The Journal of Laryngology and Otology
September 1993, Vol. **107**, pp. 837–839

Transnasal endoscopic surgery of sphenoid sinus aspergillosis

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Abstract

Aspergillus sp. are the most common contaminants of the paranasal sinuses with the maxillary sinus as the site most frequently involved. Fungal sphenoid sinusitis can be a life-threatening situation, thus aggressive therapy is indicated. The treatment is primarily surgical. The transnasal endoscopic technique offers excellent visualization and an atraumatic approach to the sphenoid sinus. Surgical exteriorization and aeration of the involved sinus, without using antifungal chemotherapeutic agents is curative. A rare case of sphenoid sinus aspergillosis which was successfully treated by transnasal endoscopic sphenoidotomy is reported.

Key words: Aspergillosis; Sphenoid sinus; Endoscopy

Introduction

Although *Aspergillus* is mainly saprophytic, severe, potentially lethal complications may arise. Three out of four previously described patients with sphenoid sinus aspergillosis died because of the intracranial extension of the infection (Miglets *et al.*, 1978). Early diagnosis and adequate therapy are required for a good outcome. Computerized tomography (CT) may aid in the early diagnosis of this disease. The treatment should include complete removal of the mycotic masses and restoration of sinus aeration (McGuirt and Harrill, 1979). Amphotericin B therapy should be reserved for those rare instances in which histological evidence of tissue invasion by the fungus is present (Nielsen *et al.*, 1983). The endoscopic intranasal sphenoid approach affords outstanding visualization and is safe and straightforward (Stankiewicz, 1989). We present a case of sphenoid sinus aspergillosis that was treated by endoscopic surgery and had a satisfactory outcome.

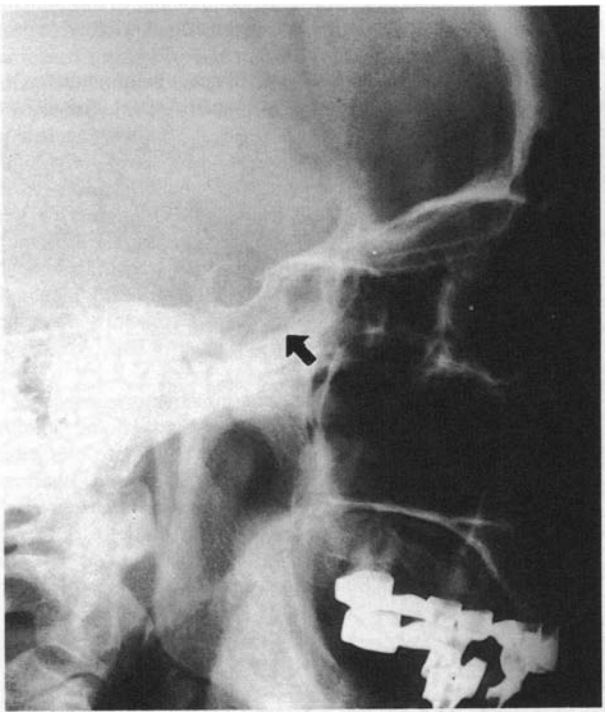

Fig. 1

Radiograph of paranasal sinuses, lateral view, shows marked increase in radiopacity of the sphenoid sinus (arrow).

Case report

A 57-year-old female was admitted for evaluation of constant

Fig. 2

CT scan showing an opacified sphenoid sinus and numerous calcific densities within it (arrow).

Accepted for publication: 28 February 1992.

https://doi.org/10.1017/S0022215100124570 Published online by Cambridge University Press

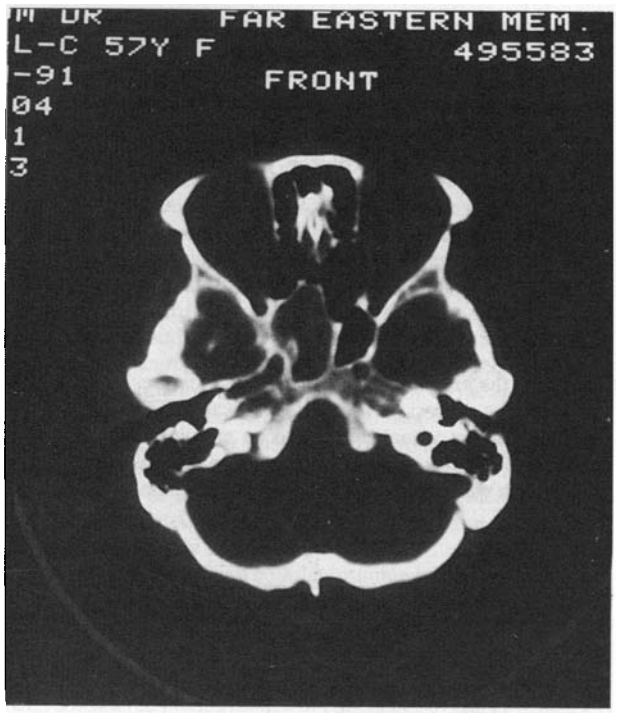

FIG. 3

Bone window showing sphenoid sinus with intact bony walls. Neither bony erosion nor bony dehiscence is noted.

