Adjunctive Endonasal Procedures with Dacryocystorhinostomy

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Introduction

Considering the wide breadth of nasal disorders commonly encountered in the general population, it is not surprising to find overlap with patients presenting with lacrimal ailments. In fact, within the subset of patients in whom surgical intervention is deemed prudent, it is occasionally necessary to perform simultaneous endonasal procedures at the time of dacryocystorhinostomy. In addition to septal deviation requiring septoplasty for access to the lacrimal system, one must also assess for various other nasal diseases including turbinate hypertrophy, nasal polyposis, rhinosinusitis, and multiple other neighboring disease processes. Emphasis must be placed on proper preoperative evaluation of concurrent disease to ensure the surgical candidate is properly consented prior to the day of surgery.

In addition to the common disease processes found in the nasal passages, it is important to first rule out some of the more threatening disorders that could necessitate further evaluation or treatment. Office endoscopy may show signs of a nasal mass, which may warrant a biopsy prior to surgical planning. Reports can be found citing lymphoma, carcinoma, or other malignant or benign tumors contributing to nasolacrimal duct obstruction [1]. In males, especially adolescents, it is important to also consider juvenile nasopharyngeal angiofibromas, as these are not to be biopsied in the office setting due to risk of hemorrhage. Once the more aggressive diseases have been ruled out, the more common nasal disorders should be considered.

Of the inflammatory sinonasal disease processes that commonly affect patients, the most common include anatomical nasal airway obstruction, some form of rhinitis or rhinosinusitis, or a combination. These entities are further broken down into various categories each with their own etiopathogenesis. Chronic rhinitis is further categorized as allergic and nonallergic, although the initial treatment of both is comparable. Acute rhinitis is frequently infectious (i.e., viral) in nature and is generally self-limiting.

Rhinosinusitis also can be categorized into its various forms, including acute or chronic, with or without polyposis, fungal, bacterial, viral, or a combination of the aforementioned (Table 28.1).

As a clinician, it is important to elicit the symptoms that accompany the disease process as this will help determine the diagnosis as well as the subsequent course of action.

For rhinitis, symptoms generally include nasal airway congestion, postnasal drip, and allergy-like symptoms including sneezing, clear nasal discharge/nose blowing, and pruritus.

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M. Javed Ali (ed.), *Principles and Practice of Lacrimal Surgery*,
DOI 10.1007/978-81-322-2020-6_28, © Springer India 2015

Table 28.1 Classification of rhinosinusitis

Acute rhinosinusitis (<4 weeks duration)
Bacterial
Viral
Invasive fungal (immunocompromised patients)
Recurrent acute rhinosinusitis (each episode <4 weeks)
Subacute rhinosinusitis (4–12 weeks duration)
Chronic rhinosinusitis (can be a combination of the following)
Bacterial
With polyposis or without
Allergic fungal
Eosinophilic mucin
Fungal ball/mycetoma/aspergilloma
Chronic fungal/saprophytic
Aspirin sensitivity and/or asthma
Mucocele formation

Table 28.2 Major and minor criteria for the diagnosis of rhinosinusitis[a]

Major symptoms	Minor symptoms
Purulent anterior nasal discharge	Headache
Purulent or discolored posterior nasal discharge	Ear pain, pressure, or fullness
Nasal congestion or obstruction	Halitosis
Facial congestion or fullness	Dental pain
Facial pain or pressure	Cough
Hyposmia or anosmia	Fever (for subacute or chronic sinusitis)
Fever (for acute sinusitis only)	Fatigue

Source: Meltzer et al. [25]
[a]Diagnosis based on presence of at least two major symptoms, or one major plus two or more minor symptoms

Symptoms of sinusitis include those listed earlier for rhinitis, in addition to the following: mucopurulent/purulent nasal or postnasal drainage, facial pressure/pain, hyposmia, fevers, headaches, halitosis, dental pain, cough, ear pain, and malaise/fatigue. Multiple sets of criteria have been proposed to help distinguish true sinusitis from various clinical imitators such as migraines, dental pains, headache syndromes, allergies, etc. A basic understanding of the algorithms used to define sinusitis and the ability to differentiate it from other diagnoses can help physicians other than otolaryngologists who may encounter these symptoms while working up a patient for a DCR or other combined procedure (Table 28.2).

Patients will often have a preconceived notion that they suffer from "sinus headaches." The most common misdiagnosis of sinusitis is migraine headaches. An alarm should go off in the clinician's mind when intermittent unilateral facial pain exists with no other accompanying symptoms in addition to a negative physical exam or negative CT scan. Multiple studies emphasize the risks of misdiagnosing migraines as sinusitis and many have even recommended a trial of antimigraine medication prior to a trial of antibiotics in such cases [2–4].

Once a thorough history has been obtained, physical exam can help narrow the differential diagnosis. Upon anterior rhinoscopy with an otoscope, the clinician can assess the anterior nasal airway for septal deviation and turbinate hypertrophy (Fig. 28.1). Significant purulence as well as polyposis or other nasal masses may also be picked up with this initial evaluation (Fig. 28.2). The next step is to assess deeper within the nasal passage, using nasal endoscopy. In-office nasal decongestant spray and topical anesthetic allows for a rigid endoscope to gently be passed into the anterior nasal cavity, the middle meatus under the axilla of the middle turbinate, and medial to the middle turbinate to assess the posterior nasal cavity. During this inspection, the various diseases of the nose can be more readily seen, such as polypoid changes, purulence, mucosal edema, nasal masses, or other conditions.

