MANAGEMENT OF ALLERGIC FUNGAL SINUSITIS

ESSAY

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By

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ABSTRACT

Since allergic fungal sinusitis was initially described by ***Millar et al. in (1981)***, many have tried to define and explain the disorder. Allergic fungal sinusitis cannot be categorized so easily. According to the literature at this time, there are five major criteria and six associated characteristics or minor criteria of patients with allergic fungal sinusitis. In reality, patients may not develop all five major criteria or have any of the associated criteria for years. Allergic fungal sinusitis is not only difficult to diagnose, but it is one of the most complicated conditions rhinologists must manage. Endoscopic sinus surgery must be used in conjunction with long-term medical therapy, *i.e*, oral and nasal corticosteroids, immunotherapy, antifungal therapy, and antimicrobial agents to effectively control the problem. Allergic fungal sinusitis is most likely the endpoint in a spectrum of sinonasal disease, driven by the presence of fungus and eosinophils with their inflammatory mediators. The affected nasal mucosa no longer functions properly, and a cycle of chronic edema, stasis, and bacterial superinfection results. Therapy entails disrupting the inflammatory process to allow normal mucosal function to resume.

Key Words:

Fungus, Allergy, Rhinosinusitis.

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INTRODUCTION

Allergic fungal sinusitis (AFS) is a noninvasive form of highly recurrent chronic allergic hypertrophic rhinosinusitis that can be distinguished clinically, histopathologically and prognostically from the other forms of chronic fungal rhinosinusitis. There are three invasive (acute necrotising, chronic invasive and granulomatous invasive) and two noninvasive (fungal ball and allergic fungal) forms of fungal rhinosinusitis currently recognised. Confusion in differentiating between the various forms of fungal rhinosinusitis and between other forms of chronic hypertrophic sinus disease (HSD) can be eliminated by adhering to strict diagnostic criteria. There are characteristic clinical history , physical examination findings, laboratory test results, including elevated total serum IgE and positive inhalant allergy skin tests, and sinus computed tomography scans showing chronic rhinosinusitis (often with the presence of hyperattenuating sinus contents) . Diagnosis of AFS is essentially based on histopathology obtained from sinus surgery. Histopathology shows the presence of eosinophilic-lymphocytic sinus mucosal inflammation, extramucosal allergic mucin (that is also seen grossly at surgery as a characteristic ‘peanut-buttery’ material), and scattered silver stain positive fungal hyphae within the allergic mucin but not in the mucosa ***(Schubert, 2004).***

Treatment of AFS has employed a combination of surgical and medical approaches. Surgery has always been a mainstay of treatment for AFRS. The development of endoscopic tissue-preserving approaches that were sufficient to remove obstructing polypoid mucosa, evacuate sinus contents, and facilitate continued sinus drainage . AFS has been noted to

have a provoking tendency for recurrence ***(Marple, 2001; Ryana and Marple 2007).***

A variety of medical treatments have been tried, each with their own advocates. Sysemic steroids and specific immunotherapy have been reported as helpful in reducing recurrence ***(Kuhn and Javer 2000).***

In addition, topical nasal corticosteroids, saline irrigations, antifungal agents, leukotriene receptor antagonists, and even macrolide antibiotics all have a potential role in the medical management of the disease ***(Rains and Mineck 2003).***

Total serum IgE levels should be followed postoperatively as they can be prognostic for recurrent disease. Close follow up and coordination of treatment by both medical and surgical physicians as a team leads to the best clinical outcomes ***(Schubert, 2004).***

ANATOMY OF THE PARANASAL SINUSES

The anatomy of the paranasal sinuses is complex and varies greatly between human subjects. Understanding this anatomy is, however, imperative for otolaryngologists who wish to avoid surgical complications. Here we will outline and summarize the basic anatomic concepts of the region, with an emphasis on surgical anatomy ***(Stammberger, 1991).***

