

## Case report

# Optic nerve aspergillosis: report of a case diagnosed by fine-needle aspiration biopsy

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**Abstract.** The aim of this study was to describe the fine-needle aspiration biopsy (FNAB) procedure in patient with a optic nerve lesion. A case of optic nerve and brain aspergillosis, an infrequent condition that can mimic tumor or tumor-like lesions, is reported. The patient was studied by CT and MRI and definite diagnosis was established by means of an ultrasound-guided FNAB. Specimen preparation revealed the presence of multiple hyphae of *Aspergillus fumigatus* in the optic nerve lesion. The FNAB procedure is a safe and reliable diagnostic method for suspected intraorbital tumors and tumor-like conditions especially when other less-invasive modalities have failed to establish the diagnosis and when cytologic confirmation is needed to implement aggressive therapy.

**Key words:** Optic nerve – Aspergillosis – Fine-needle aspiration biopsy – Ultrasound-guided biopsy

## Introduction

The upper respiratory tract is frequently contaminated by *Aspergillus fumigatus*, but only immunocompromised patients usually develop disseminated forms of aspergillosis with secondary cerebral extension in 25–40% of cases and 85–100% of mortality [1]. The diagnosis of cerebral and orbital aspergillosis is difficult because neuroimaging findings can be relatively nonspecific, blood cultures are usually negative, and tissue specimens are difficult to obtain [2]. Fine-needle aspiration biopsy (FNAB) has been successfully used in the diagnosis of orbital diseases, mainly tumors [3, 4, 5, 6], sometimes under ultrasound imaging guidance [7, 8].

To our knowledge, orbital aspergillosis diagnosed by FNAB has been reported only once [9]. We present a case of optic nerve aspergillosis diagnosed by means of ultrasound-guided FNAB.

## Case report

A 67-year-old diabetic female, with history of arthrosis and long-term steroid medication, was referred to our hospital for proptosis, transient amaurosis, right III, IV, V, and VI nerve palsy, and progressive left hemiparesis. Three months previously she had an episode of right unilateral headache involving the periorbital region, diplopia, and rhinorrhea. Cranial CT, MR imaging, angiography, and cerebrospinal fluid (CSF) were normal for this time. A new CT scan showed a nonenhancing area of low attenuation in the head of caudate nucleus, without mass effect, and a ring-enhancing lesion in the right cavernous sinus, with extension into the optic nerve (Figs. 1, 2). Magnetic resonance imaging confirmed these findings (Fig. 3).

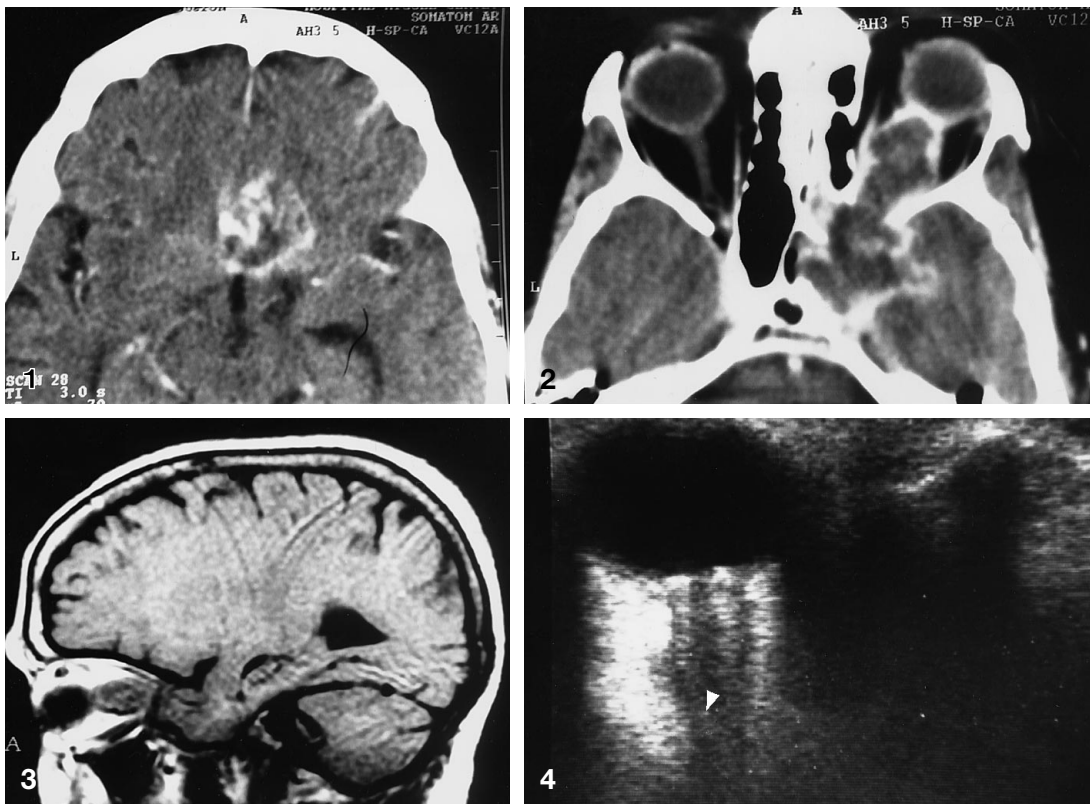
A differential diagnosis between orbital apex tumor (lymphoma) and invasive infection was not possible by means of clinical and imaging data, and FNAB was performed (Fig. 4). Microscopic examination showed multiple hyphae of *Aspergillus fumigatus* also present in posterior cultures. The patient was treated aggressively with intravenous Amphotericin B and showed remission after treatment. She is alive and feeling well 3 years later.

