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INTRACRANIAL TUBERCULOMA: CLINICAL AND MRI FINDINGS

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We presented 3 cases of intracranial tuberculomas with clinical features, CSF and MRI findings. Three cases with intracranial tuberculoma were diagnosed with emphasis on MRI and the clinical findings.. One patient died during antituberculous treatment. In two patients, antituberculous medications were effective with marked clinical improvement.

Keywords: *Intracranial tuberculoma, MRI findings.*

İntrakranial tuberkulom: klinik ve MRI bulguları

İntrakranial tüberkulom tanısı alan 3 vaka klinik özellikleri, BOS bulguları ve MRI bulguları ile sunuldu.Vakalar klinik ve MRI bulguları ağırlıklı olarak değerlendirildi. Bir vaka antituberküloz tedavi sırasında kaybedildi. İki vakada, antitüberküloz tedavisi etkili oldu ve klinik düzelme izlendi.

Anahtar kelimeler: *İntrakranial tuberkuloma, MRI bulguları*

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Tuberculosis is still endemic in developing countries, although recently a number of studies have reported cases of tuberculosis in association with AIDS infection in the USA and Haiti[1,2] . In Turkey, where tuberculosis is endemic, AIDS is still rare disease and no association has been reported yet. In developing countries, tuberculomas may account for 5% to 30.5 % of intracranial space occupping masses. Most published reports emphasize the greater frequency in children and young adults. Clinical recognition of tuberculosis rests mainly on the evidence of the general disease. In most series, tuberculous lesion in other organ or a definite history of tuberculous disease are present in only about half the patient operated for intracranial tuberculoma[3] .

Magnetic resonance imaging study has been used in the diagnosis of tuberculoma in the brain[4,5] , brainstem[5,6] and spinal cord[7,8] . As with bacterial menengitis, MRI is more sensitive than CT to subtle enhancement along the bony inner table of the skull[9] . We presented here, three cases with the clinical and MRI findings of intracranial tuberculoma.

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PATIENTS

Case 1. A 56 year-old man was admitted to our hospital because of headache and vomiting over 4 months, and somnolonce for two weeks. He has been received antituberculous therapy for pulmonary tuberculous for two years.

On examination he was drowsy, had bilateral papilaedema and right hemiparesis. Deep tendon reflexes were exaggreated and rigth plantar reflex was extensor. His temperature was 38.5 ^{0}C. The sedimentation rate (ESR) was 70mm/h. WBC (White blood cell count) was 20.000. Chest X- ray showed on inferior opacity in the right lung. Examination of cerebrospinal fluid showed 55 mg/dl protein, 3 WBC and Koch bacilus was negative.

MR of the brain, T_1 WI showed a hypointense mass with peripheral hyperintense rim on the left thalamus and multiple lesions on the right periventriculer white matter.
T_2 WI showed a hyperintense mass surrounded by a hypointense rim on the left thalamic region (Figure1).

He was treated with isoniazid (8 mg/kg per day), rifampicine (10 mg/kg per day), ethambutol (20 mg/kg per day). Dexamethazone (4mg every 6h IV) was given 10 for days. The patient's condition was deteriorated and he died on the 13th hospital day.

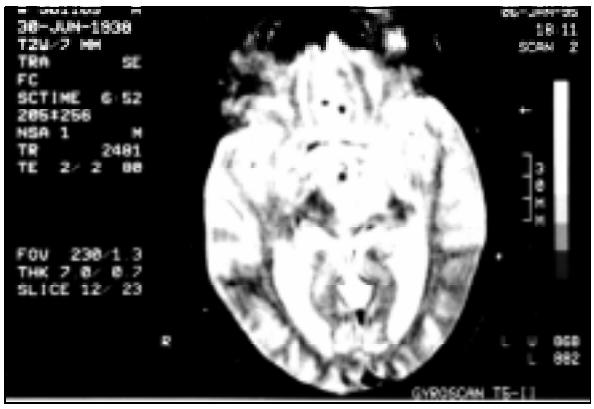

Figure 1. Axial T_2WI shows a hyperintense mass surrounded by edema on the left talamic region.

Case 2. A 49 year-old woman has been diagnosed tuberculous menengitis one year ago. She was treated with rifampicine, ethambutol, izoniazid for nine months. She was discontinued the antituberculous treatment before three months. She admitted to our hospital because of severe headaches, vomiting, deafness, diplopia and pitosis for three weeks.