Over the past few decades, the use of CT scans for diagnostic purposes and surgical planning has become increasingly utilized. If findings such as a nasal mass or polyposis are found during the initial

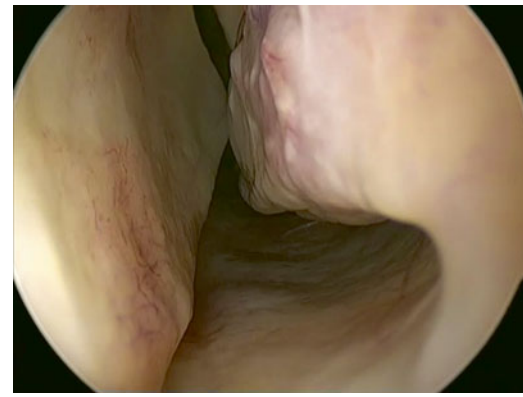

Fig 28.1 Left nasal endoscopy showing significant septal deviation as well as mild turbinate hypertrophy narrowing the nasal airway

Fig 28.2 Classic view of severe but benign appearing nasal polyps

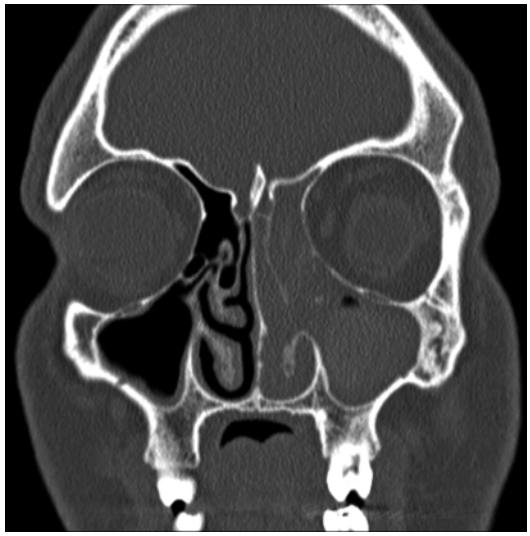

Fig 28.3 Patient with mild mucosal thickening of the right maxillary sinus but otherwise normal appearing sinuses on that side. Contrast this to the patient's left side, where pan-sinusitis is seen as opacification of the sinuses and will require surgical intervention to correct

physical exam, imaging is generally accepted as part of the primary workup. However, most other nasal diseases warrant a trial of medical therapy prior to obtaining further diagnostics.

If septal deviation or turbinate hypertrophy is encountered during endoscopy and they account for the patient's symptoms, then radiologic confirmation is unlikely to be necessary. However, if criteria of rhinosinusitis are met and symptoms persist despite medical therapy, then a CT scan of the sinuses is generally obtained prior to further intervention (Fig. 28.3).

Surgical Techniques of Adjunctive Procedures

If the decision is made to proceed with an endonasal procedure in addition to a dacryocystorhinostomy, the order of the surgeries becomes relevant. In general, surgeries done for access and anatomical obstruction such as a septoplasty are performed first to allow the surgeon proper visualization of the nasolacrimal system. If bilateral DCRs are to be performed, the DCR on the nonobstructed side can be performed prior to a septoplasty. In the rare case that a septal deviation requiring surgical intervention protrudes to the opposite side of the nasolacrimal duct obstruction, the DCR can be performed first followed by the septoplasty. Inferior turbinate reduction can be performed after a DCR as this procedure generally does not influence the work done on the nasolacrimal system. Middle turbinate work is usually performed before the DCR to allow improved access and can include anterior partial turbinectomy or concha bullosa excision. If an axillary mucosal flap is going to be utilized for the DCR as described by Wormald [5], and a middle turbinate procedure is required, the mucosal flap must be raised prior to the middle turbinate procedure to prevent its loss during the preceding interventions. If functional endoscopic sinus surgery (FESS) is going to be performed with the DCR, then the DCR is performed first. This is done because during DCR one removes the anterior wall of the agger and exposes it; this makes the first step in FESS easy as the agger is exposed and ready to be taken down. Again, if the axillary flap is to be utilized, this is to be performed as the first part of the DCR and can be later trimmed as needed for a mucosal graft to promote healing.

Septoplasty

One of the keys to a successful endoscopic DCR is adequate surgical access during the surgery and ample space surrounding the surgical bed in the postoperative period. Therefore, it is recommended to have a low threshold in performing an adjunctive septoplasty. By straightening such a

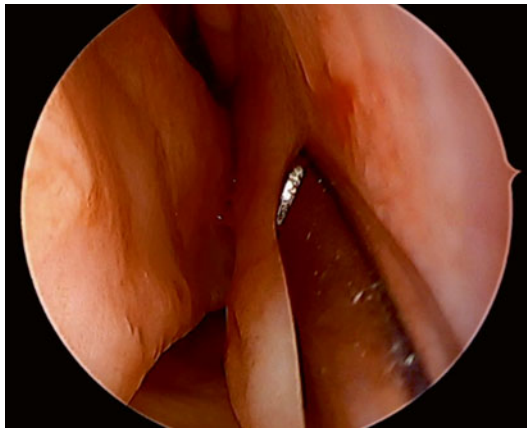

Fig 28.4 Endoscopic view of right deviated nasal septum narrowing the nasal cavity