## Technique

The FNAB was performed under ultrasound image guidance (free-hand method) with a 23-gauge spinal needle using a 7.5-MHz linear-array ultrasound transducer (GE 3600, General Electric, Milwaukee, Wis.). Prior to the FNAB, a Doppler study was performed to avoid vessels. The CT and MRI techniques showed that

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**Fig. 1.** Cranial CT after contrast medium injection. Ring-enhanced lesion at head of right caudate nucleus

**Fig. 2.** Orbital CT shows apical infiltrate extending into the posterior ethmoidal sinus, optic nerve, adjacent right cavernous sinus, and temporal lobe with bony destruction

**Fig. 3.** T1-weighted spin-echo sagittal MRI shows an enlarged optic nerve

**Fig. 4.** Sonogram of the right eye shows an enlarged and irregular optic nerve. The tip of the needle (*arrow*) is shown as a marked point of echogenicity

ethmoidal approach is good to get the lesion, but the lateral side of the orbit was thought to be the best sonographic way to reach the optic nerve lesion. The procedure was performed with the closed eyelid because sterile ultrasound gel was required. A small amount of local anesthesia was instilled in the skin and subcutaneous tissue and in orbital fat only when the needle tip echo was lost sonographically in orbital fat echogenicity. Millimetric to-and-fro movements during insertion of the needle also allowed better visualization of the needle tip. The method permits continuous monitoring of the needle tip as it advances and enters the lesion, at which time the aspiration is performed [1].

When the tip of the needle reached the lesion, the needle was blocked with a clamp and the obturator was removed. A 20-ml syringe provided an aspirating device by being connected to the needle, and aspiration was carried out. Purulent material was obtained and after equalizing negative pressure into the system by releasing the plunger, the needle was withdrawn and the aspirate was put onto glass slides. Half of them were fixed

with 95 % ethanol and stained with hematoxylin-eosin and the rest were stained with fluorescein. Pathologic examination showed a marked amount of chronic inflammation with necrotic tissue around it. Fluorescein-stained slides revealed the presence of branching hyphae with the characteristic appearance of *Aspergillus*.

## Discussion

The development of *Aspergillus* brain abscess is an ominous sign with an associated mortality rate of 85–100 % [1, 2]. Because of this high morbidity and mortality, an early diagnosis and a prompt therapy is essential in the management of these patients. Three neuroimaging patterns of aspergillosis in the cerebral and craniofacial regions have been described (meningitis, abscesses, and cerebral infarction) [2]. In the appropriate clinical setting and maintaining a high index of suspicion, these patterns can be used to suggest the diagnosis, but in the absence of surgery only FNAB can provide a definitive diagnosis.

Confirmation or exclusion of a diagnosis is mandatory in deciding whether or not to perform surgery, and observation [5] is the principal indication for FNAB in most patients. The FNAB technique is not only a safe and accurate procedure, but also a low-cost one [2]. The sensitivity of the method is 100 % and the specificity 98 % [4].

