Acute Necrotizing Encephalopathy of Childhood (ANEC): A Case Report

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Abstract- Acute necrotizing encephalopathy (ANE) is an infrequent disease in childhood with Specific clinical complications. To date, the highest incidence of this disease has been reported in East Asian children. The clinical features of the disease include convulsions, frequent vomiting, and coma. Most of these patients die within days or cause severe neurological complications. The disease is characterized by symmetric and necrotic multifunctional lesions in the thalami and brainstem. We reported a 5-year-old girl infant from Besat Hospital, Sanandaj, Kurdistan, located in west of Iran.

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Introduction

Acute Necrotizing Encephalopathy Acute of Childhood (ANEC) is an uncommon encephalopathy that is almost exclusively seen in Japanese children (1). The disease is seen with symmetric and necrotic multifunctional lesions in the central nervous system mainly in the thalamus, tegmentum, cerebellum, and deep white matter (2). The disease is caused by viral infections. Neuropathlogically, these infections affect the blood-brain barrier which known as Dysoria (3).

The reason of the disease is still unknown. Although influenza virus, mycoplasma and human herpes have been reported as common causes, it is now believed that the disease is most likely to be affected by the immune or metabolic system (4). Cytokines, Tumor necrosis factor 1, interleukin 1 and 6 receptors may be responsible for this disease, too (5). No specific treatment has been prescribed for this disease and less than 10% improvement is predicted for the disease. Most people with this disease experience severe loss of consciousness and death (6).

Severity of conflict and Magnetic Resonance Imaging (MRI) lesions are specifically related to the result (7). We report a 5-years-old girl with ANEC who was hospitalized to Besat Children Hospital to know more about this disease.

Case Report

A 6-year-old girl presented to a district hospital with a history of cough and runny nose followed by five days of fever, multiple bouts of diarrhea, vomiting, and convulsions. She was also febrile (39.7 C) and had tachycardia (125 bpm). Chest and abdominal findings were normal. Following repeated seizures, the patient's level of consciousness decreased, and she became lethargic. The laboratory findings were completely abnormal (Table 1 A and B).

Brain MRI was performed and showed symmetrical abnormal signal intensity hypo/T1 and hyper/T2W, FLAIR and restricted in DWI in bilateral subcortical white matter, posterior aspect of basal ganglia, thalamus, brain stem, and bilateral cerebellar white matter. According to the patient’s age, history, and imaging ANEC are at the top of the DDX. Unfortunately, this patient died at the age of 5 due to acute necrotizing encephalopathy (Figure 1).

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Table 1. Laboratory test findings (A) blood test & (B) Urinalysis

A	Test Name	Result	Unit	Flag	Reference Range
1	**BUN**	29	mg/dl	Hi	7-16.8
2	**Ca**	8.5	mg/dl	Low	8.6-10.3
3	**Na(ser)**	164	mEq/L		138-145
4	**Mg**	1.84	mg/dl	Low	Female:1.9-2.5
5	**K(ser)**	4.3	mEq/L		3.6-5.9
6	**MCH**	27.4	pg	Low	27.5-33.2
7	**MCHC**	30.22	g/dL	Low	30.0-38.0
8	**Plt**	60 Manul plt		Low	140-440
9	**RDW**	14.6	%	Hi	11-14.5
10	**SGOT(AST)**	123	IU/L		Female up to 31
11	**SGPT(ALT)**	283	IU/L		Female:<31

B	Test Name (Macroscopic)	Result		Test Name (Microscopic)	Result
1	**Urine protien**	Positive (+++)	1	RBC	20-25
2	**Glucose**	Positive (++)	2	Epi. Cell	2-5
3	**Blood**	Positive (++)	3		

