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Fatal Case of a Cerebral and Pulmonary Aspergillosis in an HIV-Infected Patient

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Abstract **Case Report**

***Introduction*:** Cerebral aspergillosis is a rare and very severe pathology, usually affecting immunocompromised patients, for whom early antifungal treatment is necessary. Because of the clinical and microbiological diagnostic difficulty, brain imaging is crucial for the positive and differential diagnosis. However, the scannographic and MRI appearance is not very specific, as aspergillosis lesions classically present as multiple rounded images, with or without a hemorrhagic component, with or without annular enhancement after contrast injection. Diffusion imaging may present a more specific aspect and help in early diagnosis. ***Case Report*:** The patient was 48 years old and had been followed for 4 months for positive HIV infection at the AIDS stage. She presented with a sudden onset of HTIC syndrome (headache, vomiting and confusion) in a febrile context.On admission, the clinical examination found a stable patient on the HD and respiratory plan, BMI: 16 kg/m2, polypneic at 28cpm, febrile at 39°the other constants are normal (FC: 90 b/mn, BP: 11/8 cmHg, FR: 28 c/mn. The somatic examination was without particularities. The biological workup showed white blood cells at 14900 (PNN: 13800) and CD4 lymphocytes at 45/mm.The evolution was marked by the occurrence of acute respiratory distress 3 days later with an elevated D-Dimer level of 740 µg/L. A thoracic angioscan was performed to rule out pulmonary embolism. Aspergillosis serology was performed: positive. The diagnosis of cerebral aspergillosis by dissemination from the pulmonary focus was retained. The patient died within 24 hours. ***Conclusion*:** Morphological imaging of cerebral aspergillosis lesions is not very specific. Knowledge of their appearance on diffusion imaging (global restriction of water diffusion or heterogeneous "target" appearance) can provide valuable assistance in the positive and differential diagnosis of aspergillosis.

Keywords: Cerebral aspergillosis, diagnosis, Aspergillosis serology, scannographic, thoracic angioscan.

INTRODUCTION

Cerebral aspergillosis is a rare and very severe pathology, usually affecting immunocompromised patients, for whom early antifungal treatment is necessary. Because of the clinical and microbiological diagnostic difficulty, brain imaging is crucial for the positive and differential diagnosis. However, the scannographic and MRI appearance is not very specific, as aspergillosis lesions classically present as multiple rounded images, with or without a hemorrhagic component, with or without annular enhancement after contrast injection. Diffusion imaging can present a more specific aspect and help in early diagnosis.

We report a case of cerebral and pulmonary aspergillosis with a fatal course in a 48-year-old immunocompromised woman.

CASE REPORT

The patient was 48 years old and had been followed for 4 months for positive HIV infection at the AIDS stage. She presented with a sudden onset of HTIC syndrome (headache, vomiting and confusion) in a febrile context.

On admission, the clinical examination found a stable patient on the HD and respiratory plan, BMI: 16 kg/m2, polypneic at 28cpm, febrile at 39°the other constants are normal (FC: 90 b/mn, BP: 11/8 cmHg, FR: 28 c/mn. The somatic examination was without particularities. The biological workup showed white blood cells at 14900 (PNN: 13800) and CD4 lymphocytes at 45/mm.

The evolution was marked by the occurrence of acute respiratory distress 3 days later with an elevated D-Dimer level of 740 µg/L. A thoracic

angioscan was performed to rule out pulmonary embolism.

Aspergillosis serology was performed: Positive.

The diagnosis of cerebral aspergillosis by dissemination from the pulmonary focus was retained. The patient died within 24 hours.

