Fungal septal abscess complicating maxillary sinus fungus balls in an immunocompetent host

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ABSTRACT

Background: *Fungal infections of the nasal cavity can be destructive entities that are typically seen in immunocompromised hosts. We present a case of a localized fungal abscess of the nasal septum in an immunocompetent host after endoscopic treatment of maxillary sinus fungus balls.*

Method: *A 51-year-old woman with a history of asthma and recent treatment with oral steroids presented with bilateral maxillary sinus mycetomas. She underwent endoscopic sinus surgery. The postoperative course was complicated by an asthma flare, which required oral steroids. The patient returned with nasal obstruction, and results of a physical examination were consistent with a nasal septal abscess. Drainage was attempted, and cultures showed fungal elements. The abscess reaccumulated, and the patient was referred to our institution. Operative drainage was performed with placement of a catheter in the septal abscess cavity. Forty-eight hours of amphotericin irrigations were performed through this site. The patient was started on oral antifungal therapy. Results of an immune workup, including testing for human immunodeficiency virus and assessing immunoglobulin levels, were negative. Final fungal cultures grew Scedosporium apiospermum sensitive to voriconazole. The patient completed therapy without further recurrence. Follow-up at 6 months demonstrated no further recurrence of her fungal septal infection.*

Conclusion: *Sinonasal fungal infections rarely occur in immunocompetent hosts. The septum may have been seeded during the endoscopic sinus surgery. The use of oral steroids may have been a risk factor for the development of an aggressive nasal septal fungal abscess in this patient. This is the first reported case of a nasal septal abscess in an otherwise immunocompetent host with S. apiospermum.*

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Invasive fungal infections of the paranasal sinuses usually coincide with an immunocompromised state and can be destructive and fatal entities that require emergent surgical intervention. In contrast, fungal sinusitis in the patient who is immunocompetent is more indolent and can present as a fungal ball or allergic fungal sinusitis.[1] Fungal balls are more common in patients with intact immune systems and are most commonly seen in the maxillary sinuses, although may be seen at other sites, including isolated to the sphenoid sinus.[2] Infectious fungal pathogens typically include *Aspergillus* group and *Mucor* group families, with less common causes being *Candida* or *Alternaria*[3]. Rarely, *Pseudallescheria boydii* and *Scedosporium apiospermum* species have been implicated in several cases of sinonasal fungal infections in the immunocompetent host.[4]

We described a case of a patient with a history of asthma, treated with short courses of oral steroids, who developed bilateral maxillary fungus balls and, later, a recurrent nasal septal abscess caused by *S. apiospermum.* She was successfully treated with surgical drainage and postoperative antifungal therapy.

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CASE PRESENTATION

A 51-year-old woman with a history of asthma was seen for chronic sinusitis for which she had had surgery several years ago. Her asthma had been controlled on a montelukast inhaler, inhaled steroids, and albuterol as needed. Several times during the year, she required a brief course of oral steroids for asthma exacerbations. On evaluation, the patient was found to have continued symptoms of sinusitis, including nasal congestion and multiple flares during the year. Computed tomography imaging showed mucosal thickening and maxillary sinus opacification. The patient was taken to the operating room for a functional endoscopic sinus surgery and was found to have bilateral maxillary sinus fungus balls, which were removed. The patient was discharged with a course of antibiotics. Her immediate postoperative course was complicated by an asthma flare for which she was started on a week of oral steroid therapy.

Several weeks after surgery, the patient developed persistent and increasing nasal congestion. On examination, she was found to have swelling of her nasal