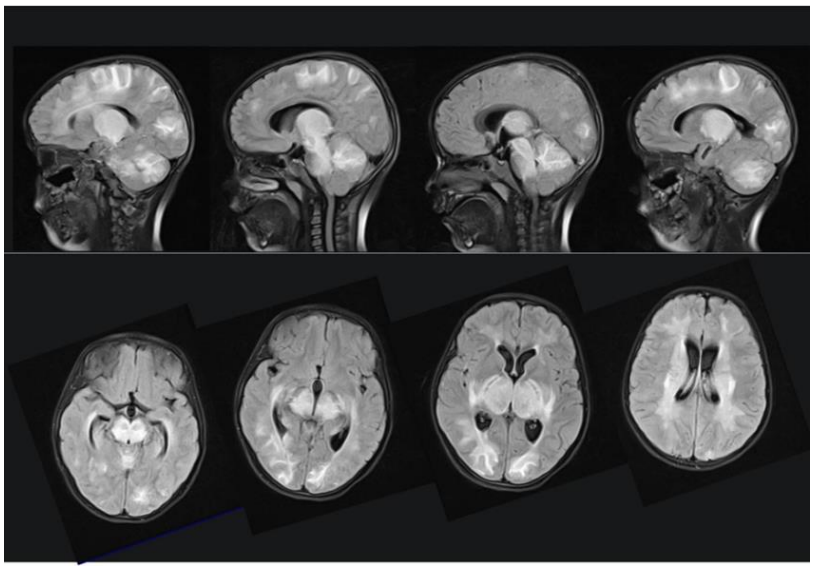

Figure 1. Axial and Sagittal T1 /T2W, FLAIR, and DWI MRI brain images (A, B) show increased signal intensity in bilateral subcortical white matter, posterior aspect of basal ganglia, thalamus, brain stem, and bilateral cerebellar white matter

Discussion

ANEC is a distinguished kind of encephalopathy and is reported for the first time in Japan in the 1990s. It had since been found in Taiwan, South Korea, and to a lesser limit in the United States and Europe. It affects patients between 5 months and 12 years of age (1,7). First presented as a Subgroup of Reye's syndrome, it was soon to imagine being neurological effects from flu infection. However, many factors including human herpesvirus-6, measles, herpes simplex, and parainfluenza are involved in this disease (7,8). Recent studies suggest that immune or metabolic factors may play a role in this disease. However, this disease is thought to be associated with cytokines, it is also thought to be related to cytokines such as tumor necrosis factor receptor-1, interleukin (IL)-1, and IL-6 (9).

Acute necrotizing encephalopathy (ANE), usually happens some days after a viral infection; its clinical period is distinguished by convulsions and coma (2). Common laboratory tests show non-specific results such as increased liver function tests, metabolic acidosis,

increased acute phase reactants, and elevated Cerebrospinal Fluid (CSF) protein (10,11). Accurate diagnosis of the disease depends on pathological, laboratory, and radiological results (12). Radiological and MRI images of the disease reveals multi focal, symmetrical cerebral lesions in the thalamus, tegmentum, and cerebellum (2). In the leading evaluations of the disease causes, viral encephalitis, Wernicke encephalopathy, deep cerebral vein thrombosis, hypoxia, some neurodegenerative disease (10), and the neurometabolic disorders exist (13).

Leigh's syndrome is a rare neurometabolic illness that affects the Central Nervous System (CNS) between the age of 3 months and 24 months, and is known as subacute necrotizing encephalomyelopathy (14). In the case of disease (ANE), gene mutation in nuclear DNA causes damage of motor skills and ultimately death. In addition, the difference between viral encephalitis and ANE disease is diagnosis of the pleocytosis in CSF, whereas there are no necrotic damages in toxic encephalopathies (15,16).

Radiology and MRI imaging play an important role in ANEC diagnosis. The most specific imaging finding would be bilateral lesions of the thalami with the involvement of brainstem, internal capsule, and basal ganglia (9,17). In addition, brain scans of the disease show primary lesions with hemorrhagic foci, atrophy, or centralized cysts and encephalomalacia (1). Low prognosis associated with this disease include hemorrhage and capitation (9).

Here, we reported a case of ANEC. Our patient had recurrent convulsions with a high fever. Metabolic and laboratory tests were abnormal. Brain MRI indicated pathologic findings consistent with ANE.

ANE is an infrequent disease in childhood with clinical features including convulsions, frequent vomiting, and coma. Most of these patients die within days or the disease could cause severe neurological complications.

Ethical Approval and Consent to Participate

This research has been confirmed by the Research Center of Kurdistan University of Medical Sciences and Ethics Committee with the file number IR.MUK.REC.1399.080.

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