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MINIMALLY INVASIVE TECHNIQUES

A minimally invasive endoscopic approach to chronic isolated frontal sinusitis

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Chronic isolated frontal sinusitis occurs infrequently. When it does, most of the ethmoid cells are well aerated, and the frontal sinus is involved secondary to anatomic obstruction or inflammatory changes confined to the frontal recess. In this article, we describe a targeted endoscopic approach in which standard anterior ethmoidectomy is unnecessary in treating this condition. Complete uncinectomy with resection of the terminal recess, or the agger nasi or frontal cell is followed by frontal sinusotomy. The ethmoid bulla and the maxillary ostium are left intact. The ethmoid bulla and the anterior wall of the suprabullar recess serve as an effective posterior boundary of frontal recess dissection in the coronal plane, and as a barrier between the surgical instruments and the anterior ethmoid artery. The described technique may be insufficient in certain anatomic variations, such as frontal recess pneumatization originating behind the plane of the bulla lamella. In these situations, the ethmoid bulla will need to be resected. It is concluded that chronic isolated frontal sinusitis can be effectively treated in select cases with a minimally invasive endoscopic procedure that is limited to the reestablishment of frontal sinus outflow.

Frontal sinusitis is a common illness that is usually secondary to inflammatory changes in the prechambers (ie, the anterior ethmoid cells), thus, the rationale for treating chronic frontal sinusitis with anterior ethmoidectomy.[1] In contrast, isolated frontal sinusitis is infrequently encountered. When it is, most of the ethmoid cells are well aerated, and the frontal sinus is involved secondary to anatomic obstruction or inflammatory changes confined to the frontal recess.

We had noted in our earlier operations that the ethmoid bulla had no anterior opening to the ethmoid infundibulum in most cases. Setliff et al[2] supported this observation and found that 68% of the ethmoid bullae have a single posterior opening into the hiatus semilunaris superior. This finding may explain the occasional presence of frontal recess and sinus disease without spread of infection into the ethmoid bulla and the other anterior ethmoid cells. It follows, then, that in certain cases, the frontal sinus is subordinate only to the most anterior compartment of the ostiomeatal unit, namely, the frontal recess.

In a previous study, the authors investigated variations in the superior attachment of the uncinate process, the prevalence of agger nasi and the dimensions of the frontal ostium,[3] and the results led to the design of a simplified endoscopic surgical approach to the frontal sinus.[4] This approach was centered on complete removal of the superior attachment of the uncinate process, including the terminal recess, when frontal sinusotomy was indicated. We had formerly surgically treated the ethmoid bulla and the remaining anterior ethmoid cells as soon as a frontal sinusotomy had been accomplished, even in the absence of anterior ethmoid disease. We have since changed this protocol because we now regard the ethmoid bulla and the anterior wall of the suprabullar recess as forming an effective posterior boundary of frontal recess dissection in the coronal plane, and as a barrier between the surgical instruments and the anterior ethmoid artery. This is also in keeping with the

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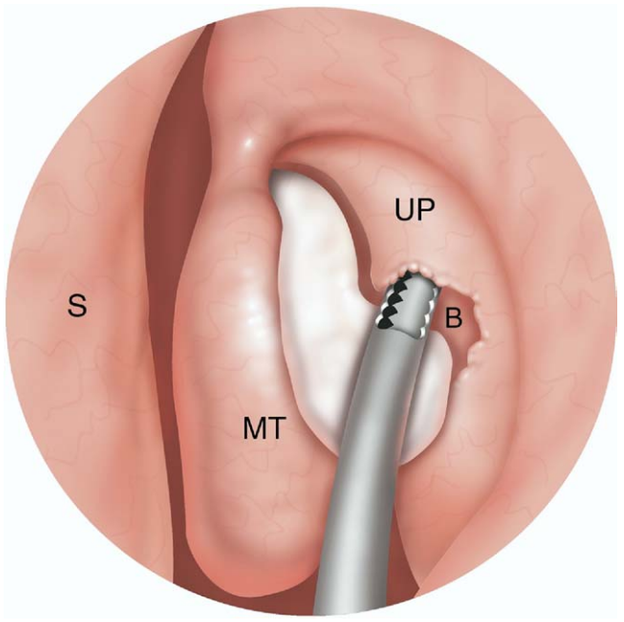

Figure 1 Emergence of a polyp from the middle meatus. The visible inferior portion of the uncinate process (UP) is removed using a curved microdebrider. B, ethmoid bulla; MT, middle turbinate; S, nasal septum.

fact that unnecessary dissection posterior to the bulla lamella increases the risk of penetrating the fovea ethmoidalis or the lateral lamella of the cribriform plate. We have also noted that ethmoidectomy may induce middle turbinate lateralization if the basal lamella is accidentally injured and so believe that the approach we now describe is safer than the traditional one.

