Case Report

Case Report on Metachromatic Leukodystrophy

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ABSTRACT

Metachromatic leukodystrophy is a neurometabolic condition triggered by the accumulation of cerebroside sulfatide which includes both central and peripheral nervous systems. We record a seventeen-year-old boy born of non-consanguine marriage with aspiration pneumonia and history of frequent seizures, delayed developmental milestones of neurodegenerative disorder after 4 years of age, and MRI scan. There are no specific treatments available for the aforementioned rare genetic condition and only symptomatic treatments can be given for enhancing the patient's quality of life.

Keywords: Metachromatic leukodystrophy, genetic disorder, neurodegenerative, sphingolipids, arylsulfatase enzyme A, tigroid patterns.

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INTRODUCTION

Metachromatic leukodystrophy is a lysosomal storage disease that can be progressive, neurodegenerative, or inherited. It includes four types of late infantile (< 4years of age), early infantile (4-6years of age), late juvenile (6-16 years of age) and adult (> 16 years of age)[1,3,4.] The inability to degrade sulfated glycolipid mainly galactosyl-3-sulfate ceramides produces deficiencies in a lysosomal enzyme (arylsulfatase A) that cause sulfate accumulation within the myelin sheath of the nervous system leading to a degeneration of white matter[4].

CASE REPORT

A 17-year-old male patient was born from non-consanguineous marriage, who had a history of trouble breathing after consuming food, vomiting, and loss of consciousness. The patient had similar episodes before and sought medication, as well as prior episodes of seizures. The patient's antenatal history was uneventful with a birth weight of 3.6 kg and immunized up to date. The patient had deferred developmental milestones until age 4. The general examination found the patient to be drowsy, responding to painful stimuli, anemia (+), BP-80/64mmHG, PR-104 beats per minute and oxygen saturation -97%.

The systemic analysis showed the B/L wheeze and crept (+), CNS-drowsy. Patient was awake, thin built, lumbar lordosis, and nystagmus with crossed legs showing a drop in the foot and positive for contractures and Babinski sign. Laboratory investigations showed (PCO2-33.6mmHG, PO2-59mmHG, CSO2-91 percent, K+-3.1mmol / L, Ca2 +-1.01mmol / L, Glu-133mg/dl, Lac-3.29mmmol/L, creatinine: 0.33mg/dl, PLT-339 x 10^9/L. Patient initiated treatments include Inj.1gm cefotaxime, Inj.Metronidazole 500mg, Inj.ranitidine 50mg, Inj.deriphylline 2cc, Inj.dexamethasone, Tab.clonazepam which Tab.levetiracetam, and was on ICU ventilator support. Even though symptomatic regimen modality was introduced, conditions worsened in patients and declared dead on the 5th day of admission due to type II respiratory failure.

DISCUSSION

MLD is a lysosomal storage disorder from the family of leukodystrophies and affects the metabolism of sphingolipids among the sphingolipidoses. Leukodystrophies influence the growth and production of myelin sheaths, the fatty coating that functions in the central and peripheral nervous systems as an insulator around nerve fibers. MLD involves the deposition of cerebroside sulfate with an autosomal recessive pattern of inheritance [1.]

The incidence of the disease is estimated to be 1 in 40,000 cases, according to data from the United States. No differences were observed in the disease based on race or gender. Mortality rates are high in metachromatic leukodystrophy due to the rapid progression of the disease condition [4].

The patient's family members did not confirm the occurrence of this condition. MLD demonstrates an

autosomal recessive pattern of inheritance. The disease is passed down by families in which both parents transfer a faulty gene to the offspring to have the disease. Parents may also possess the defective gene and act as carriers but do not have MLD. Children inheriting only one faulty gene from one parent will be a carrier but will not normally acquire MLD [4]. There's a 25 percent risk that when two carriers have a kid, the kid will get both genes and have MLD.

MLD's clinical characteristics include mental deterioration, hypotonia (low muscle tone), developmental delay, speech abnormalities, mental capacity loss, blindness, stiffness, seizures, impaired swallowing, paralysis, impaired school performance, ataxia, tremors, seizures and dementia[3]. The index case is a type of early infantile metachromatic leukodystrophy as the infant exhibited symptoms such as gait defects (foot drop, lordosis lumbar), repeated seizures, behavioral changes, intellectual retardations, milestone regression after 4 years of age coinciding with MLD symptoms[2,4].

The diagnostic modalities for the disease include MRI scanning and enzyme assay test to detect arylsulfatase enzyme A deficiency MRI scanning reveals symmetric confluent areas with high signal strength in periventricular white matter with subcortical U fiber ranging and is found to be close to tigroid patterns in the appearance[2]. MRI is considered primary imaging modality in patients with leukodystrophy and plays a role in recognizing, localizing, and characterizing anomalous white matter underlying it [4].

There is no prescribed treatment regimen for the disease. To alleviate the symptoms of the subject and relieve discomfort, medications such as muscle relaxants, epilepsy drugs, psychological medications, and analgesics may be provided[3]. To improve neurocognitive functions, bone marrow or cord blood transplantation is the solutions available primarily in the case of asymptomatic late infantile and early juvenile form. Here, in the case of the index boy, drugs were introduced to improve aspiration pneumonia conditions that occurred after food intake. Future treatment options for the disease which include gene therapy, enzyme replacement therapy, substratum reduction therapy, and potentially enzyme enhancement therapy is currently being explored [4].

Table 1: Cases reported on metachromatic leukodystrophy

SL.NO	References	Year	Findings
1	Gopen Kumar Kundu *et al.*	2016	A case report of juvenile MLD diagnosed by typical history, brain imaging, and enzyme assay
2	Jillalla Narsing Rao *et al.*	2015	A two-year-old boy presented with recurrent, generalized seizures, regression of milestones along with characteristic MRI findings and untraceable ARSA activity suggesting late infantile metachromatic leukodystrophy.
3	Hsiang-Ru Liaw *et al*.	2015	Patients with late infantile metachromatic leukodystrophy exhibited a rapid and devastating clinical course. The pattern of demyelination on brain MRI together with peripheral demyelination polyneuropathy indicates that evaluation of ARSA activity in leukocytes is warranted. A wide diversity of ARSA gene mutations was noted in Asia
4	Vaibhav S Lokhande *et al*.	2014	A case of infantile metachromatic leukodystrophy
5	Mallikarjun K *et al.*	2011	A case report on juvenile MLD
6	Karki S *et al*.	2011	A case report on metachromatic leukodystrophy
7	Meuleman N *et al.*	2008	Hematopoietic stem cell transplantation with mesenchymal stromal cells infusion for the treatment of metachromatic leukodystrophy

CONCLUSION

MLD is a serious illness that gets worse over time. Individuals eventually lose all muscular and mental functions. The span of life varies depending on the age the condition started but the course of the disease usually runs from 3 to 20 years. The key to success is the right indications for both the doctor and the health professionals to reassure the patient throughout the entire course of treatment and to institute a strict and regular reminder regime to ensure a better prognosis.

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