LATERAL ORBITAL APPROACH TO INTRAORBITAL LESIONS

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SUMMARY
In this study, we present operative results of lateral orbital approach of eight patients with intraorbital tumors such as cavernous hemangioma, schwannoma, epidermoid and other tumors. Lesions were removed completely in all patients with this route. Operative complications were seen in three patients including transient impairment of eye movements in two patients and visual impairment with atonic pupil in one patient. Lateral approach to the orbit is less invasive technique than transcranial approach and can be safely used for tumors that located in the inferior, superior, and especially lateral compartment of the orbit.

Key Words: Lateral, Orbit, Surgery, Tumor.

ÖZET
Intraorbit Lezyonlara Lateral Orbital Yaklaşım
Bu çalışmada, kavernoz hemanjiom, schwannoma, epidermoid tümör gibi intraorbit tabii tümörü olan, lateral yaklaşım ile tedavi edilmiş sekiz hastanın operasyon sonuçları sunulmuştur. Hastaların tümünde lezyonlar bu yolla total çıkarılmıştır. Üç hastada operasyon komplikasyonları görülmüştür; iki hastada göz hareketlerinde geçici kısıtlılık, bir hastada görme keskinliğinde azalma ve atonik pupil olmuştur. Orbita lateral yaklaşımı, transkranial yaklaşımı göre daha az invaziv bir tekniktir ve orbitanın superior, inferior ve özellikle lateral kompartmanında yerleşmiş tümörlerin çıkarılması için güvenli bir şekilde kullanılabilir.

Anahtar Kelimeler: Lateral, Orbita, Cerrahi, Tümör.

Orbital lesions may arise from the contents of the orbit, from surrounding structures, or from a metastatic source. Various surgical approaches have been used for exposure of these lesions (1-4). By the development of modern neuroradiological techniques, it is possible to determine the exact location and extend of the intraorbital lesion, and its relationship with blood vessels, nerves and muscles in this region (5). Beside of these neuroradiologic advances, surgical approaches have also been modified and have become less invasive by the developments in microsurgical techniques.

The lateral approach to the orbit first proposed in 1889 by Krönlein (6) and modified by Berke in 1953 (7), and by Maroon and Kennerdell in 1976 (8). This approach has been selected for tumors that located in the lateral, superior or inferior compartment of the orbit (1, 8, 9). This approach has also been used for orbital decompression in patients with Graves’ ophthalmopathy (10).

In this study, we present our surgical experience in eight patients with intraorbital lesions that treated with lateral orbital approach.

Patients and Methods
Between 1997-2002, eight cases with intraorbital lesions were treated surgically with lateral orbital approach in our institution. There were 4 male (50%) and 4 female (50%), ranging in age from 4 to 63 years, with a mean of 27.1 years. Characteristics of patients are shown in Table 1. Plain X-ray films, computed tomography (CT) and/or magnetic resonance imaging (MRI)

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<table>
<thead>
<tr>
<th>Patient No/ Sex/Age (years)</th>
<th>Symptoms/ Duration (months)</th>
<th>Location of tumor (Compartment)</th>
<th>Type of tumor</th>
<th>Complication</th>
<th>Follow-up (months)</th>
<th>Prognosis</th>
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<td>1 / F / 35</td>
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<td>Cavernous Hemangioma</td>
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<td>Epidermoid cyst</td>
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</tr>
<tr>
<td>3 / M / 49</td>
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<td>Superior, lateral, inferior, posterior</td>
<td>Schwannoma</td>
<td>-</td>
<td>38</td>
<td>Good</td>
</tr>
<tr>
<td>4 / M / 41</td>
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<td>Lateral, superior</td>
<td>Schwannoma</td>
<td>-</td>
<td>41</td>
<td>Good</td>
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<td>Good</td>
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<td>Good</td>
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<td>Lateral</td>
<td>Ectopic lacrimal gland</td>
<td>-</td>
<td>14</td>
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</tr>
</tbody>
</table>

were used for diagnosis and surgical planing. Ultrasonography was also used in some cases, especially for differential diagnosis.

