Can leprosy affect the central nervous system? A retrospective study

Savaş Öztürk, 1Tülin Öztürk, 2Ilker Erden, 3Haydar Uçak, Ilkay Can

Balikesir University Medical Faculty Department of Dermatology; 1Elazig Training and Research Hospital Radiology Department, 2Elazig Training and Research Hospital Dermatology and Leprosy Department 3Dicle University Medical Faculty Dermatology Department, Turkey

Correspondence address: Dr. Savaş Öztürk, Balikesir University Medical Faculty Department of Dermatology, Turkey. E-mail: drsozturk@gmail.com.

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ABSTRACT

Objective: We aimed to study the leprosy cranial Magnetic Resonance Imaging (MRI) findings and cerebral pathology.

Methods: A total of 20 patients with leprosy who underwent MRI findings were presented.

Results: Nonspecific senile atrophic changes were observed in most of patients with leprosy. Furthermore; meningiomas was observed in three patients with leprosy and chronic dural venous sinus thrombosis was observed in one patient with leprosy.

Conclusion: According to our study findings there may be involvement of Central Nervous System (CNS) in patients with leprosy. Leprosy effect on CNS must be supported by the further largely investigations.

Key words: Central nervous system, leprosy, MRI, meningiomas

INTRODUCTION

Leprosy is a chronic granulomatous infection, caused by mycobacterium leprae (M. leprea), primarily affecting the peripheral nerve trunks and cutaneous nerves. Leprosy continues to be a challenge to health worldwide, with about 250,000 new cases being detected every year. It classically presents with neural and/or dermal signs and symptoms. [1, 2]

Diagnosis is based on three criteria: characteristic skin lesions in association with thickened nerves, demonstration of acid fast bacilli in slit skin smears, and histopathology of skin biopsies. In developed countries, the diagnosis is suspected when a patient who has stayed in an endemic area suffers from a peripheral neuropathy of unknown etiology. [3] In leprosy CNS is thought to be free from bacilli. However, in a study of the 44 cases of 67 leprosy patients had vacuolar changes of motor neurons either in medulla oblongata (nucleus ambiguous or hypoglossal nucleus) or spinal cord. This study provides significant additional evidence to indicate that M. leprae is present in the CNS in a subset of patients. [4]

MATERIALS AND METHODS

This study was approved the ethics committee of Dicle University Medical Faculty, Diyarbakir, Turkey. A total of 20 patients with leprosy (15 male, 5 female) in Elazig Training and Research Hospital Dermatology and Leprosy Clinic who underwent MRI were included in this study. Written informed consent has been taken from the patients prior to the study. In our study, the age of the patients ranged from 63 to 85 years. Contrast agent was used in three patients during the MRI examinations who had intracranial and cervical tumors.

MRI was performed using a 1.5-T magnet system (General Electric Signa EXCITE high speed scanner, Milwaukee, Wisconsin, USA) equipped with high-speed gradients. Axial T2-weighted images (TR/TE, 3775/102 ms), sagittal T2-weighted (TR/TE, 5425/85 ms) and T1-weighted (TR/TE, 525/16 ms) images were received.
Analysis of MRI was performed by an experienced radiologist (T.O). Cranial MR findings gathered under three headings: T2 hyperintensities and lacunar infarct, atrophy, and the other signs. T2-hyperintense areas were evaluated in two locations (Periventricular, centrum semiovale) Central atrophy (enlargement of the lateral and third ventricles) and peripheral (widening of the sulci) atrophy were noted. Accompanying other findings were also noted.

RESULTS

We detected pathologic findings in 18 of 20 patients (85%) by MRI. MRI findings of all patients are summarized in Table1.

Eighteen patients with diffuse cortical cerebral atrophy in accordance with the increased depth and width in the cerebral fissures and sulci. Three of 18 patients had central atrophy.

Seventeen of 20 patients had in T2-weighted images, white matter hyperintensity (gliosis). We detected both periventricular and subcortical hyperintense areas in 10 of 17 patients and 3 patients had only periventricular hyperintense areas, 4 patients had only subcortical hyperintense areas. Chronic lacunar infarcts were identified in 4 patients. These 4 patients were defined as focal areas of decreased signal intensity on T1-weighted images and as foci of increased signal intensity on T2-weighted images ranging from 2 to 15 mm in diameter and located in the basal ganglia, thalamus, brain stem.

Also, we found extra-axial mass in indicating cranial menengiomas in two patients and one patient had spinal menegioma.

In a 74-year-old male patient had been found to 2 concurrent menengiomas [Figure 1]. MRI showed a 3,5x1,5 cm extra-axial round-shaped mass in the left temporal lobe that showed isointensity on T1-weighted imaging, hyperintensity on T2-weighted imaging and hyperintensity on diffusion-weighted MRI. This was homogeneously enhanced with Gadolinium Diethylenetriaminepenta-Acetic Acid (Gd-DTPA) with the dural tail sign. Additionally, we found another 1,5x1 cm mass lesion was detected in the right frontal convexity. The signal intensity of the tumor was isointense on both T1- and T2-weighted images. There was no surrounding edema. Intravenous administration of contrast material resulted in homogeneous enhancement of the mass and a dural tail sign are observed.

In a 67-year-old male patient was detected in a 1,5x1,5 cm left frontal convexity meningioma [Figure 2]. Axial T2–weighted-MRI was demonstrated a hypointense left frontal meningioma. Mass was isointense to cerebral parenchyma on T1 weighted sequences on MRI, this mass was homogeneously enhanced with dural tail sign.
The 72-year-old female patient was diagnosed incidentally cervical meningioma [Figure 3]. MRI revealed a Th-1 thrcal intradural extramedullary mass that was isointense to spinal cord on T1- and T2-weighted sequences. On MRI, this mass was homogeneously enhanced with dural tail sign. The spinal cord was severely compressed and displaced.