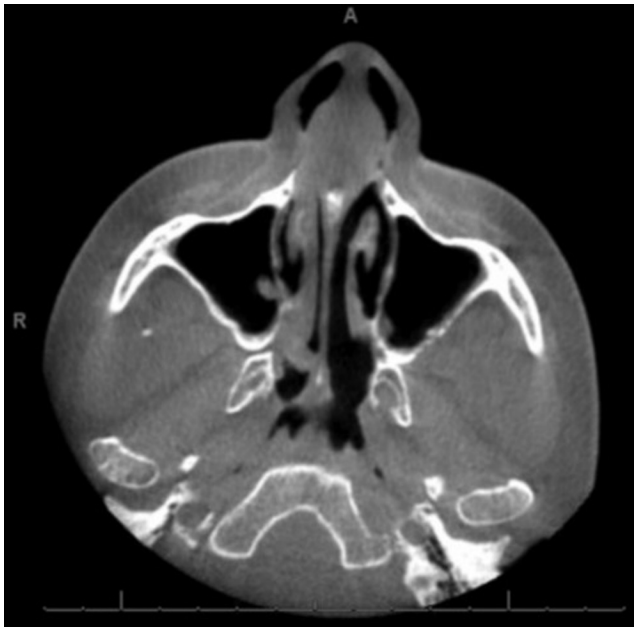

Figure 1. *Maxillofacial computed tomography, showing septal abscess.*

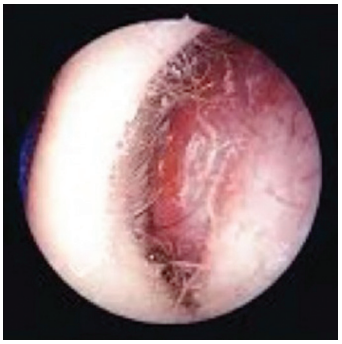

Figure 2. *Intraoperative view of nasal septal abscess.*

septum, consistent with an abscess. Operative drainage was performed, and cultures were sent for analysis. Antibiotics were resumed, but the abscess cavity reaccumulated and needle aspiration was performed twice. Cultures from the initial drainage were initially suspicious for *Aspergillus* species. Final cultures were positive for *S. apiospermum*.

The patient was then referred to our institution for further management. On examination, she was found to have bilateral nasal septum swelling, and computed tomography imaging showed an anterior septal abscess (Figs. 1 and 2). Operative drainage was performed, which revealed purulent fluid and loss of the anterior septal cartilage. An intravenous-type catheter was left between the mucoperichondrial flaps at the end of the surgery; amphotericin irrigations were performed through this catheter twice a day for 72 hours after surgery. Cultures showed fungal elements and coagulase negative *Staphylococcus aureus* results. The infectious diseases team was consulted, and the patient was started on a course of Augmentin and voriconazole. Results of an immune workup, including testing for human immunodeficiency virus and assessing immunoglobulin levels, were normal. The patient's asthma remained well controlled during her stay. Her condition improved, and she was discharged in stable condition and without evidence of abscess reaccumulation. Final fungal cultures were significant for *S. apiospermum*, sensitive to amphotericin B and voriconazole. The patient was continued on oral antibiotics and a 3-month course of voriconazole. On follow-up, the patient was without recurrent fungal infection and was doing well. She has been followed up for 8 months without recurrence of her septal or sinus problems.

DISCUSSION

S. apiospermum is a fungus that is primarily found in agricultural or garden soils in temperate climates and is rarely found in tropical areas. It has been known to cause opportunistic infections due to traumatic entry or underlying host immune factors.[5] *S. apiospermum* was once thought to be the asexual teleomorph of *Pseudallescheria boydii*, although newer diagnostics show that separate genus species of *Scedosporium* family exist independent of *Pseudallescheria boydii*[6]. These species can be devastating for patients who are immunocompromised and are associated with infections of the lungs, skin, and bones. *S. apiospermum* infections have been increasingly described in the immunocompetent population, particularly in patients with respiratory compromise, such as cystic fibrosis, bronchiectasis, or chronic obstructive pulmonary disease.[7] In these situations, host defenses may be anatomically altered and allow for fungal entry.

Chronic steroid use may also play a role in infection; *Scedosporium* infection has been reported to cause pulmonary infection in the setting of chronic steroid treatment in a patient who was otherwise immunocompetent[8] In addition to the immunosuppressive effects, steroid use can cause mild elevations in blood glucose, which may be sufficient to predispose certain patients to invasive fungal disease.[9] The typical sites for sinonasal *Scedosporium* infection include the maxillary and sphenoid sinuses. To date, there has been one report of *Scedosporium* that caused maxillary sinusitis in an immunocompetent host.[10] There have been no reports of a *Scedosporium* septal abscess after functional endoscopic sinus surgery.

Both noninvasive and invasive fungal infections of the nasal cavity benefit from biopsy for speciation and, in the former case, to rule out mucosal invasion. For invasive fungal infections, both species identification and susceptibilities are essential in guiding treatment. *Scedosporium* species can be easily confused with the more common *Aspergillus* species, and correct specia-