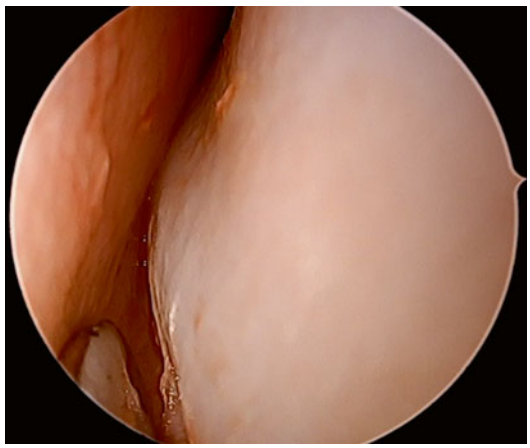

Fig 28.5 Endoscopic submucoperichondrial view showing the septal deviation

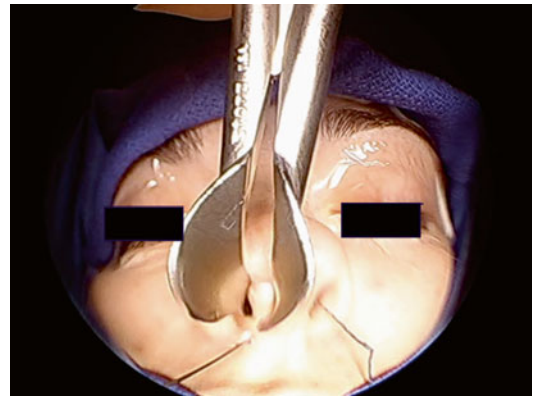

Fig 28.6 External view of right caudal deviation

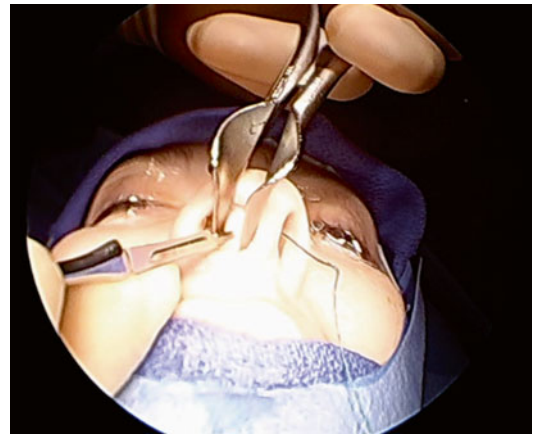

Fig 28.7 Right hemitransfixation incision

deflection (Figs. 28.4, 28.5, and 28.6), the surgeon gains improved access to the axilla of the middle turbinate and the area surrounding the proposed neo-ostium of the DCR. Considering the surgeon has all required instrumentation already set up including endoscopes, suction, lighting, etc., our recommendation is to perform an endoscopic septoplasty rather than an open version.

To be able to perform an endoscopic septoplasty, certain instruments are necessary. A suction Freer elevator helps keep a clear surgical field while allowing the surgeon to continue to elevate the flaps. The endoscopic lens cleaner can remove blood without reinsertion of the endoscope repeatedly throughout the procedure and facilitates surgical progress.

The initial incision is made either in the location of a Killian incision or, if there is caudal dislocation of the cartilaginous septum, in the more anterior location of a hemitransfixion incision (Fig. 28.7). The subperichondrial plane is exposed using a scalpel, iris scissors, or other sharp instrumentation, and then further elevated using the suction Freer (Fig. 28.8).

In order to preserve the septal flap during elevation of the flap off the maxillary crest, it is best to raise the flap as far posterior as possible prior and then to dissect toward the floor in the posterior region and bring this plane progressively anteriorly releasing the flap from the crest (Fig. 28.8). This helps prevent perforation of the

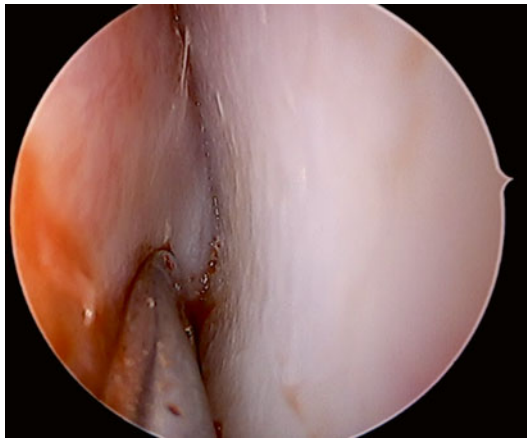

Fig 28.8 Submucoperichondrial elevation of the flap

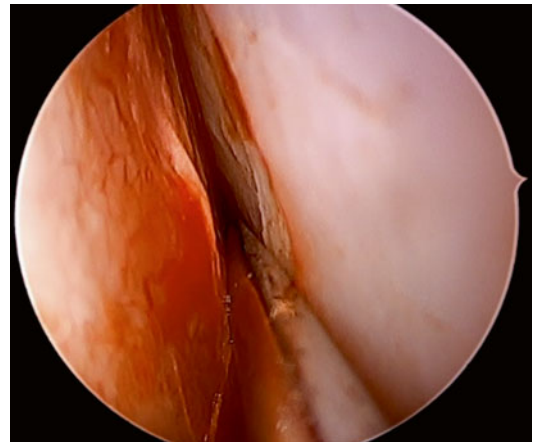

Fig 28.9 The bony–cartilagenous junction (Note the smooth cartilage and the rough bony area behind)

mucosa as it thins out over the junction of the cartilage and nasal crest. This is best done by starting on the side of the septum without a spur or significant deviation to ensure at least one septal flap is preserved. In most cases, if there is a significant spur or deviation it can be very difficult to maintain the integrity of the flap, so preserving the nondeviated side flap becomes critically important in avoiding a septal perforation.

Often, if the cartilaginous septum is elongated and dislocated off the crest, and an inferior strip of cartilage needs to be removed just above the maxillary crest, rather than attempting to elevate all the way to the floor in this circumstance, the flap can be raised down to the presenting edge of the spur. The flap is not raised over the entire deflection, as it is likely to tear. Rather, using the sharp end of a regular Freer elevator, a horizontal incision is made above the spur through the cartilage onto the crest. This allows for removal of the cartilaginous insertion into the crest from anterior to posterior. If the bony crest is found to contribute significantly, this can be removed using an osteotomy chisel. In general, patients should be counseled preoperatively that numbness of the central incisors can be common, but most often dissipates after several weeks. Ideally, only half of the crest that is protruding into the nasal cavity is removed because damage to the nerves is more common when the whole maxillary crest is removed.

