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Accessing the Orbital Roof via an Eyelid Incision: The Transpalpebral Approach

ABSTRACT—This article outlines a new surgical technique for accessing the orbital roof: the transpalpebral approach. It involves making an incision on the double fold of the upper eyelid, then dissecting the orbital septum and the orbicular muscle of the eye. This exposes the orbital roof and enables the surgeon to approach without a coronal incision of the scalp; the direct eyelid incision provides adequate workspace. We use this approach in three orbital roof fractures and one orbital hemangioma. This orbital approach offers a simpler surgical technique, a less invasive one, and still provides excellent exposure of the superior orbital cavity.

The type of skin incision used to approach tumors or fractures at the orbital roof greatly influences intraoperative exposure and, hence, both functional and aesthetic results. Surgical approaches are commonly made through (1) the lacerated area, (2) a suprabrow incision,^{1,2} (3) the supraorbital region,^{3,4} or (4) a coronal incision of the scalp.

The coronal approach, either a semicoronal or a bicoronal incision, is usually used for surgical access to the orbital roof. Nevertheless, the technique has some problems. It takes a longer time to reach the workspace than does the direct approach, and it may also result in excess blood loss. Furthermore, relatively large skin incisions can result in alopecia, scarring at the temporal region. This is especially noticeable in a short-haired person.

We develop a new approach to the orbital roof, the transpalpebral approach, which is a modification of

Tajima's "dismasking flap" technique.⁵ The advantages of this technique over coronal approaches include excellent access to the orbital roof, inconspicuous operating scars, and avoidance of coronal skin flaps.

This article illustrates this technique and reports four cases.

MATERIALS AND METHODS

Surgical Method

A 2.5- to 3.5-cm upper eyelid incision is made along the superior palpebral sulcus (Fig. 1). Dissection is performed until the superior edge of the tarsus is reached. At this point, the skin-muscle flap is raised from the tarsus and the orbital septum. The dissection then continues above the septum to the rim of the orbit

Figure 1. Schematic drawing of the surgical technique: upper eyelid incision with superior palpebral sulcus.

(Fig. 2). To avoid damaging the septum, a periosteal incision is made on the anterior aspect of the orbital rim. After this, the orbital roof is exposed by a blunt dissection at the subperiosteal space (Fig. 3).

Figure 2. Approach to the orbital roof through the orbital septum and the orbicular muscle of the eye.

Figure 3. The surgical field: superior orbital cavity and superior orbital rim.

When necessary, the supraorbital nerve and its vessels are severed, and the periosteum is sutured to close the wound. If the supraorbital nerve and its vessels are cut, the supraorbital nerve is sutured under the operating microscope. Finally, the palpebral skin is closed.

Patient Population

This approach was employed from October 1996 to July 1998 on three patients with orbital roof fractures (two men, one woman) and on one patient with an orbital cirroid hemangioma (woman). Their average age was 36 years (range 23 to 51) (Table 1).

CASE PRESENTATION

Case 2 (Fig. 4)

A 51-year-old man was referred to the Department of Plastic Surgery at Fukuoka University Hospital (FUH) with complaints of enophthalmos and orbital dystopia of his right eye. One year prior to consultation, the patient had sustained a facial injury caused by a traffic accident, but there was no surgical intervention. Radiological studies at the time of injury showed a maxillary fracture of the right orbit.

Table 1. Patient Data

Case	Age	Sex	Diagnosis	Follow-up (M)	Results	Complication
1	33	F	Hemangioma, orbit	22	excellent	none
2	51	M	Orbital roof fracture	14	fair	none
3	37	F	Orbital roof fracture	13	good	none
4	23	M	Orbital roof fracture	11	good	none

The right globe rested 5 mm higher than did the left. Hertel exophthalmometer measurement indicated that the right globe rested 5 mm posterior to the left. Computed tomography (CT) scanning revealed a right-side orbital roof fracture with upward dislocation and a fracture of the right maxillary wall.

The patient was operated on using the transpalpebral approach. The right-side orbital roof was explored via a 3-cm incision along the superior palpebral sulcus of the upper eyelid. The orbital roof was dislocated upwardly and was reconstructed using grafting pieces of

sliced costal cartilage. Although the enophthalmos improved after surgery, the superior orbital dystopia remained because an insufficient amount of cartilage was applied.

Case 3 (Fig. 5)

A 37-year-old woman was referred to the Department of Plastic Surgery at FUH with complaints of enophthalmos and orbital dystopia of her right eye.

Figure 4. Case 2. (A) Preoperative condition of the patient. Frontal view shows enophthalmos and a superior orbital dystopia of the right eye. (B) Basal view shows extreme enophthalmos. (C) Three-dimensional CT scan shows fracture and dislocation of the right orbital roof. (D) Surgical exposure by transpalpebral approach. The arrow indicates the supraorbital neurovascular bundle. (E) Six months postoperatively, frontal view. (F) Basal view.

