

Assessment of Safety and Efficacy of Ultra-micro Transconjunctival Lower Eyelid Bags Removal Combined with Orbital Fat Transfer

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Methodology

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Abstract

Background

The elaboration of a precise operation is essential during lower eyelid blepharoplasty. The aim of this study was to investigate the clinical effect of ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer in the correction of lower eyelid bags.

Methods

A total of 226 patients underwent lower eyelid blepharoplasty in our department during the past 3 years (2018-2020). Excluded were patients with previous eyelid surgery, diplopia, strabismus and associated procedures. A retrospective chart review of patients undergoing traditional transconjunctival blepharoplasty (n=104) and ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer (n=122) was performed. The length of follow-up ranged between 24 hours and 3 months after operation.

Results

The control group (conventional conjunctival blepharoplasty) included 45 males and 59 females with an average age of (44.5±3.5) years, while the observation group (subconjunctival blepharoplasty with orbital fat transfer) included 49 males and 73 females with an average age of (43.1±4.2) years. There were no statistically significant differences between the two groups in gender ($p = 0.27$) and age ($p = 0.44$) ($p > 0.05$). The Clinical improvement of the observation group is significantly higher than the control group, after 5 days has significant statistical differences between two groups ($P < 0.05$). It was found that the clinical efficiency of the observation group was significantly higher than that of the control group ($P < 0.05$). Next, we compared the complications between the two groups and found that there was a significant difference between the two groups ($P < 0.05$). The satisfaction of the two groups at different follow-up times was compared: 1 day after the operation, the satisfaction of the observation group was 52.5%, and that of the control group was 32.5%, with no statistically significant difference ($P > 0.05$). The satisfaction of the observation group was higher than that of the control group at 3d and 1 month after surgery, and the difference was statistically significant ($P < 0.05$).

Conclusion

The application of ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer can correct the lower eyelid bag safely and effectively with short postoperative recovery time, high patient satisfaction and low complication rate. This advanced technical skill may significantly improve the treatment of lower eyelid bags.

Background

The eyelid skin is one of the thinnest parts of the human body, and the aging of the eyelid skin greatly affects the aesthetic of people's appearance and is most easily detected. Eyelid bags are considered a sign of ageing, but they often appear prematurely due to the variety of causes that favor them [1]. A survey conducted by Goldberg et al. [2] shows that there was no one category that played a dominant role for most patients; rather, multiple anatomic categories were identified as playing a role in producing the eyelid bags, including cheek descent and hollow tear trough, prolapse of orbital fat, skin laxity, orbicularis hyperactivity, and triangular cheek festoon. The orbital fat was the one anatomic problem to receive the highest cumulative contribution score, indicating that they were thought to be most important in causing the aesthetic problem. For different anatomic problems, different treatments are recommended. The short-term and long-term complications of lower eyelid blepharoplasty via transconjunctival incision are less than that of skin flap procedure, which is generally accepted. However, it has been reported that the problems caused by traditional transconjunctival blepharoplasty include postoperative hematoma, dislocation of lower eyelid, incision scar, uneven skin of lower eyelid, diplopia, cyst and granuloma. Therefore, lower eyelid blepharoplasty with safety, efficacy and little side effect is getting more and more attention. Now we will introduce a new procedure to remove the lower eyelid bags which can avoid damaging to the vessels maximally and thereby minimize complications by inserting the needle through the conjunctiva rather than a scalpel.

Methods

The general information

A total of 226 patients treated with lower eyelid blepharoplasty for the correction of lower eyelid bags in Guangzhou Jianli Medical and Beauty Outpatient Department between January 2018 and January 2020 were retrospectively evaluated. The study was approved by the Ethics Committee of Nanfang Medical College (NFEC-2017-K3-Revision02) and adhered to the tenets of the Declaration of Helsinki. Prior to surgery, patients were asked to complete a questionnaire and a written informed consent was obtained from the patients themselves. A consent was also obtained for the clinical photographs. Data regarding history of any previous facial surgery and number of retreatments and complications or side effects after post-operation were extracted from patient charts. Routine postoperative outpatient evaluations were made at immediately, 24 hours, 3 days and 5 days, 15 days and 3 months after the operation via telephone or Wechat. Patient satisfaction was recorded at 1 month with self-evaluation of the treatment result as "worsened", "unchanged", or "improved". Two of the authors (W.K.X. and M.M.C.) evaluated the photographs, and a consensus decision was made for ultimate grading on a similar improvement scale of 1 (worse), 2 (no change), and 3 (improvement). Standard pre- and postoperative photographs were taken and compared to analyze the success of the procedures.