As the septoplasty proceeds, occasional glances with the endoscope into the bilateral nasal cavities

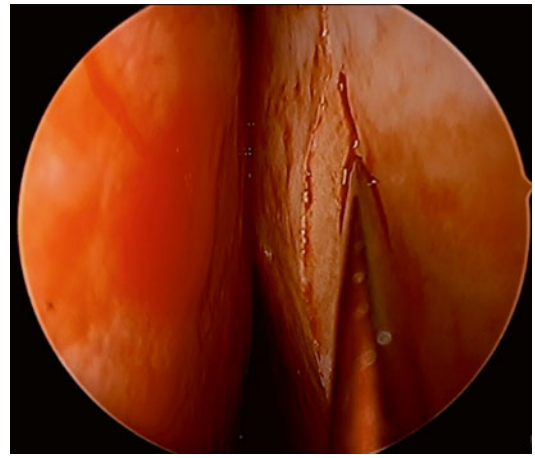

Fig 28.10 Cartilage incision with a sharp Freer elevator (Note the spared cartilage anterior and above the incision)

will allow the surgeon to correct the areas of greatest concern. The posterior bony deflections can be addressed by disarticulating the bony and cartilaginous junction (Fig. 28.9) followed by bilateral subperiosteal planes. A sharp Freer elevator is used to incise the cartilage leaving a good strut anterior and above (Fig. 28.10) and disarticulate the portion to be removed (Fig. 28.11). The bony spur is then exposed (Fig. 28.12) and can be removed superiorly using a through-biting instrument such as an open Jansen–Middleton to prevent torqueing on the roof and thus preventing a skull base damage and CSF leak (Fig. 28.13). A good space is thus created within the nasal cavity (Fig. 28.14).

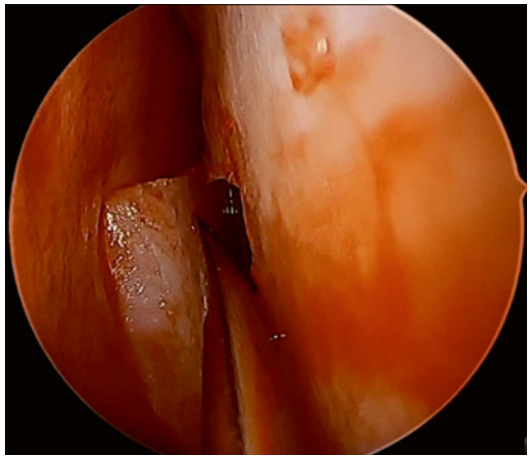

Fig 28.11 Disarticulating the incised cartilage

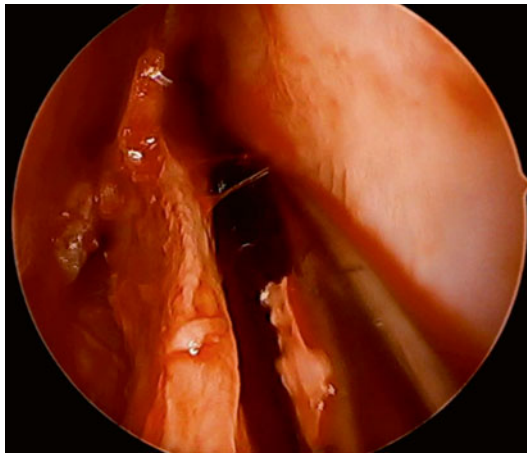

Fig 28.12 Isolation of bony spur

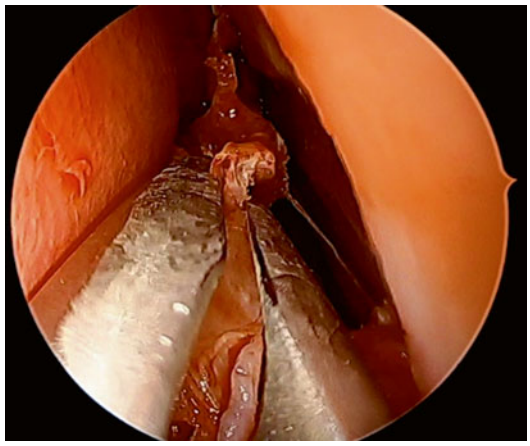

Fig 28.13 Bony spur removal using the Jansen–Middleton forceps

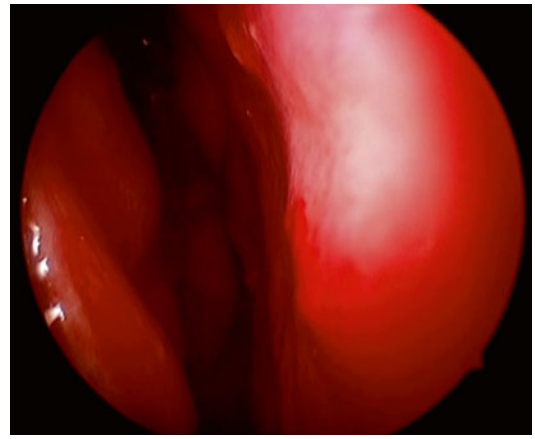

Fig 28.14 Increased space within the nasal cavity following surgery

Anteriorly, the quadrangular cartilage is removed only in areas that are obstructing the nasal airway, taking precautions to leave an L-strut of at least 1 cm to prevent saddle nose deformity.

If no prior tears have been created in either mucosal flap, the scalpel is used to make a 2–3 cm horizontal incision posteriorly on the floor of one flap to prevent a septal hematoma. A quilting suture is placed through the septum to hold the flaps together as well, also preventing fluid collection between the mucosal flaps. A review of the literature shows that in patients undergoing DCRs, septoplasty was necessary in up to 47 % of patients [5–10].

Turbinate Reduction

Like most procedures, the surgical interventions used for hypertrophy of the nasal turbinates have evolved over time. Proper patient assessment and a trial of medical therapy should be performed before the decision is made to reduce the turbinates. In those patients that fail medical therapy and in whom other contributing factors have been eliminated (allergies, sinus disease, etc.), turbinate reduction is a valid option with improvement of the patient's nasal airway and frequently in their quality of life [11–19].

Inferior turbinoplasty is the procedure of choice as it maintains the functional medial surface of the

turbinate while effectively reducing the size of the turbinate avoiding such complications as atrophic rhinitis and empty nose syndrome.