In a 68-year-old male patient was detected the right transverse and sigmoid sinus suggestive of a chronic dural venous sinus thrombosis [Figure 4]. MRI revealed chronic thrombus was hyperintense area on T2-weighted images and isointense area on T1-weighted images.

DISCUSSION

Leprosy is a human chronic infectious disease caused by Mycobacterium leprae. Only a small percentage (less than 1%) of the population that comes into contact with M. leprae develop the disease.\[5\] Since the introduction of multidrug therapy in 1982 by the World Health Organisation, the leprosy burden has been dramatically reduced. However, although the reported number of registered cases worldwide
has declined in the last two decades, the reported number of new cases each year has remained the same.\textsuperscript{[6]} Mycobacterium leprae primarily affects the peripheral nerve trunks and cutaneous nerves.\textsuperscript{[3]} There is no certainty effect of leprosy on CNS.

In a study, intracellular bacilli and lepromatous meningoencephalitis were found in brain tissues of infected nine banded armadillos (Dasypus novemcinctus).\textsuperscript{[7]} Furthermore, one other study of the 44 cases of 67 leprosy patients had vacular changes in medulla oblongata or spinal cord.\textsuperscript{[4]} These studies are important in terms of showing effects of leprosy on CNS.

Among findings were the most common lesion was cerebral atrophy. There are many causes of atrophy such as cerebrovascular, metabolic, demyelinating, degenerative diseases and age-related conditions.\textsuperscript{[8]} We found cerebral atrophy in 18 patients with leprosy.

MRI is known to be sensitive in detecting periventricular and subcortical white-matter lesions, which appear as hyperintense areas of variable configuration. The number and size of these lesions have correlated with chronologic age and with some conditions such as hypertension and prior ischemic event which are known to be risk factors for cerebrovascular diseases.\textsuperscript{[9-11]} We found white-matter lesions in 17 patients. We think that the cause of atrophy and white-matter lesions in our patients not leprosy but the nonspecific senile atrophic changes.

Meningiomas are easily diagnosed by MRI, and mostly are asymptomatic.\textsuperscript{[12]} Meningiomas are the third common intracranial tumors which comprise approximately 14\% to 20\% of all intracranial tumors.\textsuperscript{[13,14]} Meningiomas show characteristic findings on conventional MRI; thus their differentiation from intraaxial tumors is easy with typical features. In 85\% of the patients with meningiomas are seen a solid lesion with homogenous contrast enhancement, dural tail sign an extraaxial location.\textsuperscript{[15]} The incidence of multiple intracranial meningiomas varies from 1\% to 10\% in different series.\textsuperscript{[16]} They have a peak incidence in patients aged between 40 and 60 years, and the incidence in women is approximately twice that in men.\textsuperscript{[13,16]} MRI findings of meningiomas of the patients were consistent with the literature. The treatment was not planned since the 67 and 74-year-old patients were very old and there were not clinical and neurological symptoms. The 72-year-old patient was operated because she had weakness and pain, and histopathological examination of the mass was compatible with meningioma.

Although meningiomas are the most common tumor in the central nervous system, their incidence, epidemiology, and clinical outcomes have been poorly defined.\textsuperscript{[17]} In addition to increasing age, the most consistent factor associated with risk of meningioma is exposure to ionizing radiation, many other environmental, lifestyle and genetic risk factors have been studied with inconclusive results.\textsuperscript{[18]} Other risk factors have included such as diabetes, hypertension, and epilepsy, occupational lead exposure, personal hair dye use, cigarette smoking, head trauma and allergies.\textsuperscript{[16, 18, 19]} In reviewing the literature, mycobacterial diseases and leprosy were not among the risk factors for the development of meningiomas. In the literature there is only one case of meningioma with leprosy.\textsuperscript{[20]} We have detected the meningiomas in three patients of the our 20 patients with leprosy. At the advanced age of our patients have risk factors for the development of meningioma. However, outside the advanced age, we think that the leprosy disease may to be a risk factor for the development of meningioma.

Cerebral venous thrombosis is a relatively uncommon disorder, with an estimated annual incidence of two to seven cases per million in the general population. Since the possible causal factors and clinical manifestations of thrombosis are many and varied imaging plays a primary role in the diagnosis.\textsuperscript{[21]} More than 100 causes of venous thrombosis have been described in the literature. Causal factor may be classified as local or systemic. Local processes that alter the venous flow (eg, sinus trauma, regional infection such as mastoiditis, and neoplastic invasion or compression) may potentiate the development of thrombosis. Systemic causes include protein S and protein C deficiencies, a peripartum state, oral contraceptive use, and hypercoagulable states secondary to malignancy. In as many as 25\% of cases, no cause is identified.\textsuperscript{[22]} The absence of a flow void and the presence of altered signal intensity in the sinus is a primary finding of sinus thrombosis on MRI. Slow or turbulent flow also may cause a signal intensity alteration in the sinus.\textsuperscript{[21]} In our cases we have observed loss of signal void in the thrombosed cerebral sinuses. Leprosy is a characteristic
predilection disease of two particular tissues; skin and nerves. Vascular involvement is rare and when present may be a part of disseminated disease in advanced cases. Lepromatous involvement of blood vessels is likely to be secondary to involvement of the nervi-vasorum of the blood vessels.\[23\]

CONCLUSION

According to our study findings there may be involvement of CNS in patients with leprosy. Leprosy effect on CNS must be supported by the further largely investigations.

REFERENCES