Surgical Procedures

The control group—Traditional transconjunctival blepharoplasty

Lidocaine is injected transcutaneously around the conjunctiva and adipose tissue to be removed. An incision of 2~3 cm is made through the conjunctiva just below the tarsal plate. The aponeurosis and lower-eyelid retractor are dissected to expose the orbital fat, and the globe is pressed gently, enabling the excess orbital fat to protrude. A total of 0.5 ml of anesthetic is injected into the orbital fat; the excess fat of the medial, and lateral compartments is excised; and hemostasis is achieved with careful bipolar electrocautery.

The observation group—Ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer

Approximately 0.5 ml of 2% lidocaine with 1:200,000 epinephrine is administered by the transconjunctival route posterior to the tarsal plate with the patient in the supine position. A small entry site 0.1cm below the inferior tarsal plate is done by piercing the skin to the depth of subconjunctiva after exposing the tarsal plate. Subsequently, Blunt separation is made along the inferior orbital edge of the subconjunctival layer using mosquito-type hemostatic forceps and the protruding orbital fat could be seen. Open the orbital septum, press the eyeball gently, resect the excess of central and medial prolapsed orbital fat conservatively. There was no obvious bleeding and oozing, no protuberance of the lower eyelid, better leveling, and a closed incision. The operation on the right side is the same as that on the left side, and the amount of fat removal was approximately equal to that of the disappearance of fat bulge even if the eyeball was lightly pressed. At the end of the operation, the fat removed from the lower eyelid bag was chopped, placed and centrifuged to get pure fat, which inhaled in 1mL syringe for backup. Pure fat was injected into the obvious depression of the lacrimal sulcus in the predetermined bilateral line. After the operation, the bilateral lacrimal sulcus was obviously improved, the bilateral lacrimal sulcus was symmetric and the shape was satisfactory.

Postoperative Care and evaluation

The patients are instructed to apply ice compresses during the first 24 h to minimize welling. One to two levofloxacin eye drops are used every 4–6 h for 2–3 days. The patient is routinely interviewed telephonically the following day and is instructed to report any problem. The time when the skin appearance of the lower eyelid returned to normal, the satisfaction and the complications after the operation were compared and analyzed between the two procedures.

Statistical analysis

All data are presented as the mean±SD. Statistical analysis was conducted using Student's t test or chi-square test. All analyses were performed using SPSS for Windows (version 20.0; SPSS Inc, Chicago, IL). P<0.05 was considered statistically significant.

Results

Comparison of general conditions between the two groups of patients

In the past 3 years (2016-2019), a total of 226 patients in our department underwent lower eyelid blepharoplasty. There were 94 males (41.6%) and 132 females (58.4%) aged between 23 and 65. The control group (conventional conjunctival blepharoplasty) included 45 males and 59 females with an average age of (44.5±3.5) years, while the observation group (subconjunctival blepharoplasty with orbital fat transfer) included 49 males and 73 females with an average age of (43.1±4.2) years. There were no statistically significant differences between the two groups in gender (p = 0.27) and age (p = 0.44) (p > 0.05), as shown in table 1.

Table1 comparison of general conditions between the two groups of patients

Group	Observation group n=122	Control group n=104	t value	P value
Gender				
Male(n/%)	49(40.16)	45(43.27)	1.23	0.68
Age	43.1±4.2	44.5±3.5	0.59	0.57
⊠Average age⊠				

Note: P⊠0.05 indicates significant statistical significance

Comparison of postoperative improvement between the two groups

The follow-up time was 24 hours to 3 months after surgery. The improvement was significantly greater in the observation group, especially after 15 days (Figure 1-3). Immediately after, after 24 hours, 3 and 5 days, 15 days and 3 months by phone or WeChat routine postoperative clinical assessment, evaluation results show that, the clinical improvement of the observation group is significantly higher than the control group, after 5 days has significant statistical differences between two groups (P < 0.05), see table 2. The representative figures could be seen in Fig.4.