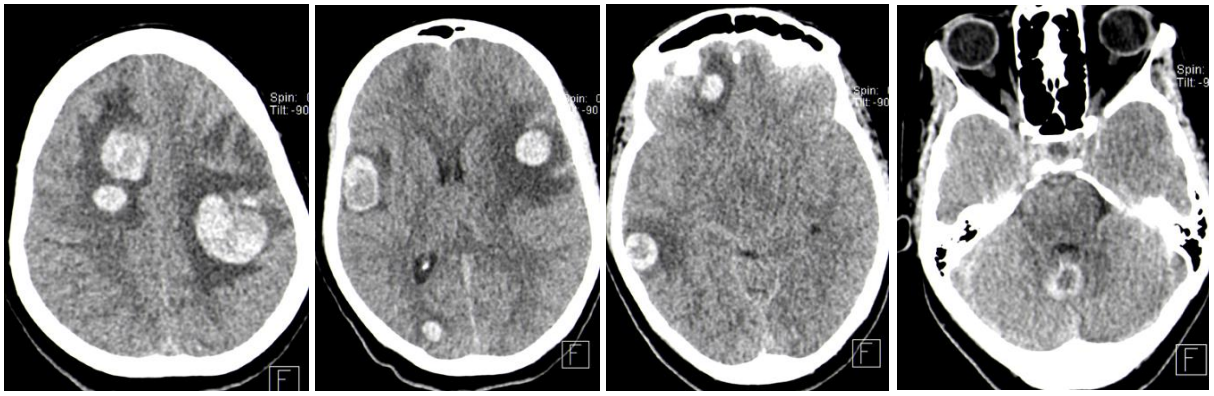
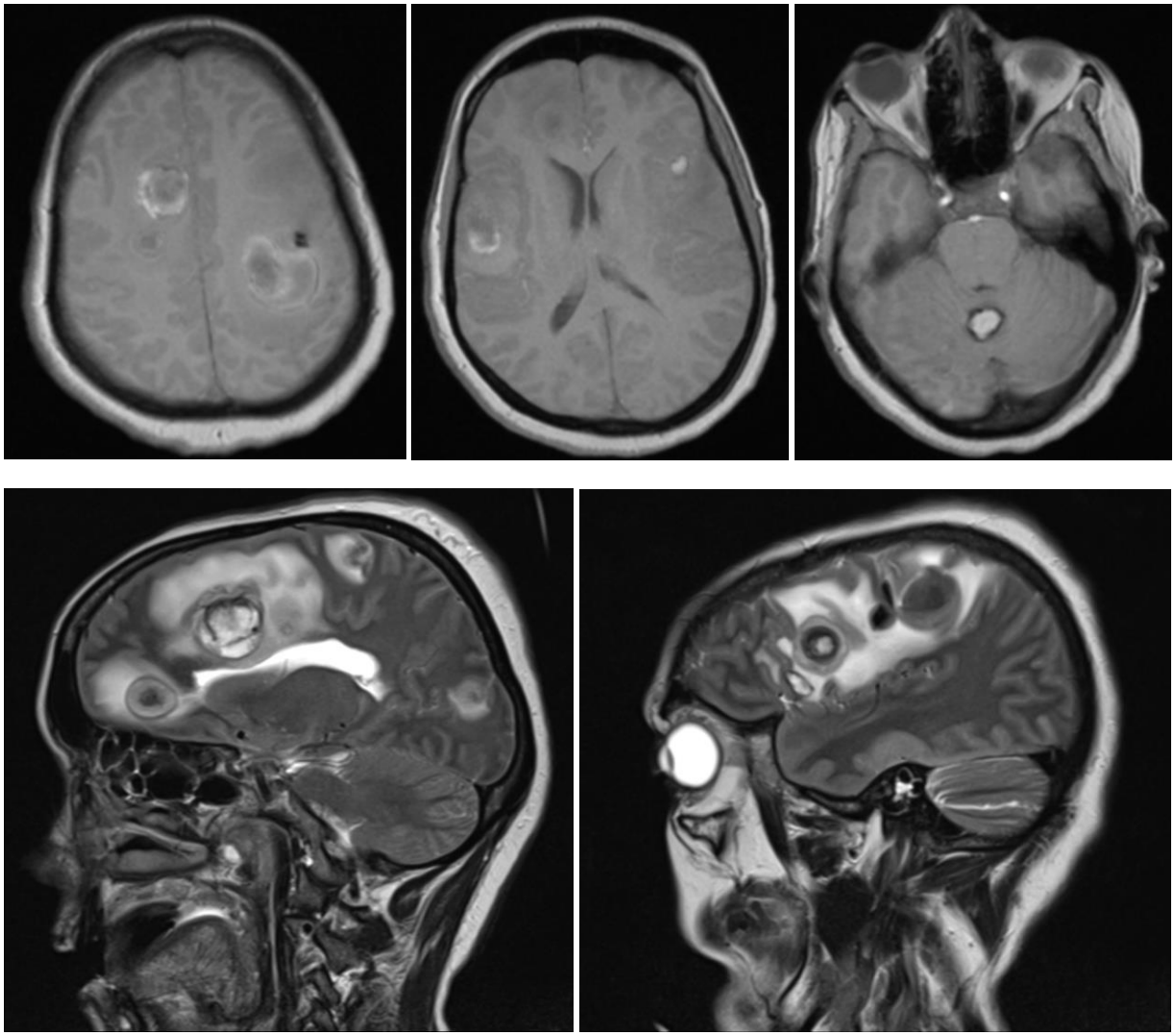


Figure 1: Axial section brain scan without injection: multiple spontaneously hyperdense supratentorial nodular formations with central necrosis and subfactorial involvement