On admission she was alert and well oriented. There was palsy of the right 3rd, 8th, 9th, 10th 12th nerves and bilateral horizontal nistagmus. Deep tendon reflexes were exaggreated with bilateral Aschilles' clonus. Both plantar reflexes were extensor. Cerebellar tests were positive on the rigth side. She was ataxic. The temperature was 38.9 ^{0}C. Chest X-ray was normal. ESR was 45mm/h. The blood count count showed 10.800 leukocyties. CSF releaved 450 WBC with 85% PLN. Protein was 490 mg/dl. Glucose was 1.5 mmol. On MRI with intravenous contrast media, T_1WI showed hypointense mass with hyperintense ring enchancment in the left cerebellar hemisphere (Figure 2). Antituberculous treatment (izoniazid, rifampicine, pyrazinamid, and ethambutol combined with dexamethasone) was started orally. Antituberculous treatment was continued for 9 months. Her general condition improved progressively.

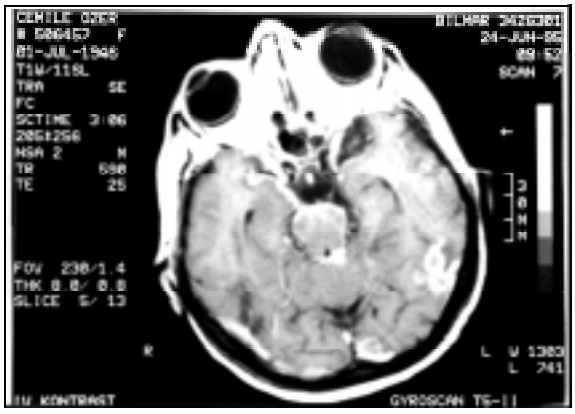

Figure 2. Axial T_1WI with contrast media shows hypointense mass with hyperintense ring enchancement on the left cerebellar hemishere.

Case 3. A 62 year old-man was admitted to our hospital because of headache and right hemiparesis for one month. He had diabetes

mellitus for 15 years. Six months previously, he was diagnosed as pulmoner tuberculosis and treated with rifampicine, izoniazid and ethambutol . The treatment was discontinued before 3 months .

On admission he was alert and well oriented and afebrile. He showed right hemiparesis. Chest X-ray was normal, ESR was 56mm/h. Laboratory investigations showed high WBC (15.000). CSF count showed no cell, 25 mg/dl protein. On T2W MR, multiple tuberculomas were seen in the lentiform nucleus on the left and gray matter(Figure.3).

He received antituberculous treatment (izoniazid, rifampicine, pyrazinamid and ethambutol). He showed progressive improvement . Nine month later, he had fully recovered.

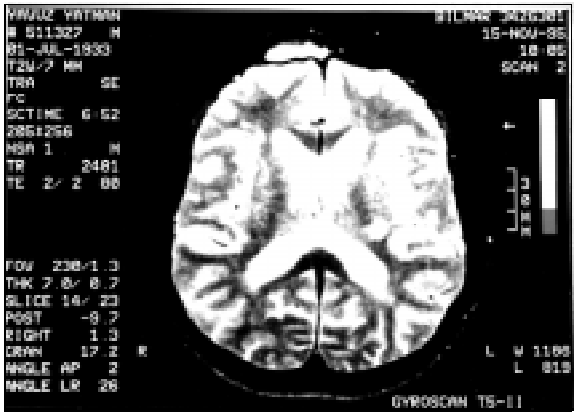

Figure 3. Axial T_2WI shows a hyperintense mass on the left lentiform nucleus and posterior limb of internal capsular region and multiple hyperintense lesions in the periventicular white matter on the both sides.

DISCUSSION

In contrast to less developed countries where it still remains a major problem, tuberculosis of the central nervous system is a relatively rare clinical problem in the industrialized western nations, accounting for less than 0.5% of the cases of the tuberculosis in the United States. Unfortunately, the infrequency of the disease often results in the diagnostic oversights. The promptness with which treatment is initiated is the most important physician controlled factor influencing the prospect of the recovery and the avoidance of serious neurologic sequelae[7,8] . The most common form of intracranial tuberculosis is tuberculous menengitis, but involvement of the brain may also take the a solid granulomatous mass[9] . In developing countries, it still accounts for 15%-30% of neurosurgical cases and affect mainly children and young adults[9,10] . Although rare in the industrialized countries, tuberculomas have not completely disappeared and represent 0.15% to 0.18% of intracranial tumors[10,11,12] .

