

Vestibular and postural biomarkers in spinocerebellar ataxias and peripheral vestibular lesions

Abstract

Vestibular dysfunction can be a part of clinical impairment in spinocerebellar ataxias. Together with cerebellar symptoms, it can lead to imbalance and also to impairment of dynamic visual acuity (DVA) in these patients.

The aim of the work was to objectify the involvement of the vestibulo-ocular reflex in patients with SCA using modern diagnostic methods. At first the innovative method of video head impulse test (vHIT) was introduced in patients after vestibular schwannoma surgery, in whom a clearly defined vestibular impairment is present. We investigated DVA in SCA patients, the degree of the DVA impairment correlated proportionally with the impairment of vestibular function measured by vHIT. The best predictive values for DVA impairment were obtained by using a model that combined impairment of vestibulo-ocular reflex measured by vHIT and degree of cerebellar dysfunction according to SARA (scale for assessment and rating of ataxia). The research also aimed at the verification of postural stability disorders in patients with SCA using posturography. Standard posturographic parameters (area, sway path and mean velocity of Centre of foot Pressure - CoP) did not allow to distinguish between individual types of stability disorders. A specific parameter that is characteristic of cerebellar impairment is the 3Hz postural tremor detectable by frequency analysis of the stabilogram (Fast Fourier transform - FFT). We have shown that this parameter can serve as a biomarker of the early stages of cerebellar involvement in patients with SCA.

We have published the first three cases of "CANVAS" (cerebellar ataxia syndrome, neuropathy, vestibular areflexia) in Czech Republic and introduced the method of molecular genetic examination of this disease into clinical practice.