Abducens Nerve Palsy and Postganglionic Horner Syndrome with or without Severe Headache

Hiromasa Tsuda¹, Hiroshi Ishikawa², Mutsumi Kishiro¹, Noriko Koga² and Yoji Kashima²

Abstract

Objective To report the clinical features of 9 patients with both abducens nerve palsy and postganglionic Horner syndrome.

Patients and Methods Nine patients with this symptom combination were examined by our Neuro-ophthalmology Clinic in Nihon University Itabashi Hospital between 1978 and 2004. Patient ages ranged from 28 to 63 years (average 47.2±8.7 years). Six patients were males and 3 were females. Primary diseases, accompanying symptoms and prognoses were surveyed.

Results In primary diseases, neoplasm in the cavernous sinus was observed in 2 patients, sphenoidal sinus cyst in 2, intra-cavernous carotid aneurysm in 2, epipharynx carcinoma in 1, chordoma in the base of the skull in 1, and meningioma in the middle cranial fossa in 1. Five patients with extra-cavernous sinus lesions; sphenoidal sinus cyst, epipharynx carcinoma, chordoma and meningioma, complained of severe headache. However, in patients without severe headache, intra-cavernous sinus lesions such as carotid aneurysm and metastatic carcinoma were detected. After therapy, abducens nerve palsy improved in 5 patients, however, Horner syndrome persisted in all patients.

Conclusion We emphasize that this symptom combination is an important sign of lesions in the posterior portion of the cavernous sinus or in its vicinity. Moreover, the presence or absence of severe headache depends on whether the lesion is in the intra-cavernous or extra-cavernous sinus.

Key words: aneurysm, cavernous sinus, neoplasm, severe headache, sphenoidal sinus cyst

(DOI: 10.2169/internalmedicine.45.1598)

Introduction

Isolated or combined impairments of the oculomotor nerve, the trochlear nerve, the abducens nerve and the trigeminal nerve, especially the ophthalmic and the maxillary nerves, are observed in cavernous sinus lesions. Furthermore, postganglionic sympathetic nerve fibers enter the cavernous sinus with the internal carotid artery and join the abducens nerve for a short distance in the posterior portion of the cavernous sinus. Then, the fibers join the ophthalmic branch of the trigeminal nerve (1-3) (Fig. 1). Based on these anatomical findings, Parkinson (1) predicted that lesions within the cavernous sinus could induce abducens nerve palsy and ipsilateral Horner syndrome simultaneously. Moreover, in addition to lesions within the cavernous sinus, lesions in its vicinity may also induce this combined symptom. To date, only 19 patients with this combined symptom have been reported in the English literature (4-19). Here, we describe the clinical features of 9 patients with this symptom combination.

Patients and Methods

We reviewed 9 patients with combined symptoms of abducens nerve palsy and ipsilateral postganglionic Horner syndrome treated at Nihon University Itabashi Hospital between 1978 and 2004. Patient ages ranged from 28 to 63 years (average 47.2±8.7 years). Six patients were males and 3 were females. One case was previously reported (19). All

¹ Division of Neurology, Department of Medicine, Nihon University, School of Medicine, Tokyo and ² Department of Ophthalmology, Nihon University, School of Medicine, Tokyo