Table 2 Comparison of the improvement of the lower eyelids of the two groups of patients (n)

Groups	Immediately after surgery	24 hours after surgery	3 days after surgery	15 days after surgery	3 months after surgery
Observation group n=122	1	1	8	53	86
Control group n=104	0	0	5	25	72
t value	2.53	2.53	2.86	8.96	12.36
P value	0.25	0.25	0.03	0.01	0.05

Note: P⊠0.05 indicates significant statistical significance

Comparison of clinical efficacy between the two groups

The clinical efficiency of the two groups was compared, and it was found that the clinical efficiency of the observation group was significantly higher than that of the control group ($P < 0.05$), as shown in Table 3. Typical cases have been shown in Fig.5 that the continuous observation among pre- and postoperative photographs in both groups.

Table 3 Comparison of clinical efficacy between the two groups (N /%)

Group	Heal	Excellent	Improve	Invalid	Total effective rate
Observation group (n=122)	45/36.89	42/34.43	30/24.6	5/4.09	117/95.90
Control group (n=104)	23/22.12	33/31.73	36/34.62	12/9.61	92/88.46
χ^2	4.59				
P value	0.031				

Note: $P < 0.05$ indicates significant statistical significance

Comparison of complications between the two groups

We compared the complications between the two groups and found that there was a significant difference between the two groups ($P < 0.05$), as shown in Table 4. Complications above were all managed conservatively and spontaneous resolution was seen within 4 to 8 weeks. None of the patients experienced diplopia, strabismus, blindness or palpable lumpiness (Fig.6).

Table 4 Comparison of surgery-related complications between the two groups (N /%)

Group	Bleeding	Local bag piece	Spherulitic crystal edema	Eyelid ectropion after bleeding or infection adhesion	Skin ecchymosis	Incidence
Observation group (n=122)	1/1.63	2/1.63	2/1.63	0/0	3/0.81	5/5.73
Control group (n=104)	2/1.92	3/1.92	4/1.92	1/1	6/1.92	9/8.65
χ^2	8.095					
P value	0.043					

Note: $P < 0.05$ indicates significant statistical significance

Analysis of patients' satisfaction between the two groups

The satisfaction of the two groups was analyzed after follow-up, and the results showed that the satisfaction of the two groups at different follow-up times was compared: 1 day after the operation, the satisfaction of the observation group was 52.5%, and that of the control group was 32.5%, with no statistically significant difference ($P > 0.05$). The satisfaction of the observation group was higher than that of the control group at 3d and 1 month after surgery, and the difference was statistically significant ($P < 0.05$). See Table 5 for details.

Table 5 Comparison of patients' satisfaction between the two groups at different follow-up periods (N /%)

Group	1d of postoperative	3d of postoperative	1 month of postoperative
Observation group (n=122)	60/49.2	89/79.6	122/100
Control group (n=104)	41/39.4	51/49.0	93/89.4
X ²	3.298	4.589	8.951
P	0.06	0.03	0.001

Note: $P < 0.05$ indicates significant statistical significance

Discussion

The periorbital area has been shown by experimental eye-tracking studies to be the preferred attention area when judging fatigue and age [3]. Consequently, treatments aimed at the rejuvenation of this area are highly effective in enhancing the appearance of an individual's face. Lower eyelid bags are one of the degenerative diseases, which always seen in the elderly and even young patients. Prior studies have already reported in 1988 that degeneration of orbital septal fascia, relaxation of orbicularis oculi muscle and skin relaxation could be three predisposing factors to the increased rate of lower eyelid bags [4]. Although there are many methods of lower eyelid blepharoplasty at present, many operators still use the traditional conjunctival procedure to blepharoplasty, resulting in unnecessary palpebral margin incision scar in a small number of patients. and the incision is large and prone to postoperative hematoma, bruising, uneven skin of lower eyelid, diplopia, cyst and granuloma and other complications. And on this basis, we optimized the procedure. We choose a small entry site about 0.1 cm below the inferior tarsal plate by piercing the skin to the depth of subconjunctiva using a 23-gauge needle. This needle-hole can minimize the damage of blood vessels to reduce the probability of postoperative bruising and retroocular edema, maximize the integrity of the lower eyelid tissue, with rapid recovery, good aesthetics and no obvious postoperative adhesion, accompanied by the ideal treatment effect and satisfaction.

