Original Research

Acquired Demyelinating Diseases in Children: A Retrospective Analysis at a Tertiary Care Hospital

Mahendra Singh Sisodiya[1], Sarika Swami[2]

[1]Assistant Professor, Department of Neurology, Sardar Patel Medical College, Bikaner, Rajasthan, India
[2]Associate Professor, Department of Pediatrics, Sardar Patel Medical College, Bikaner, Rajasthan, India

Corresponding Author:
Dr. Sarika Swami
Associate Professor, Department of Pediatrics, Sardar Patel Medical College, Bikaner, Rajasthan, India
Email: swami.sarika09@gmail.com

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ABSTRACT

Background: The present study was conducted for assessing pediatric patients with acquired demyelinating diseases in children.
Materials &Methods: It was a retrospective study evaluating 40 patients of less than 15 years of age. Inclusion criteria for the present study included clinical, radiological, and immunological features of acquired demyelinating disorders. Complete clinical and demographic detail of the patients was obtained. A Performa was made and detailed medical history of all the subjects was recorded. All the results were recorded on a Microsoft excel sheet and were subjected to statistical analysis by using SPSS software. Univariate analysis was done for evaluation of the level of significance.
Results: Data of a total of 40 subjects was analyzed. The mean age of the subjects was 12.9 years. Among these 40 subjects, ADEM, TM, NMI, MS and ON were found to be present in 62.5 percent, 15 percent, 12.5 percent, 7.5 percent and 2.5 percent of the patients respectively. Mean age of the subjects with ADEM, TM, NMI, MS and ON was found to be 7,6 years, 9.5 years, 9.9 years, 11.3 years and 12.8 years respectively. 21 subjects were males while the remaining were females. In majority of the cases, cerebral cortex was involved followed by thalamus and brainstem. Other areas to be involved included spin and optic nerve.
Conclusion: Pediatric subjects having new, subacute focal neurological deficits in the absence of any traumatic history/metabolite disorder should be looked on with suspicion for having acquired CNS demyelination.
Keywords: Acquired Demyelinating, Children, Syndrome.

INTRODUCTION

Acquired demyelinating syndromes (ADS) represent acute neurological illnesses characterized by deficits persisting for at least 24 hours and involving the optic nerve, brain, or spinal cord, associated with regional areas of increased signal on T2- weighted images. ADS may occur as a monophasic illness, such as optic neuritis (ON), transverse myelitis (TM), acute disseminated encephalomyelitis (ADEM), or as a chronic relapsing condition, such as multiple sclerosis (MS) and neuromyelitis optica spectrum disorder (NMOSD).[1-3]

Any patient with new, subacute focal neurologic deficits occurring after a known infection, and in the absence of trauma, metabolic derangements, or known underlying structural abnormalities, should be suspected of having acquired CNS demyelination. In addition to detailed history and physical examination, the suggested workup for these children includes cerebrospinal fluid (CSF) and serum analysis as well as neuroimaging.[4-6]

The first demyelinating event or ADS in children ≤18 years can have a very varied clinical and radiological expression. The main diagnoses that encompass an ADS in the pediatric age are acute disseminated encephalomyelitis (ADEM), multiple sclerosis (MS), neuromyelitis optica spectrum disorder (NMOSD), and myelin oligodendrocyte glycoprotein (MOG) antibody disease (MOGAD).[7,8]

Hence; the present study was conducted for assessing pediatric patients with acquired demyelinating diseases in children.

MATERIALS & METHODS

The present study was conducted for assessing pediatric patients with acquired demyelinating diseases in children. It was a retrospective study evaluating 40 patients of less than 15 years of age. Inclusion criteria for the present study included clinical, radiological, and immunological features of acquired demyelinating disorders. Complete clinical and demographic detail of the patients was obtained. A Performa was made and detailed medical history of all the subjects was recorded. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis by using SPSS software. Univariate analysis was done for evaluation of level of significance.

RESULTS

Data of a total of 40 subjects was analyzed. The mean age of the subjects was 12.9 years. Among these 40 subjects, ADEM, TM, NMI, MS and ON were found to be present in 62.5 percent, 15 percent, 12.5 percent, 7.5 percent and 2.5 percent of the patients respectively. Mean age of the subjects with ADEM, TM, NMI, MS and ON was found to be 7,6 years, 9.5 years, 9.9 years, 11.3 years and 12.8 years respectively. 21 subjects were males while the remaining were females. In majority of the cases, cerebral cortex was involved followed by thalamus and brainstem. Other areas to be involved included spin and optic nerve.

Table 1: Subjects with acquired demyelinating disease

Acquired demyelinating disease	Number	Percentage
ADEM	25	62.5
TM	6	15
NMI	5	12.5
MS	3	7.5
ON	1	2.5
Total	40	100

Table 2: Subjects with acquired demyelinating disease.

