CT FINDINGS OF BRAIN-INFECTIONS IN THE HIV-POSITIVE PATIENTS WITH THE CORRELATED PATHOGENS

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Summary. Sixty HIV-positive patients admitted because of brain infection. Cryptococcosis, toxoplasmosis and tuberculosis were the main infectious processes. Twenty-eight cases had CT brain images. Causing organism of the neurological problems were verified by CSF-culture, CSF-PCR and serum titer. Every case showed a good response to the treatment. Fifteen patients had cryptococcosis; 60% showed normal pattern, 20% showed mild atrophy, 6.7% showed mild hydrocephalus, abnormal enhancement and enhanced nodule without surrounding edema. Eight cases were toxoplasmosis and all cases presented with multiple ring enhanced lesions with surrounding edema. Three cases had mixed infections of cryptococcosis and tuberculosis and showed normal pattern. One case of tuberculosis showed low density of white matter without nidus and another case showed infarction of the basal ganglia.

Key words: AIDS-Brain computed tomography-Brain infections

The central nervous system is commonly affected in the HIV-positive patients. Approximately forty percents of them have neurological symptoms as the initial presentation (1).

This study described the CT images of the infected brains in the HIV-positive patients. Correlation of the image-patterns with the organisms involved were made.

Materials and methods

From September 1992 to August 1994, 238 AIDS patients were admitted due to various problems. Sixty patients had meningitis and/or infectious processes in the brain parenchyma and/or ventricular systems. Computed tomography of the brains were performed with standard technique, including plain and i.v. contrast enhanced studies, in 28 cases.

The diagnosis of HIV infection was made by both gelatin agglutination test and ELISA test. The diagnosis of the brain infection was made by positive CSF-culture, CSF-PCR, India ink preparation, CSF-gram stain, CSF-AFB-stain, CSF-crypto-antigen, and serum toxo-titer. Every diagnosed case showed a good response to the specific treatment for that pathogen.

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Results

Various infectious processes involving brains of 60 AIDS-patients was shown in Table I. The age of the patients who had CT scans performed varied from 21 to 56 yrs. old. There are 13 cases (46%) ages between 21-30 yrs, 11 cases (39%) ages between 31-40 yrs. 4 cases (14%), ages between 41-50, and 1 cases (41%) ages between 51-56 yrs.

The causative pathogens, CT patterns and numbers of the patients were shown in Table 2. Examples of the lesions of toxoplasmosis were shown in Fig 1. Abnormal enhancement and small enhanced nodule of cryptococcosis were seen in Fig. 2, Fig. 3 and Fig. 4. Low density white matter lesion and ganglionic infarction in tuberculous cases were shown in Fig. 5 and Fig. 6 respectively.

Neurological manifestations included headache, fever, seizure, hemiparesis, and stiff neck. Most of the cases presented with neurological problems as the first episode and the HIV-infected condition was made known at the time of the admission. Duration of the illnesses from the onset to the admission time was 3 days to 2 months, mostly 2-3 weeks.

Discussion

Infectious processes involving brains were seen in 25% of all admitted AIDS-patients (60 in 238 patients). Cryptococcosis appeared in 62% of our cased with brain infection (60 cases) but occurred in only 6% of 35 infectious cases, reported by Levy et al in 1986 (2). Toxoplasmosis appeared more (77%) in his report comparing with 17% in our series. Tuberculosis were seen in 10% of our cases but none in Levy's cases. This probably reflected the changing of the prevalence of the causative organisms in the 1990 or reflected different behavior of the infectious processes in the different parts of the world.

Normal CT pattern was the most common finding in cryptococcosis, in our series (64%) and in Papovich's cases (43%) (3). Brain atrophy occurred less in our series (14%), compared with that in Tien's series (45%) (4), in Mathews cases (44%) (5) and in Papovich's cases (34%). The difference was probably due to short duration of the illnesses from the onset of symptoms to the admission day and/or due to the first attack of brain infections in most of our patients. In addition, most of the patients were young, i.e. 85% were less than 40 yrs. old. Focal lesioin in the form of enhanced small nodule withiout surrounding edema was shown only 7% in our cases, 17% in Tien's series and 11% in Paovich's series. It appeared in more percentage in Mathews' cases (44%); however his involving cases with CT study were not many. The lack of surrounding edema was in corresponding with those found in other series.

