Mucopolysaccharidosis VI (Case Report) Brain MRI and MR Spectroscopy Findings

Mukopolisakkaridoz VI (Olgu Sunumu) Beyin MRG ve MR Spektroskopi Bulguları

Mukopolisakkaridoz VI (Olgu Sunumu) / Mucopolysaccharidosis VI (Case Report)

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Özet

Mukopolisakkaridoz VI veya Maroteaux-Lamy sendromlu çoklu sistem tutulumu olan, arilsülfataz B (ARSB) genindeki mutasyonlar ile tespit edilen otozomal resesif lizozomal depo hastalığıdır. Bu olgu sunumunda takip beyin manyetik rezonans görüntülemesinde (MRG) periventriküler lezyonlarda progresyon ve manyetik rezonans (MR) spektroskopide hafif miyoinozitol yüksekliği dışında belirgin patolojik pik göstermeyen tip 6 Mukopolisakkaridozlu olgunun radyolojik görüntüleri sunulmuştur. MR spektroskopi ile birlikte klinik bulgular ayırıcı tanıda bazı hastalıkları dışlamaya yardımcı oldu.

Anahtar Kelimeler

Mukopolisakkaridoz Tip 6; Makrosefali; Manyetik Rezonans Görüntüleme; Manyetik Rezonans Spektroskopi

Abstract

Mucopolysaccharidosis VI or Maroteaux-Lamy syndrome is an autosomal recessive lysosomal storage disorder with multisystem involvement which is determined by mutations in the arylsulfatase B (ARSB) gene. Herein, we report the radiological findings of a case of Mucopolysaccharidosis VI which showed progression of periventricular lesions on follow-up magnetic resonance imaging (MRI) and slight elevation of myoinositole and no other significant pathological peak on magnetic resonance (MR) spectroscopy. MR spectroscopy as well as the clinical findings helped us to exclude some of the diseases in the differential diagnosis.

Keywords

Mucopolysaccharidosis VI; Macrocephaly; Magnetic Resonance Imaging; Magnetic Resonance Spectroscopy

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Introduction

Mucopolysaccharidosis VI (MPS-VI) or Maroteaux-Lamy syndrome is an autosomal recessive lysosomal storage disorder with multisystem involvement which is determined by mutations in the arylsulfatase B (ARSB) gene [1]. MPS-VI is a treatable disease with enzyme replacement therapy and the prognosis is variable depending on the age of onset, disease progression and early diagnosis, which makes the imaging important [2]. Central nervous system abnormalities have been previously reported however; MRI findings are not very well recognized. We wish to report the brain magnetic resonance imaging (MRI) and MR spectroscopy findings of a case of MPS- VI.

Case Report

A 15- month-old female patient initially presented to a state hospital with the complaint of not being able to walk without help. According to the history given by the parents and the birth reports, she did not have asphyxia and her height and weight were normal at birth. Walking with help at 12 months was learned in her history and she never walked alone. She was born to consanguineous parents. On physical examination she had mild phenotypic changes like frontal bossing, short philtrum, bilateral epicanthus, low-set ears, sacral dimple and macrocephaly.

Due to the phenotypic changes and history of consanguineous marriage, genetic and metabolic diseases were suspected. The laboratory findings including urine and blood amino acids, serum creatine kinase, tandem mass spectrometry and activity of biotinidase enzyme, glucose, electrolytes, urea, lactate dehydrogenase and cholesterol levels were normal. Chromosome analysis showed no abnormality. MRI revealed a few hyperintensities on FLAIR and T2-weighted images in periventricular white matter. There wasn't any obstructive mass or hydrocephalus.

At 4 years of age, the patient was admitted to our hospital with poorly progression of mental and motor status. She didn' t take any medication at the time. Brain MRI with routine sequences and MR spectroscopy were performed. On routine sequences there were multiple small foci of cystic lesions, most probably dilated perivascular spaces with accumulated glycosaminoglycan which were not present on the previous MRI (Figure 1). These lesions did not show any contrast enhancement. (On MR spectroscopy, minimal elevation of myoinositol peak was detected at TE: 30 ms. N- acetylaspartic acid, lactate and choline levels were normal (Figure 2). Radiological differential diagnosis included mucopolysaccharidosis or Löwe Syndrome, however, the patient lacked ocular or renal abnormalities to favour Löwe Syndrome. Ultrasound of the abdomen excluded possible solid organ abnormalities.

Macrocephaly, clinical phenotype, progressive nature of the disease and history of first degree consanguineous marriage made the diagnosis of mucopolysaccharidosis more likely. After detecting decreased activity of arylsulfatase B enzyme, MPS type VI was confirmed by mutational analysis of the ARSB gene.

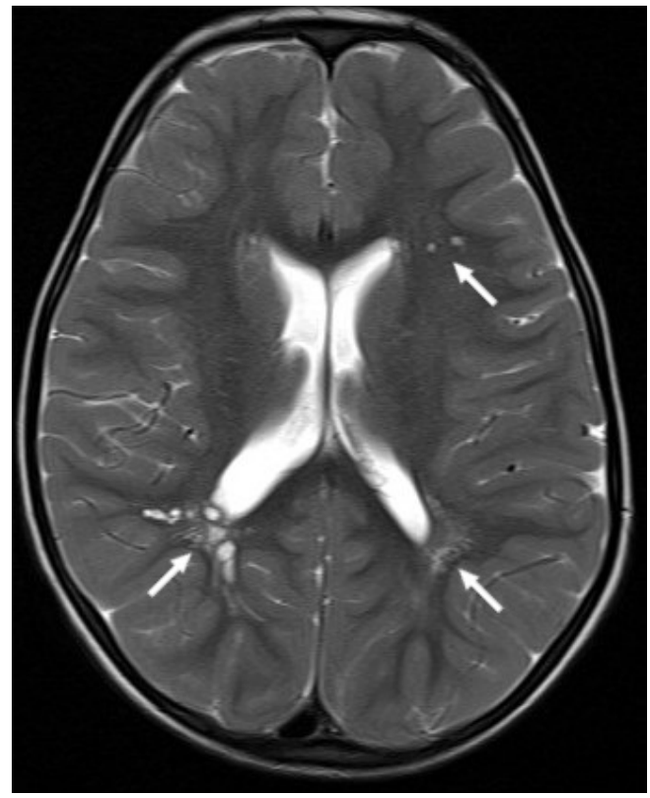


Fig.1. Axial T2-weighted image shows enlarged perivascular spaces in the periventricular region (arrows).

