Abducens Nerve Neurinoma
—Case Report—

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Abstract
A 61-year-old female presented with an abducens nerve neurinoma manifesting as diplopia and facial numbness. The tumor was totally removed, and the exact origin was confirmed intraoperatively. Neuroradiological imaging and clinical history are frequently insufficient to obtain an accurate preoperative diagnosis of intracranial neurinoma.

Key words: abducens nerve, neurinoma

Introduction
Intracranial neurinomas account for about 8% of all primary brain tumors,1,2 and most commonly involve the acoustic or trigeminal nerves. Neurinomas of the abducens nerve are extremely rare, with only eight previous cases.1,2,5,6,9,10,14 We report a case of neurinoma originating from the abducens nerve.

Case Report
A 61-year-old female had been healthy until October 1994, when she developed diplopia followed by left facial numbness. The diagnosis of left abducens nerve palsy was made at an ophthalmic hospital. She was admitted to our department in February 1995.

Neurological examination revealed left abducens nerve palsy, hypesthesia over the second division of the left trigeminal nerve, and decreased left corneal reflex, but no other neurological abnormalities. There were no cutaneous manifestations of von Recklinghausen’s disease.

Computed tomography revealed a low-density mass in the left cerebellopontine (CP) angle with ring-like enhancement, and mild ventricular dilatation, but no enlargement of the left internal auditory meatus. Magnetic resonance (MR) imaging revealed an extra-axial, cystic mass with marked displacement of the brainstem (Fig. 1). Vertebral angiography showed mild elevation of the left superior cerebellar artery. The preoperative diagnosis was trigeminal nerve neurinoma.

She underwent a left lateral suboccipital craniotomy on February 28, 1995. The trigeminal, facial, and acoustic nerves were compressed by a yellowish, encapsulated tumor. The tumor arose from the middle part of the abducens nerve (Fig. 2). Normal abducens nerve was recognized at the entrance to Dorello’s canal distally and at the origin proximally. The abducens nerve was resected, and the tumor was removed completely. Histological examination revealed neurinoma (Fig. 3).

Postoperatively, she developed left facial paresis, left-sided hearing disturbance, and dysphagia. Symptoms except for abducens nerve paresis and hearing disturbance improved within 2 months.

Discussion
Only nine cases of neurinomas arising from the abducens nerve, including our case, have been reported (Table 1).1,2,5,6,9,10,14 The patients, aged from 10 to 62 years (mean 45.9 years), were four males and five females. No association with neurofibromatosis was identified. Abducens nerve palsy and diplopia were the presenting symptoms in seven patients and were observed in all patients. Trigeminal nerve disturbance was present in four patients. The mean dura-
tion of symptoms was 13 months (range 2 months to 3 years).

Abducens nerve neurinoma has been classified into two types on the basis of location: Type I neurinomas arise from and occupy the cavernous sinus and parasellar region; type II arise from the prepon-tine area and CP angle. Therefore, the primary symptoms of type I are abducens nerve palsy and diplopia, whereas the symptoms of type II are more likely to be severe, such as obstructive hydrocephalus and raised intracranial pressure. Moreover, type II neurinomas are usually larger than type I. Five of the nine cases were type I, and four were type II. Our case was type II.

MR imaging was performed in six patients, in none of whom abducens nerve neurinoma was diagnosed preoperatively. Differentiation among neurinomas arising from the oculomotor, trochlear, trigeminal, and abducens nerves is very difficult, even with MR imaging, as these are no specific characteristics. The most frequent first symptom is a deficit of the nerve hosting the tumor. However, some trigeminal nerve neurinomas present initially with abducens nerve palsy rather than trigeminal sensory impairment.

In our case, the origin of the tumor could be ascertained intraoperatively, but this was not always possible. The origin was not identified intraoperatively in four of the nine cases. The selective postoperative deficit of the harboring nerve was an important clue to identify the source in the other cases.

