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Improvement of divergence insufficiency with treatment of thyroid disease: A case report

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Abstract

This is a case that showed improvement of divergence insufficiency after treatment of thyroid disease. A 50-year-old man developed horizontal diplopia a few days prior to presentation while driving a car. On ophthalmologic examination, prism and alternate cover test revealed an esotropia of 8 prism diopters (PD) at distance and exophoria of 2 PD at near in the primary position. He did not show limitation on ductions, or any signs of conjunctival injection, ptosis, eyelid edema, lid lag and proptosis. Orbit and brain magnetic resonance (MR) imaging and MR angiography revealed no abnormal findings in the extraocular muscles and brain. Serum free T4 level was normal and thyroid stimulating hormone (TSH) level was slightly low, while increased levels of thyrotropin-binding inhibitory immunoglobulin (TBII) and antithyroid microsomal antibody were detected. He was managed with glasses of 4 PD base-out prisms in both eyes. Two months later, serum free T4 was elevated and TSH was markedly reduced. TBII was highly elevated and thyroid stimulating immunoglobulin was positive. After 3 weeks of antithyroid treatment with methimazole, his diplopia improved, and prism and alternate cover test showing orthotropia at distance and exophoria of 10 PD at near in the primary position. This case highlights the importance of thyroid function tests and TSH receptor antibodies in patients with acute onset of divergence insufficiency. Divergence insufficiency could be improved with antithyroid treatment.

Keywords: Divergence insufficiency, thyroid disease

INTRODUCTION

Divergence insufficiency or age-related distance esotropia is an acquired comitant esotropia greater at distance than at near without any limitation of ductions.[1] Duane[2] originally categorized divergence insufficiency in 1896 as a part of horizontal strabismus. Recently a term of age-related distance esotropia was introduced to substitute divergence insufficiency in the elderly.[3,4] In elderly patients, progressive loss of fusional divergence amplitudes with aging[5] or degenerated lateral rectus-superior rectus band[6] has been proposed as the mechanism. We found a 50-year-old man who showed improvement of divergence insufficiency after treatment of thyroid disease. The association of divergence insufficiency and thyroid disease has not been reported.

CASE REPORT

A 50-year-old man developed horizontal diplopia a few days prior to presentation while driving a car. On ophthalmologic examination, his visual acuities were 20/15 OU. He showed esotropia of 8 prism diopters (PD) at distance and exophoria of 2 PD at near in the primary position. He did not show any limitation on ductions (Figure 1). Margin reflex distance was +5 mm OD and +4 mm OS. There were no signs of conjunctival injection, ptosis, eyelid edema, lid lag or proptosis. Pupillary examination, slit lamp examination and fundus examination were normal.

Orbit and brain magnetic resonance (MR) imaging and MR angiography revealed no abnormal findings in the extraocular muscles and brain. Serum T3, free T4 and acetylcholine receptor antibody levels were normal. However, thyroid stimulating hormone (TSH) level was reduced to 0.27 (normal range, 0.3~4.0 uIU/ml), and thyrotropin-binding inhibitory immunoglobulin (TBII) was mildly elevated to 1.75 (normal range, 0~1.0 IU/L) together with antithyroid microsomal antibody to 126 (normal range, <60 U/ml). He complained of fatigue, but denied any symptoms such as palpitation or weight changes. He was managed with glasses of 4 PD base-out prisms OU.