This preservation of the medial wall of the inferior turbinate maintains the airflow receptors in this wall and avoids the "empty nose syndrome" in which the patient cannot perceive airflow despite a widely patent nasal airway. In this technique, local anesthetic agent is infiltrated into head of the inferior turbinate (IT) (Fig. 28.15) and an incision is taken on the head (Fig. 28.16). The head is trimmed onto bone allowing space for the endoscope and a powered microdebrider to be placed. The microdebrider is used to remove the soft tissue over the inferior and medial portions of the turbinate. Next, a dissector is used to dissect in the subperiosteal plane (Fig. 28.17) the medial mucosa and remaining lateral mucosa from the vertical portion of the inferior turbinate bone, isolating the bone (Fig. 28.18). The bone is removed and any residual bone fragments are cleared with a ball probe, back-biter, or other endoscopic instruments (Fig. 28.19). Once this bone is removed, the two vessels supplying the inferior turbinate can be visualized in the posterior region of the turbinate. These vessels are cauterized with bipolar forceps. The residual turbinate is then outfractured and rolled laterally so that the medial mucosa covers any exposed tissue, minimizing postoperative crusting (Fig. 28.20). The rolled turbinate is held in place with a strip of oxidized cellulose or surgicel. No other packing is used in the nose. The powered inferior turbinoplasty

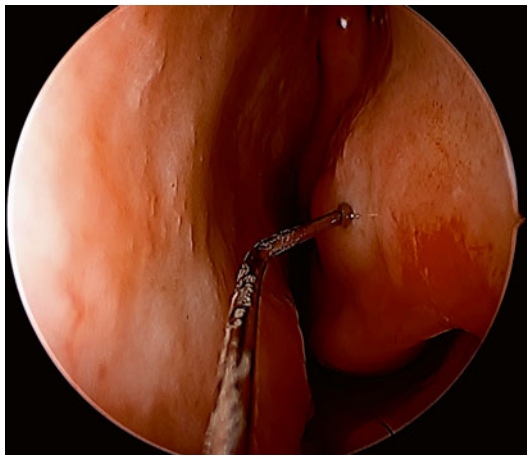

Fig 28.15 Injecting into the head of inferior turbinate for decongestion

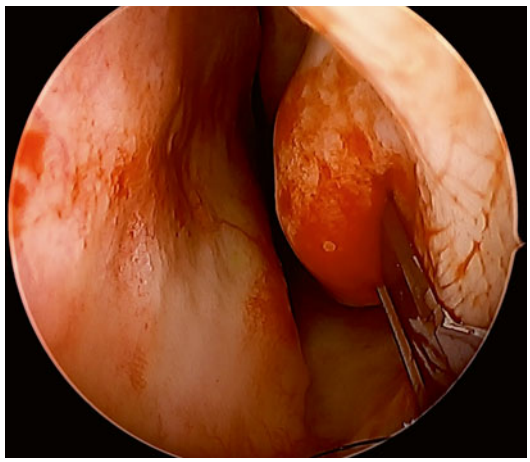

Fig 28.16 Inferior turbinate incision

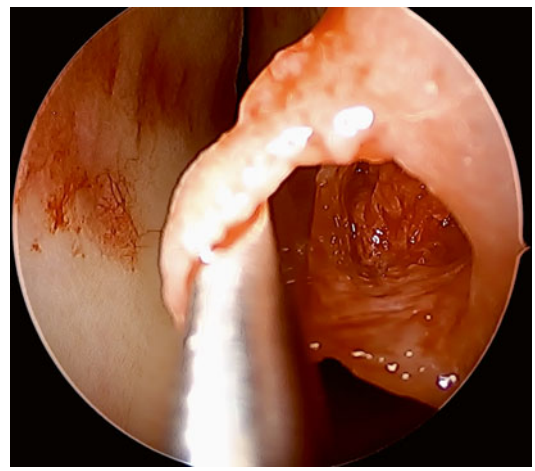

Fig 28.17 Raising the submucosal plane

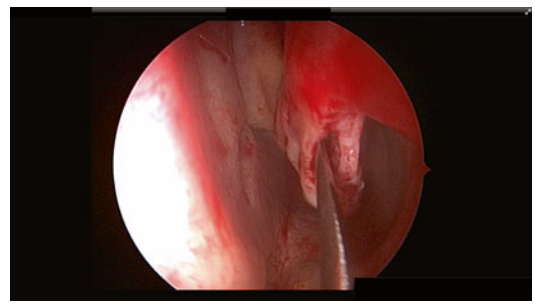

Fig 28.18 Isolation of the inferior turbinate bone

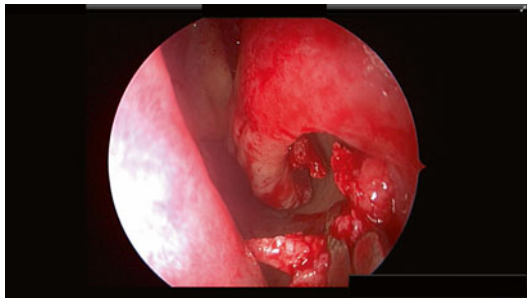

Fig 28.19 Removal of the inferior turbinate bone

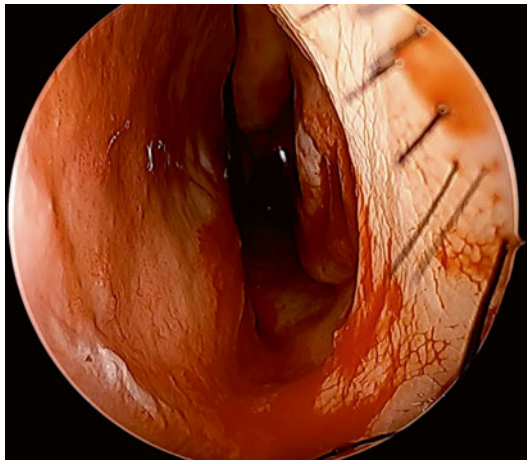

Fig 28.20 Intraoperative photo following turbinoplasty

preserves the medial aspect of the mucosal covering of the inferior turbinate and therefore reduces the risk associated with standard turbinectomy procedures while still giving long-lasting results [20] (Fig. 28.21).