frontal, periorbital and vertex headaches of one year duration. She had neither a history of sinusitis nor nasal symptoms. Her family history and review of systems were non-contributory. Paranasal sinus radiographs showed increased radiopacity of the sphenoid sinus (Figure 1). CT scan revealed an opacified right sphenoid sinus with several calcific densities (Figure 2). No bony destruction was present (Figure 3). The remainder of the paranasal sinuses appeared normal. Pre-operative endoscopic examination revealed a small amount of mucoid dark material in the right sphenoethmoidal recess. No polyp or gross anatomical abnormalities of the nose were noted.

The patient underwent a transnasal endoscopic sphenoidotomy under local anaesthesia. At the time of surgery, a brownish mass bulging from the sphenoid sinus was noted. Removal of the right anterior wall of the sphenoid sinus revealed the cavity to be filled with a cheesy, greyish-brown material. The natural ostium was enlarged inferiorly and medially with a 90° punch, and then the sinus was evacuated. The mucous membrane lining the sinus was not remarkably thickened. No nasal packing was required. Histological sections from the sinus specimens demonstrated *Aspergillus* organisms (Figure 4).

The headaches ceased within 48 hours of the surgical drainage of the sphenoid sinus. The patient was discharged from hospital on the third post-operative day and was then followed-up as an outpatient. Four months after discharge the patient remained asymptomatic and endoscopic examination showed an easily visualized sinus ostium with well-healed sinus mucosa. No residual aspergilloma was noted.

Discussion

Aspergillus sp. are the most common contaminants of the paranasal sinuses with the maxillary sinus as the site most frequently involved (Warder *et al.*, 1975). *Aspergillus fumigatus* accounts for approximately 90 per cent of these infections (Miglets *et al.*, 1978). Sphenoid sinus aspergillosis is extremely rare and to date there are about 21 cases in the literature. Lavelle (1988) reported only 13 cases in the world literature and added a further case. Subsequently, other cases have been described (Tan *et al.*, 1988; Tsuboi *et al.*, 1988; Fujiwara *et al.*, 1989; Horton II and Osguthorpe, 1989; Loh and Howng, 1990). Of these 21 patients, there were four deaths, all related to *Aspergillus* meningitis. There was also one patient who died after sphenoidotomy (Nielsen *et al.*, 1983).

The pathogenesis of fungal involvement of the sinuses is not fully known. Milosev *et al.* (1969) believed that as spores of the *Aspergillus spp.* are inhaled, they settle in the sinuses: commonly in the ethmoids and antra. They become pathogenic when the condition in the sinus becomes relatively anaerobic. Predisposing factors that may cause a sinus to become relatively anaerobic include nasal polyps, chronic infection, or mucosal thickening owing to allergy (Miglets *et al.*, 1978). Aspergillosis of the sphenoid sinus as an isolated disease process in an otherwise healthy person is quite rare, but the reported incidence is increasing, probably because of heightened physician awareness, an aging population, and the increasing number of immunosuppressed patients (Horton II and Osguthorpe, 1989). Systemic corticosteroid therapy also appears to increase susceptability to sphenoid aspergillosis. Administration of systemic corticosteroids should be avoided when fungal sinusitis is considered (Weinstein *et al.*, 1976). The patient presented here was not in poor physical condition, with cancer or immunological suppression. Her occupation as a farmer, however, might have been relevant, since living in an agricultural environment and in a hot humid climate are the factors known to increase the susceptibility of patients to *Aspergillus* infection (McGuirt and Harrill, 1979).

The symptoms and signs of sphenoid sinus aspergillosis are directly related to sinus anatomy and its contiguous structures. In the few documented cases of isolated sphenoid aspergillosis, headache was the most frequent symptom. The headaches were usually unilateral and located in the parietal, occipital and retrobulbar regions, or even the vertex. Other symptoms included purulent rhinorrhea, nasal obstruction, postnasal bleeding, facial pain, ptosis, proptosis, diplopia and decreased visual acuity (Nielsen *et al.*, 1983; Horton II and Osguthorpe, 1989). As in other reports of sphenoid sinus aspergillosis, our patient presented with minimal nasal and sinus complaints. In this patient the diagnosis was made during the evaluation of what were primarily constant headaches.

