Symposium on Autonomic Nervous System Dysfunction and Medical Diseases¹⁾

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1. Abnormalities of Pupils

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Horner's sign.

Horner's sign is observed on the affected side of the sympathetic tract to the eye and face. It consists of miosis, narrowing of palpebral fissure and enophthalmos. Edematous mucosa of the paranasal cavity on magnetic resonance imaging (MRI) (Fig. 1) can be added to the list as one of the characteristic features of the sign. It may alternate from one side to the other, which is called "alternating Horner's sign" (1), often seen in Shy-Drager syndrome (Fig. 2). Even the pupils of normal subjects change in size following circadian rhythm; in addition, slight anisocoria changes from one side to the other. Alternating Horner's sign is caused by bilateral supranuclear lesions and the phenomenon is considered to be the augmented alternation of the pupils in normal subjects (2). Slight pathological phenomena are consistently found in normal subjects.

Pourfour du Petit syndrome

Stimulation of the sympathetic nerve develops Pourfour du Petit syndrome, which is rarely observed compared to Horner's sign. Progressive facial hemiatrophy (Parry-Romberg syndrome) is known to often be associated with Horner's sign. However, in the early stage of the disease, Pourfour du Petit syndrome is observed as seen in Fig. 3. This suggests that the disease is due to a hyperactive sympathetic nerve to the face,

which is known to reduce the subcutaneous adipose tissue. Horner's sign is the residual feature characteristic of the disease.

Dilated pupil

Dilated fixed pupil is one of the criteria of brain death, which is due to paralysis of a parasympathetic nerve of the brain-stem. However, non-dilated fixed pupil may be observed in the dead. Now the criteria includes only 'fixed pupils'.

Pupils in the aged

Pupil size becomes smaller following the aging process. Palpebral fissure also becomes narrower, as seen in Rembrandt's self portraits (Fig. 4). It is suggested that bilateral mild Horner's sign is present in the aged.

Swaying phenomenon of the autonomic nervous system

The human body is controlled by balanced mechanisms, including the autonomic nervous system. The balances are not static, but dynamic, because the dynamic balance is easier than the static, as seen in the rope-riders in the circus. Prigogine and Stengers stated that there is "order through fluctuations" (3) in nature. The same is true in the human body manifesting swaying phenomena, one of which is right to left alternation of the

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Figure 1. Mucosal edema in the right paranasal cavity in a case with homolateral Horner's sign.

Figure 2. Alternating Horner's sign is observed in the left eye (top) and in the right eye (bottom).

pupils (4).

Emotion

Pupil size is markedly influenced by emotional state. The pupil is a mirror of the mind. Emotion resists against scientific approaches, however, various phenomena observed in the pupil may offer possible clues to this study.

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Figure 3. Progressive hemifacial atrophy of the right side. Pourfour du Petit syndrome is observed on the homolateral side.

Figure 4. Rembrandt's self portraits at ages 24(A), 49(B), 54(C) and 63(D) years.

A	B
C	D