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Case Report

Rasmussen encephalitis: A case report

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Abstract

Rasmussen's encephalitis (RE) is a chronic focal encephalitis involving single cerebral hemisphere characterized by progressive neurological dysfunction and intractable seizures. The cause is mostly unknown but proposed to be associated with immune-mediated and associated with viral infections. We report a case of RE following exanthematous illness clinically diagnosed as chickenpox.

Key words: *Chickenpox, Chronic focal encephalitis, Hemispherical atrophy, Rasmussen's encephalitis*

Rasmussen's encephalitis (RE) is a rare but severe immune-mediated chronic focal encephalitis leading to unilateral hemispheric brain atrophy, associated with progressive neurological dysfunction and intractable seizures. The cause is not well-established and at present, no conclusive evidence is there to answer why and how RE starts. A viral etiology was suggested by Rasmussen based on the constituents of immune reaction in the brain such as lymphocyte infiltration and microglial nodules [1,2]. We found no study in Indian literature reporting RE following viral infections. Hence, we report a case of RE following an exanthematous illness clinically diagnosed as chickenpox.

CASE REPORT

A 7-year-old child presented with the inability to walk and speak properly with gradually increasing the weakness of limbs and left sided seizures. Weakness was more in distal parts of the body than proximal areas. Child was developing normally till the age of 2.5 years with no significant illness when he had developed a febrile illness with vesicular rash, clinically documented as chicken pox. However, it was not confirmed by serological or culture studies. Child recovered from that illness in 7 days. 3 months later, parents noticed a sudden onset of weakness of limbs and left focal seizure episodes. There was no history of trauma or contact with tuberculosis and his antenatal and postnatal period was uneventful. There was no significant family history. Left sided weakness and frequency and duration of seizures were increasing gradually since the onset for which he received multiple antiepileptics in last 4 years with no significant improvement.

On examination, the child was afebrile with stable vital signs. On central nervous system examination, progressive spastic hemiparesis with disuse atrophy was noted on the left side. The weakness was more at distal joints (power 1/5 - wrist and ankle joints) as compared to proximal joints (power 3/5 in shoulder and hip joints). Deep tendon reflexes were brisk with positive Babinski sign on the left side. Cranial nerves and sensory system examination was normal. There were no cerebellar or extrapyramidal signs. The child also had mental retardation and cognitive impairment (DQ 40 and IQ 35-50). His hearing and vision were intact; though, the speech was slurred. Other systemic examination was apparently normal.

All routine laboratory investigations and cerebrospinal fluid (CSF) examination were normal. Electroencephalogram (EEG) revealed focal epileptiform discharges (originated from the right frontoparietal region) with secondary generalization at few places. Magnetic resonance imaging (MRI) brain showed diffuse atrophy involving right cerebral hemisphere mainly in the cortical and subcortical areas with ex-vacuo dilatation of right lateral ventricle. Multiple gliotic-encephalomalacic areas were seen in right temporo-frontoparietal lobes suggestive of RE. Based on the clinical synopsis and investigations, diagnosis of RE secondary to viral infection (chicken pox) was considered; however, we could not confirm the diagnosis by CSF examination for oligoclonal band or CSF-polymerase chain reaction (PCR) and CSF-IgG levels for *Varicella zoster* due to non-availability of these tests in our institution.

Pediatric neurologist opinion was taken and dosages of antiepileptics were adjusted along with supportive therapy including child psychology, physiotherapy, and occupational therapy. Initially, seizures were decreased in frequency and duration with three antiepileptics (phenytoin, sodium valproate, and oxcarbazepine) but in follow-up there was very poor control with three antiepileptics. Hence, he was counseled

regarding prognosis and surgical management and referred to super specialty center.

DISCUSSION

RE is a chronic, progressive inflammation of the brain of unknown origin. Recent research suggests a possible viral origin or a viral-induced autoimmune mechanism [1,2]. Onset of this disease is in childhood and is characterized by an abrupt appearance of focal, persistent motor seizure activity (epilepsia partialis continua), followed by hemiplegia and progressive cognitive deterioration in majority of the cases. The mean age at presentation is between 6 and 8 years [3]. They usually present with focal motor seizures; although, generalized seizures have been noted as well. This is followed at varying time intervals by progressive loss of motor function in the ipsilateral limbs, which may culminate in frank hemiplegia. Cognitive deterioration accompanies motor impairment and is progressive.

