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CASE REPORTS

Horizontal Gaze Palsy with Progressive Scoliosis: A Case Report and Literature Review

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ABSTRACT

Horizontal gaze palsy with progressive scoliosis (HGPPS) is a rare autosomal recessive disorder. The ROBO 3 gene mutation is responsible for the disease. We present a boy aged 12 years who was admitted for scoliosis surgery who had also had horizontal gaze palsy since birth. His brainstem abnormalities were compatible with the syndrome of HGPPS. HGPPS is one of the rare congenital diseases of childhood. Horizontal gaze palsy, ametropia, and progressive scoliosis are the main findings of the disease. This syndrome should be kept in mind for both ophthalmologists and orthopaedic surgeons in patients who present with gaze palsy and scoliosis. Early diagnosis of scoliosis makes it possible to treat the disease at an early stage, and early diagnosis of ametropia is important in the prevention of amblyopia.

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Horizontal gaze palsy with progressive scoliosis (HGPPS) is a rare autosomal recessive congenital disorder characterized by the absence of horizontal gaze movements and progressive scoliosis.[1] The disorder is associated with mutations in the ROBO3 gene located at chromosome 11q23-25.[1–3] Scoliosis occurs in adolescence, whereas vertical gaze limitation is present from birth. The syndrome also includes typical neurologic disorders such as a distinctive brain stem malformation and defective crossing of certain brain stem neuronal pathways.[4] Magnetic resonance imaging (MRI) findings include pontine hypoplasia, absent facial colliculi, butterfly configuration of the medulla, and a deep midline pontine cleft. Diffusion tensor imaging (DTI) maps show the absence of decussating ponto-cerebellar fibres and superior cerebellar peduncles.[5]

Case presentation

A boy aged 12 years with a history of horizontal gaze palsy since birth was admitted to our orthopaedics clinic for scoliosis surgery. An ophthalmologic examination revealed normal visual acuity, biomicroscopic and funduscopic findings. Physical examination revealed a thoracolumbar scoliosis with 67 degree Cobbs angle (Figure 1a). Eye movements were absent in conjugate horizontal movements but preserved in vertical gaze and convergence bilaterally (Figure 1b-f). Pupils were isocoric and reactive. It was learned that the mother and father were first-degree relatives. He was the third child of the healthy parents who were cousins, and the other children were healthy. Neuroradiologic imaging revealed a midline pontine cleft, butterfly-shaped bulbomedullary junction, and tent-shaped fourth ventricle.

Discussion

HGPPS is a rare autosomal recessive disease that was first reported in 1975 by Sharpe and colleagues, and the ROBO3 gene mutation was described as responsible for HGPPS in 2004.[6,7] The typical radiologic and physical examination findings of our patient who presented with thoracolumbar scoliosis and horizontal gaze palsy were strongly suggestive of HGPSS even though we were not able to perform genetic testing.[6] His neuroradiologic findings were very typical for HGPSS; pons hypoplasia, characteristic anterior

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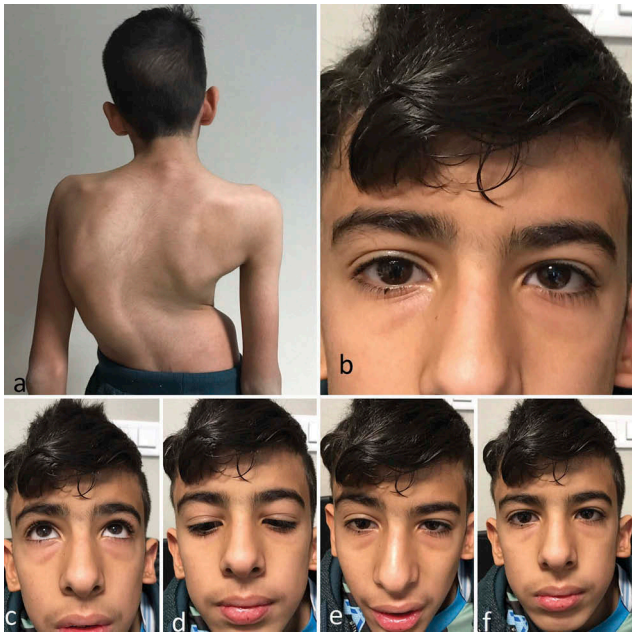

Figure 1. a. The patient has thoracolumbar scoliosis with 67 degree Cobbs angle. Eyes were orthophoric in primary position (b), vertical gaze movements were preserved (c,d), no movement in horizontal gaze position (e,f).

flattening, and a midline cleft referred to as a butterfly configuration on axial imaging.[8]

The ROBO3 gene plays a role in the regulation of hindbrain axonal midline crossing and helps cell migration. Mutations of ROBO3 result in abnormal horizontal eye movement, progressive scoliosis, brainstem malformation, and defective crossing of brainstem neuronal pathways.[6,9] Horizontal gaze palsy is a major ophthalmologic finding. Nystagmus and ametropia are other important ophthalmologic findings for these patients, which can lead to amblyopia and permanent poor vision.[10–13] Horizontal gaze palsy in these patients is probably related to aberrant supranuclear input onto the abducens motoneurons from the pontine reticular formation that cannot cross the midline, and inability of the developing axons in the medial longitudinal fasciculus to cross the midline. The mechanism of the scoliosis aspect is less clear, but it may result from a lack of normal contralateral pathways to spinal muscles.[14–16]

A total of about 20 patients were HGPPS were reported in a 10-year literature review. The ethnic origin of these patients were Saudi Arabian, Turkish, Moroccan, Iranian, Irish-German, Irish-English, Kosovan (East European), Qatari, Iraqi, and Tunisian. Consanguineous marriage was remarkable between the parents of these patients.[5,6,10–12,14,17] In the Khan et al. trial, the authors reported that a patient followed up with infantile esotropia and cross fixation had been diagnosed as having HGPSS upon further examination.[14] In the same way, in the four-patient series of Volk, one patient was previously diagnosed as having Duane syndrome and underwent surgery accordingly, but was later diagnosed as having HGPSS.[18] This diagnosis must be kept in mind in patients in whom horizontal gaze limitation is one of the clinical findings.

Early diagnosis of HGPSS is very important for the prevention of permanent vision loss and ophthalmologic problems at early ages and directing the patient's genetic counselling. Also, because scoliosis is progressive, it is important to take preventive measures in this regard in terms of directing the patient to surgery at the best time.

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