A graded approach in East Asian personalized lower blepharoplasty: A retrospective study spanning 12 years

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Purpose: The aim of the study was to describe a graded approach for assessment and specific treatment, which can achieve satisfactory postoperative result in East Asian personalized lower blepharoplasty. Methods: We reviewed 913 patients who underwent lower blepharoplasty from 2008 to 2020. We preoperatively classified patients with different characteristics to provide personalized treatment. Results: There were 163 patients with fat herniation but no lower eyelid skin laxity, 259 patients with lower eyelid skin laxity accompanied by mild fat herniation, 313 patients with sagging lower eyelid skin accompanied by mild fat herniation and tear troughs, and a total of 178 patients with sagging skin accompanied by moderate to severe fat herniation and tear troughs. The overall success rate was 97.81%. Postoperative complications included the following: conjunctival chemosis, dry eye symptoms, and more. Conclusion: For East Asian patients with different characteristics, we achieved satisfactory postoperative results through accurate preoperative clinical grading and personalized surgical plans. The success of the operation not only depends on correct manipulation during the procedure but also on the surgeon’s accurate assessment and full grasp of the anatomy of each patient preoperatively.

Key words: East Asian, eyelid bags, lower blepharoplasty

Lower blepharoplasty and upper blepharoplasty are some of the most popular cosmetic procedures worldwide.¹ In East Asia, upper blepharoplasty is more commonly referred to as double eyelid surgery, and the patients are mostly young women. The main purpose of the surgery is to form a symmetrical and smooth double eyelid crease, so that the patients’ palpebral fissure height is enlarged and the appearance is more aesthetic.²⁻⁴ Lower blepharoplasty differs, however, as it is used to reduce aging in the lower eyelid. It addresses issues such as skin laxity, lower eyelid bags, and tear troughs.⁵⁻⁷ Due to ethnic differences between the East and the West, there are fewer patients with severe horizontal lower eyelid laxity (> 6 mm) in East Asia.⁸⁻¹⁰ Therefore, we usually do not need to perform lateral canthopexy or lateral canthoplasty during lower blepharoplasty,¹¹⁻¹³ but focus more on the manipulation of skin, muscle, fat, and ligaments.

In the past, many surgeons have ignored the patients’ individual characteristics and have used surgical methods that are too generalized, resulting in poor postoperative results. Some patients do not need dissection of the skin, fat, or other tissue, and for some patients with high-risk factors, even the smallest amount of the skin or fat removal can cause complications such as lower eyelid malposition, ectropion, and sunken lower eyelid.¹²⁻¹³ Moreover, some surgeons mistakenly believe that the tear trough hollow is only due to the herniation of fat and attempt to solve this issue by simply removing the fat and skin without releasing the ligament and filling the hollow. Therefore, on the basis of previous experience, we applied the method of clinical-graded assessment to complete personalized lower blepharoplasties for East Asian patients, hoping to achieve good postoperative results and provide other plastic surgeons the benefit of our experience.