The current study is the first, to the authors' knowledge, which investigated the long-term success and safety of an improved and refined minimally invasive surgical procedure for correction of lower eyelid bags. We are cautioned against overaggressive resection of orbital fat due to the hollow appearance noted in patients undergoing overaggressive lower eyelid blepharoplasty. However, there are always some

ways to deal with the pre- or postoperative hollow of lacrimal sulcus, such as conservative resection and transposition of prolapsed orbital fat.

Although there are obviously a variety of causative pathophysiologic mechanisms associated with lower eyelid bags, there is no doubt that a slackening of orbicular muscle tension, lower lid horizontal laxity also secondary to a weakness of canthal support and the weakening of the orbital septum all favor a prolapse of orbital fat [1]. Goldberg also highlight how the presence of bulging orbital fat tissue is the important cause of this condition for a high percentage of patients. Due to the poor elasticity of the skin and the tension of the orbicularis oculi muscle in the elderly, the lack of supporting strength of the orbital septum can easily lead to the herniation of ocular fat [5]. A total of 167 patients with lower eyelid bags were divided into different age groups by CT and the loss of orbital fat was evaluated. The results demonstrated that the loss of orbital fat increased gradually with age [6]. An article showed that the orbital fat of lower eyelid protruded out and the periocular space expanded with the increase of age, leading to the formation of aging state [7]. Another article also considered that with the increase of age, the orbicularis oculi muscle became thinner and the orbital fat protruded out, leading to the formation of lower eyelid bags [8]. These studies suggested a potential role of orbital fat prolapse in the pathophysiology of eyelid bags. This is perceived as a significant problem by patients seeking rejuvenation or aesthetic enhancement of the periocular area and fat transfer is a good surgical option [9-12]. Based on these observations, our clinical cases further confirmed that more than eighty percent of patients with lower eyelid bags have different degree of lacrimal depression, and more than twenty patients would be more obvious after the removal of eyelid bags (Figs.7); Therefore the fat in the orbital septum cannot be removed directly to achieve the purpose of removing the lower eyelid bags in the actual operation, and the filler of autologous fat is necessary.

From our clinical practice, we explored that the pure fat extracted from the lower eyelid bags has a good survival rate by centrifuge at 3000 rpm, 15min. After that, fat is layered into the predetermined depressions of lacrimal sulcus (always in proportion of 80% on the periosteum and 20% under the skin). The follow-up time was 24 hours to 3 months after surgery. The improvement was significantly greater in the observation group, especially after 15 days (Figure 1-3). Immediately after, after 24 hours, 3 and 5 days, 15 days and 3 months by phone or WeChat routine postoperative clinical assessment, evaluation results show that, compared with control group, the observation group China intelligence and clinical improvement is significantly higher than the control group, after 5 days has significant statistical differences between two groups ($P < 0.05$).The clinical efficiency of the two groups was compared, and it was found that the clinical efficiency of the observation group was significantly higher than that of the control group ($P < 0.05$).We compared the complications between the two groups and found that there was a significant difference between the two groups ($P < 0.05$).The satisfaction of the two groups was analyzed after follow-up, and the results showed that the satisfaction of the two groups at different follow-up times was compared: 1 day after the operation, the satisfaction of the observation group was 52.5%, and that of the control group was 32.5%, with no statistically significant difference ($P > 0.05$). The satisfaction of the observation group was higher than that of the control group at 3d and 1 month after surgery, and the difference was statistically significant ($P < 0.05$).

Based on these observations, it has become the authors' practice to assess patients with the amount of orbital fat preoperatively for concomitant depression of lacrimal sulcus and to perform resection of prolapsed orbital fat at the time of eyelid bag removal in an attempt to repairing each layer of relaxed eyelid tissue and levelled eyelid buccal groove.

