

SPINOCEREBELLAR ATAXIA TYPE 6: A CASE REPORT

Ataxia espinocerebelar tipo 6: relato de caso

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ABSTRACT

The aim of this study was to investigate the vestibulocochlear alterations observed in a case of spinocerebellar ataxia type 6. The case was referred from the Hospital das Clínicas to the Otoneurology Laboratory of an educational institution and was subjected to the following procedures: anamnesis, otologic examination, as well as audiological and vestibular assessments. The case shows a 57-year-old female patient with a genetic diagnosis of spinocerebellar ataxia type 6 who presented unsteadiness of gait with tendency to fall to the left, dysarthria, and dysphonia. The audiological assessment presented sloping audiometric configuration from 4.0 kHz and tympanogram type "A" with the presence of acoustic reflexes bilaterally. Observed during the survey of positional vertigo in the vestibular assessment were the presence of oblique and vertical downbeat nystagmus, spontaneous and semispontaneous with multiple core features (absence of latency, paroxysm, fatigue and vertigo), abolished optokinetic nystagmus and hyporeflexia in the caloric test. We found labyrinthine alterations that indicate central vestibular system disorders and lend credence to the importance of this evaluation. The existence of a possible relationship between the findings and vestibular symptoms displayed by the patient indicated the relevance of the labyrinthine evaluation for this type of ataxia once the presence of vertical downbeat nystagmus proved to be frequent in this type of pathology.

KEYWORDS: Spinocerebellar Degenerations; Ataxia; Vestibular Function Tests; Electronystagmography; Nystagmus, Optokinetic

■ INTRODUCTION

Spinocerebellar ataxias (SCA) are a heterogeneous group of neurodegenerative diseases characterized by the presence of progressive cerebellar ataxia whose initial clinical manifestations include deterioration in balance and motor coordination, as well as ocular disorders ¹⁻³.

SCA type 6 (SCA6) makes up 10-30% of SCA cases but is one of the rarest types in Brazil, having

a high incidence in Australia, Japan, and Germany. The identified chromosome is 19p13, gene SCA6, CAG mutation and protein CACNA1A ³⁻⁶. SCA6 is an autosomal dominant disorder caused by mutations characterized by the presence of an expansion of a repeat trinucleotide of the gene responsible for the calcium channel ². It is evident by "pure" cerebellar ataxia and may be associated symptoms of dysarthria, nystagmus, dysphagia, dystonia, and impaired depth sensitivity ^{5,6}. Patients may describe severe vertigo episodes before the beginning of the ataxia ⁵. There is a slow and progressive development of clinical symptoms that become more debilitating around age 50 (late onset) ⁵, but may occur before age 20 (early onset) ^{7,8}. The severity of clinical manifestations and age at onset of symptoms depend on from which parent the expanded allele is inherited ⁹.

Neuroimaging studies reveal cerebellar atrophy and pathological examinations demonstrate a reduction in the Purkinje layer of the

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cerebellar cortex and a gliosis of the inferior olivary complex¹⁰⁻¹².

The identification of a patient with SCA is achieved through many clinical forms and frequent associations that may occur with the disease's progression. Until today, there have been more than 30 types of SCA diagnosed, of which, types 2 and 3 are the most prevalent².

The fundamental element for vestibular analysis is nystagmus. Evidence that make up a vestibular examination permit the assessment of the relationship between balance and the function of the posterior labyrinth, vestibular branches of the eighth cranial nerve, vestibular nuclei of the rhomboid fossa and floor of the fourth ventricle, the vestibular pathways, and, especially, vestibulo-oculomotor, vestibulocerebellar, vestibulospinal, and vestibular cervical-proprioceptive interrelationships^{13,14}.

The aim of this study was to verify the vestibulo-cochlear alterations observed in a case of SCA6.

■ CASE PRESENTATION

The case study is exploratory and descriptive. We evaluated a female patient, 57 years old, who was referred by the Clinical Hospital to the Otoneurology Department of a Teaching Institution. The study was approved by the Ethics Committee under number 058/2008 and carried out after patient authorization via the signing of a consent form.

The diagnosis of SCA6 was carried out through genetic testing using the Polymerase Chain Reaction (PCR) technique.

The following procedures were followed:

Anamnesis – A questionnaire with emphasis on neurological signs and symptoms was filled out.

ENT Evaluation – An ENT assessment was conducted with the purpose of excluding any alteration that could affect the exam.

Audiological evaluation – Conventional pure tone audiometry was performed with a two-channel audiometer (GN Otometrics, Madsen Itera model, with TDH-39 headphones, with thresholds in dB HL). The equipment was calibrated according to ISO 8253 standards. Next, the speech recognition threshold (SRT) was tested as well as the speech recognition index (SRI). To characterize the degree of hearing loss, the referenced author's¹⁵ criteria were adopted.

