Rasmussen's Encephalitis

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Abstract

Rasmussen's encephalitis is a chronic inflammatory disease of unknown origin affecting one cerebral hemisphere. We report a case of a seven year old boy who presented with unilateral seizures and progressive hemiparesis.

Key words: Partial seizures, hemiparesis, progressive cerebral hemiatrophy

Introduction

Rasmussen's encephalitis is a rare neurological disease of childhood characterised by progressive unilateral hemisphere atrophy, focal intractable seizures and progressive neurological deficit[1]. It is rarely fatal but its effects are devastating. Early diagnosis is important before the process destroys much of the hemisphere.

The Case

A seven year old boy presented with left hemiparesis, and recurrent episodes of focal seizures on the left side. He was delivered at term with a birth weight of 2.7 kilograms and had an uneventful neonatal period. His initial mile stones were appropriate for age.

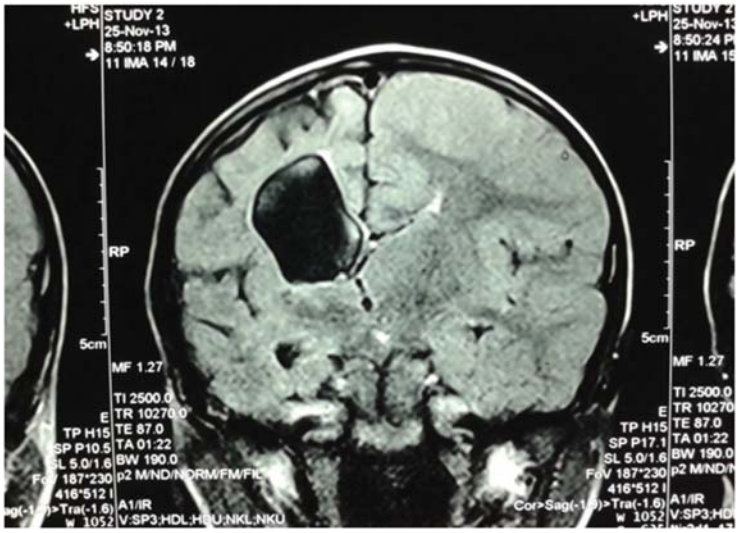

Fig: MRI brain showing diffuse cortical atrophy with exvacuo dilatation of cortical sulci lateral ventricle involving the right cerebral hemisphere.

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At the age of seven months, he was hospitalised with fever and status epilepticus. He recovered without neurological deficit and was treated as febrile seizures. Two months later, child had one episode of stiffening of the left upper and lower limbs lasting for approximately five minutes and he recovered without neurological deficit. Two weeks later mother noticed that child was not using the left upper and lower limbs as much as the right.

From then on, he used to have frequent episodes of seizures, always restricted to left limbs, sometimes involving the left half of face with turning of face to left side and brief loss of consciousness. The frequency of seizures had been increasing to five to six episodes every month. His left

side motor weakness increased to left hemi paresis. He also had aphasia, mild cognitive impairment with learning difficulty. He was on three anticonvulsants but the seizures episodes continued with same frequency.

In the EEG there were epileptiform discharges over the right hemisphere with sharp and slow wave complex. MRI brain showed diffuse cortical atrophy with exvacuo dialatation of cortical sulci and lateral ventricle involving the right cerebral hemisphere. Altered signal intensity noted with in the right Thalamus. The T2W image shows diffuse increased signal intensity in the cortical and sub cortical white matter. The left cerebral hemisphere, brain stem and cerebellum are all within normal limits. There is progressive right cerebral atrophy as compared to CT brain done at the age of two years.

Progressive cerebral hemi atrophy with clinical deterioration and focal EEG features was the key to diagnosis of Rasmussen's Encephalitis for this child. He was put on daily dose steroids at 2 mg/kg of prednisolone daily. After two months of treatment with prednisolone, there was a marked improvement with reduction in his seizure frequency but no improvement in cognition and aphasia. He has been referred to Neurosurgeon for considering the feasibility of hemispherectomy.