Received for publication October 11, 2005; Accepted for publication May 23, 2006

Correspondence to Hiromasa Tsuda, Department of Internal Medicine, National Health Insurance Minamitama Hospital, 3-10-1 Sandamachi, Hachioji, Tokyo 173-0832
Figure 1. A: Anatomy of the posterior portion of right cavernous sinus. This figure was previously reported in reference 19. B: Magnification of A. C: A schema of right cavernous sinus and its vicinity. (II: the optic nerve, III: the oculomotor nerve, IV: the trochlear nerve, V₁: the ophthalmic nerve, V₂: the maxillary nerve, V₃: the mandibular nerve, VI: the abducens nerve, SN: the sympathetic nerve fibers, ICA: the internal carotid artery.) Ocular sympathetic nerve fibers leave the internal carotid artery, and then join the abducens nerve for a short distance in the posterior portion of the cavernous sinus. The cavernous sinus extends from the orbital apex to the posterior wall, and has a length of about 20 mm. The cavernous sinus is divided into 3 portions separated by the location of the extra-cranial orifice of the optic canal and the entry of the maxillary nerve into the sinus based on the Ishikawa classification. The anterior portion runs from the orbital apex to 3.5 mm posterior, that is to the extra-cranial orifice of the optic canal. The middle portion is from 3.5 mm behind the orbital apex to 10 mm posterior, that is at the point of entry of the maxillary nerve into the cavernous sinus. The posterior portion is from 10 mm behind the orbital apex to the posterior wall of the sinus. Fig. 1A is indicated in the dotted rectangle.

Patients first came to our Neuro-ophthalmology Clinic. Restriction of abduction was detected by the red glass test and Hess-Lancaster test. Postganglionic Horner syndrome was diagnosed based on slight miosis, mild ptosis and a lack of pupillary dilation after topical 5% tyramine.

Regarding primary diseases, 4 patients were treated in the Department of Otorhinolaryngology, 4 in the Department of Neurological Surgery, and 1 in the Department of Respiratory Medicine. Primary diseases, prognoses and accompanying symptoms such as ophthalmic and/or maxillary nerve involvement, headache and facial hypohidrosis were surveyed.

### Results

The combined symptoms of abducens nerve palsy and ipsilateral postganglionic Horner syndrome appeared on the right side in 6 patients and on the left side in 3. Regarding primary diseases, intra-cavernous carcinoma was observed in 2 patients [metastasis from parotid carcinoma (Fig. 2A) and metastasis from small cell type lung carcinoma]. Extra-cavernous sinus neoplasm was detected in 3 patients [epipharynx carcinoma, chordoma in the middle and posterior cranial fossa and meningioma in the middle cranial fossa (Fig. 2B)]. Sphenoidal sinus cyst was seen in 2 patients (Fig. 2C). Intra-cavernous carotid aneurysm was observed in 2 patients (Fig. 2D).

Impairment of both the ophthalmic and the maxillary nerves was observed in 2 patients. Five patients with extra-cavernous sinus lesions; sphenoidal sinus cyst, epipharynx carcinoma, chordoma and meningioma, complained of intolerably severe persistent headache on the same side of the lesions. The other 4 patients with intra-cavernous sinus lesions; intra-cavernous carotid aneurysm and metastatic carcinoma did not have severe headache. On the other hand, facial hypohidrosis was not detected in any patients.

Two patients with intra-cavernous sinus carcinoma underwent systemic chemotherapy and radiation therapy. Three patients with extra-cavernous sinus neoplasm underwent exenteration. Cystectomy and antibiotic drug therapy were performed in 2 patients with sphenoidal sinus cyst. Surgical
therapy was performed in 2 patients with intra-cavernous carotid aneurysm. Only 1 patient with metastasis of small cell type lung carcinoma died despite therapy. Autopsy was not permitted. Abducens nerve palsy improved in 5 of 9 patients in this series, however, Horner syndrome persisted in all patients (Table 1).

Discussion

The cavernous sinus extends from the orbital apex to the posterior wall of the sinus, and has a length of about 20 mm. Based on the Ishikawa classification, the cavernous sinus is divided into 3 portions separated by the location of the intra-cranial orifice of the optic canal (3.5 mm posterior from the orbital apex) and the entry of the maxillary nerve into this sinus (10 mm posterior from the orbital apex). Therefore, the posterior portion of the cavernous sinus is located from 10 mm behind the orbital apex to the posterior wall (Fig. 1C) (3). In addition, postganglionic sympathetic nerve fibers join the abducens nerve for a short distance in the posterior portion (1-3). Therefore, the combined symptoms of abducens nerve palsy and ipsilateral postganglionic Horner syndrome may indicate that the lesion located within the posterior portion of the cavernous sinus or in its vicinity (3-19). Conversely, pontine tegmental lesions may also cause this symptom combination, however, the facial nerves are likely to be involved.

