Upper Eyelid Skin Laxity in Elderly Patients
Correction Surgery With Eyelid Marginal Incision

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Background: Laxity of the upper eyelid skin in the elderly usually leads to an aged appearance and visual field defect, which affects their quality of life. However, there are very few reports on the evaluation and treatment strategy for upper eyelid skin redundancy in elderly Asians. Hence, this article describes an upper eyelid skin laxity correction surgery using an innovative parallel palpebral margin incision to improve ptosis and enlarge the visual field.

Methods: From August 2012 to March 2021, 87 patients with severe eyelid laxity and ptosis presented to the Plastic Surgery Department of the Zhongda Hospital Affiliated to Southeast University. Upper eyelid skin laxity correction surgery with eyelid marginal incision was performed to correct the excessive tissue between the eyebrow and the upper eyelid and improve patients’ vision field. Thereafter, a postoperative follow-up was conducted to observe the results in terms of skin laxity, eyelid shape changes, visual field improvement, postoperative scars, and patients’ satisfaction.

Results: During the follow-up, information was collected between 3 months and 1 year after surgery. No visible scars were seen in patients after the operation, and the sagging skin of the upper eyelid was corrected. In addition, the effect of correcting visual field defect is stable, with no recurrence within 1 year. The operation was effective, and patients were satisfied.

Conclusion: This surgical strategy significantly improved severe upper eyelid skin laxity with inconspicuous postoperative scars. After the operation, patients felt satisfied, and their quality of life was notably improved.

Key Words: elderly patient, near-eyelid-margin incision, upper eyelid skin laxity

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METHODS

Patients
Between August 2012 and March 2021, 87 patients (66 women and 21 men) underwent upper eyelid skin laxity correction surgery, with the incision adjacent to eyelid margin. The average age of female patients was 52 years, and the average age of male patients was 57 years. No patients had undergone prior eyelid plastic surgery. All patients received surgical treatment, and the results were analyzed.

Preoperative Assessment
Examinations of the upper lid should be sufficiently comprehensive to clarify the potential risks for upper lid blepharoplasty. Preoperative assessment includes a thorough medical history, ophthalmologic history, trauma history, and so on. Patients with illnesses such as hypertension, diabetes, dry eye, eyelid surgery, glaucoma, blepharitis, and thyroid disease should be fully assessed before conducting the operation. The preoperative examinations that doctors should conduct to exclude myogenic and neurogenic ptosis are as follows: the width of palpebral fissure, the strength of levator palpebrae superioris muscle, the height of upper eyelid lifting, and the strength of frontal muscle. In addition, visual function examination, diopter measurement, eye position, and eye movement examination are also required to ensure that the patient's symptoms can be relieved by surgery. And the degree of sagging skin on the upper eyelid needs to be assessed before the surgery. The patients should be fully informed of the possible outcomes and complications, and the surgeries should be thoroughly explained to the patients. After the objective assessment of the actual blepharoplasty surgery was understood by the patients, written permission of patients was obtained by signing the informed consent. In other words, the informed consent form was signed before the surgical procedure.
operation, and the operation was performed by the same surgeon. Thereafter, the preoperative photographs were taken from various angles.

Surgical Procedure

The patients were instructed to sit upright, stare forward attentively, and gently close their eyes with the eyeballs in the gazing position to fully reveal the upper eyelid skin. The marking for the incision was placed just 2 mm superior to the edge of the eyelid, and the lateral margin of the incision was appropriately extended according to the degree of laxity of the patient's upper eyelid skin. The incision line was drawn with a toothpick dipped in gentian violet solution and was fixed with fixative solution (usually the tincture of iodine). Then, the patient was asked to be in a supine position, and marked area was disinfected with iodophor. Local anesthetic was administered subcutaneously with a mixture of lidocaine and 1:100,000 epinephrine, and the entire face was disinfected while waiting for the anesthetic to fully infiltrate. The entire face was well exposed, with sterile sheets covering the rest of the head and shoulders. The skin and the subcutaneous tissue were incised along the preoperative design line, and the orbicularis oculi muscle was dissected from the deeper fascia tissue to expose the orbital fat. The surgeon then lightly pressed the eyeball to make the orbital septum fat protrude from the orbital bone. The orbital fat was slightly pulled with a forceps, and the septum surrounding the orbital fat was dissected by a vascular clamp. Further anesthesia was required during this procedure by injecting additional lidocaine into the orbital septal fat pad, which is quite sensitive, and the patient may feel uncomfortable when the fat pad was pulled. The protruding orbital septum fat was fixed using a vascular clamp and was sharply removed, and then bleeding was controlled by heat coagulation. The levator aponeurosis was exposed, and an appropriate width of the levator palpebrae superioris muscle was removed according to the degree of ptosis. The stump of the levator aponeurosis was sutured with 7-0 cosmetic thread. Then, the patient was requested to open his/her eyes to observe the extent of ptosis correction. Minor adjustments were continuously made until the inferior margin of the upper eyelid was superior to the upper edge of the pupil, when the patient was instructed to close the eyes to confirm the amount of excess skin. Subsequently, the upper eyelid was pulled downward to confirm the corresponding precise position of the original incision line on the excess flap so that an appropriate amount of skin was removed to the extent of not affecting eye closure (Fig. 1). One of the most important procedures was to create the incision in a wedge direction, wherein the cross section of the incision presents a trapezoid with a broad lower width and a narrow upper width. Lastly, the skin was continuously sutured with 7-0 cosmetic thread to complete the surgery (Fig. 2). After the operation, chlorotetracycline ointment was applied on local skin, and the patient's eyes were bandaged. An ice pack was applied to the eyes (15–20 min/time, 3–5 times/day, for 2 consecutive days). After 5 to 7 days, the surgical sutures were removed.