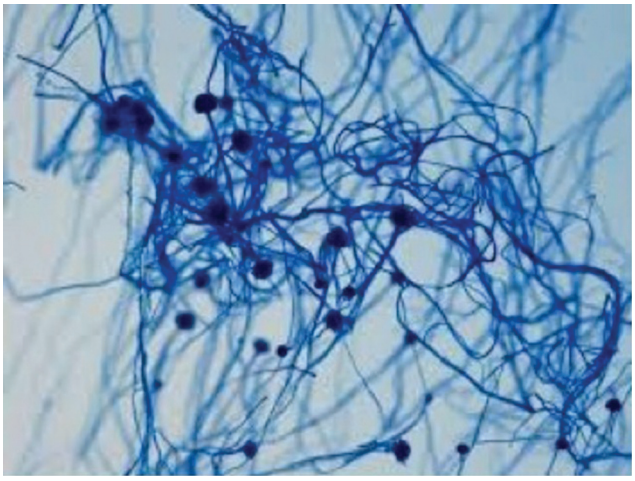

Figure 3. *Aspergillus species.*

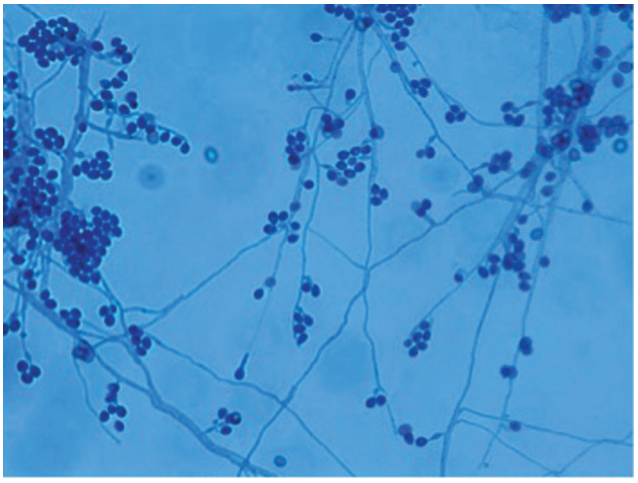

Figure 4. *Scedosporium species.*

tion is accomplished through careful histology and, occasionally, by molecular diagnostics[11] (Figs. 3 and 4). Cultures from the initial septal drainage were suspicious for *Aspergillus*, but, on further review, *Scedosporium* was identified. The distinction is important; *Aspergillus* species typically respond well to amphotericin B, whereas *Scedosporium* species have a high rate of amphotericin resistance. Voriconazole, a newer azole, has shown good *in vivo* and *in vitro* activity against the *Scedosporium* species of mold.[12]

Topical amphotericin B therapy has been used in several patients with invasive fungal infections of the nasal and respiratory tracts.[13,14] Amphotericin B has documented *in vitro* antifungal activity; as such, topical use seems possible and effective.[15] Amphotericin irrigations have been used with good success, both in isolation and in conjunction with intravenous antifungal therapy for invasive fungal rhinosinusitis and may assist a greater response and organ preservation.[16] We used topical amphotericin empirically in our patient because of the potential to save the nasal septum from further debridement. Final fungal cultures showed greater susceptibility to voriconazole, and amphotericin was discontinued. The efficacy of amphotericin irrigations in this setting remains unknown, although the utility for amphotericin-sensitive fungus should be investigated.

Our patient may have been at increased risk for infection due to her underlying respiratory compromise as well as subclinical immunocompromise due to postoperative steroid use. In addition, the patient's previous endoscopic sinus surgery may have created traumatic entry points at her nasal septum for *Scedosporium* infection. The patient was also found to have bilateral maxillary sinus fungus balls. Although cultures were not sent at the time, it is possible that the patient had fungal balls composed of *Scedosporium* present in her nasal cavity. The combination of surgical trauma, impaired respiratory status, and the use of postoperative steroids may have set the stage for an invasive fungal infection.

Our patient's case illustrated the diagnostic steps that can help guide early and effective treatment for invasive fungal infections in an immunocompetent host. Atypical infection should be suspected if the patient does not respond to standard treatment measures. Bacterial and fungal cultures of the infected area should be obtained and sensitivities performed to help guide treatment. Accurate identification of the fungal organism is key to guiding treatment. Empiric antibacterial and antifungal treatment should be started while awaiting results. An immune workup should also be undertaken to exclude unknown causes of immunocompromise, including diabetes, low levels of immunoglobulin G subclasses, or human immunodeficiency virus. After the patient improves, he or she should be followed up long term to ensure durable treatment response. Although rare, fungal infections in immunocompetent hosts can occur and require a certain degree of suspicion and accurate identification for complete treatment response.

CONCLUSION

Sinonasal fungal infections are rare in the patient who is immunocompetent. Risk factors may include the use of steroids for chronic medical conditions. A high degree of suspicion for atypical infection should be used for patients with risk factors for subclinical immunocompromise and sinonasal infections that do not respond to standard treatments. The causative pathogens of fungal infections in patients who are immunocompetent may be different and varied. Correct identification of the causative pathogen is important to guide antifungal treatment.

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