Two months later, serum free T4 was elevated

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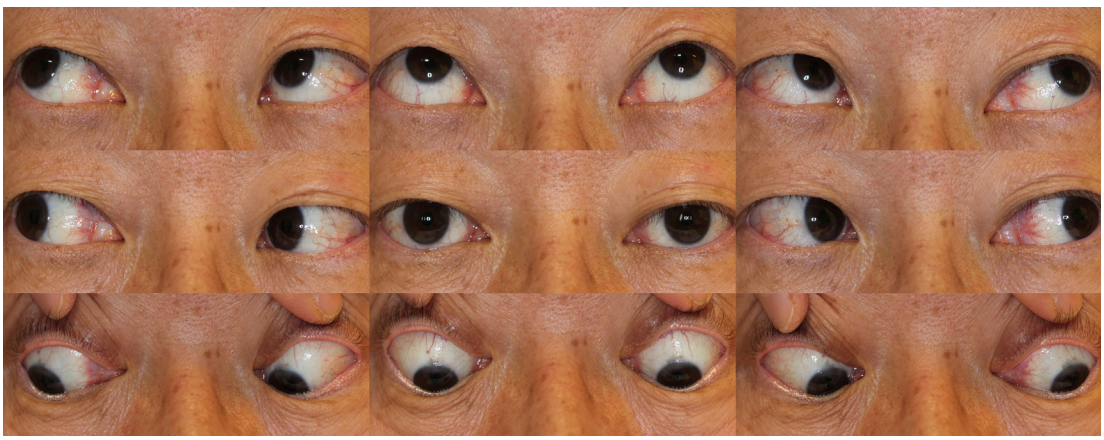

Figure 1. Ocular versions showed no limitation of eye movements in both eyes.

to 7.77 (normal range, 0.89~1.79 ng/dl) and TSH was markedly reduced to less than 0.01 uIU/ml. TBII levels was highly elevated to 29.64 (normal range, 0~1.0 IU/L) and thyroid stimulating immunoglobulin (TSI) was positive. After 3 weeks of antithyroid treatment with methimazole, his diplopia improved and prism and alternate cover test showed orthotropia at distance and exophoria of 10 PD at near in the primary position.

DISCUSSION

There has been no report of divergence insufficiency associated with thyroid disease as well as improvement of divergence insufficiency with antithyroid medication.

Divergence insufficiency is generally a benign condition and the majority of cases are not associated with underlying neurologic of systemic abnormalities.[1] Systemic disorders associated with divergence insufficiency include pseudotumor cerebri, temporal arteritis, and progressive supranuclear palsy.[1] Our patient had none of these diseases. Jacobson[1] suggested a microvascular ischemic insult to the divergence center of the brain. Chaudhuri and Demer[6] reported that symmetric inferior displacement of lateral rectus pulleys was associated with divergence paralysis esotropia, and named them as 'sagging eye syndrome'. Guyton[7] proposed that divergence insufficiency develops secondary to permanent shortening, or increased tone, of the medial rectus muscles as a response to near work. However, our patient was only 50 years old and his orbit MR imaging showed no inferior displacement of the lateral rectus nor any abnormal findings in the orbit and brain. In addition, divergence insufficiency improved with antithyroid treatment. Therefore, our patient is not compatible with any of the mechanisms of divergence insufficiency suggested above.

Thyroid stimulating immunoglobulin (TSI) shows significant association with the clinical features of Grave's ophthalmopathy and may be regarded as a functional biomarker of disease severity.[8] Thyroid stimulating immunoglobulin (TSI) levels were significantly higher in patients with Grave's ophthalmopathy, and correlated with the clinical severity.[8] Elevated thyrotropin-binding inhibitory immunoglobulin (TBII) levels have been reported in patients with Grave's ophthalmopathy who showed marked fluctuations in their deviation angles of strabismus.[9,10] Regensburg *et al*.[11] also reported that extraocular muscle enlargement is associated with higher thyrotropin-binding inhibitory immunoglobulin (TBII) levels and impaired motility. Our patient initally showed mildly elevated thyrotropin-binding inhibitory immunoglobulin (TBII) and was converted to overt hyperthyroidism within 2 months after the onset of diplopia. However, our patient did not show the typical features of Grave's ophthalmopathy. The only positive sign of Grave's ophthalmopathy was subtle retraction of the eyelids. Extraocular muscles were normal in size and did not show any limitation on ductions. Therefore, the exact mechanism that caused divergence insufficiency is unknown.

In conclusion, thyroid function should be tested in patients with divergence insufficiency, and divergence insufficiency could be improved with antithyroid treatment.

DISCLOSURE

No financial disclosure

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