Immittance testing – This procedure was performed to assess the integrity of the tympanic-ossicular system via tympanometry and acoustic reflex. The equipment used was a Madsen OTOflex 100 impedance meter. We applied the criteria of the referenced author¹⁶.

Vestibular Evaluation – Initially, the subject was tested for vertigo and position/ placement, spontaneous and gaze nystagmus. Next, for vector electronystagmography (VENG), a Berger model VN316 thermosensitive device was used, with three recording channels, also used were a Ferrante brand swivel chair, a Neurograff EV VEC model visual stimulator, and a Neurograff air othothermometer, model NGR 05. We made the following eye and labyrinth tests using VENG, according to criteria proposed by the referenced authors¹⁷.

Calibration of eye movements, research on spontaneous and gaze nystagmus, pendular tracking, research on optokinetic nystagmus, pre- and post-rotatory and pre- and post-caloric. The duration of caloric stimulation in each ear with air at 42°C and 18°C was 80 seconds for each temperature and the responses were recorded with eyes closed and then with eyes open to observe the inhibitory effect of eye fixation.

■ RESULTS

The case portrays a patient with genetic diagnosis of SCA6 and presented with unsteadiness of gait with tendency to fall to the left, dysarthria, and dysphonia.

Through an audiological assessment, the patient presented sloping audiometric configuration at a frequency of 4 kHz and a type A tympanometric curve, with the presence of bilaterally acoustic reflexes. SRT and SRI results were compatible with pure tone thresholds. The vestibular exam showed positional vertigo with the presence of downbeat and down and left oblique nystagmus, with central characteristics (no latency, paroxysm, fatigue, and dizziness); regular calibration of eye movements; spontaneous downbeat nystagmus with eyes open was present, oblique to the left and down with a slow component angular velocity (SCAV) of 4°/s, with eyes closed, oblique to the left and down with a SCAV of 8°/s; gaze nystagmus, multiple downbeat and horizontal to left with central features; abolition of optokinetic nystagmus; pre-rotational nystagmus – symmetrical stimulation of the lateral semicircular ducts with nystagmus frequency (counter-clockwise (CC) = 9 and clockwise (C) = 8) with directional preponderance of nystagmus (DP) of 6% to left. Symmetrical stimulation of the posterior semicircular canals with nystagmus frequency (CC=9 and C=9) with DP of 0%. Symmetrical stimulation of posterior semicircular canals, with nystagmus frequency (CC= 9 and C=9) with DP of 0%, and post-caloric nystagmus with air at 42°C in the right ear (RE) with SCAV of 0°/s (no response), 42°C in the left ear (LE) with SCAV of 18°/s, 18°C in RE

with SCAV of 6°/s and 18°C in LE with SCAV 24°/s. The patient reported no dizziness and showed the presence of the inhibitory effect of eye fixation in the four stimulations.

Findings on examination: presence of nystagmus with central characteristics in testing of positional vertigo, and of spontaneous nystagmus with eyes open, multiple types of gaze nystagmus, the abolition of optokinetic nystagmus, and caloric hyporeflexia. The conclusion of the examination was suggestive of a right-deficit central vestibular dysfunction.

■ DISCUSSION

Gait imbalance, nystagmus, decreased muscle tone, dysarthria, vertigo, dysphagia, and dysphonia, and are frequently described symptoms in several studies^{2,5,18}. We observed similar symptoms in our case. Authors¹⁹ reported that the combination of vestibular dysfunction with the presence of cerebellar atrophy may contribute significantly in the onset of instability, which is the initial symptom of SCAs. The authors²⁰ evaluated 140 patients and reported oscillopsia as the second most prevalent symptom.

With respect to the basic audiological evaluation, the results could not be discussed due to lack of researched literature on the subject. Studies²¹ reported that in most neurodegenerative diseases the most common auditory dysfunctions are observed in the examination of brainstem auditory evoked potential (BAEP) and occur in regions of the inferior colliculus, lateral lemniscus, and the cochlear nuclei.