Discussion

Rasmussen's encephalitis was first described by Rasmussen et al in 1958.It is associated with slowly progressive neurological deterioration and seizure in children. Seizures are often the first problem to appear. Simple partial motor seizures involving one side of the body were the most common (77%), followed by secondarily generalised tonic-clonic seizures (42%), complex partial seizures (19% with automatism and 31% with subsequent unilateral motor involvement). (Oguni et al 1991)[1]

Rasmussen's encephalitis is a chronic inflammatory disease of unknown origin and is envisaged as sporadic. Though rarely fatal, but its effects are devastating. The seizures are typically relentless and hemi paresis and mental impairment often follow.

The disease is characterised by three stages. An initial prodromal phase is characterised by a relatively low seizure frequency and only rarely some degree of hemi paresis. It had a median duration of 7.1 months. In acute phase of the disease, patients have frequent focal seizures and development of hemi paresis. The median duration of acute period was 8 months. The acute phase was followed by a residual stage with a permanent and stable hemi paresis. The seizure reduction can be explained partially by the loss of neurons due to the inflammatory process. The neuronal loss, one of the corner stone of RE also explains the worsening and irreversibility of the neurological status.[2]

Although the definitive diagnosis is to confirm chronic inflammatory changes in brain specimen, recent progress in clinical research has allowed a clinical

Table 1: European Consensus Diagnostic Criteria for RE (2005) (Bien et al., 2005b)

Diagnosis criteria according to Bien et al:

If all primary criteria are present, the diagnosis is very likely. If that is not the case, two out of three secondary criteria must be present.

Diagnostic	Primary criteria	Secondary criteria
Clinical	Partial seizures AND unilateral neurological deficit(s)	Epilepsia partialis continua (EPC) or progressive* unilateral neurological deficit(s)
MRI	Unilateral focal cortical atrophy AND – T2/FLAIR hyperintense signal (multi- or unifocal**) O R – atrophy of the ipsilateral head of the caudate nucleus	Progressive* unilateral focal cortical atrophy
EEG	Unilateral slowing with or without epileptiform activity, unilateral ictal onset	
Histopathology		T lymphocyte dominated encephalitis with activated microglial cells and reactive astrogliosis***

Neurological deficits or cerebral hemiatrophy should increase to be considered as being "progressive", which implicates that at least two clinical examinations or MRI studies are carried out (6 months or more).

** The signal can be seen either in the grey or the white matter.

*** Numerous macrophages, B lymphocytes, plasmocytes or viral inclusion bodies exclude the diagnosis of RE

diagnosis with a relatively higher accuracy. Progressive cerebral hemiatrophy with clinical deterioration and focal EEG features are the key to diagnosis, avoiding brain biopsy.

Progressive lateralised cerebral hemi atrophy demonstrated by CT scan and MRI appears to be a characteristic finding of Rasmussens Syndrome. One puzzling aspect of Rasmussens syndrome is why chronic encephalitis always affects only one hemi sphere, leaving the other intact. [3]

Three key factors have been considered in the aetio-pathogenesis of this disease. These include viruses, auto antibodies (GLUR3 antibodies) and cyto toxic T lymphocytes. Based on these concepts different therapeutic strategies have been pursued such as antiviral agents, plasmapheresis, immunoadsorption, immunosuppresion or immunomodulation with intravenous immunoglobulin[4]. However due to lack of larger studies, to date there is no established therapeutic strategy of this devastating disease.

The most effective treatment of Rasmussen's Encephalitis with regard to seizure freedom is hemi spherectomy[4]. This procedure however is usually performed only at a later stage of the disease when a patient has developed a fixed hemiparesis with loss of fine finger movement.

Although AEDs have little or no effect on partial seizures, they reduce the risk of generalised seizures. Antiepileptic therapy is recommended through the disease.

We are presenting this case because of its rarity and need of awareness for early diagnosis and treatment, to prevent severe neurological deficit. The period of most extensive brain damage is on an average the 8 months of the acute disease phase. Early initiation of immunotherapy has been suggested to improve the outcome and alter the natural history of the disease. Early Immunological therapies with steroids, immunoglobulin (IG), plasmapheresis, and immunosuppressive therapy with tacrolimus may prevent the loss of neurons and progressive cerebral atrophy and thus improve the outcome and alter the natural history of the disease. Future therapeutic interventions should therefore focus on this time period rather than on later burnt out stage during which the majority of brain atrophy has already taken place.

Rasmussen's encephalitis should always be considered in the differential diagnosis of hemiparesis with partial seizures localised to the same side of hemiparesis. An early neuroimaging should be mandatory so that early therapy may prevent further loss of neurons.

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