Teaching NeuroImage: Optic Pathway Involvement in Maple Syrup Urine Disease

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A 10-day-old neonate presented with vomiting and irritability. Diffusion-weighted imaging showed abnormal signal intensities, including characteristic involvement of the optic pathway (Figure 1A, B). Maple syrup urine disease (MSUD) was suspected. Blood tests confirmed elevated levels of branched-chain amino acids (BCAAs)-leucine, isoleucine, and valine.

Optic pathway signal abnormalities occur in 26.3% of patients with MSUD and may cause cortical visual impairment and transient blindness. These abnormalities are caused by a deficiency of alpha-ketoacid dehydrogenase, elevated BCAAs, and reduced (Na+/K+ATPase) pump function resulting in water accumulation between the myelin layers (intramyelinic edema); however, they are reversible with treatment and over time.

Figure title:
Diffusion-weighted magnetic resonance imaging of a 10-day-old neonate with MSUD

Figure legend:
Figure 1. (A) Diffusion-weighted magnetic resonance images and (B) corresponding apparent diffusion coefficient (ADC) images demonstrating diffusion restriction with corresponding reduced ADC in bilateral optic tracts (curved arrows), lateral geniculate bodies (long arrows), optic radiations (short arrows), bilateral perirolandic white matter (arrowheads), brainstem (open arrows), cerebellar white matter (asterisks).


References


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