**Operative technique**

Under general anesthesia, S-shaped skin incision was used and curved up to the brow and then posteriorly along the upper margin of the zygomatic arch for approximately 35 to 40 mm from the lateral canthus to avoid to damage the frontal branches of the facial nerve (8). After skin incision, the fascia of the temporal muscle was incised along the skin incision, the temporal muscle was dissected subperiostally and retracted posteriorly to expose the lateral orbital bone. Midas Rex pneumatic tool (Midas Rex Inc, Texas, USA) was used to open a bone window. The peri-orbita was dissected from the inner surface of the lateral wall of the orbit. After the bone removal was completed, an incision was made in the peri-orbita fascia parallel to the lateral rectus muscle. The orbital-self retaining retractor was used for superior and inferior retraction of the orbital fat. Lateral rectus muscle was dissected from surrounding structures and retracted superiorly or inferiorly with silk sutures. Two main microsurgical routes including above and below the lateral rectus muscle were used to visualize the tumor. The neural and vascular structures in the lateral compartment of the orbit were carefully dissected and preserved. After tumor resection was completed, hemostasis was established and the peri-orbita was reapproximated. The subcutaneous tissue and skin were closed with Vicryl (Ethicon Ltd., UK).

**Results**

The lesions of the orbit were completely removed in all cases. Operative complications were seen in three patients including transient impairment of eye movement in two cases and worsened visual impairment with atonic pupil in another case. In our series, the mean follow-up period was 26 months and recurrence was not seen. One patient with malign B-cell lymphoma (Fig. 1) was referred to the medical oncology and radiation therapy unit to further investigation and treatment.

Figure 1. A 63-year-old woman with malign B-cell lymphoma.
(a) contrast-enhanced axial computed tomography
(b) contrast-enhanced axial magnetic resonance imaging
(c) contrast-enhanced coronal magnetic resonance imaging
(d) postoperative axial computed tomography.
Discussion

It is crucial that selection of proper approach to intraorbital lesions depends on various criteria including the location of the tumor, the size of the lesion, the vascularity and the ultrasonic characteristics of the tumor and the probable pathology anticipated (1). Modern diagnostic methods including angiography, computed tomography and magnetic resonance imaging have been used to define these criteria. Transcranial approach to the intraorbital lesions generally selected for lesions with intracranial extension, for tumors located in the orbital apex and deep medial orbital compartment and intracranial tumors with extension into the orbit (1). Although transcranial approach provides better exposure to the orbital cavity for superiorly and medially located tumors, it is far more invasive than lateral orbital approach. Intraorbital tumors except located in the middle compartment of orbital fossa or tumors that extend into the optic canal can be safely removed through lateral orbital approach. The optic canal opening is difficult with this approach so this approach is contraindicated for resection of optic nerve gliomas or for tumors that extends to the superior orbital fissure or optic canal (1, 4). In our series, we provided enough exposure to remove the lesions completely without major complication in all cases via lateral orbital approach. Illustrative cases are shown in Figure 1 and Figure 2.

The extent of the bone removal was 2 mm beyond spheno-zygomatic suture posteriorly, 5 mm beyond fronto-zygomatic suture superiorly, zygomatic arc inferiorly and inferior orbital fissure medially (Figure 3). Contrary to description by Arai et al., lateral orbital rim was preserved and we had no difficulties to remove anteriorly placed tumors (4). Witschafter et al. also described preservation of the lateral rim in lateral orbitotomy (10). We also did not need to remove the sphenoid bone and expose anterior temporal dura because none of our lesions was placed within the muscle cone.

Visual impairment is one of the most serious postoperative complication and may due to traction on the optic nerve or sacrifice its vascular supply (4). In our series, visual impairment worsened with a tonic pupil in one patient who had a schwannoma that was located on the superior, lateral, posterior and inferior compartment of the orbit. It was possible that either the ciliary ganglion or short ciliary nerve was damaged during the resection of tumor. It was also possible that visual impairment was due to traction of the optic nerve during tumor resection.

Figure 2. A 35-year-old woman with cavernous hemangioma.

(a) contrast-enhanced axial computed tomography
(b) contrast-enhanced coronal computed tomography
(c) postoperative axial computed tomography
removal. Special attention should be taken to preserve these structures.

We were dissected lateral rectus muscle from surrounding structures and retracted superior or inferiorly with silk sutures during surgery. In our series, transient impairment of eye movement and lateral gaze palsy were seen in two patients postoperatively and improved within two month follow-up period. It was thought that transient impairment of eye movement was due to retraction of lateral rectus muscle. Although retraction of lateral rectus muscle is required to expose the intraconal compartment, it should be keep on mind that traumatic retraction of the lateral rectus muscle may results in permanent lateral gaze palsy (4).

Enophthalmos as a result of removal of the lateral wall of the orbit was not seen in our series. We also avoided to damage the frontal branches of the facial nerve during the skin incision with the skin incision described above. Therefore, the operative results were also cosmetically satisfactory in our series.

As summary, the lateral orbital approach is less invasive than transcranial approach to the orbit and can be safely applied to intraorbital lesions which locate in the lateral, superior, and inferior compartments of the orbit.
REFERENCES