

Allergic Mucin in Allergic Fungal Rhinosinusitis



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A previously healthy 67-year-old man visited the otorhinolaryngologist's office reporting mucinous nasal secretion, post-nasal drip, and right nasal stuffiness for 8 months. On the initial visit, the nasal endoscopy revealed only sparsely pooled mucinous discharge in the right middle meatus with no mass lesion or nasal polyps. A computed tomography image revealed diffusely thickened mucosa of the right maxillary sinus partially filled with a dense secretion showing areas of hyperattenuation in the bone window setting (Figure 1, arrowhead). No focal microcalcifications, bony destructions, or bony remodeling were identified in the maxillary sinus. The patient had serum eosinophilia of 598 eosinophils/ μ L (9.7% total white blood cells). The radioallergosorbent test showed an elevated total IgE concentration of 915.60 IU/mL and the multiple allergen simultaneous test revealed type I hypersensitization (atopy) to *Aspergillus* spp. (class 3), *Cladosporium* spp. (2+), weak sensitization to *Penicillium* spp. (1+), and none to *Alternaria* spp.

During elective endoscopic sinus surgery, allergic mucin (Figure 2, A, B, arrows) that was light gold and had a peanut butter-like texture, accompanied by thick mucoid discharge (Figure 2, A and B, arrowheads) completely filling the right maxillary sinus, was observed. The maxillary sinus mucosa exhibited diffuse swelling with polyposis (Figure 2, A, asterisk), which was stripped and trimmed with a microdebrider after a middle meatal antrostomy. The histology of the obtained mucin demonstrated multiple nonpigmented (hyaline) septated hyphae with acute-angled branching molds upon Grocott methenamine silver stain (Figure 2, C, arrowhead), likely suggesting the presence of *Aspergillus* spp. in the dense mucinous background, which showed no invasion into the maxillary sinus mucosa. The mucin was infiltrated with more than 200 eosinophils on high-power field (Figure 2, D, asterisk), and multiple Charcot-Leyden crystals (Figure 2, D, arrowhead) were noticeable. The distinctive allergic mucin with multiple fungal hyphae, polyposis of the involved paranasal sinus mucosa, and atopy to *Aspergillus* spp. confirmed the patient's diagnosis to be allergic fungal rhinosinusitis (AFRS).

The patient was prescribed an intranasal corticosteroid spray and nasal rinsing with saline for 4 months after surgery. Three

months after the operation, the patient was symptom-free and the maxillary sinus mucosa maintained its normalized state.

Allergic fungal rhinosinusitis is a distinct clinical entity in the general category of chronic rhinosinusitis (CRS).¹ It is a noninvasive form of a fungal mucosal infection in the upper respiratory tract resulting in an intensely persisting T_H2 allergic reaction against an environmental fungus colonized in the paranasal sinuses.¹ In most cases, AFRS is diagnosed during sinus surgery for CRS on observing allergic mucin.¹ The clinician must be aware of the typical gross features of allergic mucin in AFRS, as depicted in the image shown here, and distinguish them from fungal ball sinusitis, CRS, or CRS with nasal polyps. The clinical importance of promptly diagnosed AFRS is that administering systemic or topical glucocorticoids after surgery may reduce disease relapse and mucosal swelling, because the pathophysiology of AFRS mostly lies in T_H2 allergic inflammation.¹

The most common AFRS-etiologic molds reported are dematiaceous (such as *Bipolaris*, *Curvularia*, and *Exserohilum*) and *Aspergillus* (a hyaline mold).¹ Based on the morphologic analysis of histopathology, *Aspergillus* spp. was most likely the causal fungus in this case. Although a histopathologic examination can confirm the presence of molds, and specific morphologic characteristics of different molds may suggest the causative mold in AFRS, it may often be confused with other types of molds when a fungal culture has not been performed.² Therefore, a fungal culture of the surgical specimen should be performed in addition to a histopathologic examination when an allergic mucin is detected during sinus surgery in a patient with these AFRS-specific characteristics.