Three patients with intracranial tuberculoma (two men and one women aged 49-62) were diagnosed in our clinic. Intracranial tuberculoma is a rather common neurological disorder in many areas of the world that results from hematogenous spread from a focus of tuberculous infection[13] . Although it occurs at any age, 86 % of patients with intracranial tuberculoma are under the age of 25 years in developing countries such as China and India [13,14] . In contrast in USA most patient are over 20 and tuberculosis results from reactivition of dormant disease[10,15] . A past history of tuberculosis is common , occuring in about %50 of cases in most series[11,13,14)] .Such evidence is of great value in differential diagnosis, but does not exclude the diagnosis . One of our case had suffered tuberculosis in the past and two patients had evidence of active disease elsewere in the bodies. The clinical manifestations of intracranial tuberculoma may be pleomorphic, and recognition of a typical syndrome is not possible. The pleomorphism is mainly related to indiuvidual difference in the size and topogrphy of the lesions. Symptoms of raised intracranial pressure are the usual presenting feature. Arseni reported symptoms of intracranial hypertention in 72 %. [15] . The incidence of papillaedema was 89% in Chile[14] , 83% in India[13] and 42%-55% in the United States series[16,17] . Papillaedema was noticed in two of our cases All patient had papillaedema. Lateralizing sings are not common in patients with intracranial tuberculoma. Two cases had hemiparesis. In one series, 25% had fever[17] but only 10% in another[16] . One of our patients noticed somnolonce, which could be related to perilesional edema rather than to the lesion itself. It was reported that clinical manifestations of intracranial tuberculoma are usually present a period of weeks or months before diagnosis [18,19] . In our patients, the durations of symptoms before diagnosis varied from two weeks to three months. Tuberculin skin test may be also useful

on the regions where tuberculosis is not endemic[10,17] . However we could not use this test as a reliable indicator of active disease because of the high incidence of positive results in the population of our country. The CSF examination had a little aid in the diagnosis of intracranial tuberculoma. Isolated protein elevation was the most commun abnormality found in 88 % of sampled patients in one report [16] , but only 36 % in another[18] . Smears of CSF for acid-fast bacilli are not very sensitive and negative smears should not be taken as proof aganist the diagnosis. In our cases, the CSF was examined in all patiens. Two patints showed elevated protein and increased white blood cells counts in one patients, but none of them had positive smears for acid -fast bacilli in CSF. In tuberculous menengitis the appearance of new neurological symptoms and signs may indicate the development of cerebral tuberculoma which may occur in the first 2 months of succesfull treatment[20] . This is generally recognized as a paradoxical response to therapy. The explanation of new lesions or the expanstion of existing ones is elusive. The exact mechanism might be due to a complex host-organism interaction[20,21] . Chemotherapy of any tuberculous focus causes destruction of acid-fast bacilli and liberation of tuberculoprotein, therefore invoking an inflammatoryresponse with resulting edema and swelling in cervical nodes during treatment for tuberculosis. The mechanism by which intracranial tuberculomas enlarge may be similar[8,20,22] . The usual presentation include not only the clinical picture but also the absence of the classical CSF findings. The CSF changes in untreated tuberculous menengitis are lymphocytic pleocytosis with high protein and low glucose[23] . This condition was seen in one of our patient. The CSF may not initially show any abnormalities in patient with severe tuberculosis of the brain or spinal cord. This condition was seen in two of our patients. The absence of the classical clincal picture and CSF findings should not misguide the treating physician, and the patient has to be started an anti-tuberculous drugs, if there is a high index of clinical suspicion.

MRI has an important role in the diagnosis of intracranial tuberculoma. Tuberculoma may vary in appearance. Lesions with central necrosis tend to show central hyperintensity on T_2WI and to have a peripheral hypointensity rim[4] . However, more organized solid lesions often appear strikingly hypointense on the T_2WI as a result of the granulation tissue and compressed glial tissue in the central core. Occasionally, alteranating rings of hypointense and hyperintense signal form as a result of layers of granulations tissue deposition. In all cases, lesions appear to be of gray matter intensity on T_1WI.

Prior to the development of chemotherapy, the mortality of intracranial tuberculoma was very high. Now all patients receive antituberculous chemotherapy, which results in an improvement in most, and cure in some current medical therapy includes isoniasid, rifampin, pyrazinamid, plus ethambutol hydroclorid and or streptomycine sulfate. In our cases, after the initiations of antituberculous chemotherapy, marked clinical improvement was observed in two patients. One patient died in two weeks despite the initiations of antituberculous therapy. This patient showed poor neurological status on admission. Intracranial tuberculoma in this patient was too late diagnosed. The optimal duration of treatment is uncertain. Lepper and Spies found no recurrence of tuberculous menengitis after one or more years of the treatment[24] . Mayer et al suggested triple drug therapy for the first 3 months[17] . The use of dexamethasone is contraversial[17,24] . Dexamethasone was given to two patients over 10 days, a dose of 4 mg every 6 h.

Intracranial tuberculoma is a potentially curable disease that must be differentiated from other space-occupying lesion of the brain. Wide spread use of modern neuroimaging techniques has led to better recognition of such extremely rare cases. Early diagnosis and prompt therapy with antituberculous therapy are important in preventing mortality and reducing morbidity.

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