Middle turbinate procedures can also be performed in conjunction with an endoscopic DCR. If the middle turbinate is pneumatized as per the CT scan, this is considered an anatomical variation known as a concha bullosa. This cell can obstruct access for the DCR or become infected, block the natural osteomeatal complex, cause a contralateral septal deviation, or block the neo-ostium after a DCR has been performed. To excise the concha bullosa, an incision is made into the anterior face of the turbinate using a scalpel or sickle knife. Once the concha bullosa has been entered, endoscopic scissors are placed through the aperture in the closed position, and then opened inside in order to pry the cell open

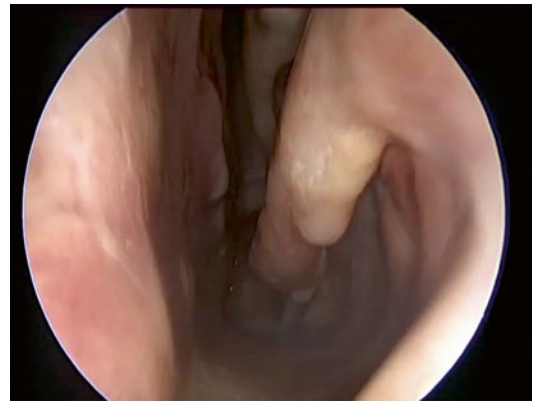

Fig 28.21 Several months after septoplasty and inferior turbinoplasty, the well-healed mucosa and patent airway demonstrate the drastic improvement from the preoperative view seen in Fig. 28.1

further. The lateral portion of the concha bullosa can then be removed using the endoscopic scissors or straight through-cutting instruments until the posterior aspect is released.

Even if the middle turbinate is not pneumatized, occasionally middle turbinate work (including partial or complete turbinectomy) is still required to ensure adequate space at the neo-ostium after DCR. This space surrounding the os is crucial to prevent synechiae and stenosis of the new nasolacrimal aperture [5, 21–23].

Functional Endoscopic Sinus Surgery

In the same review of DCR literature mentioned earlier, 15 % of patients underwent ancillary endoscopic sinus surgery for ongoing nonresponsive chronic sinusitis or nasal polyposis [5–10].

The various nuances of functional endoscopic sinus surgery (FESS) are too numerous to cover in this chapter, although certain points are worth mentioning. Due to the small but devastating chances of catastrophic complications such as carotid artery injury, skull base violation, and blindness, sinus surgery is generally performed only by a fully trained otolaryngologist. Regardless of the technique used, the DCR is most often performed prior to the sinus surgery. During the initial steps

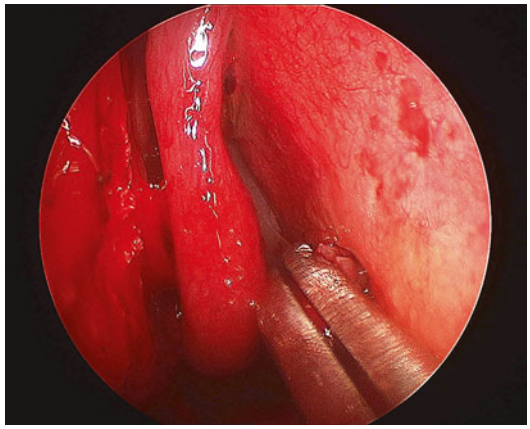

Fig 28.22 Uncinectomy (*horizontal*) by backbiting forceps

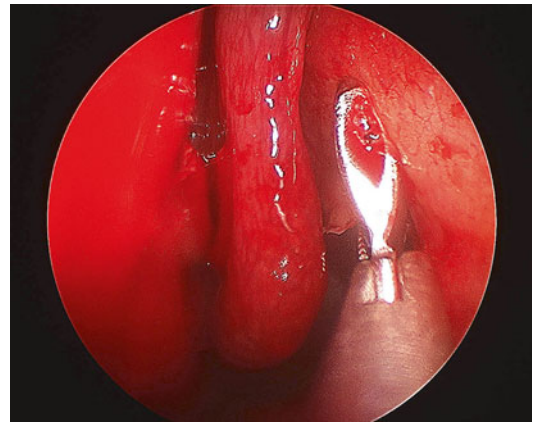

Fig 28.23 Vertical portion removed with 45° up-biting Blakesly forceps

of the DCR, the axillary flap can be raised and the agger nasi cell opened, thus preparing for further exenteration of the ethmoid and frontal cells during the FESS. Occasionally, severe polyposis requires that the FESS be initiated prior to the DCR as the disease may block the middle meatus and the area of lacrimal dissection. The goal of the FESS is to open the sinuses in a natural pathway to allow proper drainage of mucus while preserving the maximal amount of mucosa. In addition, proper aeration and improved access for saline irrigation is thought to decrease the inflamed or polypoid nature of the mucosa found in diseased sinuses. At the time of the FESS, each diseased sinus is addressed individually in order to remove entrapped mucus, mucopurulent discharge, polyps, or fungal growth that may have accumulated. Figures 28.22, 28.23, 28.24, 28.25, 28.26, 28.27, 28.28, 28.29, 28.30, 28.31, 28.32, 28.33, 28.34, 28.35, and 28.36 give a brief pictorial overview of a standard FESS surgery. Once the sinus surgery has been performed, the surgery can be completed as planned with standard postoperative care. Sinus rinses with saline are a mainstay in most sinus surgeons' postoperative care regimen and are utilized in the DCR/FESS patients as well. Nasal saline spray and douche can be started within 24 h of surgery. This helps to remove blood clots from the nose and creates a clear nasal passage. If stenting is to be performed, it also prevents mucous from accumulating around the O'Donoghue tubes, which can create a medium or become a nidus for secondary infection.