RESULTS

Several criteria were included in the postoperative evaluation, such as the degree of upper eyelid skin laxity correction, bilateral upper eyelid symmetry, and complications. The assessment was conducted by both the patients and 2 plastic surgeons. Among the 87 patients, satisfactory results (100%) were obtained with no complications in patients (Fig. 3). Postoperative complications were evaluated by the surgeons, and no patient suffered from complications such as upper eyelid

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**FIGURE 1.** Photographs of the technique for removing excessive skin. A, When the ptosis had been corrected adequately, the excess eyelid skin was pulled downward to confirm the width of the skin beyond the incision line. The original incision line was marked with the dashed line in A, B. A vertical incision was made from the midpoint of the upper eyelid, and the incision was extended to overlap with the incision line. C, Removal of an appropriate amount of skin without affecting the postoperative outcome of the eyelid closure. This patient's left eye was slightly swollen after the surgery, causing the effect shown in C. D, The postoperative appearance when this patient opened her eyes, showing the rejuvenation of the upper eyelid.
depression, multiple eyelids, asymmetric double eyelid, bleeding, infection, and so on. Very few patients experienced swelling of the incision site 1 week after the operation. After 2 months of follow-up, the complications were satisfactorily resolved (Table 1).

CASE

The picture (Fig. 4) shows a 61-year-old male patient with no previous history of eyelid surgery. The surgeon proposed to perform plastic surgery with the incision near the eyelid margin to treat senile upper eyelid skin laxity. According to the gender of the patient, an incision line was made 2 mm above the upper eyelid, and a 2-mm-wide orbicularis muscle below the incision was removed. After exposing the orbital fat, excessive orbital septal fat was sharply removed. A small part of the levator aponeurosis at both medial and lateral sides of the incision was cut. Then, the stump of the levator aponeurosis was sutured with 7-0 cosmetic suture. The upper eyelid was pulled downward to confirm the overlap line, and then the skin between the line and the upper free edge of the incision was resected. The image (Fig. 4B) shows the width of the skin to be removed. Then the skin was sutured with 7-0 cosmetic thread. The patient's upper eyelid shape is noticeably cleaner and more youthful after surgery.

DISCUSSION

Age-related upper eyelid skin laxity is a spontaneous and degenerative change, which is caused by multiple factors. First, the elastic fiber of the orbicular skin degenerates with age, which weakens the connection between the skin and the orbicularis oculi muscle. In addition, it may lead to eyelid redundancy that the levator aponeurosis lengthened, split, and partially or completely ruptured from the tarsus under gravity. Also, the denaturing of the orbital fat and the fibrosis of the orbital fat can aggravate eyelid redundancy. Factors above result in the loss of muscle strength provided by levator aponeurosis. Changes resulting from sun exposure worsen the degeneration of the periorbital skin. Second, the aging appearance with sagging skin is significantly amplified by the effects of gravity and light. The main characteristic of photo-aged skin is decreased elasticity due to degeneration and entanglement of elastic fibers as well as the loss of collagen and the increase in volume of matrix content. Third, aging leads to bony changes in the orbit and surrounding facial bones, in addition to age-related laxity of the upper eyelid skin due to the reduction and thinning of the orbital fat pad and sagging of the nose.

The main purpose of the upper eyelid laxity correction surgery is to remove excess flabby upper eyelid skin and bloated adipose tissue of the orbital septum. If it relies only on the removal of excess skin to correct upper eyelid sagging, the thickness, texture, and elasticity of the skin on the upper and lower edges of the incision will be different, which can easily cause scar hyperplasia, stiff double-eyelid shape, and even complications such as lagophthalmos and upper lid ectropion. Those are unacceptable to patients and doctors. The most common surgical strategy is creating a double-eyelid incision to remove excess skin and to strengthen degenerated aponeurosis, followed by a new double-eyelid appearance.
postoperatively. In recent years, with the acceleration of population aging, elderly people are increasingly demanding to restore their youthful beauty in a natural form and not to obtain a prominently seen double-eyelid appearance. Therefore, we choose upper eyelid skin laxity correction surgery with eyelid marginal incision in elderly patients to improve skin redundancy and correct appearance of ptosis.