The anatomy of the paranasal sinuses will be discussed, with special emphasis on the ethmoid sinus and the ethmoid structures that are important in endoscopic sinus surgery.Fortunately, several rhinologists and surgeons have reduced the complex ethmoidal labyrinth of the adult into a series of lamellae on the basis of embryologic precursors ***(Fig.1,2,3,4).*** The first lamella is the uncinate process; the second lamella corresponds to the ethmoidal bulla; the third is the basal or ground lamella of the middle turbinate; and the fourth is the lamella of the superior turbinate. The basal lamella of the middle turbinate is especially important, as it divides the anterior and posterior ethmoids. The frontal, maxillary, and anterior ethmoids arise from, and therefore drain into, the middle meatus. The posterior ethmoid cells arise from, and therefore drain into, the superior and supreme meati, while the sphenoid sinus drains into the sphenoethmoid recess. The lamellae are relatively constant features between human subjects, making intraoperative recognition important. They can help the surgeon maintain anatomic orientation when operating within the labyrinth of the ethmoid sinus.

Fig. (1): Lateral wall of the nose: inferior turbinate (it), middle turbinate (mt), and superior turbinate (st) ***(Kennedy* et al., 2001)**

Fig. (2): *Lateral wall of the nose. The middle turbinate has been resected to reveal the important structures of the middle meatus: uncina process (up), ethmoid bulla (eb), and the hiatus semilunaris (inferior) (*)*