The study of positional vertigo showed the prevalence of downbeat and oblique nystagmus to the left and down with central features, i.e., no latency, paroxysm, fatigue, or dizziness. Authors¹⁸ evaluated 21 patients with SCA6 and observed, through the use of Frenzel goggles, positional nystagmus in the supine position and head down with the same characteristics in 14 patients, and for the headshaking test in 20 patients. This test is characterized by visualization of nystagmus after rapid and repetitive head rotation. Only one case had benign paroxysmal positional vertigo (BPPV). Authors¹⁸ reported that the downbeat and horizontal nystagmus were the most evident types for this type of SCA. Authors²⁰ observed that downbeat nystagmus occurred in a larger number of positional vertigo patients but did not refer to a percentage and that SCA6 is a predominantly cerebellar dysfunction. Another study²² conducted on 83 ataxic patients (25 with SCA6 and 58 with other types of ataxia) revealed that 84% of patients with SCA6 in the positional vertigo study presented with downbeat

nystagmus while in other types of ataxia only 5.2% of subjects presented this trait, which shows that this type of nystagmus is an extremely important clinical symptom and demonstrates that the vestibular cerebellum is most affected in this type of SCA. Authors²³ reported a very rare case which presented with periodic alternating nystagmus with oblique eye deviation and mentioned that its periodic rhythmic ocular oscillation has been associated in various cerebellar disorders and attributed to instability in the vestibulo-ocular reflex.

It is known that lesions of the cerebellar vermis cause ataxia of the upper limbs, head titubation, dysmetria, and eye movement tremors, and it is the eye that expresses the extent of electrical activity in the eye and neck muscles. Some evidence suggests that lesions in the cerebellar vermis cause vertical dysmetria, while more lateral or horizontal paravermian dysmetria causes injuries. Moreover, the more anterior the dysmetria lesion, the more intense the dysmetria in the upper eye, while the more posterior the lesions, the more intense in the lower eye²⁴.

In the vestibular examination the presence of spontaneous nystagmus with eyes open and closed, multiple gaze nystagmus, abolition of optokinetic nystagmus, and caloric hyporeflexia were also observed. Among the tasks of the cerebellum is control of eye movements and any abnormalities can cause oculomotor changes, such as nystagmus. In this case, the central vestibular findings indicate alterations arising from degeneration of the cerebellum and its afferent and efferent pathways. Studies¹³ reference the loss of hair cells in the cristae ampullaris and of the utricular and saccular maculae, the decline in the number of nerve cells in Scarpa's ganglion, the degeneration of otoliths, reduced labyrinthine blood flow, and the progressive depression of neural stability. A reduction in the ability to compensate for vestibulo-ocular and vestibule-spinal reflexes contributes to the reduced velocity of tracking movement and rotational and caloric hyporeactivity for both the peripheral and central vestibular system, a characteristic present in SCAs.

In the literature regarding otoneurological elements, few current studies were found, but those used in the present study reported significant alterations in the tests that make up the inner ear examination.

■ FINAL CONSIDERATIONS

There are auditive alterations, especially labyrinthine, that indicate disease of the central vestibular system and showing the importance of this type of

evaluation. The existence of a possible relationship between the findings and vestibular symptoms presented by the patient pointed out the relevance of the labyrinthine examination, since the presence of downbeat nystagmus was shown to be frequent in this type of ataxia.

Therefore, the importance of the presence of the speech-language pathologist in the diagnosis and for directing of interventions for patients with SCA is clear, from the moment that neurotological symptoms are observed in this disease.

RESUMO

O objetivo deste estudo foi verificar as alterações vestibulococleares observadas em um caso de ataxia espinocerebelar tipo 6. O caso foi encaminhado do Hospital de Clínicas para o Laboratório de Otoneurologia de uma Instituição de Ensino e foi submetido aos seguintes procedimentos: anamnese, inspeção otológica, avaliações audiológica e vestibular. O caso retrata uma paciente com diagnóstico genético de ataxia espinocerebelar tipo 6, do sexo feminino, com 57 anos de idade, que referiu desequilíbrio à marcha com tendência a queda para a esquerda, disartria e disфония. Na avaliação audiológica apresentou configuração audiométrica descendente a partir da frequência de 4kHz e curva timpanométrica do tipo "A" com presença dos reflexos estapedianos bilateralmente. No exame vestibular observou-se na pesquisa da vertigem posicional presença de nistagmo vertical inferior e oblíquo, espontâneo e semiespontâneo múltiplo com características centrais (ausência de latência, paroxismo, fatigabilidade e vertigem), nistagmo optocinético abolido e hiporreflexia à prova calórica. Constataram-se alterações labirínticas que indicaram afecção do sistema vestibular central evidenciando-se a importância dessa avaliação. A existência da possível relação entre os achados com os sintomas vestibulares apresentados pela paciente apontou a relevância do exame labiríntico neste tipo de ataxia uma vez que a presença do nistagmo vertical inferior demonstrou ser frequente neste tipo de patologia.

DESCRITORES: Degeneração Espinocerebelar; Ataxia; Testes de Função Vestibular; Electronistagmografia; Nistagmo Optocinético

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