For severe upper eyelid dermatochalasis, the common treatment methods are traditional blepharoplasty, direct brow lift, transbrow excision blepharoplasty, infrabrow lift surgery, and brow lifting + double-eyelid surgery. These surgical methods may lead to conspicuous double-eyelid lines and even cause scar hyperplasia. For elderly patients who did not desire a prominently seen double eyelid, we carried out the upper eyelid skin laxity correction surgery with parallel palpebral margin incision. The surgical incision was relatively concealed, and the postoperative scar was more inconspicuous.

We often pressed the patient's eyebrows in a sitting position before surgery to assess the degree of redundancy of the patient's upper eyelid skin. During the operation, we removed partial orbital septal fat and levator fascia, and brow lifting + double-eyelid surgery. In the process of strengthening the levator muscle, the patient was instructed to open his/her eyes to confirm that the upper eyelid edge is above the pupil, where the patient's visual field was not affected. Then part of the orbicularis oculi muscle, excessive skin, and corresponding subcutaneous tissue were removed. However, the differences in the thickness of skin on the upper and lower margins of the incision tend to form a stiff eyelid appearance after the surgery. Considering of this, we chose to remove part of the orbicularis oculi muscle tissue on the upper lip of the incision to form a slope of muscle attached to the superficial surface of the anterior tarsal fascia. The myocutaneous flap became thinner toward the incision, which resembled the normal eye. During the study, it was found that more upper eyelid skin and muscle tissue could be removed through eyelid marginal incision compared with traditional surgery, and the incision can be well concealed.

This operation has the following advantages. First, the eyelid marginal incision is more concealed with inconspicuous scar, and it is more consistent with the natural surgical results that older people need. Second, this surgical strategy allows a wider range of dissection so that more bloated skin and orbicularis oculi muscle tissue can be removed compared with traditional double-eyelid incisions, thus reducing the burden on the soft tissues of the upper eyelids and achieving a rejuvenating effect. Among the patients followed up, the largest amount of upper eyelid skin tissue removed during the operation was 1.62 cm. In addition, depending on the patient's condition, we removed part of the orbital septal fat and retro-orbicularis oculi fat layer tissue to reduce the volume and weight burden on eyelids and to increase muscle strength.

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**TABLE 1. Preoperative and Postoperative Data of the Patients**

|                  | Pre-op | Post-op |
|------------------|--------|---------|
| MRD1, mm         | 1.5 ± 0.3 | 2.4 ± 0.2 |
| Palpebral fissure, mm | 6.7 ± 0.2 | 7.5 ± 0.3 |
| Brow to lash line, cm | 1.3 ± 0.3 | 1.1 ± 0.2 |
| Complications    | —      | Swelling around the incision (few patients) |

Data are presented as average ± SD.

MRD1, margin reflex distance-1.
for eye opening. Finally, before suturing the skin, the orbicularis oculi muscle and skin were trimmed to form a wedge myocutaneous flap to simulate natural appearance. This allows the natural transition of the skin at the incision. Compared with the traditional surgery, the effect of near-eyelid-marginal incision surgery is particularly efficacious in correcting upper eyelid skin laxity. There was no prominent double-eyelid appearance, and periorbital wrinkles became shallow. The patient’s visual field was considerably improved.

After surgery, 87 patients achieved satisfactory results during long-term follow-up. And the postoperative scar was relatively inconspicuous with no complications occurred. The rejuvenated appearance of the bilateral upper eyelids greatly improves the patients’ life and mental health. For Asians, keloidal hyperplasia is an important factor affecting postoperative results. The incision near the eyelid margin can be naturally hidden, and scars are not conspicuous. The skin and the orbicularis oculi muscle were cut through the eyelid marginal incision, and the deep surface of the orbicularis oculi muscle was bluntly separated to expose the tarsal fascia, orbital septum tissue, and retro-orbicularis oculi fat. If the outer edge of the upper eyelid incision cannot be well aligned, an auxiliary incision can be made along the original crow’s feet to further hide the scar.7 Wedge-shaped resection of the orbicular oculi muscle on the outer margin is feasible. Before closing the skin, suturing of the muscle should be performed to reconstruct the natural anatomical structure of the orbicular oculi muscle ring.

CONCLUSION

The postoperative results of upper eyelid skin laxity correction surgery in elderly patients were satisfactory. When performing upper eyelid correction, the surgeon applied an innovative marginal incision near the upper eyelid. According to the specific conditions of the patient, the incision was appropriately extended along the direction of the crow’s feet, so that the double-eyelid line scar could be hidden in the eyelid margin and fine wrinkles around the eyes. Meanwhile, special attention was given to avoid overremoving excessive skin and orbital fat during the operation. After surgery, the patient’s visual field improved, and the eye contour appeared more youthful and natural with fewer complications and faster recovery. Therefore, this surgical procedure is worth promotion.

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