifically instructed to evaluate for Wegener's granulomatosis and vasculitis. Rarely infection can lead to perforation and atrophic rhinitis with crusting. Classically this is secondary to *Klebsiella ozaenae* but may occur with other bacteria as well. The patient whose diagnosis eludes histopathologic abnormality but who continues to have severe crusting may have cocaine abuse as an etiology. Septal perforation and crusting can develop and persist, and even lead to palatal perforation even after cocaine use is stopped. The diagnosis in this 20-year-old with a septal perforation was *Staphylococcus aureus* infection in a patient with mild diabetes. The crusting ultimately resolved with prolonged antibiotic-directed therapy both orally and topically and frequent débridement and nasal irrigation.

Steroid Injection for Nasal Polyps (see Video 1-13)

Nasal polyps are usually responsive to the topical application of nasal steroid sprays. In refractory nasal polyps or in patients intolerant of nasal steroid sprays, the polyp can be injected with steroids. Nasal polyps are usually insensate, and steroid injection into the polyp can be accomplished with or without prior topical anesthetics into the nose. The nasal polyp is rarely able to contain more than 0.2 mL of steroid injected into the polyp without the injected steroid leaking back out of the puncture site when the needle is withdrawn. The preferred steroid is triamcinolone acetonide, 40 mg/mL, because of its small molecular size. The duration of the steroid injection effect is usually 8 to 12 weeks.

Steroid Injection of the Inferior Turbinate (see Video 1-14)

In the mid-1980s, there were several case reports of both temporary and permanent blindness following the injection of steroid into the inferior turbinate. The mechanism is one of retrograde embolization of the vessels of the inferior turbinate into the retinal artery. If a steroid injection into the inferior turbinate is undertaken, the patient should be apprised of the risk, and the risk should be minimized by adequately decongesting the nose and then injecting steroid into multiple areas of the inferior turbinate to minimize the deposition of a single large bolus. Triamcinolone acetonide, 40 mg/mL, is preferred because of its small molecular size. A total of 0.5 mL is injected into each turbinate. Several injections are made beginning posteriorly and advancing anteriorly in order to minimize embolization into orbital vessels. There is often bleeding following injection of the inferior middle turbinate and pledgets are placed into the nose following the steroid injection for approximately 5 to 10 minutes. The duration of effect is usually 8 to 12 weeks. Steroid injections of the turbinates are helpful in nasal congestion responsive to steroids in the patient who is intolerant of topical sprays.

Steroid Injection of the Frontal Sinus in a Patient with Wegener's Granulomatosis Following Frontal Sinus Drill Out (see Video 1-15)

Steroid injections, using a 26-gauge spinal needle, are used to minimize frontal restenosis and scarring. In this example, the frontal sinus recess is injected with a small amount (0.15 mL) of triamcinolone acetonide. The scope is placed through the superior septal perforation up into both the right and left frontal sinus, and the injection is into the mucosa of the back wall of the frontal sinus. This patient had a prior endoscopic frontal sinus drill out (Lothrop IV).

In-Office Microdébridement of Nasal Polyps (see Video 1-16)

Up to 80% of nasal polyps recur following surgery unless managed medically. Polyps can easily be removed with a microdébrider. The nose is anesthetized for 10 minutes topically with cotton pledgets impregnated with 4% lidocaine and then a 3.5-mm microdébrider is used to remove the nasal polyp. If there is enough room and the polyps are large, a 4.0 mm microdébrider blade is recommended. Note that firmly applying the mouth of the microdébrider to the maximum surface area of the polyp facilitates removal. When the mouth of the microdébrider is not fully applied to the polyp, suboptimal suction leads to a slower removal of the polyp. Polyps may occur both medial and lateral to the middle turbinate. Polyps are often sucked into the microdébrider so that one does not have to “chase” the polyp into various sinuses. If the patient begins to have discomfort during the procedure, then further anesthetic pledgets are placed in the nose for 5 to 10 minutes. Frequently one can address the contralateral side of the nose while waiting for the additional anesthesia to take effect. A trap can be placed on the microdébrider so that the material aspirated can be sent for histopathologic analysis. Care should be taken not to touch the turbinates or the septum because they will bleed and are far more sensate than nasal polyps. Rarely does one need to inject the nasal polyps to achieve anesthesia.

Removal of Nasal Polyp with Alligator Forceps (see Video 1-17)

The cost of the microdébrider is somewhat less than $150.00 per device. Polyps may also be removed with Bellucci scissors or even alligator forceps. In some patients, removal of this polyp will give immediate relief of nasal obstruction. Unilateral polyps should always be sent for histopathologic analysis because of the greater chance that a unilateral polyp represents an inverting papilloma or a malignancy. Antrochoanal polyps occur unilaterally, whereas most inflammatory polyps occur bilaterally.

Endoscopic Biopsy of Patient with a History of Inverting Papilloma (see Video 1-18)

Patients with a history of inverting papilloma are at risk for recurrence and therefore frequent endoscopic reevaluation postoperatively is important. In this case, we see a patient who has a suspicious lesion in the left anterior ethmoid area. This is at the skull base. Two areas are being inspected both medially and laterally. The irregularity in the lateral area is highlighted by reducing the light of the endoscope. Then a topical anesthetic is injected. Just above this injection is the frontal sinus and at the base of the frontal sinus is some polypoid tissue. This is the region of the anterior ethmoid artery as well. In the injection to this area, the anterior ethmoid is injected. This is confirmed by the brisk bleeding that occurs after the needle is withdrawn as well as by the blanching of the patient's left forehead after the injection. Small biopsy forceps can be used to collect biopsy specimens from the various areas. Specimens should be labeled meticulously so that any positive biopsy can be localized for further removal. The medial biopsy in this patient was benign and the lateral biopsy showed inverting papilloma.

Chronic Bacterial Sinusitis with Biofilm (see Video 1-19)

Occasionally, patients' sinus infections are refractory to both surgical and medical intervention. The biofilm is readily apparent in this patient by rigid endoscopy; however, other postsurgical patients' maxillary infection may only be visualized using a flexible fiberoptic endoscope and placing it into the maxillary sinus. Aspirate cultures of the purulent exudate can be obtained and the purulence can be irrigated from the maxillary sinus. A curved suction facilitates both the aspirate culture and the irrigation of the purulent exudate. In addition, topical antibiotics or steroids can be placed into the sinus.

Placement of Nasal Septal Button (see Video 1-20)

Symptomatic perforations can be rendered asymptomatic with the placement of a Silastic button. These are commercially available through Hood Laboratories, 575 Washington Street, Pembroke, MA 02359 (Catalog # NSB-10-S for 1 cm, NSB-20-S for 2 cm, and so on up to 5 cm in diameter). The nasal cavity is first anesthetized and then using either the endoscope or a headlight for visualization, the button is introduced into the nose on the other side. The flange is extracted through the contralateral side and then the button is positioned. Usually the patient's perforation is far smaller than the button. Thus one must cut the button to modify its size to fit the patient's perforation and nasal dimensions. Placement of an antibiotic ointment to the button daily may delay the formation of a bacterial biofilm. Once the button is too crusted, it should be removed. At this point the perforation may be sufficiently mucosalized so there is no further bleeding or crusting.