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Invasive aspergillosis of the paranasal sinuses: a medical emergency

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Abstract
A rare case of invasive aspergillosis of the paranasal sinuses in a previously healthy individual is presented. The disease caused severe complications and proved fatal. Classification, aetiology and presentation of sinus aspergillosis are discussed. Early diagnosis and management is stressed to avoid the high incidence of morbidity and mortality.

Key words: Aspergillosis; Paranasal sinuses

Introduction

Invasive aspergillosis of the paranasal sinuses, previously thought to affect only immunocompromised patients, is being increasingly recognized in healthy individuals. The prognosis worsens with involvement of the orbit and intracranial structures when the outcome may be fatal.

A high index of suspicion is essential for diagnosis, and aggressive surgical and medical treatment must be initiated at an early stage to prevent a high incidence of morbidity and mortality (Jahrsdoerfer *et al.*, 1979).

Case report

A 76-year-old Caucasian male was referred to the Otorhinolaryngology department with a seven-week history of feeling generally unwell, frontal headaches and sudden loss of vision in the left eye. He was known to suffer from hypertension and mild heart failure but was otherwise healthy. Sinusitis was originally diagnosed by his general practitioner but he failed to respond to antibiotics. His loss of vision was attributed by an ophthalmologist to ischaemic optic neuropathy secondary to hypertension.

On examination he looked ill, was unable to detect light with his left eye but could count fingers with the right eye uncovered; his other cranial nerves were intact. In both nasal cavities mucopurulent debris could be seen in the middle meatus. Blood investigations were normal except for a white cell count of 19.3 $\times$ 10^9/l (normal: 4.0–11.0 $\times$ 10^9/l).

A computed tomography (CT) scan of the paranasal sinuses showed opacification of both antra and posterior ethmoids with focal areas of calcification in the left antrum. There was also destruction of the medial wall of the left antrum and posterior wall of the left ethmoids, with soft tissue extending into the orbital apex and surrounding the posterior end of the optic nerve (Figures 1 and 2). A malignant lesion was suggested by the radiologist.

An urgent endoscopic examination was planned but before this could be done, the patient's general condition deteriorated and he lost vision in the other eye. The subsequent endoscopic examination showed gross inflammatory changes in both middle meatus with green/brown debris within the ethmoidal cells and antra. Microbial

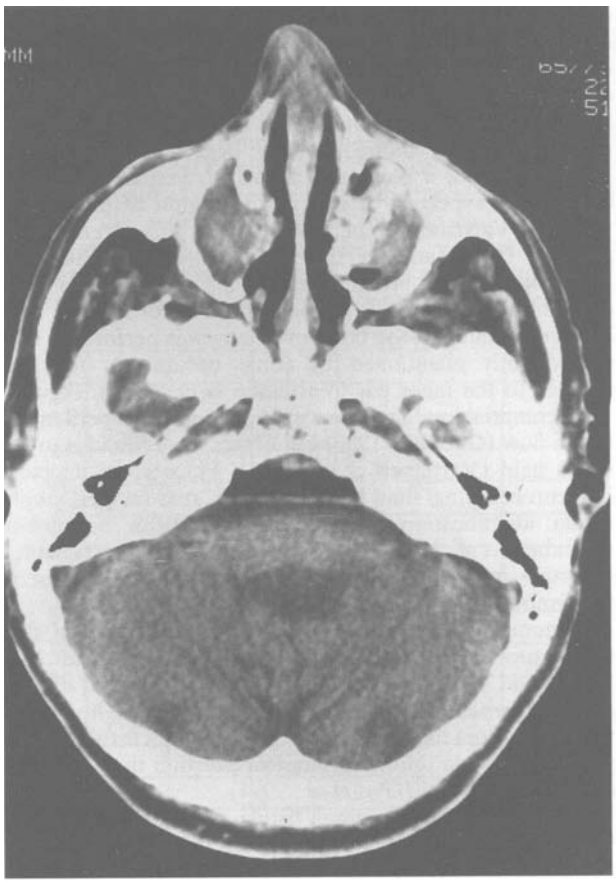

FIG. 1

An axial CT scan showing opacification of both antra with calcification within the left antrum and destruction of its medial wall.