The results of this study showed that in the recovery time of lower eyelid bags skin, satisfaction and the incidence of postoperative complications in the observation group were better than those in the control group, which fully demonstrated the important role of ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer in lower eyelid blepharoplasty. In addition to cardio-cerebral vascular sclerosis, many middle-aged and elderly patients with elevated blood lipids and blood viscosity rely on drugs for long-term treatment, especially drugs for promoting blood circulation and removing blood stasis. The above situations may lead to more blood oozing and bleeding during the operation. Therefore, medical staff must comprehensively consider the actual situation of patients, take preventive measures for various adverse reactions, reduce accidents, and pay attention to avoid cardio-cerebrovascular and other complications during the operation.

The authors have so far treated more than 1000 patients with lower eyelid bags using the described above ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer procedure in ten years. With a low overall complication rate, all the adverse advents that they encountered were mild and temporary. No cases of diplopia, strabismus, blindness or other serious complications were observed in our department. Our analysis of the demographics of cases information revealed that over sixty percent patients were women and that the average age (43 years) was similar to the previously reported case series. This data reflects the high incidence of lower eyelid bags and the growing awareness of this defect among the middle-aged women population.

This study is not without limitations, including its retrospective nature. Furthermore, only patients with of 3 months of clinical follow-up were included in this study. While phone interviews were used to further assess long-term follow-up, the authors acknowledge that this may underestimate the rate of recurrence.

Conclusions

The treatment of ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer is a safe and effective procedure with high patient satisfaction and low complication rate, which is worthy of further clinical application.

Abbreviations

CT: Computed tomography

Declarations

Acknowledgements

We express our gratitude to the participants who donated their time in completing the questionnaires.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Nanfang Medical College (NFEC-2017-K3-Revision02) and was therefore performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Authors' contributions

W.K.X. was responsible for the data collection and designed the study; W.K.X. drafted the manuscript; X.X. carried out the analysis and interpreted the results, assisted in drafting and reviewing the manuscript; W.K.X. and M.M.C. were responsible for the operation and the follow-up. Z.J.F. and M.M.C. were the project supervisors. All authors reviewed the final manuscript and gave their consent. The authors read and approved the final manuscript.

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Availability of data and materials

All data generated or analyzed during this study are not publicly available to maintain the privacy of the individuals' identities. The data set supporting the conclusions is available upon request to the corresponding author.

Consent for publication

Not applicable.

Competing interests

There are no competing interests to declare.

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Figures

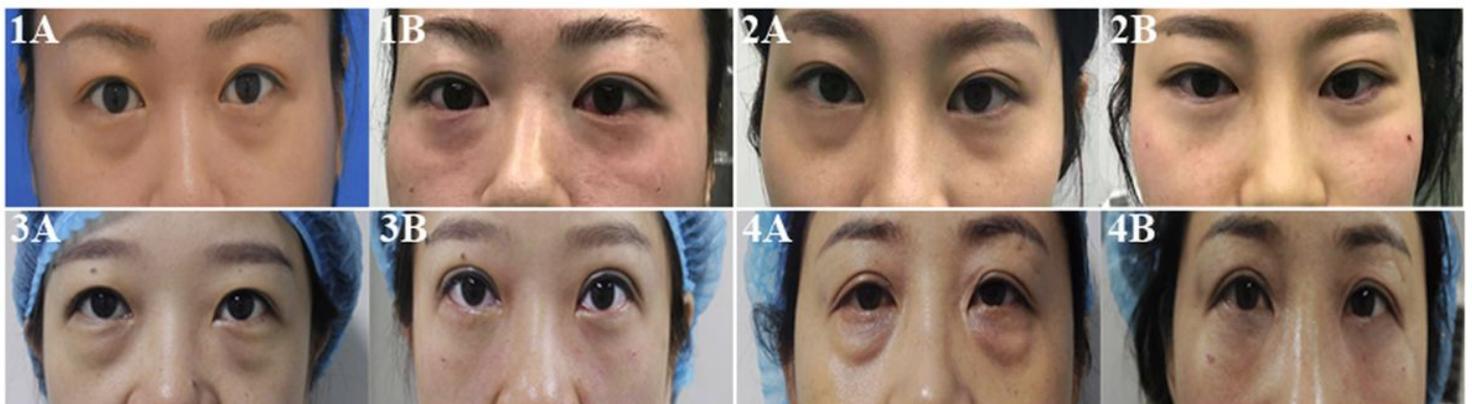


Figure 1

Pre- and immediate postoperative photographs in both groups. 1A-2B, the patients were treated by the traditional transconjunctival blepharoplasty with the moderate swelling. 3A-4B, the patients were treated by the ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transpositioning with less swelling and bruise.