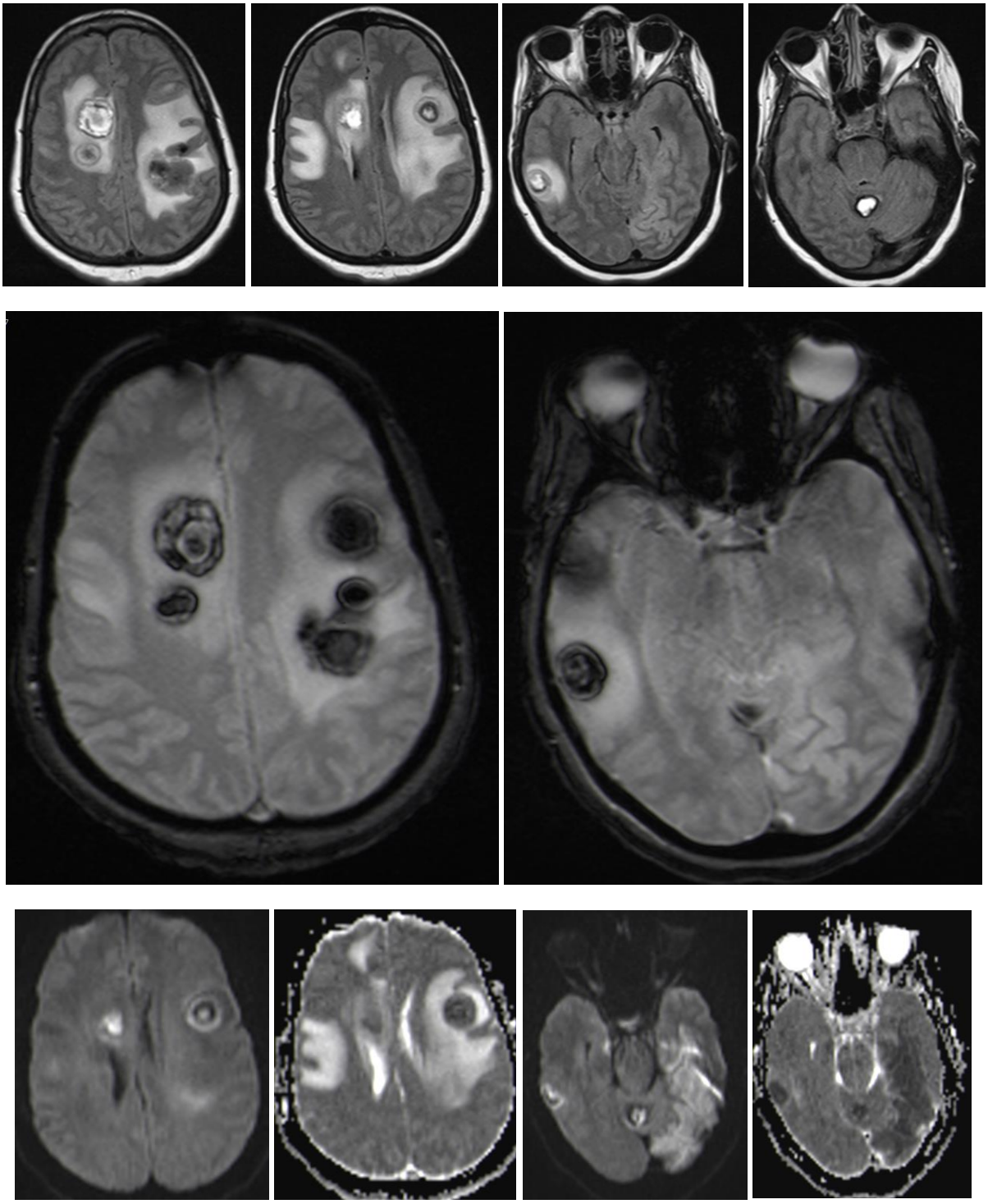


Figure 2: T1 axial, T2 sagittal, T2*, diffusion, T1 EG 3D sequences after injection of Gadolinium: Multiple nodular lesions above and below the tentorial cortex, rounded in shape, well limited, with central necrosis in T1, T2 and Flair hyposignal and T1, T2 and Flair hypersignal for some of them with a hypersignal crown on all sequences, discreetly enhanced after injection of PDC in relation to cerebral aspergillomas. Signal abnormality in the temporo-occipital, mesencephalic and left thalamic cortico-subcortical area in T1 hyposignal, T2 hypersignal and diffusion with ADC restriction in relation to an ischemic stroke of the posterior cerebral artery