Figure 5. Case 3. (A) Enophthalmos and a superior-medial orbital dystopia of the right eye. (B) Three-dimensional CT scan shows fracture of right zygoma and right superior medial rim of the orbit. (C) Coronal CT scan shows orbital roof fracture. (D) Surgical exposure by transpalpebral approach revealing orbital roof. (E) Sliced costal cartilaginous graft is performed on the orbital roof. (F) Thirteen months postoperatively.

One year prior to consultation, the patient had sustained a facial injury caused by a traffic accident. Radiological studies at the time of injury demonstrated a fracture of the right zygoma and the right superior medial rim of the orbit. Physical examination showed superior and medial orbital dystopia and enophthalmos, with the right globe resting 5 mm higher than the left and medial to it. Hertel measurement also indicated the right globe rested 5 mm posterior to the left. On radiographic examination, a coronal CT of the head revealed a right-side orbital roof fracture with upward deviation.

The patient was operated on using both a subciliary and a transpalpebral approach. The laterally and downward dislocated zygoma was repositioned and then fixed by titanium plates. The right-side orbital roof was

explored through a 3-cm incision along the superior palpebral sulcus of the eyelid and reconstructed using sliced costal cartilaginous grafts. There were no postoperative complications.

The patient's enophthalmos and orbital dystopia improved after surgery.

RESULTS

Working Space

This approach enables the surgeon to observe the supraorbital rim, the orbital roof, and the cephalic half of the lateral and medial orbital walls. To facilitate han-

dling of the orbital cavity, the supraorbital neurovascular bundle is temporarily severed.

Surgical Outcome and Complications

In two patients with orbital roof fractures, enophthalmos improved significantly after grafting sliced costal cartilage onto the orbital cavity. In one patient with an orbital roof fracture, however, the cartilage graft was too small to improve the enophthalmos and the vertical orbital dystopia satisfactorily.

In the patient with a cirroid hemangioma of the orbit, the hemangioma was resected completely without secondary deformity of the eyelid. The patient showed no recurrence of the hemangioma 14 months after the operation.

In all patients, postoperative swelling of the upper eyelid subsided 2 weeks after surgery, and operative scars on the upper eyelid were inconspicuous and without contracture. This technique did not affect visual activity or ocular movement.

DISCUSSION

Because traumatic fracture of the orbital roof is uncommon and may be unrecognized at the time of injury, later treatment is often provided for vertical orbital dystopia and enophthalmos resulting from an orbital roof fracture.⁶⁻⁸ We operated on three patients with orbital roof fractures who had sustained facial injuries 3 to 12 months before the reconstructive surgery. All patients complained of enophthalmos with or without vertical orbital dystopia.

Before 1996, when operating on orbital roof fractures, in most cases we employed the coronal incision commonly used for craniotomies. Bicoronal and semicoronal incisions, craniofacial approaches, are used for tumors in the anterior cranial fossa and in the orbitofrontobasal region. These incisions are used to safely and completely expose the orbital roof region via a transcranial or subcranial approach. An extensive coronal incision from the tragus is required to peel the scalp flap down to the frontonasal suture and expose the orbital roof. The time spent on this approach may be substantial and may result in conspicuous scar alopecia at the temporal region.

The new transpalpebral approach that accesses the orbital roof via an eyelid incision is a modification of Tajima's dismasking flap technique.⁵ It eliminates the problems caused by coronal incisions and allows excellent access to the superior orbital cavity. The Tajima dismasking flap technique is a cranio-orbitofacial degloving method that uses a circumpalpebral incision with or without piriform margin incision. It opens a wide surgi-

cal field to direct vision⁹ and is used for a surgical intervention around the nasal cavity, the orbit, the maxilla, and the anterior cranial base.¹⁰

The transpalpebral approach provides access to the orbital roof without employing a coronal incision of the scalp. This direct eyelid incision provides sufficient working space and preserves the supraorbital nerve to the forehead, thereby preventing postoperative sensory disturbances.

Although the most common postoperative complication is periorbital edema, which may be severe during the 1st week after surgery, improved cosmesis is usually achieved within 2 weeks. None of the patients showed dysfunction of the upper eyelid, such as levator palpebrae or cicatricial contracture, during their postoperative course.

Advantageous indications of this technique are found in orbital roof fractures or intraorbital tumors. In addition, the removal of the orbital rim and a portion of the orbital roof exposes the frontal sinus and anterior cranial fossa.

The authors believe this orbital approach, with its simpler, less invasive surgical technique, offers excellent exposure of the superior orbital cavity.

CONCLUSION

The transpalpebral approach was used on three patients with orbital roof fractures and one patient with a cirroid hemangioma of the orbit. The method provided both excellent access to the orbital roof and superior functional and aesthetic results.

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