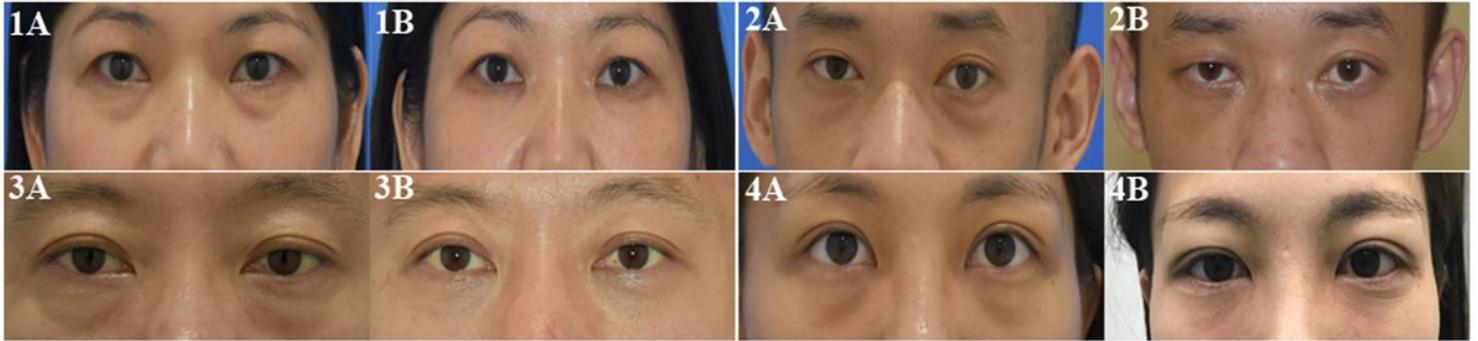


Figure 2

Pre- and postoperative photographs at 15 days in both groups. 1A-2B, the patients were treated by the traditional transconjunctival blepharoplasty: 1A-1B, the mild swelling. 2A-2B, the mild bruise, especially on the right side. 3A-4B, the patients were treated by the ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transpositioning with less postoperation complications.