The surgical approach depends on the anatomical location of the tumor. The frontotemporal approach was used for type I neurinomas involving the
cavernous sinus and parasellar region. Either the lateral suboccipital or subtemporal approach was used for type II neurinomas involving the prepon
tine area and CP angle. The lateral suboccipital ap
proach was used in our patient, because the tumor
was situated exclusively in the posterior fossa.
However, the tumor extended rostrally beyond the
seventh and eighth cranial nerve complex and com
pressed it, which made this approach difficult and
caused postoperative facial and hearing distur
bances. Therefore, the subtemporal approach might
have been recommended in our patient.

The extent of resection was also dependent on the
tumor location. The tumor was removed completely
in two of the five patients with type I neurinomas,
and in three of the four patients with type II. The
tumor is difficult to totally remove when the caver
nous sinus is involved.

Almost all patients had persistent abducens nerve
palsy postoperatively, because the nerve was usually
disturbed or sacrificed. In our patient, the nerve was
unavoidably sacrificed because of serious involve
ment by the tumor. Strabismus surgery, such as
transposition of the vertical rectus muscle, is effec
tive for abducens nerve palsy. Alternatively, the in
tracranial nerve can be repaired using an interposed
nerve graft, such as the sural nerve. Since the ab
ducens nerve is a pure motor nerve, this technique
may be advisable in expectation of functional recov
ery.

Table 1 Patients with abducens nerve neurinoma

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Author (Year)</th>
<th>Age/ Sex</th>
<th>Clinical presentation</th>
<th>Tumor size (cm)</th>
<th>Tumor type*</th>
<th>Surgical approach</th>
<th>Extent of resection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bing-Huan (1981)</td>
<td>46/F</td>
<td>abducens nerve palsy, hydrocephalus</td>
<td>7</td>
<td>II</td>
<td>suboccipital</td>
<td>total</td>
</tr>
<tr>
<td>2</td>
<td>Leunda et al. (1982)</td>
<td>10/M</td>
<td>abducens nerve palsy, hydrocephalus,</td>
<td>5</td>
<td>II</td>
<td>subtemporal</td>
<td>total</td>
</tr>
<tr>
<td>3</td>
<td>Hansman et al. (1986)</td>
<td>58/M</td>
<td>abducens nerve palsy</td>
<td>2.5</td>
<td>I</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>4</td>
<td>Ginsberg et al. (1988)</td>
<td>47/F</td>
<td>abducens nerve palsy, hydrocephalus,</td>
<td>5.5</td>
<td>II</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>5</td>
<td>Tung et al.</td>
<td>35/M</td>
<td>abducens nerve palsy</td>
<td>2.0</td>
<td>I</td>
<td>frontotemporal</td>
<td>total</td>
</tr>
<tr>
<td>6</td>
<td>Barat et al. (1992)</td>
<td>45/F</td>
<td>abducens nerve palsy</td>
<td>3.2</td>
<td>I</td>
<td>frontotemporal</td>
<td>subtotal</td>
</tr>
<tr>
<td>7</td>
<td>Barat et al. (1992)</td>
<td>49/F</td>
<td>oculomotor and abducens nerve palsy,</td>
<td>?</td>
<td>I</td>
<td>frontotemporal</td>
<td>?</td>
</tr>
<tr>
<td>8</td>
<td>Lanotte et al. (1992)</td>
<td>62/M</td>
<td>oculomotor and abducens nerve palsy,</td>
<td>2</td>
<td>I</td>
<td>frontotemporal</td>
<td>total</td>
</tr>
<tr>
<td>9</td>
<td>Present case</td>
<td>61/F</td>
<td>abducens nerve palsy, hydrocephalus,</td>
<td>3.5</td>
<td>II</td>
<td>suboccipital</td>
<td>total</td>
</tr>
</tbody>
</table>

*According to Tung et al., I: tumor predominantly involving the cavernous sinus and parasellar region, II: tumor predominantly involving the preptontine area and cerebellopontine angle.

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