Anatomy

From shallow to deep, the lower eyelid layers include the skin, subcutaneous tissue, orbicularis oculi muscle (OOM), tarsal plate, orbital septum, orbital fat, capsulopalpebral fascia, and palpebral conjunctiva [Fig. 1a]. The skin of the lower eyelid is thin and soft, and the subcutaneous tissue is relatively loose. Therefore, the skin of the lower eyelid is prone to aging, and edema or congestion often occurs after surgery.¹⁴ The OOM can be divided into three parts: the pretarsal, preseptal, and orbital portions. The OOM bundles near the periphery are thicker and looser, while the OOM bundles near the eyelid margin are slender and tight. The three parts of the OOM can be divided into deep and shallow bands, and the shallow bands converge and continue to form the medial canthal tendon.¹⁵⁻¹⁶ The orbicularis retaining ligament is located at the confluence of the preseptal OOM and the orbital OOM. It is a very important anatomical structure for lower blepharoplasty. The orbicularis...
retaining ligament originates from the periorbit of the orbital rim and passes through the OOM to insert into the dermis of the lid-cheek junction.\textsuperscript{[17]} The medial orbicularis retaining ligament is extremely short or almost nonexistent, until it lengthens centrally and shortens again laterally, presenting as an overall V-shape. Many scholars call the medial orbicularis retaining ligament the tear trough ligament, and the lateral one is called the palpebromalar ligament.\textsuperscript{[18-20]} The orbital septum fat of the lower eyelid is actually one entity, but in order to facilitate distinction and manipulation, it is often referred to as medial, central, and lateral fat pads. The medial fat granules are small and off-white, while the middle and lateral fat granules are larger and bright yellow. The medial and central fat pads are separated by the inferior oblique muscle, and the middle and lateral fat pads are separated by the arcuate expansion of the inferior oblique muscle. Therefore, the inferior oblique muscles may be damaged when manipulating fat pads.\textsuperscript{[21]} The capsulopalpebral fascia is the main retractor of the lower eyelid, and its function is similar to that of thelevator palpebrae superioris on the upper eyelid. The thickened part of the capsulopalpebral fascia is called the Lockwood ligament. It is an important supporting structure of the eyeball as it can buffer the pressure of the eyeball on the orbital fat.\textsuperscript{[22-25]}

We believe that the most important cause of eyelid bags is the destruction of balance, that is, the herniation of the orbital fat is greater than the protective effect of some of the supporting structures on the orbital fat. The structures that can protect orbital septal fat include the lower eyelid skin, OOM, orbital septum, and capsulopalpebral fascia. As the lower eyelid skin, the OOM, and the orbital septum gradually loosen, the shift of the orbital septum fat will cause the fat to herniate outward to form eyelid bags. Similarly, when the capsulopalpebral fascia or Lockwood ligament loosens, the pressure of the eyeball on the orbital fat will also cause the fat to herniate outward [Fig. 1b]. The main reasons for the formation of the lid-cheek junction are the traction of the orbicularis retaining ligament and the drooping lower eyelid tissue. In addition, the infraorbital rim bone will loosen and gradually sink with aging,\textsuperscript{[26]} which is one of the reasons why the lid-cheek junction becomes obvious as time goes by. Therefore, when the surgeon addresses the tear trough or palpebromalar groove, the repositioning of orbital fat and the release of the orbicularis retaining ligament should be performed simultaneously.

**Methods**

This was a retrospective study to assess the results of the graded approach technique we use in our clinic. The study was approved by the Ethics Committee. The use of photographs was approved by all patients. The study abides by the Declaration of Helsinki. The selected patients were those who underwent lower blepharoplasty from 2008 to 2020. All operations were performed by the same surgeon. These patients all presented with different degrees of surgical indications, such as laxity of the lower eyelid skin, fat herniation, drooping tissue, or tear trough problems. The study also collected data on the patients’ age, sex, smoking history, whether there was proptosis ocular before surgery, whether the face had undergone other plastic surgery, postoperative complications, follow-up time, and whether the surgery was successful. We defined surgery success as the patient being satisfied with the postoperative results and there being no need for any subsequent operations. We also tried to estimate postoperative outcomes based on objective parameters for all patients. Parameter A is the distance from the pupil to the lower eyelid, and B is the distance from the pupil to the lower margin of the eyelid bag [Fig. 1c]. Changes in A and B were obtained by comparing patients’ photos before and after surgery. Before the operation, we divided the patients into grades 1–4 according to their different characteristics. The first-grade patients had no lower eyelid skin laxity and only orbital fat herniation with or without a tear trough. The second-grade patients had sagging skin and mild fat herniation but no tear trough. The third grade included patients with loose lower eyelid skin and mild fat herniation with a tear trough. Patients classified into the fourth grade had loose skin, moderate to severe fat herniation, and deformity of the tear

| Table 1: Patients’ demographics |
|-----------------------------|
| Characteristics | Value (%) |
| Age at operation, year | 45.7 |
| Mean | 21-75 |
| Sex | 57 (6.24%) |
| Male | 856 (93.76%) |
| Female | 172 (18.84%) |
| Patient with smoking history | 102 (11.17%) |
| Proptosis ocular | 74 (8.11%) |