This patient had AFRS with a typical allergic mucin. It is hoped that the publication of this description will guide many clinicians in the prompt suspicion with accurate assessment, aiding in the proper management of AFRS.

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FIGURE 1. Computed tomography image of patient with allergic fungal rhinosinusitis. A diffusely thickened maxillary sinus mucosa is noticeable with dense secretion with areas of hyperattenuation in the right maxillary sinus (*arrowhead*).

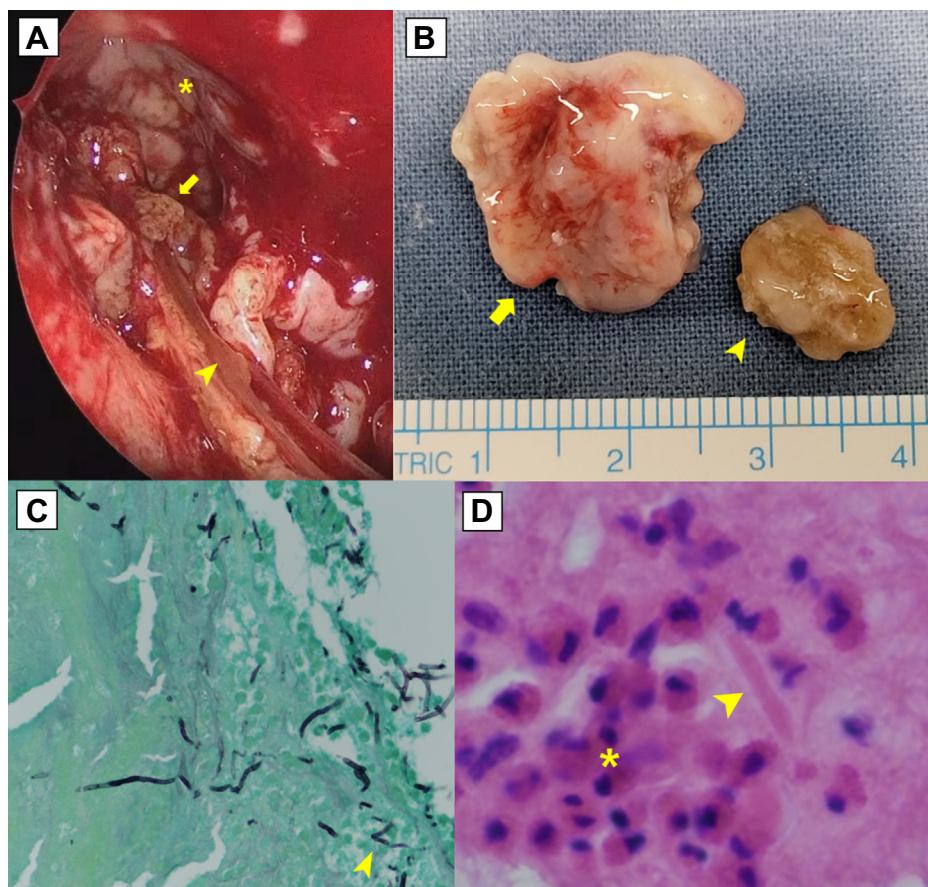


FIGURE 2. Intraoperative gross and histologic features of patient with allergic fungal rhinosinusitis. (**A, B**) Intraoperative and gross images of typical allergic mucin (*arrow*) with dense mucoïd discharge (*arrowhead*) noticed in the right maxillary sinus on endoscopic sinus surgery. Severely swollen and polypoid mucosa of the maxillary sinus (**A**, *asterisk*) is noticeable. (**C**) Grocott methenamine silver stain of obtained maxillary sinus mucosa revealed multiple hyaline septated hyphae with acute-angled branching, suggesting the possibility of *Aspergillus* spp. (*arrowhead*). There was no evidence of *Aspergillus* hyphae invasion to the mucosa in the obtained maxillary sinus mucosa. (**D**) Hematoxylin-eosin stain of obtained allergic mucin, revealing intense infiltration of eosinophils (*asterisk*) in dense mucinous background with many Charcot–Leyden crystals (*arrowhead*).