Abnormal enhanced pattern in cryptococcosis was seen as illdefined border areas of atchy enhancement, shown at both putamen, and vermis, were probably more than 3 mm cryptococcomas, described in Mathews' article (5). These lesions diasppeared after treatment in our series.

Abnormal meningeal enhancement was seen in only one case in our series at supracerebellar cistern, and was also less seen in the reports of Mathew (5), Tien (4) and Chag (6). This enhancement occurred together with abnormal enhanced parenchyma and increased enhancement of the choroid plexus, probably reflected more extensive infection in this patient.

Enlarged and intense enhancement of the choroid plexus was shown at both sides of posterior horns of lateral ventricle in one case. Similar findings at choroid plexus of the temporal horns of this infectious process of cryptococcosis, was described in two cases studied by MRI enhanced study, reported by Nicholas (7). However, there was no CSF entrapment as in his cases.

MRI studies was not performed in our institution in these AIDS-brain infectious cases. They did CT studies just to detect focal lesions, so that we did not have such MRI cases. MR was more effective than CT in detecting dilated perivascular spaces and cryptococcomas (5).

All cases of toxoplasmosis in our cases, presented with ring enhanced lesions with surrounding edema which were similar to the reports of LEVY (2), Dina (8). Cases of ring-enhanced lesion with surrounding edema which did not respond to toxolasmosis treatment, could represent other processes, like lymphoma (9) (10) (11) and tuberculosis as was shown in this series though ring lesions are not clearly visualized.

Two cases of tuberculosis were seen as areas of infarction at both basal ganglia and as white matter edema or cerebritis or early abscess formation. Infarction is probably secondary vasculitis.

Interestingly, mixed infections of tuberculosis and cryptococcosis appeared as normal CT findings. This should be explained by mild degree of meningitic forms.

Table 1: Sixty HIV-positive patients, who had brain infections, admitted between September 1992 to August 1994.

INFECTIOUS PROCESSES	No. of PATIENTS Cases % of total HIV.
1. Cryptococcosis	37 (62)
2. Toxoplasmosis	10 (17)
3. Tuberculosis	6 (10)
4. Tuberculosis + Cryptococcosis	2 (3)
5. Tuberculosis + Toxoplasmosis	2 (3)
6. Toxoplasmosis + Cryptococcosis	1 (1.5)
7. Bacterial meningitis	1 (1.5)
8. Meningitis, unknown cause	1 (1.5)

Table 2: Disease processes, CT patterns in 28 cases and numbers of patients in each process

Disease processes	**CT patterns**	**No. of patients (%)**
Cryptococcosis	Normal	9/15 (60)
	Mild atrophy	3/15 (20)
	Mild hydrocephalus	1/15 (6.7)
	Abnormal enhanced area at vermis, basal ganglia, meningeal enhancement at sup. cerebellar cistern and enlarged enhanced choroid plexus of lat. ventricles	1/15 (6.7)
	Small enhanced nodule without surrounding edema	1/15 (6.7)
Toxoplasmosis	Ring enhanced lesions with surrounding edema	8/8 (100)
Cryptococcosis + tuberculosis	Normal	3/3 (100)
Tuberculosis	Low density of white matter without enhanced nidus	1/2 (50)
	Ganglionic infarct	1/2 (50)