.***(Kennedy* et al., 2001)**

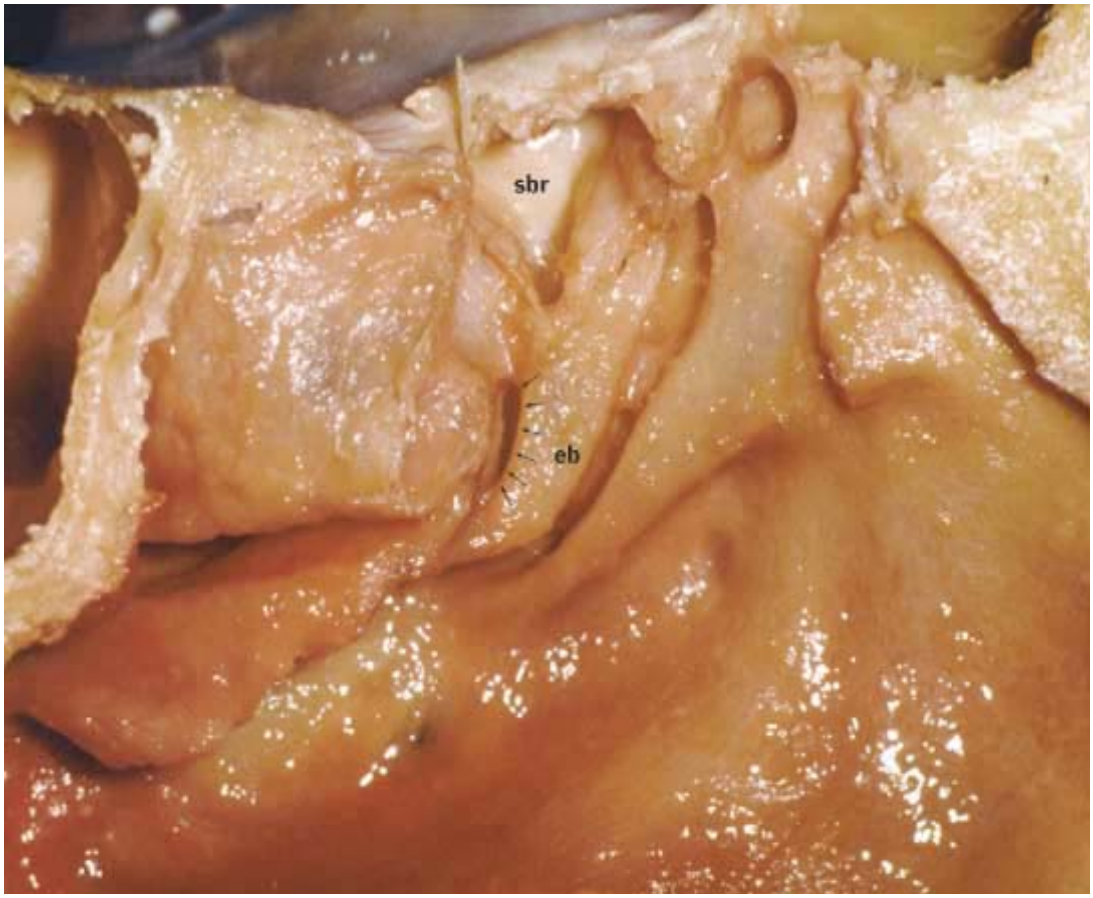

Fig. (3): *Resection of the superior portion of the middle turbinate reveals the suprabullar recess (sbr) above the ethmoidal bulla (eb). The hiatus semilunaris superior (arrows) is seen posterior to the ethmoidal bulla.The hiatus semilunaris superior leads to the retrobullar recess. In this case,the suprabullar and retrobullar recesses are separate pneumatization tracts.* ***(Kennedy* et al., 2001)**

Anterior Ethmoid

Agger Nasi

On anterior rhinoscopy, a prominence can be easily appreciated at and just anterior to the middle turbinate's insertion into the lateral nasal wall. This region was designated the agger nasi, taken from the Latin *agger*, meaning mound or eminence, and *nasi*, meaning nose. This mound or eminence is a very consistent feature on nasal examination. In many but not all cases, the agger nasi region is pneumatized by an anterior ethmoid cell, referred to as the agger nasi cell. This cell usually takes its origin from the superior aspect of the infundibulum or the frontal recess region ***(Fig.4) (Stammberger, 1991; Van Alyea, 1939 and Ritter, 1973)***.

The agger nasi cell is bordered anteriorly by the frontal process of the maxilla, superiorly by the frontal recess/sinus, anterolaterally by the nasal bones, inferomedially by the uncinate process of the ethmoid bone, and inferolaterally by the lacrimal bone. The intimate relationship of the cell to the lacrimal bone readily explains the finding of epiphora in select patients with sinus disease. The agger nasi can also be important in frontal sinusitis and its treatment. The superior aspect of the cell serves as the anteromedial floor of the frontal sinus and a significant portion of the anterior border of the frontal recess. This is relevant for understanding the pathophysiology of frontal sinusitis and the surgical treatment of the frontal sinus. The agger nasi can pneumatize inferomedially to pneumatize the uncinate process ***(Fig.4).*** In a small percentage of patients, the pneumatization can be significant, and bulla formation of the uncinate may occur ***(Bolger et al., 1990 and Kennedy, Zinreich, 1988).***