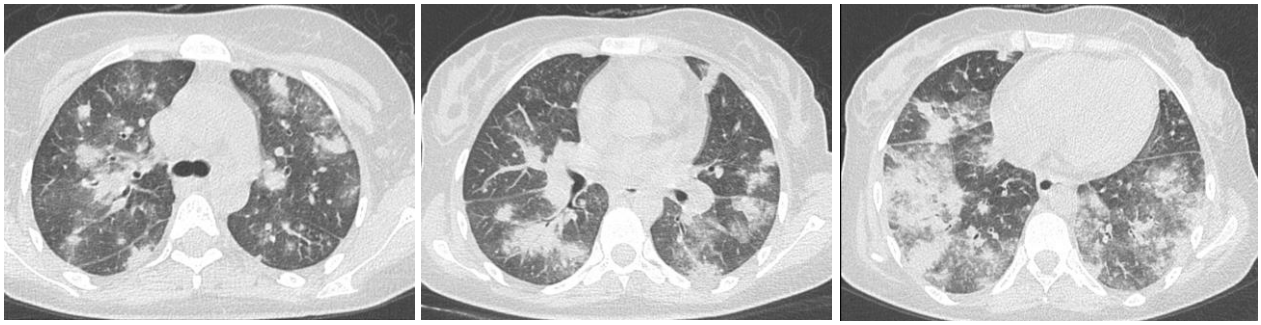


Figure 3: Chest CT scan in axial sections showing multiple sparse intraparenchymal nodules surrounded by a peri-lesional halo with multiple foci of parenchymal condensation and branching micronodules in the middle lobe, all in favor of invasive pulmonary aspergillosis

DISCUSSION

A rare condition, classically affecting immunocompromised patients, particularly following marrow transplantation.

It is one of the most dreaded localizations of invasive aspergillosis, a ubiquitous opportunistic infection defined by the existence of tissue invasion by mycelial filaments. Most commonly of hematogenous origin by dissemination from a pulmonary focus; however, a sinus origin by contiguity is also possible.

The brain is a common site of dissemination, with an incidence of 10 to 40% involvement during invasive aspergillosis. The prognosis is very poor, with an estimated mortality rate of 85 to 100%.

Symptomatology is polymorphic, often late and misleading, represented by a febrile state, headaches, vigilance disorders, focal neurological signs and convulsions. Unlike other microorganisms, aspergillus filaments are angioinvasive, which makes them responsible for specific cerebral lesions. They destroy the wall of the large cerebral arteries, blocking the origin of the small perforating arteries leading to initially sterile infarct zones. During a second phase, the aspergillary elements invade the infarcted area which evolves towards septic necrosis. True "infectious vasculitis" with infarction and/or hemorrhage.

Infarcted lesions may have a hemorrhagic component, which may guide the diagnosis. However, this aspect is described in only 25% of aspergillosis lesions.

One of the important signs classically described in imaging is the absence of enhancement of the lesions, due to the absence of inflammatory reaction in immunosuppressed patients or that undergoing corticosteroid therapy. However, peripheral contrast, corresponding to the formation of a capsule, may be present in 13 to 50% of cases, most often in the most immunocompetent patients and on the largest lesions.

The central elevation of diffusion suggests a progression from the center of the lesion to necrosis. The lowering of the diffusion of the intermediate ring corresponds to an infarcted zone. This area may also show a hemorrhagic component in some lesions (presence of a superimposable ring in hyposignal on T2* sequences, discrete hypersignal on T1 sequences). The increase in diffusion of the peripheral zone corresponds to vasogenic edema (appearing as a hypersignal on FLAIR sequences).

Confirmation of the diagnosis is based on mycological specimens from primary or secondary foci and/or aspergillosis serology and/or aspergillosis antigenemia.

Antifungal treatment (voriconazole) has considerably improved the prognosis of this condition. Surgery may be useful in case of diagnostic doubt or in the presence of a large compressive lesion.

The main differential diagnoses to be considered in the presence of brain lesions in an immunocompromised patient are:

- Toxoplasmosis.
- Cryptococcosis.
- Candidiasis.
- Malignant lesions (lymphoma++, hemorrhagic metastases).

MRI shows small hypersignals in the basal ganglia region on T2 sequences, persisting in hypersignal on FLAIR sequences.

If the blood-brain barrier is disrupted, intraparenchymal collections, called cryptococci, may form around the Virchow-Robin spaces. They rarely take contrast in immunocompromised patients.

Cerebral lymphomas: Present as T1 hypo-, hypo-, iso or hypersignal T2 lesions, with homogeneous or peripheral contrast almost always.

The hypercellular character of these tumors is the cause of a restriction of water diffusion. Perfusion imaging can be useful, providing more specific

information (normal rCBV values and a tumor perfusion curve showing a significant rise above the baseline after the first pass).

CONCLUSION

Cerebral aspergillosis is a serious pathology whose diagnosis must be evoked in the presence of an immunocompromised background, the notion of pulmonary or ENT aspergillosis and lesions preferentially affecting the basal ganglia and the thalamus.

The presence of a "target" aspect on the diffusion sequences is very suggestive of the diagnosis.

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