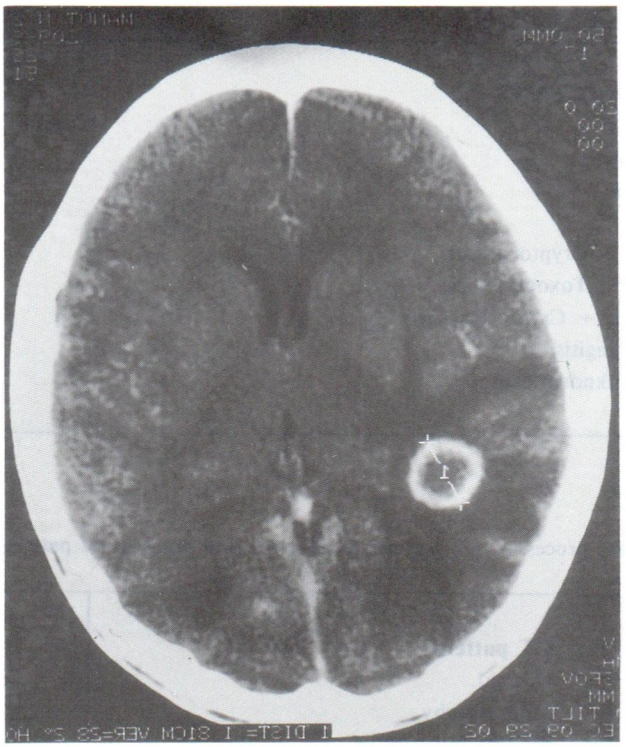

Fig. 1. Enhanced CT scan showed a ring enhanced lesion with surrounding edema in toxoplasmosis

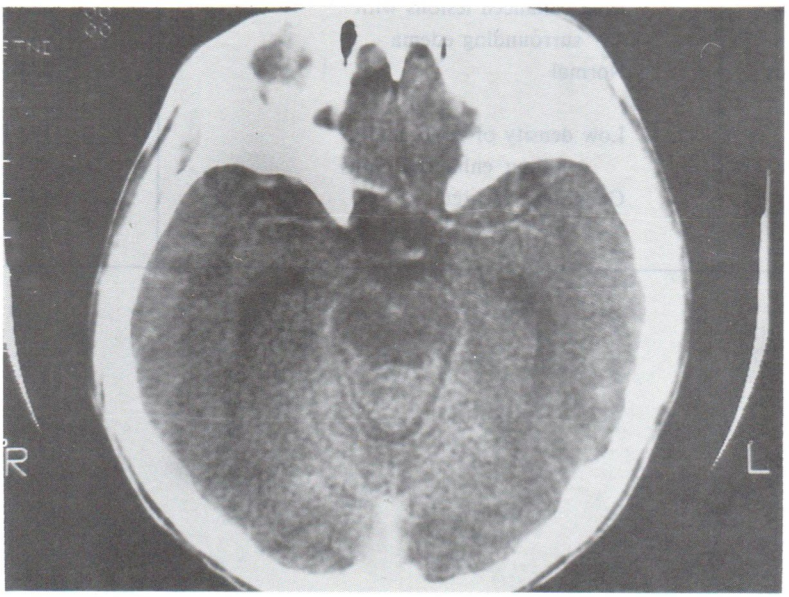

Fig. 2. Enhanced CT scan showed enhanced tentorial and supra-cerebellar cistern meninges, in cryptococcosis