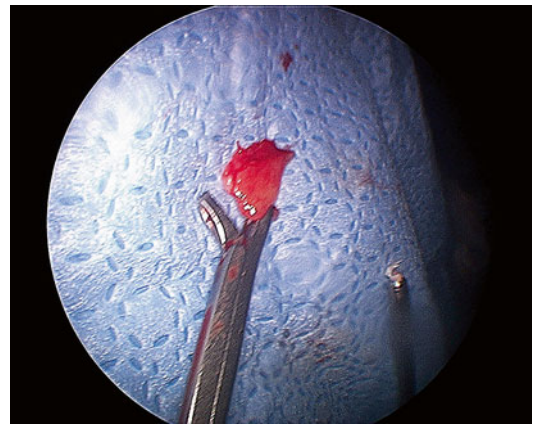

Fig 28.24 Uncinate removed en-block

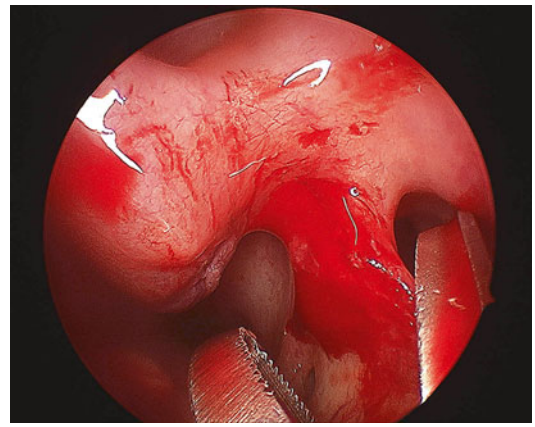

Fig 28.25 Middle meatal antrostomy

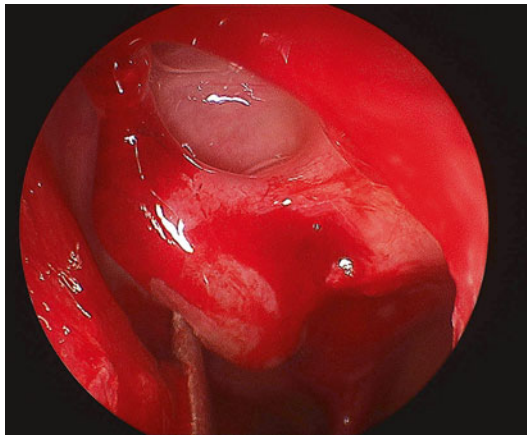

Fig 28.26 Beginning of anterior ethmoidectomy

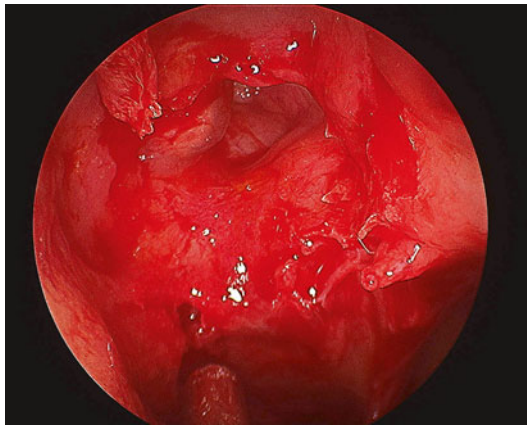

Fig 28.27 Completed anterior ethmoidectomy

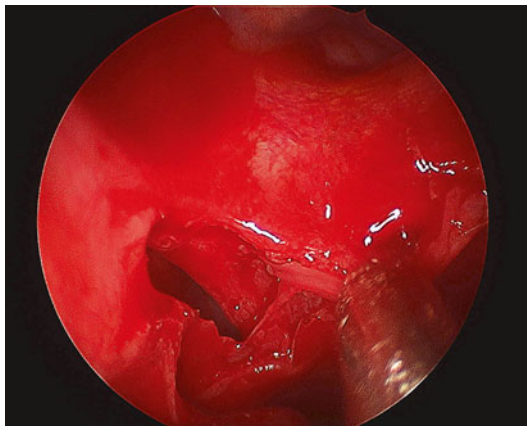

Fig 28.28 Commencing posterior ethmoidectomy

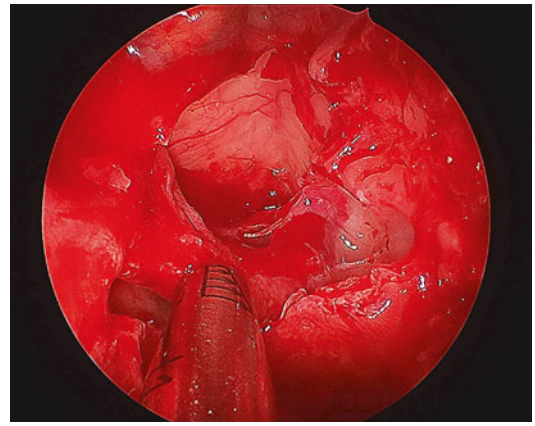

Fig 28.29 Completed posterior ethmoidectomy

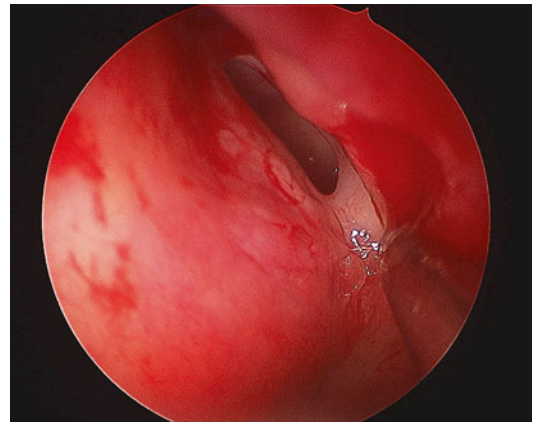

Fig 28.30 Sphenoid ostia visualized

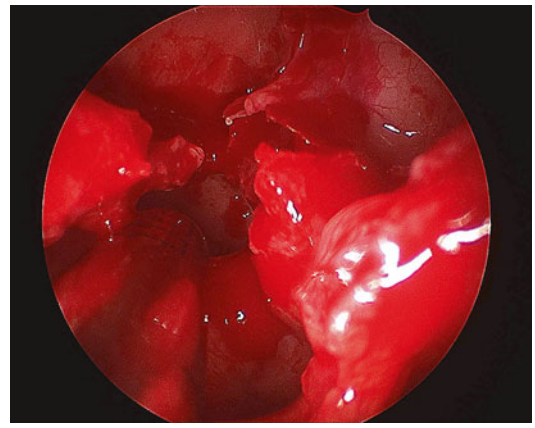

Fig 28.31 Sphenoidotomy

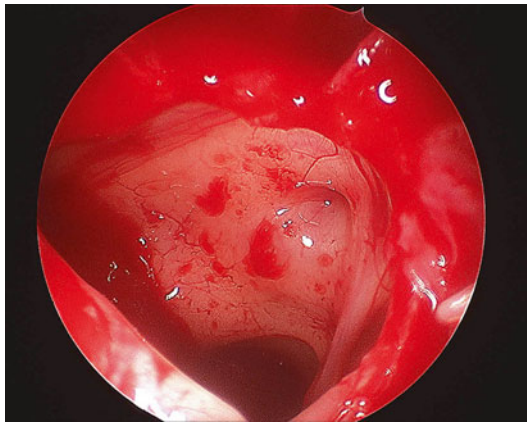

Fig 28.32 Completed sphenoidotomy (Note the opticocarotid recess in sphenoid cavity)

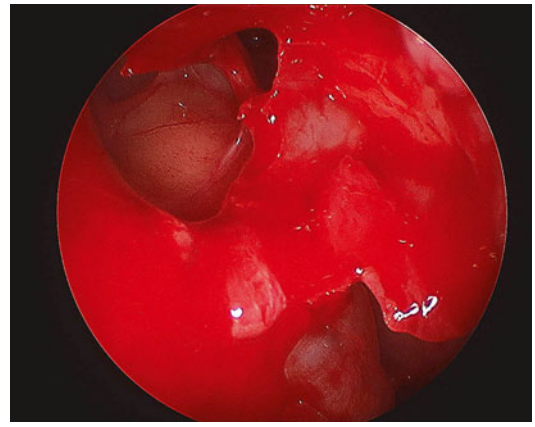

Fig 28.35 Enlarged opening of the frontal sinus

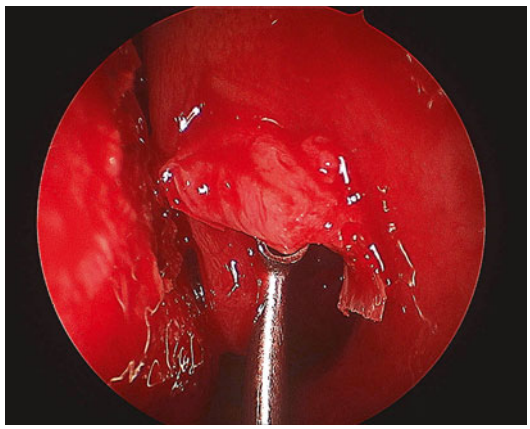

Fig 28.33 Axillary flap access to agger nasi and frontal recess

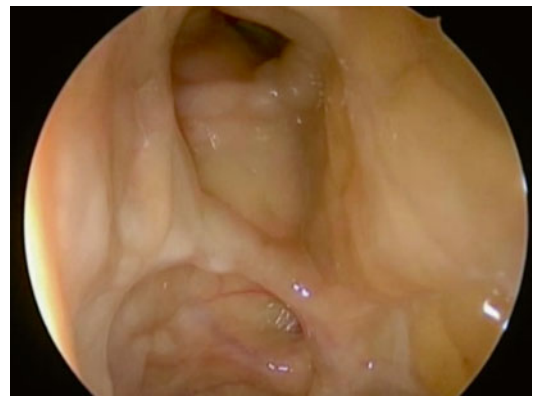