Louri[5] introduced the concept of "intact bulla sinusotomy" in 1993. We further developed and refined the technique, and were encouraged by the frequent absence of direct communication between the frontal recess and the ethmoidal bulla. The objective of this article is to describe a problem-oriented targeted endoscopic technique for treating chronic isolated frontal sinusitis in which standard anterior ethmoidectomy can be obviated.

Operative technique

We had earlier published a detailed description of our surgical approach to the frontal sinus.[4] Frontal sinusotomy was routinely followed by standard anterior ethmoidectomy that inevitably included resection of the ethmoid bulla. In the current study, the ethmoid bulla was left intact in all cases.

In our currently described surgical approach to isolated frontal sinusitis, it is crucial to preoperatively evaluate the frontoethmoid connection by thin-section computerized tomographic (CT) scans, paying special attention to the anatomy of the uncinate process. If, as it is in 88% of the cases,[3] the uncinate process attaches superiorly to the lamina papyracea to create a terminal recess, the opening of the frontal recess is medial and posterior to the dome-shaped uncinate process. If the uncinate process attaches superiorly to the cribriform lateral lamella or to the middle turbinate (the remaining 12% of the cases), the frontal sinus outflow tract is lateral to the uncinate process. Throughout the operation, anatomic landmarks should be identified as precisely as possible before removal of the disease process, even though this contributes to the tediousness of the procedure. We employ a 0° endoscope for the initial steps of the procedure, and angled endoscopes for the frontal recess and sinus vicinity. We use microdebrider for the removal of the entire uncinate and agger nasi, and fine-curved forceps for the removal of bony fragments.

After the uncinate process is identified, it is medialized with the hooked end of a frontal ostium seeker. A 40° microdebrider is used to remove the visible inferior portion of the uncinate process (Figure 1). The natural maxillary ostium is preserved if it is normal and free of mechanical obstruction. The middle turbinate is preserved unless there are severe polypoid changes or a concha bullosa. Resection of the inferior portion of the uncinate process generally reveals a dome-like structure that resembles an inferiorly opened anterior ethmoid cell. This structure is the superior blind end of the ethmoidal infundibulum that is formed by the lateral bending of the uncinate process and is called "the terminal recess."[1,3] The latter is often mistaken for an agger nasi cell or for the frontal sinus itself when it is in a high position. In essence, the terminal recess can be described as having anterior and posterior walls. If a frontal sinus seeker is inserted posteromedially to the posterior wall and advanced upwards, the upper end of the instrument usually enters the frontal sinus.

We now switch to a 30° or 70° endoscope and use the curved 40° microdebrider to completely remove the anterior wall of the terminal recess, whose posterior wall is now clearly exposed (Figure 2). We trace the posterior wall

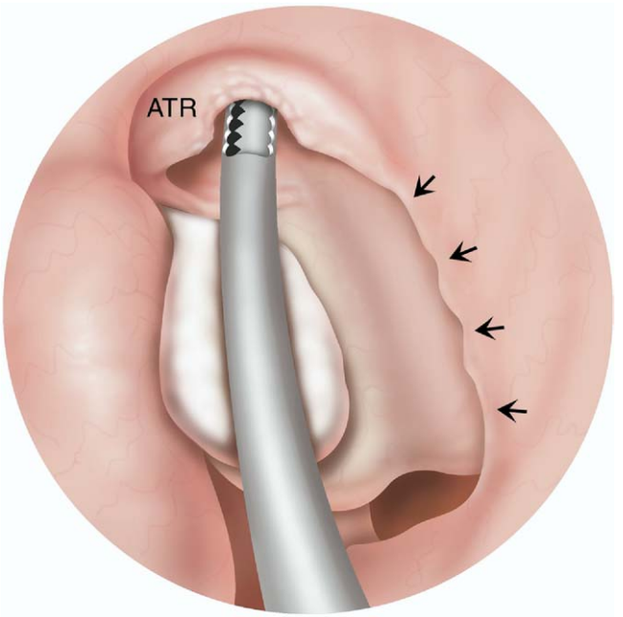

Figure 2 Exposure of the terminal recess reveals that the polyp is in the frontal recess, located posteromedially to the posterior wall of the terminal recess. A 40° debrider is used to remove the anterior wall of the terminal recess (ATR). The maxillary ostium is preserved. Arrows indicate the cut edge of the uncinate process after its removal.