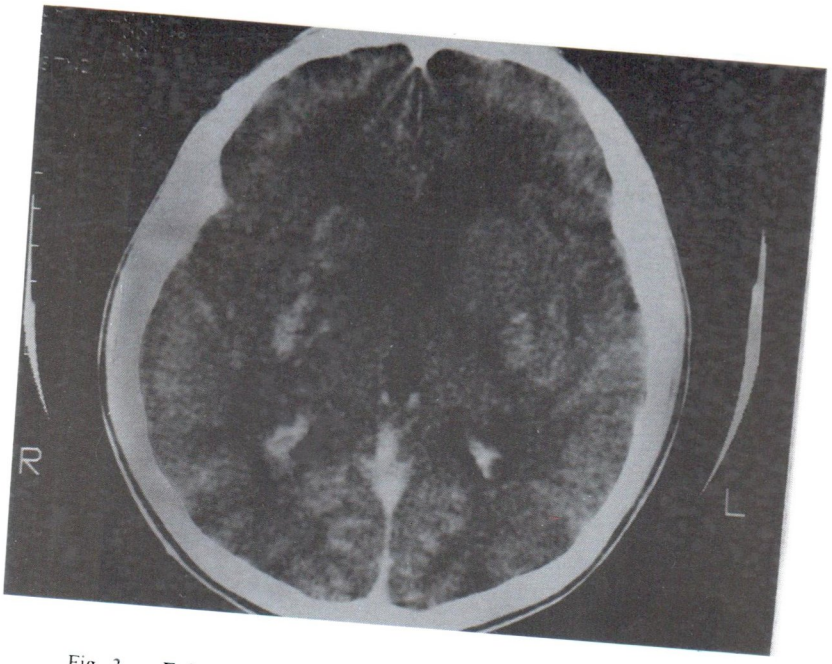

Fig. 3. Enhanced CT scan showed patchy enhancement of both sides of basal ganglia and enlarged enhanced choroid plexus of both posterior horns, in cryptococcosis

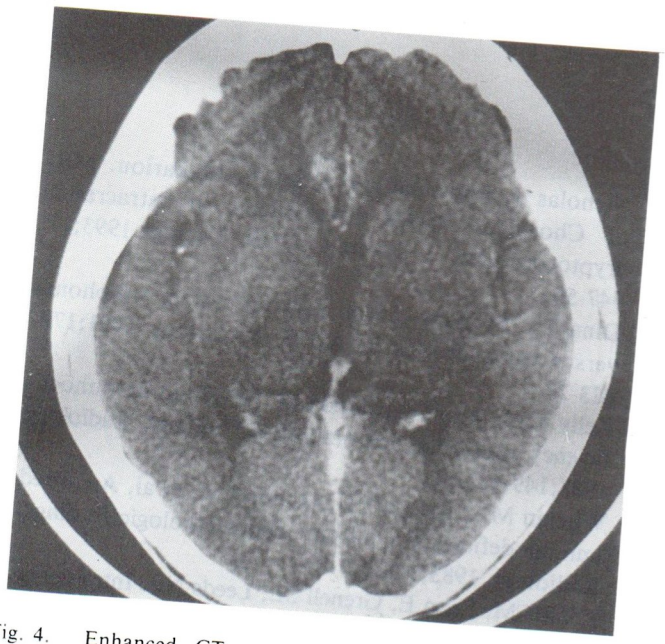

Fig. 4. Enhanced CT scan showed enhanced small nodule without surrounding edema at right genu of Corpus Callosum, in cryptococcosis

Fig. 5. Enhanced CT scan showed low density of white matter of both parieto-occipital lobes without enhanced nidus lesion, in tuberculosis.

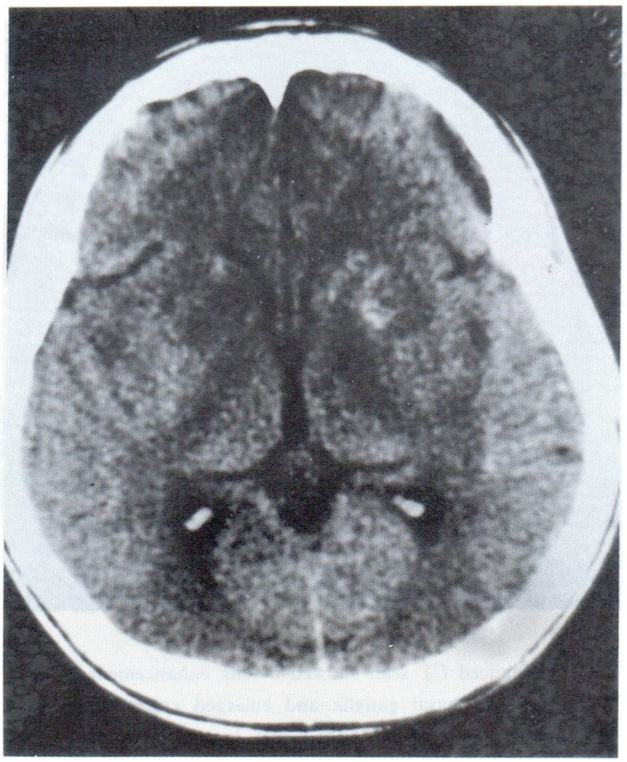

Fig. 6. Enhanced CT scan shows enhanced infarction at both basal ganglia, in tuberculosis.

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