Fig 28.36 Wide opened and well-draining sinuses following FESS

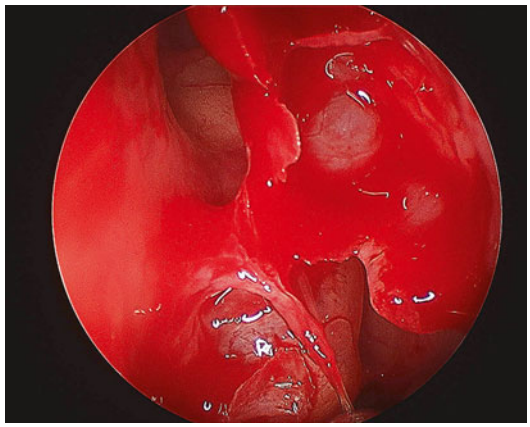

Fig 28.34 Frontal recess

Conclusion

It is beneficial for both Ophthalmologists and otolaryngologists to develop a close liaison with each other when starting an endoscopic DCR practice [24]. Both have expertise in different areas and can improve the overall patient care, the preoperative evaluation, the surgical outcomes, and even the postoperative management. The main advantage of a two-team approach is allowing the Ophthalmologist to assess for additional eye disease while the sinus surgeon is able to endoscopically assess the nasal cavity, septum, and perform ancillary endonasal procedures that may be

necessary while avoiding multiple trips to the operating room. Both surgeons should learn to be comfortable with all aspects of assessment and surgery and should be able to assist each other with ease in order to provide optimal patient care.

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