Acquired demyelinating disease	Mean age (years)	Males (n)	Females (n)
ADEM	7.6	12	13
TM	9.5	2	4
NMI	9.9	3	2
MS	11.3	2	1
ON	12.8	1	0

Table 3: Radiological findings

Areas involved	ADEM	TM	NMI	MS	ON
Cerebral cortex	22	0	2	0	1
Thalamus	10	0	3	0	0
Brainstem	5	0	2	0	0
Cerebellum	3	0	1	0	0
Spine	0	6	2	0	0
Optic nerve	0	0	2	1	0

DISCUSSION

Neuroimmune disorders of the central nervous system (CNS) encompass a wide spectrum of conditions that, collectively, are not uncommon in childhood. Many of these disorders result in acquired demyelination of the brain and/or spinal cord. Neuroimmune demyelinating disorders manifest across the age spectrum, but the clinical phenotypes, radiologic expression, treatment, and prognostic considerations are often distinct in children compared to adults. A significant subset of demyelinating disorders in children are monophasic and do not necessitate chronic immunotherapy. Accurately distinguishing monophasic disorders from those with a high propensity for a dynamic relapsing course requires close clinical and radiologic surveillance.[9- 11]

The recent discovery of CNS autoantibodies and their role in demyelinating syndromes has led to a paradigm shift in the classification of relapsing demyelinating syndromes (RDS) of childhood into 4 main groups: multiple sclerosis (MS); Aquaporin 4 antibody (AQP4-Ab) associated disease; Myelin Oligodendrocyte Antibody (MOG-Ab) associated disease and antibody negative RDS. These antibodies are highly relevant for treatment choices and prognosis.[12- 14] Hence; the present study was conducted for assessing pediatric patients with acquired demyelinating diseases in children.

Data of a total of 40 subjects was analyzed. The mean age of the subjects was 12.9 years. Among these 40 subjects, ADEM, TM, NMI, MS and ON were found to be present in 62.5 percent, 15 percent, 12.5 percent, 7.5 percent and 2.5 percent of the patients respectively. Mean age of the subjects with ADEM, TM, NMI, MS and ON was found to be 7,6 years, 9.5 years, 9.9 years, 11.3 years and 12.8 years respectively. In a study conducted of a large cohort of UK children, Abdel-Mannan et al. report that pedMS is diagnosed in 19% of children with ADS and that, based on a 10-year follow-up, 68% of all ADS has a monophasic presentation. Interestingly, in a Sardinian pediatric population, multiple sclerosis was diagnosed in 72% of first ADS cases. A number of factors contribute to the diagnostic and prognostic complexity of ADS in children. Epidemiological differences across studies are confounded by age: the definition of a 'pediatric' population may range from less than 16 years to less than 18 years of age. The length of follow-up periods as well as the retrospective (from adult multiple series) versus prospective nature of data collection (i.e. pediatric registries) also affect the proportion of multiple sclerosis diagnosed over ADS series. The age at onset of pedMS is higher than that in a monophasic ADS and a greater probability for a multifocal relapsing-remitting inflammatory disease (pedMS) with increased age is corroborated by a more frequent association with brain abnormalities during magnetic resonance imaging (MRI) and the evidence of intrathecal synthesis of oligoclonal immunoglobulin G (IgG) in the cerebrospinal fluid. Differential diagnosis with other neuroinflammatory or systemic inflammatory conditions may be more challenging than in adults and especially in ADEM-like onsets.[12- 14]In the present study, 21 subjects were males while the remaining were females. In the majority of the cases, cerebral cortex was involved followed by thalamus and brainstem. Other areas to be involved included spin and optic nerve. In any child presenting with suspected NMOSD, serum MOG and AQP4 antibodies should be checked. The majority of children with AQP4-positive NMOSD will have detectable antibodies at the presentation. However, a subgroup of children may not exhibit evidence of AQP4 IgG until later in the disease course, and thus AQP4 antibodies should be rechecked periodically when a high index of suspicion exists. CSF often shows evidence of lymphocytic or neutrophilic leukocytosis, and protein and IgG index may also be elevated. Intrathecally unique oligoclonal bands are seen in less than one-third of pediatric patients. Neuroimaging in pediatric NMOSD may mimic other pediatric acquired demyelinating syndromes but has some distinctive attributes. Optic neuritis in the setting of NMOSD often exhibits longitudinally extensive T2/FLAIR hyperintensities extending posteriorly along the optic tract and into the chiasm. Longitudinally extensive transverse myelitis often involves the central cord and extends for at least three spinal cord segments. Additionally, T2-hyperintense lesions may be noted within the diencephalon and brainstem, particularly in areas juxtapositioned to the ventricles as these areas have high AQP4 expression. T1-hypointense lesions or gadolinium enhancement, or both, can be noted in a subset of children. Large tumefactive lesions within the cerebral hemispheres may be observed in a small subset of children with AQP4-positive NMOSD.[15- 17]

CONCLUSION

Pediatric subjects having new, subacute focal neurological deficits in the absence of any traumatic history/metabolite disorder should be looked on with suspicion for having acquired CNS demyelination.

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