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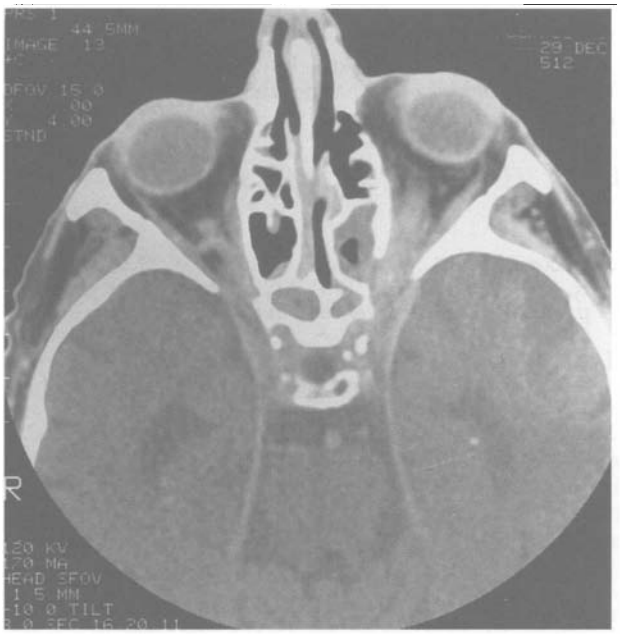

FIG. 2

An axial CT scan showing opacification of the posterior ethmoids with soft tissue extending into the left orbital apex through a breached posterior wall.

culture was negative and histopathology failed to demonstrate evidence of fungi or malignancy showing only an inflammatory cell infiltrate.

The patient died two days later and postmortem examination showed soft tissue filling the maxillary and ethmoid sinuses and extending into the left orbit. The tissue had penetrated the orbital apex and surrounded the optic chiasma. Microscopic examination revealed scattered *Aspergillus* hyphae with necrotic debris and inflammatory cell infiltrate (Figure 3).

Discussion

Aspergillus is an ubiquitous, spore-forming saprophyte found in soil and decaying organic matter. The spores may be inhaled and are frequent inhabitants of the human upper respiratory tract. When they are inoculated into anaerobic sinuses they may become pathogenic (Yumoto *et al.*, 1985).

Aspergillosis of the nose and paranasal sinuses has been classified into four types: allergic, non-invasive, invasive and fulminant (Sarti *et al*, 1988). Allergic *Aspergillus* sinusitis occurs in healthy individuals and is considered to be due to an immunological reaction to the fungal antigen, not to true fungal infection of the sinus soft tissue. The other three types may represent a spectrum of a disease process which affects both healthy and immunocompromised patients: in the non-invasive type a fungus ball 'mycetoma' lies within an intact sinus; in the invasive type the fungus spreads into the surrounding tissues leading to inflammation and necrosis; and finally in the fulminant disease, which only affects immunocompromised patients, there is a progressive vascular invasion by the fungus leading to rapid gangrene formation (Sarti *et al.*, 1988). There is still uncertainty as to why the disease becomes invasive but duration of infection, direct invasion of tissues and ischaemic necrosis due to arteritis have been suggested