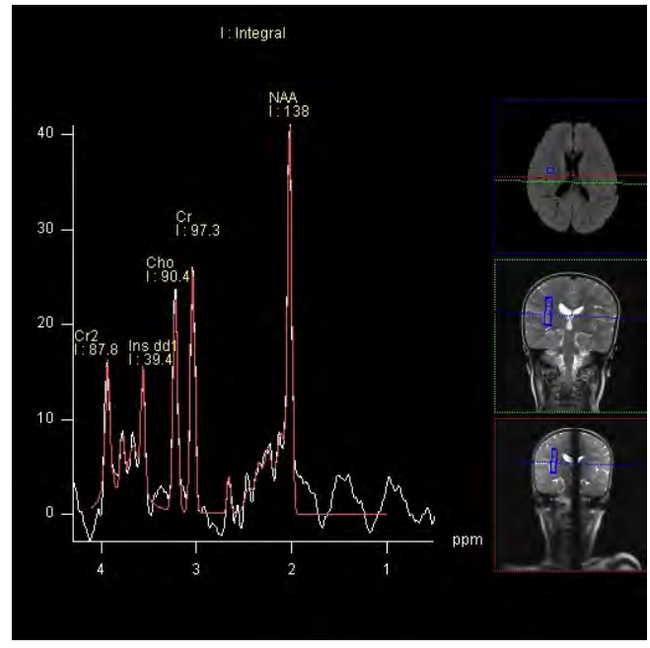


Fig.2. Multivoxel MR Spectroscopy at TE=30 msec shows that the choline, creatine and N-asetylaspartate levels are normal in a voxel at the level of right basal ganglia. There is slight elevation of myoinositol.

Discussion

Central nervous system findings in MP may include cervical cord compression caused by cervical spinal instability, meningeal thickening and/or bony stenosis, communicating hydrocephalus, optic nerve atrophy and blindness [2].

Azevedo et al reported abnormalities in approximately % 90.5 of the patients. Progressive white matter changes and the dilatation of the perivascular spaces were the most frequent abnormalities. Other findings included hydrocephalus, cerebral atrophy and mega cisterna magna [3]. There was also rapid progression of the cystic lesions presumed to be perivascular spaces in the periventricular white matter in our case.

Calleja Gero et al and Seto et al showed some abnormalities in brain parenchyma had increased frequency in different types

of MPS, however these were not specific to those types and no correlation was found with clinical severity [4, 5]. However, the clinical findings of our case were progressive as are the MRI findings.

We found elevated level of myoinositole in the white matter which is an astrocyte marker. Therefore, increased levels of myoinositole show astrocytic proliferation which is a nonspecific reaction of the brain to different kinds of central nervous system injuries. The levels of the choline were normal indicating no turnover of the membranes. Lactate peak was not found either, that could be a clue to any mitochondrial disease. Vedolin et al. proposed that increased volume of the cells may be responsible of increased myoinositole and also cerebral glycosaminoglycan deposition is related to induction of the changes in glial cells which can be measured as increase in myoinositole, which is also seen in our case as dilated perivascular spaces presumably of glycosaminoglycan storage and myoinositole increase on MR spectroscopy [6].

Based on the MR spectroscopy findings, mitochondrial diseases which were clinically suspicious could be excluded. Radiologically with the enlarged perivascular spaces and increased myoinositol level, Löwe Syndrome was also in the differential diagnosis and we could not be able to exclude unless we knew the clinical findings were not compatible with this syndrome.

In conclusion, in the presence of typical clinical findings and progressive white matter changes, enlarged perivascular spaces and increased myoinositol levels, MPS VI should be considered in the differential and may guide the clinician to the final diagnosis.

Competing interests

The authors declare that they have no competing interests.

References

1. Litjens T, Baker EG, Beckmann KR et al. Chromosomal localization of ARSB, the gene for human N-acetylgalactosamine-4-sulphatase. Hum Genet 1989;82(1):67-8.

2. Valayannopoulos V, Nicely H, Harmatz P, Turbeville S. Mucopolysaccharidosis VI. Orphanet Journal of Rare Diseases 2010;5:5.

3. Azevedo AC, Artigalás O, Vedolin L et al. Brain magnetic resonance imaging findings in patients with mucopolysaccharidosis VI. J Inherit Metab Dis 2013;36(2):357-62.

4. Calleja Gero ML, González Gutiérrez-Solana L, López Marín L et al. Neuroimaging findings in patient series mucoplysaccharidosis. Neurologia 2012;27(7):407-13.

5. Seto T, Kono K, Morimoto K et al. Brain magnetic resonance imaging in 23 patients with mucopolysaccharidoses and the effect of bone marrow transplantation. Ann Neurol 2001;50(1):79-92.

6. Vedolin L, Schwartz IV, Komlos M et al. Correlation of MR imaging and MR spectroscopy findings with cognitive impairment in mucopolysaccharidosis II. AJNR Am J Neuroradiol 2007;28(6):1029-33.

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