| Table 2: Percentage Changes from Preoperatively to Postoperatively |
|-----------------------------|
| Distance | A (%) | B (%) |
| Average | 0.13 | -14.35 |
| SD | 1.42 | 4.15 |

| Table 3: Complications’ statistics |
|-----------------------------|
| Value (%) |
| Complications requiring second operation | 20 (2.19%) |
| Insufficient fat removal | 16 (1.75%) |
| Insufficient skin excision | 4 (0.44%) |
| Chemosis | 0 |
| Short-term | 55 (6.02%) |
| Long-term | 0 |
| Dry eye | 43 (4.17%) |
| Short-term | 42 (4.06%) |
| Long-term | 1 (0.11%) |
| Lower eyelid malposition | 0 |
| Short-term | 12 (1.31%) |
| Long-term | 0 |
| Poor quality scar | 0 |
| Lagophthalmos | 0 |
Figure 1: (a) Lower eyelid anatomy. (b) F1 represents the force of the supporting structures that prevent the orbital fat from herniating outward. These supporting structures include the skin, orbicularis muscle, and orbital septum. F2 represents the buffering force of the capsulopalpebral fascia, which buffers the downward pressure of the eyeball on the orbital fat so that the fat herniates outward. F3 represents the force of the orbital septal fat to herniate outward under various factors. When F1 + F2 < F3, the balance is broken, and eyelid bags will occur. (c): Photos that show objective parameters. A: Distance from pupil to lower eyelid. B: Distance from pupil to lower margin of eyelid bag.

We adopted different surgical methods according to the different clinical grades.

**Technique**

The incision point was selected according to the clinical grade, and the procedure was performed under local anesthesia with approximately 10 mL of a 1:1 mixture of 2% lidocaine with adrenaline. The details of the operation for patients of different grades were as follows:

Grade 1: The skin of the lower eyelid of these patients was not loose; therefore, there was no need to remove the skin. In addition, considering that most of these patients were young, there was a high demand for concealed incisions and quick recovery after surgery. Therefore, we adopted the transconjunctival approach, and the incision was placed at the conjunctival fornix. After incising the conjunctiva, tarsal plate, or capsulopalpebral fascia, the OOM and the orbital septum were bluntly separated to expose the orbital septum. When there was a large amount of fat herniation and the tear trough was present, the orbital fat could be pulled down to the tear trough to be fixed and flattened and then the excess fat could be removed. If the amount of the orbital fat herniation was
Figure 2: Preoperative (a and b) and 1-year postoperative (c and d) photographs of a representative first-grade 25-year-old female patient who underwent transconjunctival lower blepharoplasty. Preoperatively, the patient had no skin laxity and no tear trough, with only mild herniated fat. The patient achieved a fast recovery and satisfactory results.

Figure 3: Preoperative (a and b) and 16 months postoperative (c and d) photographs of a representative fourth grade 54-year-old female patient with a positive smoking history and ocular proptosis who underwent transcutaneous lower blepharoplasty; the patient’s skin laxity, fat herniation, and tear trough deformity were all severe. Due to the strong contrast between preoperative and postoperative manifestation of the patient, the patient is very satisfied with the operation.
small and there was no tear trough, the surgeon tightened the orbital septum, without removing the fat. Finally, the patients’ palpebral conjunctiva, tarsal plate or capsulopalpebral fascia were sutured to prevent eyelid malposition after surgery.

Grade 2: The main characteristics of patients in this grade were loose skin and a small amount of fat herniation; therefore, we took a transcutaneous approach. We undertook a subciliary incision, then the skin and the OOM were sharply separated, and the muscle and the orbital septum were bluntly separated. In this way, a skin flap and a muscle flap were formed and the orbital septum was exposed. Because the patients only had a small amount of fat herniation and there was no tear trough, we only needed to tighten the orbital septum. Finally, we excised the excess skin and muscle, trimmed the incision edge, and sutured in turn.