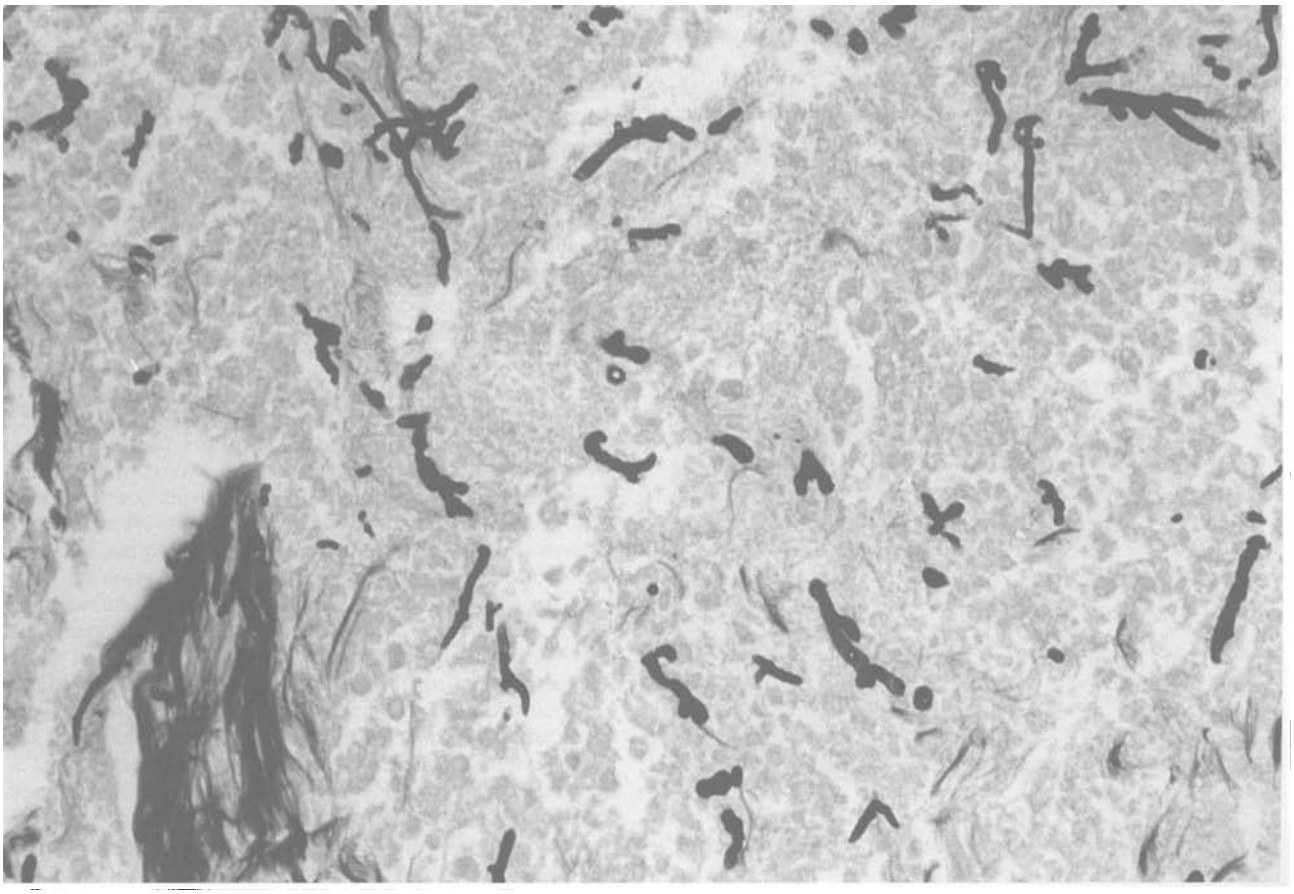

FIG. 3

A high power photomicrograph showing aspergillus hyphae within sinus mucosa (Grocott silver stain × 400).

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(Jahrsdoerfer *et al.*, 1979; Meikle *et al.*, 1985; Sarti *et al.*, 1988).

Our patient who was previously healthy presented with invasive aspergillosis. This disease was originally thought to be confined to immunocompromised patients but is increasingly being reported in immunocompetent individuals (Meikle *et al.*, 1985). It initially presents with mild symptoms of sinusitis but eventually causes tissue destruction of the sinuses and adjacent structures and at times has been misdiagnosed as a neoplasm (Ramadan, 1995). At this stage there is a high mortality rate of up to 16 per cent as reported in a series of 103 patients with aspergillosis where most of the deaths involved previously healthy individuals (Jahrsdoerfer *et al.*, 1979).

CT and magnetic resonance imaging (MRI) scanning are helpful in diagnosis: a CT scan showing opacification of the sinus cavity with areas of calcification is suggestive of fungal infection (Stammberger *et al.*, 1984); T2-weighted MRI shows very decreased signal intensity in fungal sinusitis in contrast to increased intensity in bacterial sinusitis and neoplasms (Zinreich *et al.*, 1988). However, diagnosis is only confirmed on microscopic examination as cultures may be negative (Stevens, 1981). The main histological feature is the presence of histiocytic or giant cell reaction to fungal hyphae, which can be difficult to identify because they degenerate and balloon in the necrotic tissue (Lowe and Bradley, 1986). This probably accounts for the initial failure to demonstrate hyphae in our patient.

Difficulties in diagnosis arise because of the similarity in presentation to bacterial sinusitis in the initial stage and to malignant disease in later stages. Suspicions should be aroused when a patient with a diagnosis of chronic sinusitis is not responding to antibiotics, or a patient presents with what appears to be a malignant disease in the presence of the above features on scanning and/or green/brown debris in the nasal cavities.

Early diagnosis is essential in order to avoid the high morbidity and mortality associated with the destructive disease and to instigate treatment before irreversible complications have arisen. Treatment involves aggressive surgical clearance in addition to intravenous amphotericin B with or without flucytocine followed by long-term oral itraconazole (Rowe-Jones, 1993).

Acknowledgement

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