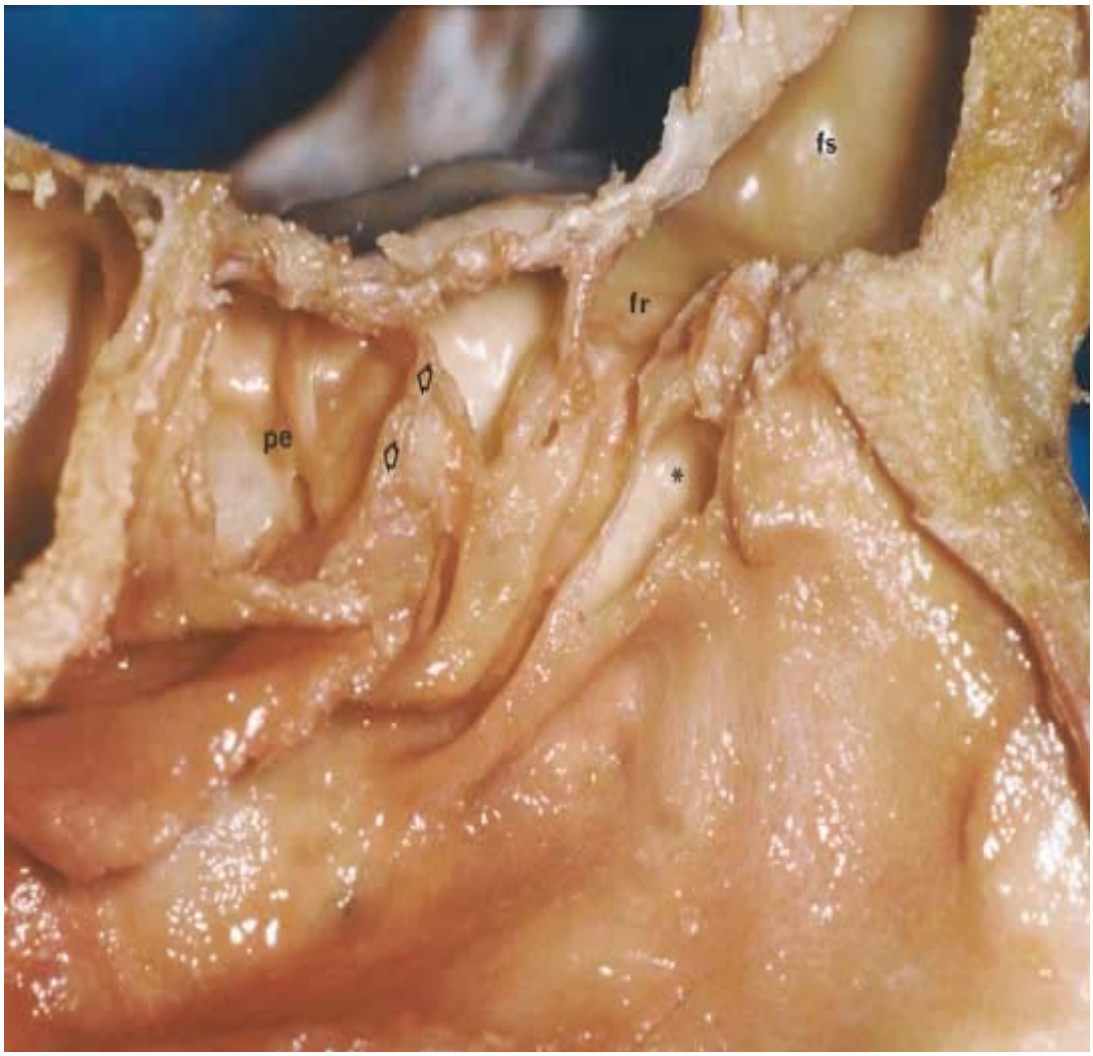

Fig.(4):*Pneumatization is present in the superior portion of the uncinate from a cell from the ethmoid infundibulum (*). The frontal sinus (fs) and frontal recess (fr) N can be seen draining into the middle meatal structures. After removing the lamellar portion of the superior turbinate, a view into the posterior ethmoids (pe) is obtained. The open arrows mark the basal lamellae of the middle turbinate, which divides the anterior and posterior ethmoids.* ***(Kennedy*** **et al., 2001)**

Uncinate Process

The uncinate process is most easily appreciated by viewing a sagittal gross anatomic specimen after deflecting the middle turbinate superiorly**.** This ethmoid structure is nearly sagittally oriented, nearly paralleling the ethmoidal bulla. It is approximately 3 to 4 mm wide and 1.5 to 2 cm in length. Through most of its course, its posterior margin is free as it has no bony attachments. The hiatus semilunaris lies directly behind the posterior margin of the uncinate **(Fig. 5)** ***(Stammberger, 1991).***

Anteriorly and superiorly, it attaches to the ethmoidal crest of the maxillae, just inferior to the lateral attachment of the anterior aspect of the middle turbinate and agger nasi. Directly inferior to this, it fuses with the posterior aspect of the lacrimal bone.Its anterior inferior aspect does not have a bony attachment. Posteriorly and inferiorly, the uncinate attaches to the ethmoidal process of the inferior turbinate bone .The attachment here is thick, and the uncinate often splits or widens in this region to fuse with the stouter inferior turbinate bone. At its posterior and superior limit, the uncinate also gives off a small bony projection to attach to the lamina perpendicularis of the palatine bone ***(Stammberger et al., 1995).***

Returning to its superior aspect, the uncinate projects posterior and superior to the middle turbinate attachment and most commonly bends laterally to insert on the lamina papyracea of the orbit **(Fig. 5).** Inferior and lateral to this portion of the uncinate lies the superior aspect of the infundibular air space, the recessus terminalis. Superior and medial to this portion of the uncinate (most commonly) lies the floor of the frontal recess. Alternatively, the uncinate can attach centrally to the skull base or medially to the superior aspect of the vertical lamella of the middle turbinate near the turbinate's insertion to the cribriform plate. ***(Stammberger, 1991 and Onishi, 1981).***