Magnetization Transfer MR Imaging Demonstration of Presumed Perilesional Gliosis around a Healed / Healing Neurocysticercosis and its Relationship with Epilepsy

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Introduction: Neurocysticercosis (NCC) is a major cause of epilepsy in most developing countries, accounting for 30-50% of the late onset seizures and is clearly an important contributor to the increase in rates. NCC is also being diagnosed with increasing frequency in the United States, where it is estimated that more than 1000 cases occur each year, mostly due to immigration from countries in which the disease is endemic. MRI and CT are the main stay in the diagnosis and there is a controversy whether to treat it with anti – parasitic agents or just give anticonvulsant and the lesion will disappear. It is known that seizure activity is independent of the persistence or disappearance of the granuloma. Recently, a cause and effect relationship has been suggested between the visibility of hyperintense signal on magnetization transfer (MT) T1 images and epileptogenesis in patients with calcified neurocysticercosis (1). The present study was performed to study the relationship between the presumed perilesional gliosis around the healing / healed solitary lesion and epileptogenesis on magnetization transfer MR imaging

Materials and methods: MR imaging was performed in 108 patients of solitary neurocysticercosis while being followed up to healing / healed stage and for control of seizures for a period of 2- 4 years. MRI of the brain was performed on a 1.5 tesla superconducting system using circularly polarized head coil. Conventional spin echo (SE) proton density, T2 (TR/TE1,2/n = 2200/ 12,80/1) and T1 (1000/15/2) weighted imaging was performed in axial plane using 192x256 matrix, 0.5 interslice gap, and 5 mm slice thickness. T1 weighted magnetization transfer MR imaging was also performed with exactly same parameters as for T1 except for the off resonance pulse. The criteria for diagnosis of neurocysticercosis were: demonstration of scolex in a cyst on the initial CT/MRI, positive serology for NCC or MT ratio of more than 30 in T2 hypointense lesions. Post contrast MT T1 imaging was also performed to look for any abnormal contrast- enhancing region. In vivo single voxel proton MR spectroscopy was also performed in initial 5 patients where there was MT T1 signal abnormality using SE sequence with TR/TE/ acq = 3000/135/128 and results were compared with corresponding contra-lateral region and the age/sex matched controls from the same regions.

Results: Summary of the results is mentioned in the table1. Out of 108 cases studied, lesions were image invisible on SE imaging in 32, calcified in 21, and healing/healed in 55 cases. Perilesional gliosis was seen in 22/108 patients. In 8/32 cases of image invisible lesion, perilesional gliosis was seen and all of them had persistent seizures. None of the image invisible lesion without perilesional gliosis had seizures. Out of 21 calcified lesions, perilesional gliosis was seen in 8 with persistent seizures. Five patients with calcified lesions and no perilesional gliosis had epilepsy. The patients with healed/healing lesions showed perilesional gliosis in 6/55 cases and 3 showed persistent seizure activity. 4/55 patients with no perilesional gliosis had persistent seizures. In vivo proton MR spectroscopy performed in initial 5 patients showed a decrease in NAA in all the cases of presumed perilesional gliosis region visible on MT T1 imaging.

Table 1: Summary of the results

Total no of cases n=108	Persistent seizures	No seizures
Gliosis (n=22)	19	03
No gliosis (n=86)	09	77

We performed statistical analysis with respect to sensitivity, specificity, and predictive value and found that the sensitivity was 67.85%, specificity was 96.25%, positive predictive value of 86.36% and negative predictive value of 89.53% for epilepsy relationship with perilesional gliosis.

Discussion: Treatment of the solitary cysticercus granuloma is still debatable. Some authors believe that anticysticercal drugs only improve the imaging without modifying the clinical activity of the disease (2). Other believe that the chances of remaining seizure free after the withdrawal of antiepileptic drugs seems to be greater in those patients who were previously treated with anticysticercal drugs (3). Gliosis is observed in a small number of patients on MR imaging with epilepsy and appear as hyperintense on T2 weighted images. In a series of 48 patients with frontal lobe epilepsy, gliosis was seen in a large number of patients on histopathology than what was observed on MRI (4). We have observed gliosis in 22/108 patients with healing and healed neurocysticercosis and persistent seizure activity was observed in 19/22 cases. Gliosis showed specificity of 96.25% with positive predictive value of 86.36% for epileptogenesis in these cases.

Conclusion: We conclude that there is a positive relationship between perilesional gliosis and epileptogenesis in patients with healed/healing neurocysticercosis.

References:

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