



Letter

Proptosis and vision loss as grave complications of allergic fungal sinusitis and polyposis

Allergic fungal sinusitis and polyposis are noninvasive, but aggressive, inflammatory responses to mold that occur in immunocompetent patients with chronic sinusitis and nasal polyposis.¹ An association of these conditions with vitamin D deficiency has been reported.² In severe cases, patients with allergic fungal sinusitis present with ophthalmic signs and symptoms, such as proptosis, diplopia, and, in extreme cases, vision loss.³ Most cases require surgical intervention, corticosteroids, and ongoing surveillance.¹ However, the role of vitamin D replacement and supplementation has also been studied.

A 30-year-old African American man with a 5-year history of sinusitis and nasal polyps presented with bilateral proptosis, gradual right-sided vision loss that progressed during the previous 12 months, and nasal obstruction. He had tried over-the-counter treatments without relief and had no known occupational or environmental exposures. Detailed ophthalmologic examination revealed bilateral proptosis, decreased range of motion of the extraocular muscles (worse on the right), visual acuity of 20/80 on the left, and complete loss of vision on the right, except for the left lower visual field.

Retinal examination revealed optic nerve atrophy attributable to ischemic neuropathy. Evaluation for a pituitary adenoma and thyroid dysfunction was normal; however, he had a severe vitamin D deficiency with a vitamin D level of 5.9 ng/mL, a peripheral eosinophil count of 11%, and an elevated IgE level of 662 IU/mL. Immunocompetence was assessed with normal IgG, IgM, and IgA levels. The results of a skin prick test ImmunoCAP specific IgE allergy panel were positive for various mold and fungal species, including *Aspergillus fumigatus* (1.81 kU/L, class III), *Cladosporium herbarum* (3.45 kU/L, class III), *Penicillium chrysogenum* (0.70 kU/L, class II), *Alternaria alternata* IgE (2.29 kU/L, class III), and *Stemphylium herbarum* (2.52 kU/L, class III). Of note, dust mite sIgE levels were below the 0.35 threshold.

The initial imaging study of choice was brain and sinus computed tomography given the extent of his proptosis, which revealed findings suggestive of sinus fungal disease. Computed tomography of the sinuses revealed complete opacification of the paranasal sinuses and nasal passageways related to mucosal thickening and fungal disease. There was marked expansion of the frontal and ethmoid sinuses, resulting in mass effect on the frontal lobes, orbits, and globes, with bilateral proptosis and mass effect on the optic nerves and extraocular muscles (Fig 1). Interestingly, on magnetic resonance imaging, the fungal disease within the sinonasal cavity had characteristic low signal on T1 and T2 images from fungal hyphae. The patient underwent exploratory sinus surgery with removal of polyps and fungal tissue. Pathologic

testing revealed benign inflammatory polyps and allergic type mucus, with Gomori methenamine silver staining revealing fungal spores, hyphae, and Charcot-Leyden crystals. Tissue culture was notable for *Bipolaris* fungal species. His symptoms, including proptosis, nasal obstruction, and vision loss, improved after surgical intervention, systemic corticosteroids for 2 weeks, and vitamin D replacement.

Allergic fungal sinusitis and polyposis have a wide spectrum of presentations. On rare occasions, severe and prolonged disease results in proptosis and vision loss.¹ Differential diagnosis for this presentation includes tumors, trauma, pseudotumors, Graves disease, sarcoidosis, and Langerhans cell histiocytosis. However, it is important to consider severe allergic fungal sinusitis and polyposis as well.

As this case demonstrates, recovery of vision and reversal of other symptoms is possible with surgery and corticosteroids even in severe cases. Despite this, recurrence rates of allergic fungal sinusitis and polyposis are high, and long-term treatment options are limited. Interestingly, vitamin D deficiency has been associated with allergic fungal sinusitis and polyposis, and many recent studies have attempted to identify a specific role in the disease. Mostafa et al² found in a prospective case study that statistically significant ($P < .001$) incidence of vitamin D deficiency was present in patients with allergic fungal sinusitis and polyposis compared with control subjects.² Our patient was African American and had severe vitamin D deficiency (5.9 ng/mL) and significant sinus bone erosion. Schlosser et al⁴ in a retrospective review found that among patients with allergic fungal sinusitis and polyposis vitamin D deficiency was more prevalent in African Americans and correlated with more severe mucosal disease on imaging compared with those without vitamin D deficiency. A possible reason for this is explained by Mulligan et al,⁵ who found in a prospective case control study that as vitamin D levels decrease, there is upregulation and increased numbers of dendritic cells and fibroblast growth factors. Carroll et al⁶ found an inverse association between low levels of vitamin D and upregulation of plasma levels of prostaglandin E₂ and granulocyte monocyte colony-stimulating factor in patients with chronic rhinosinusitis. Furthermore, they identified one cell type, the human sinonasal fibroblast, thought to play a role in chronic rhinosinusitis with nasal polyps because these cell types demonstrated increased proliferation when vitamin D levels were low.

Currently, there are ongoing clinical trials looking at the effect of vitamin D supplementation in patients with known vitamin D deficiency and allergic fungal sinusitis and polyposis. The current focus is on vitamin D supplementation effect on symptoms, postoperative healing, and potentially decreasing rates of recurrence.⁶

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Figure 1. Extensive, severe sinonasal polyposis with remodeling of paranasal sinus walls with resultant bilateral exophthalmos. High-density material within the paranasal sinuses that may represent inspissated mucus or fungal elements.

Allergic fungal sinusitis and polyposis can present in severe cases with proptosis and vision loss. Early detection and treatment are important to prevent such severe complications and may lead

to reversal of vision loss. Vitamin D deficiency is often associated, and long-term treatment with vitamin D replacement is being studied.

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