In this series, 2 patients had involvement of both the ophthalmic and the maxillary nerves. Slamovits et al (10) described a patient with adenocarcinoma within the cavernous sinus demonstrating not only this combined symptom but also impairment of both trigeminal branches. Fujisawa et al (11), and Myles and Maxner (18) also reported patients showing maxillary nerve involvement in addition to this symptom combination. On the other hand, the ophthalmic and the maxillary nerves run within the lateral wall in the posterior portion of the cavernous sinus. However, at the 10 mm behind the orbital apex to the posterior wall, the maxillary nerve departs from the cavernous sinus (3). Therefore, the presence of maxillary nerve involvement also indicates that the lesion is located within the posterior portion of the cavernous sinus or in its vicinity.

In our series, 5 patients with extra-cavernous sinus lesions complained of persistent and intolerably severe headache i-
The severe headache disappeared in all patients. Three of them had extra-cavernous sinus neoplasm. Stripf and Burde (4) described a patient with this combined symptom induced by pituitary adenoma, who complained of severe headache. In our series, 2 patients with sphenoidal sinus cyst also complained of severe headache. There are no reported cases of this combined symptom secondary to paranasal sinus cyst. On the other hand, our 2 patients with intra-cavernous metastatic carcinoma did not complain of severe headache. In the previous reports, patients with extra-cavernous lesions, severe headache might be induced by direct invasion to the periosteum of the base of the skull.

In conclusion, we considered that, in patients with extra-cavernous lesions, severe headache might be induced by direct invasion to the periosteum of the base of the skull.

References

16. Ozveren MF, Uchida K, Erol FS, Tiftikci MT, Cobanoglu B, Kawase T. Isolated abducens nerve paresis associated with incoc-

**Table 1. Present Patients with Co-existence of Abducens Nerve Palsy and Ipsilateral Postganglionic Horner Syndrome.**

<table>
<thead>
<tr>
<th>Number of Patient</th>
<th>Age/sex</th>
<th>Primary Disease</th>
<th>Side</th>
<th>Restriction</th>
<th>Ptosis</th>
<th>Headache</th>
<th>Improvement after Therapy for the Primary Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41/M</td>
<td>Epipharynx Carcinoma</td>
<td>R</td>
<td>Complete</td>
<td>+</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>48/M</td>
<td>Chordoma in the middle and posterior cranial fossa</td>
<td>R</td>
<td>Complete</td>
<td>+</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>63/F</td>
<td>Membrana in the middle cranial fossa</td>
<td>R</td>
<td>Moderate</td>
<td>+</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>28/M</td>
<td>Sphenoidal sinus cyst</td>
<td>R</td>
<td>Moderate</td>
<td>+</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>37/M</td>
<td>Sphenoidal sinus cyst</td>
<td>R</td>
<td>Moderate</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6*</td>
<td>43/M</td>
<td>Metastasis of parotid carcinoma to CS</td>
<td>R</td>
<td>Moderate</td>
<td>+</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7</td>
<td>56/M</td>
<td>Metastasis of lung carcinoma to CS</td>
<td>L</td>
<td>Complete</td>
<td>+</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>8</td>
<td>53/F</td>
<td>Intracavernous carotid aneurysm</td>
<td>L</td>
<td>Moderate</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>9</td>
<td>56/F</td>
<td>Intracavernous carotid aneurysm</td>
<td>L</td>
<td>Moderate</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>


DOI: 10.2169/internalmedicine.45.1598


© 2006 The Japanese Society of Internal Medicine
http://www.naika.or.jp/imindex.html