Grade 3: Compared with the second grade, the third-grade patients needed extra treatment of the tear trough. We chose the subciliary incision and separated the skin from the muscles and exposed the orbital septum. We subsequently released the orbicularis retaining ligament from the medial to the lateral side, then discharged the fat in the orbital septum, placed the fat in the deformity of the tear groove, and tightened the orbital septum. Finally, we removed the excess skin and muscle and sutured them.

Grade 4: For the fourth-grade patients with moderate to severe fat herniation combined with skin laxity and tear trough, treatment not only included releasing the ligament and filling the hollow but also conserving the amount of fat as much as possible to avoid insufficient postoperative lower eyelid tissue volume as this would skeletonize the patients’ eyes. The incidence selection and surgical procedure of the fourth-grade patients were similar to those of the third-grade patients; the difference lay in the manipulation of fat. For the third-grade patients with mild fat herniation, no fat removal was required after the fat was discharged to ensure that the volume of the lower eyelid tissue was sufficient. For patients classified as grade 4, moderate to severe fat herniation and oversized eyelid bags were the main aesthetic concerns. Therefore, after the orbital fat was released to fill the tear trough deformity, it was necessary to remove excessive fat.

**Results**

In this 12-year retrospective study (between June 2008 and August 2020), we reviewed a total of 913 patients who underwent lower blepharoplasty. Among them, there were 163 patients classified as first grade (no skin laxity), 259 as second grade (skin laxity with mild fat herniation and no tear trough), 313 cases as third grade (skin laxity with mild fat herniation and tear trough), and 178 cases as fourth grade (skin laxity with moderate to severe fat herniation and tear trough). As shown in Table 1, there were 57 male and 856 female patients with an average age of 45.7 years. The follow-up time ranged from 3 to 56 months, and the average follow-up time was 14.2 months. Of these patients, 102 had a history of smoking and 74 had ocular proptosis. A total of 172 patients had undergone other facial cosmetic surgery operations such as upper blepharoplasty or brow lifts. The overall success rate was 97.81%. Regarding the changes of objective parameters of patients, there was little change in parameter A, suggesting that the patient was not at risk of lower eyelid retraction or ectropion. The parameter B was significantly reduced, which proved the effect of the surgery [Table 2]. Table 3 lists the postoperative complications. A total of 55 (6.02%) patients had transient conjunctival chemosis after surgery, while no one had long-term (>3 weeks) conjunctival chemosis. There were a total of 42 (4.06%) patients with transient (<1 month) dry eye syndrome after the operation; however, the symptoms disappeared after appropriate treatment. There was one patient with long-term dry eyes, which may be related to dry eye symptoms that existed before surgery. There were 12 (1.31%) patients with temporary lower eyelid malposition. However, all of the lower eyelids returned to their normal position after 3 months, which may be related to the temporary tissue traction of the middle lamella. No poor-quality scars or lagophthalmos occurred after the operation. There were 20 (2.19%) cases requiring a second operation. Among these, 16 cases had remaining fat herniation and 4 cases still had lax lower eyelid skin. These issues were resolved after the second operation.

Figs. 2 and 3 show representative patients from the first and fourth grades. Fig. 2 shows a 25-year-old female patient with no history of smoking or other facial cosmetic procedures. The patient only had mild herniation of the lower eyelid orbital fat, which gave the appearance of slight ageing and tiredness. Therefore, we took the conjunctival approach to tighten and strengthen the orbital septum. The postoperative effect was good; the swelling disappeared quickly, and there were no other complications; the patient was very satisfied with the results. A 54-year-old female patient with a history of smoking, ocular proptosis, and no other facial cosmetic procedures. The patient’s skin laxity, fat herniation, and tear trough deformity were all severe. The patient said that aging of the lower eyelid was having a strong impact on her work and social life; therefore, she was extremely keen for surgery. We chose the transcutaneous approach to release the orbicularis-retaining ligament, discharged the orbital fat to fill the tear trough deformity, and then excised fat and skin as appropriate. The patient had more bleeding than most patients during the operation, and the postoperative swelling disappeared slowly, which may be related to the patient’s smoking history. The patient developed short-term dry eye symptoms after the surgery, but this was alleviated after treatment. All of the patient’s complaints were resolved after the operation, and the outcomes were satisfactory. There was no lower eyelid malposition and no visible scleral after the surgery.