Three disease stages have recently been proposed. Initially, there may be a rather non-specific "prodromal stage" with a relatively low seizure frequency and rarely mild hemiparesis with a median duration of 7.1 months (range 0 months to 8.1 years). Following this, all patients enter an 'acute stage' of the disease which is characterized by frequent seizures, mostly simple partial motor seizures often in the form of epilepsia partialis continua. The neurological deterioration becomes manifest by progressive hemiparesis, hemianopia, cognitive deterioration and if the language dominant hemisphere is affected, aphasia. The median duration of this stage is 8 months (range 4-8 months). After that, the patients pass into the 'residual stage' with permanent and stable neurological deficits and still many seizures, although less frequent than in the acute stage [4].

Diagnosis is based on the clinical features, EEG, MRI, and histological examination with major finding is its monohemispherical aspect [5,6]. CSF examination in most of the cases is normal; although, increased protein content, IgG index, and oligoclonal bands have been reported [5]. Histopathological examination of biopsy material and resected specimens reveal a characteristic triad of findings: Perivascular lymphocytic cuffing of round cells, gliosis, and microglial nodules in cortical layers of the brain and white matter. Resected specimens in the more advanced clinical stages have demonstrated diffuse cortical atrophy with neuronal loss and a lack of inflammatory cells.

Episodes of EPC are not necessarily associated with synchronized, rhythmic spike activity. Later in the disease, epileptogenic abnormalities over the affected size diminish and become more apparent over the healthy hemisphere, therefore erroneously indicating that unaffected hemisphere becomes epileptogenic. In MRI, hyperintense signals in white matter of the affected hemisphere and cortical swelling are seen, followed by cortical atrophy, which most often starts in the perisylvian and central area or in posterior cortices in late onset cases [7].

Vasculitis following infections, hemiplegia-hemiatrophy hemiconvulsion syndrome, and cerebral hemiatrophy (Dyke-Davidoff-Masson syndrome) are the important differential diagnosis [8]. In our case also, unihemispherical vasculitis following viral infection could not be ruled out as we did not have the investigations (such as *Varicella zoser* PCR or IgG antibodies in CSF) which could confirm the etiological diagnosis of rashes as chicken pox.

Careful analysis of the association between histopathology and clinical presentation suggests that initial damage to the brain is mediated by T-cells and microglia, suggesting a window for treatment if RE can be diagnosed early [9]. In the acute phase of the disease, immunotherapy can be tried such as steroids, immunoglobulins, plasmapheresis, and immunosuppressive therapy. Several studies used high steroid pulse therapy and reported encouraging, albeit only transient results [10]. Seizures in RE are highly pharmacoresistant in more than 80% of cases and up to now, no antiepileptic drug or combination is known to be superior over the others.

Surgical treatment is needed in most of the resistant cases. The principal surgical approach consists of disconnection of the affected hemisphere from the contralateral functioning hemisphere i.e. functional hemispherectomy. A modified, less invasive type of functional hemispherectomy, transsylvian keyhole functional hemispherectomy, is the latest variant of surgical RE techniques [11,12]. The aim of this surgery was to interrupt the connection of cortex with basal ganglia and contralateral hemisphere [11-13].

CONCLUSION

In pediatric unihemispheric progressive cerebral atrophy, RE should be considered in the differential diagnosis, especially if

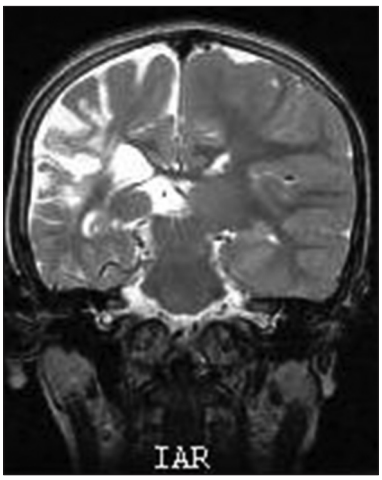

Figure 1: MRI showing diffuse hemispherical atrophy with hyperdense signals on right side

there is no intracranial calcification or contrast enhancement. Radiological study is an important tool for early diagnosis and excluding differential diagnoses, which can modify the progression of the disease.

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