The diagnosis of *Aspergillus* sinusitis may be quite difficult, especially when it only involves the sphenoid sinus. The differ-

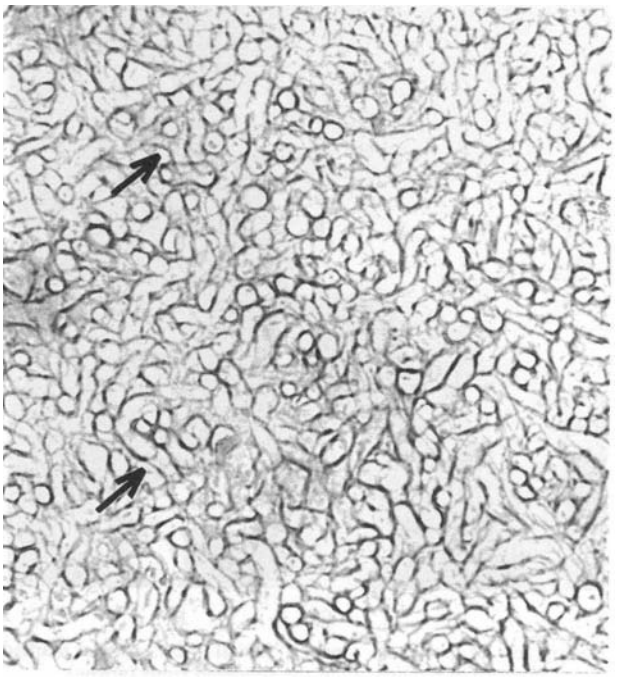

FIG. 4

Photomicrograph of sphenoid sinus specimen showing dichotomous, branching septate hyphae (arrows). (H&E; ×600).

https://doi.org/10.1017/S0022215100124570 Published online by Cambridge University Press

ential diagnoses of an opacified sphenoid sinus include acute and chronic bacterial sinusitis, mucoceles, pyoceles, and malignant tumours (Miglets *et al.*, 1978; Comoretto *et al.*, 1986). Plain X-ray films of the paranasal sinuses are a good screen for opacification but lack specificity since there are no findings diagnostic of *Aspergillus* sinusitis (Horton II and Osguthorpe, 1989). The diagnosis of fungal sinus infection should be suspected whenever a 'sinusitis' does not respond to antibiotic therapy or when the disease process is confined to a single sinus (Miglets *et al.*, 1978). The CT scan is the best diagnostic test because it readily identifies soft-tissue and bone changes. Stammberger *et al.* (1984) asserted that the finding of a metal-dense area within a paranasal sinus in the absence of a history of a foreign body is diagnostic of *Aspergillus* sinusitis.

Treatment is primarily surgical. Antifungal chemotherapeutic agents are used in the treatment of central nervous system involvement and in the fulminant form of the disease (Romett and Newman, 1982). The key to successful surgical treatment is the removal of the mycotic masses and aeration and drainage of the involved sinus (McGuirt and Harrill, 1979). There are a variety of surgical techniques used to approach the sphenoid sinus *i.e.* intracranial, trans-septal, antral and external sphenoethmoid. Extensive intranasal techniques have been described, but all have problems. Most of the above procedures require nasal packing and prolonged hospitalization. The advent of functional transnasal endoscopic sinus surgery has created new possibilities for the treatment of isolated sphenoid sinus lesions. The endoscopic intranasal sphenoid approach affords outstanding visualization and a safe, straightforward approach to the sphenoid sinus. The procedure begins with removal of the lower portion of the middle turbinate. This technique provides excellent view for excision of the fungus ball and drainage of the mucinous fluid from the sphenoid sinus. Post-operative follow-up examination with a head mirror and nasal speculum or endoscope will allow visualization of the sphenoid sinus opening, so that cleaning of debris can be performed directly (Stankiewicz, 1989).

Craniotomy should never be used as the surgical approach to the sphenoid sinus, because this approach is associated with increased morbidity and mortality (Wyllie *et al.*, 1973). Surrounding the sphenoid sinus are 13 contiguous structures as first described by Proetz (1948). Local factors disrupting the integrity of this anatomical relationship and predispose to meningitis caused by *Aspergillus* (Feely and Steinberg, 1977). In such cases, intracranial spread occurs through septic thrombophlebitis *via* communicating veins. Dissemination of aspergillosis from a radiolographically intact sphenoid sinus to the cavernous sinus *via* this route has been reported by Weinstein *et al.* (1976). Sphenoid packing after sphenoidotomy may be contra-indicated, since the only patient whose sinus was packed after sphenoidotomy died from *Aspergillus* meningitis (Nielsen *et al.*, 1983).

Endoscopic sphenoidotomy is a direct surgical procedure with minimal blood loss, reduced operating time, and decreased morbidity. No packing is required, and post-operative follow-up is excellent (Stankiewicz, 1989).

Based on our experience and review of the literature, we have concluded that the transnasal endoscopic approach, involving less risk of intracranial extension of the infection, is the best choice for the management of sphenoid sinus aspergillosis.

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https://doi.org/10.1017/S0022215100124570 Published online by Cambridge University Press