**Discussion**

The definition of beauty is continually changing over time, and many new plastic surgery methods and techniques are constantly being developed. However, lower blepharoplasty is consistently one of the most popular cosmetic procedures in East Asia and the world because it can solve various issues relating to the lower eyelid that are caused by aging. However, each patients’ problem is different, and a general procedure cannot resolve all problems. Therefore, in order to achieve good postoperative results, we classified various patients before surgery and selected personalized surgical methods. In addition, we have substantial experience in this operation as we have been performing it for more than 10 years, and we hope that knowledge of our experience will be beneficial to other surgeons.
OOM hypertrophy: a small minority of patients complain that their OOM is too thick, we call it “Wo Chan,” but many people mistake it for eyelid bags. The thick OOM is usually the preseptal portion. We adopt a transcutaneous approach to adjust the thickness of the OOM in these patients.

Male patients and exophthalmic patients: for male patients, our experience is that the amount of skin excision must be conservative. In general, we estimate that the amount of skin resection is based on the slight swinging of the lower eyelashes. However, the amount of skin resection for men should be minimal; otherwise, lower eyelid ectropion may occur after surgery. The reason for this may be the difference in skin thickness and tension between men and women.[27] This experience is also applicable to exophthalmic patients. When patients have ocular proptosis, a normal amount of skin removal may lead to postoperative lower eyelid ectropion or malposition.

Lower eyelid wrinkles: wrinkles of the lower eyelid can be divided into two types: static and dynamic.[28] Dynamic wrinkles refer to wrinkles that only appear when the OOM contracts, while static wrinkles are wrinkles that remain even when the OOM is relaxed. Many patients have expressed their desire to remove wrinkles while resecting the skin of the lower eyelid. However, we should explain preoperatively that skin resection can only relieve or remove static wrinkles, while lower blepharoplasty is not appropriate for resolving dynamic wrinkles. Botulinum toxin is indicated for the latter issue.[29,30]

Dry eye: in lower blepharoplasty, dry eye is a complication that seems to be simple but deserves attention. Long-term postoperative dry eyes may cause keratitis and even corneal ulcers. For older patients and patients with dry eye symptoms before surgery, especially, the operation should be more cautious, the removal of skin should be conservative, and eye drops and moisture chamber glasses should be used before the operation.[31–33] For such patients, a tear secretion test (Schirmer’s test) can be performed before surgery. For patients with extremely poor tear secretion, we do not recommend lower blepharoplasty.[34,35]

Conservative tissue removal: it has always been a challenge for plastic surgeons to accurately estimate the tissue volume, such as skin and fat, which should be removed. When the tissue removal is insufficient, the patient may be dissatisfied with the operation and feel that the outcome is poor. However, when the surgeons excise excessive tissue, it may cause problems such as lower eyelid malposition, eyelid retraction or ectropion, and sunken lower eyelids. Our principle for this is “better less than more,” that is, when surgeons cannot accurately judge the amount of tissue removal, they should conservatively resect skin, fat, and other tissues. Even if the patient is not satisfied with the result and undergoes a second operation, it is still much better than a postoperative skeletonized appearance. It is difficult to repair this kind of postoperative deformed appearance, and the effect is poor.

Conclusion

We implemented a clinical grading system for East Asian patients with different characteristics, such as tight or loose skin, mild or severe fat herniation, and the presence or absence of a tear trough. Based on the different levels of patients, we adopted a graded approach and achieved satisfactory postoperative results. It can be concluded that the success of the operation is not only dependent on fine manipulation during surgery but also on the surgeon’s accurate preoperative assessment of each patient and full grasp of their anatomical features.

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Conflicts of interest

There are no conflicts of interest.

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