IMAGEM EM NEUROLOGIA/IMAGE IN NEUROLOGY

Let the Fibers Guide You: DTI in ARSACS

Deixa as Fibras Guiarem-te: DTI na ARSACS

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A 35-year-old Portuguese woman with a history of parental consanguinity, but no family history of neuropathy, was followed from the age of 9 years for a demyelinating peripheral neuropathy. Initial nerve conduction studies and electromyography revealed slowed conduction velocity and low amplitude motor and sensory responses, especially in lower extremities. With disease progression, Charcot-Marie-Tooth (CMT) disease was suspected and a next generation sequencing (NGS) based gene panel test for CMT type 4 was used (*EGR2*, *FGD4*, *FIG4*, *GDAP1*, *HK1*, *MTMR2*, *NDRG1*, *PRX*, *SBF1*, *SBF2* and *SH3TC2*) – although no abnormal variant was identified, CMT remained as the suspected diagnosis.

The clinical picture was initially dominated by distal motor weakness, predominantly of the lower limbs. Over the course of several years it progressed to include cerebellar upper-limb ataxia with oculomotor disturbances and dysarthria, lower-limb spasticity, distal muscle atrophy and weakness, absent reflexes, and impaired proprioception – these were all findings characteristic of autosomal recessive spastic ataxia of Charlevoix-Saguenay (ARSACS).[1] There was no cognitive impairment. It was the onset of cerebellar findings that raised suspicion of a missed diagnosis and prompted a NGS gene panel test for hereditary neuropathies, which uncovered a homozygous pathogenic variant of *SACS*, a gene located on chromosome 13q which encodes the sacsin protein.[2] Further investigation with magnetic resonance imaging (MRI) revealed typical imaging findings – atrophy of superior vermis, a bulky pons with bilateral, parallel, paramedian, linear hypointensities in T2 weighted-images and linear T2-hyperintensities surrounding the lateral thalami (**Fig. 1**). DTI further confirmed the diagnosis, revealing bulky transverse pontine fibers (red in **Fig. 1**) and a thin cortico-spinal tract (blue in **Fig. 1**).

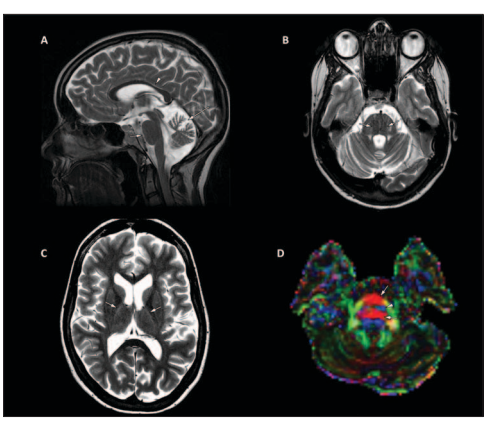

Figure 1. MRI revealed atrophy of the superior cerebellar vermis (A, long-arrow), a bulky pons (A, short-arrow) with paramedian T2-hypointensity (B), thinning of corpus callosum posterior midbody (A, arrowhead) and linear T2-hyperintensity around the thalami (C). DTI showed over-represented transverse pontine fibers (D, arrow, in red) displacing the abnormally small cortico-spinal tract (D, arrowhead, in blue).

Although the classical findings in ARSACS are well described on conventional MRI,[3] findings in advanced MRI techniques, specifically in diffusion tensor imaging (DTI), are not so well established. Nevertheless, DTI has been increasingly pointed as a very specific technique to diagnose ARSACS patients, with very distinc-

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tive features.[4] These features include a relative excess of transverse pontine fibers (which appear thickened) and small cortico-spinal tracts.[4] The combination of classical findings in conventional MRI might be relatively specific of ARSACS, but those findings can be variably present and more or less evident,[3] making DTI a useful confirmatory tool when conventional MRI is uncertain.

Clinically, ARSACS can have different phenotypes and the clinical presentation can take years to be fully expressed, which leads to underdiagnosis of ARSACS. This case highlights the possible misleading presenting phenotype of pure neuropathy, in particular resembling Charcot-Marie-Tooth disease,[1] emphasizing the need for sensitive diagnostic tools. Although not widely used, DTI can be a very good, non-invasive, and highly specific tool to diagnose this disease. ■

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JSS: Conception and writing of the manuscript and preparation of the images.

MMP: Data interpretation and critical review.

CMP: Writing of the manuscript and critical review.

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