The application of FNAB in ophthalmology was introduced in 1975 by Schyberg in Sweden [4]. Based on the literature, we feel that FNAB is particularly useful in the orbit for identifying malignant epithelial tumors

and metastatic neoplasms, non-specific mixed inflammatory masses, orbital hematomas, orbital abscesses (another case of orbital aspergillosis has been described) [6, 9], and lymphoid lesions [2, 7]. Deep, intracanal, apical, or optic nerve lesions are the most difficult and dangerous for FNAB owing to the proximity to the superior orbital fissure and the optic canal, but they are also the most rewarding because FNAB can obviate the need for difficult and invasive surgery [5]. Ultrasound of lesions of the posterior orbit is limited, but this technique remains important in evaluating the posterior orbit diseases and it is very useful in guided FNAB. However, the usefulness of this method in optic nerve lesions has not been reported much in these cases. If the mass is inside the muscle cone adjacent to the optic nerve, ultrasound usually provides helpful guidance [5]. An atraumatic and precise biopsy technique, such as FNAB under B-scan ultrasonographic guidance, represents a major contribution to the diagnosis of optic nerve lesions [2].

Suspected malignancy has been the first indication for orbital FNAB [6]. False-positive reports are almost non-existent and false-negative reports can be minimized by using imaging-guided techniques [4, 6, 7, 8].

A major limitation of FNAB is the failure to obtain sufficient cytologic material to allow the pathologist to render a diagnosis. That occurred in 12% of the patients of some series. In the majority of these patients a 25-gauge needle was used. More recently, a 22/23-gauge needle was used in selected instances where the suspected lesion appeared to be solid and more cohesive [4].

There have been few complications with FNAB [4]. Reported complications of orbital FNAB include: diffuse orbital hemorrhage and hematoma; transient or definitive visual loss; and globe perforation and brain-related death [4, 5]. Traumatic complications of FNAB are infrequent and almost never serious. It should be restricted to those situations in which the information obtained will have an impact on therapeutic decisions [3]. To avoid severe complications it is important to avoid

the transbulbar approach and to use the duplex/color Doppler ultrasound examination to identify vessels.

## Conclusion

When non-invasive techniques fail to confirm or rule out the suspicion of an optic nerve lesion, an ultrasound-guided FNAB can provide an efficient, economical, and relatively safe method of obtaining material for cytologic study.

## References

1. Shuper A, Levitsky HI, Cornblath DR (1991) Early invasive CNS aspergillosis. *Neuroradiology* 33: 183–185
2. Ashdown BC, Tien RD, Felsberg GJ (1994) Aspergillosis of the brain and paranasal sinuses in immunocompromised patients: CT and MR imaging findings. *Am J Roentgenol* 162: 155–159
3. Kennerdell JS, Dekker A, Johnson BL, Dubois PJ (1979) Fine-needle aspiration biopsy. Its use in orbital tumors. *Arch Ophthalmol* 97: 1315–1317
4. Midena E, Segato T, Piermarocchi S, Boccato P (1985) Fine needle aspiration biopsy in ophthalmology. *Surv Ophthalmol* 29: 410–422
5. Kennerdell JS, Slamovits TL, Dekker A, Johnson BL (1985) Orbital fine-needle aspiration biopsy. *Am J Ophthalmol* 99: 547–551
6. Tijl JWM, Koornneef L (1991) Fine needle aspiration biopsy in orbital tumors. *Br J Ophthalmol* 75: 491–492
7. Jakobiec FA, Coleman J, Chattock A, Smith M (1979) Ultrasonically guided needle biopsy and cytologic diagnosis of solid intraocular tumors. *Ophthalmology* 86: 1662–1678
8. Spoor T, Kennerdell JS, Dekker A, Johnson BL, Rehkopf P (1980) Orbital fine needle biopsy with B-scan guidance. *Am J Ophthalmol* 89: 274–277
9. Austin P, Dekker A, Kennerdell JS (1983) Orbital aspergillosis. Report of a case diagnosed by fine needle aspiration biopsy. *Acta Cytol* 27: 166–169
10. Sparano JA, Gucaip R, Llana JF, Moser FG, Wiernick PH (1992) Cerebral infection complicating systemic aspergillosis in acute leukemia: clinical and radiographic presentation. *J Neurooncol* 13: 91–100