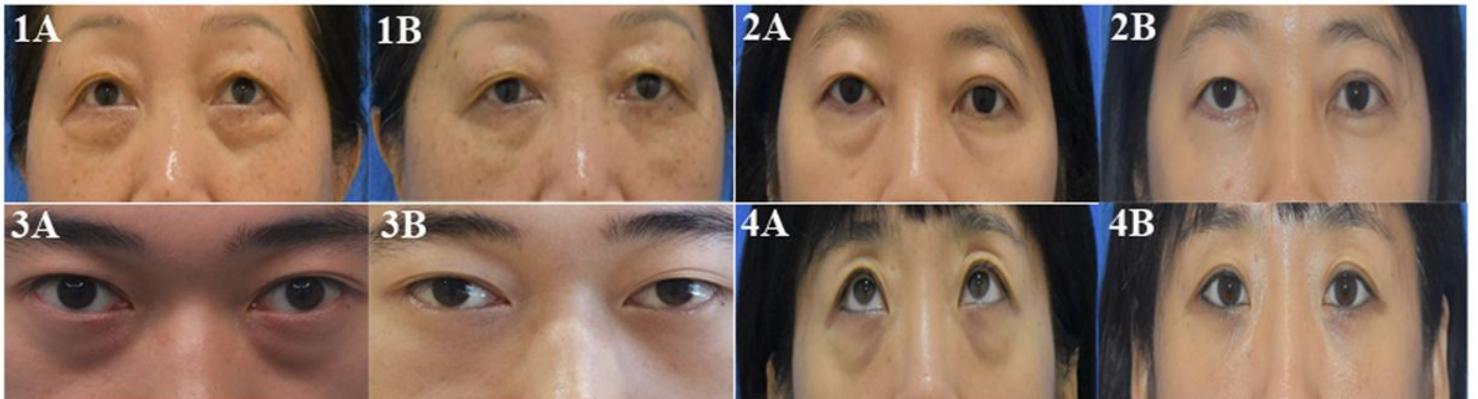


Figure 3

Pre- and postoperative photographs at 3 months in both groups. 1A-2B, the patients were treated by the traditional transconjunctival blepharoplasty: 1A-1B, the uneven skin around the lower eyelid. 2A-2B, the asymmetrical skin lines on both sides. 3A-4B, the patients were treated by the ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transpositioning with less postoperation complications.

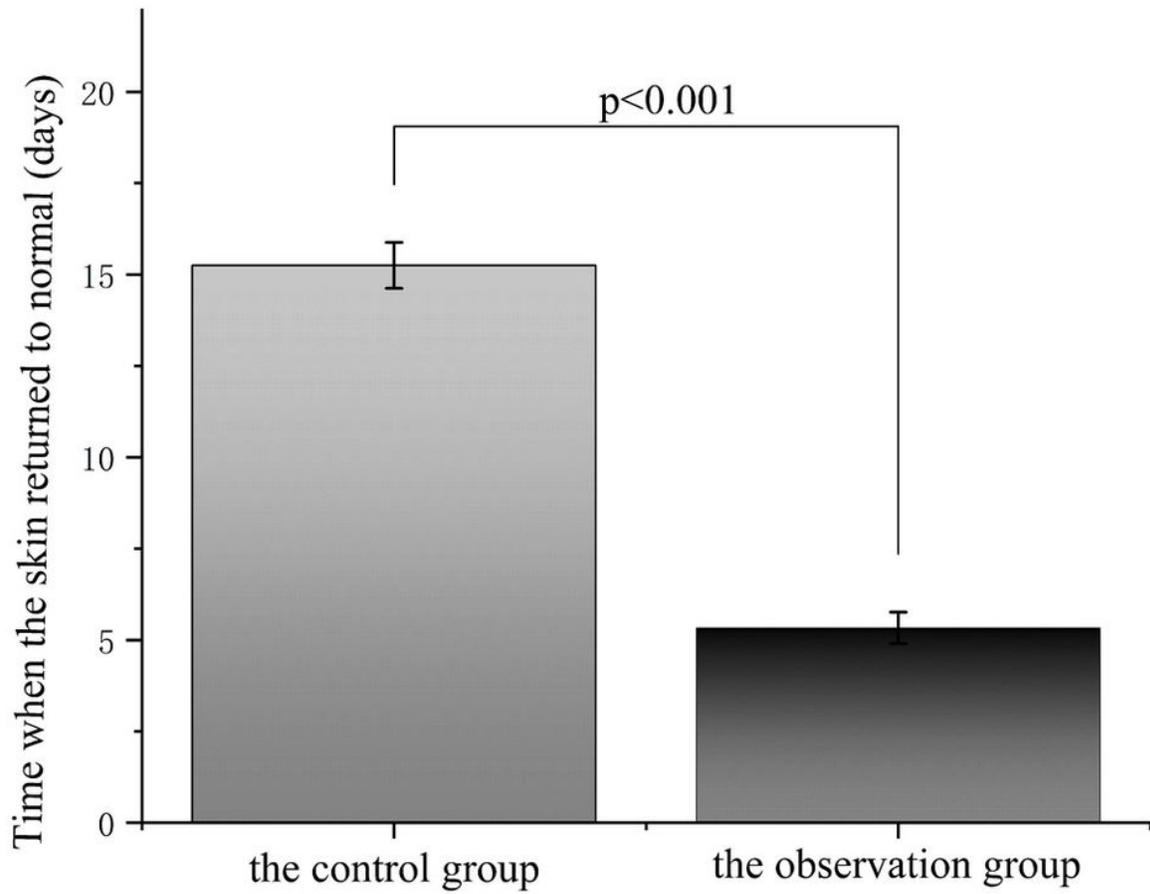


Figure 4

The recovery time when appearance of the skin around the eyes returned to normal in both groups.

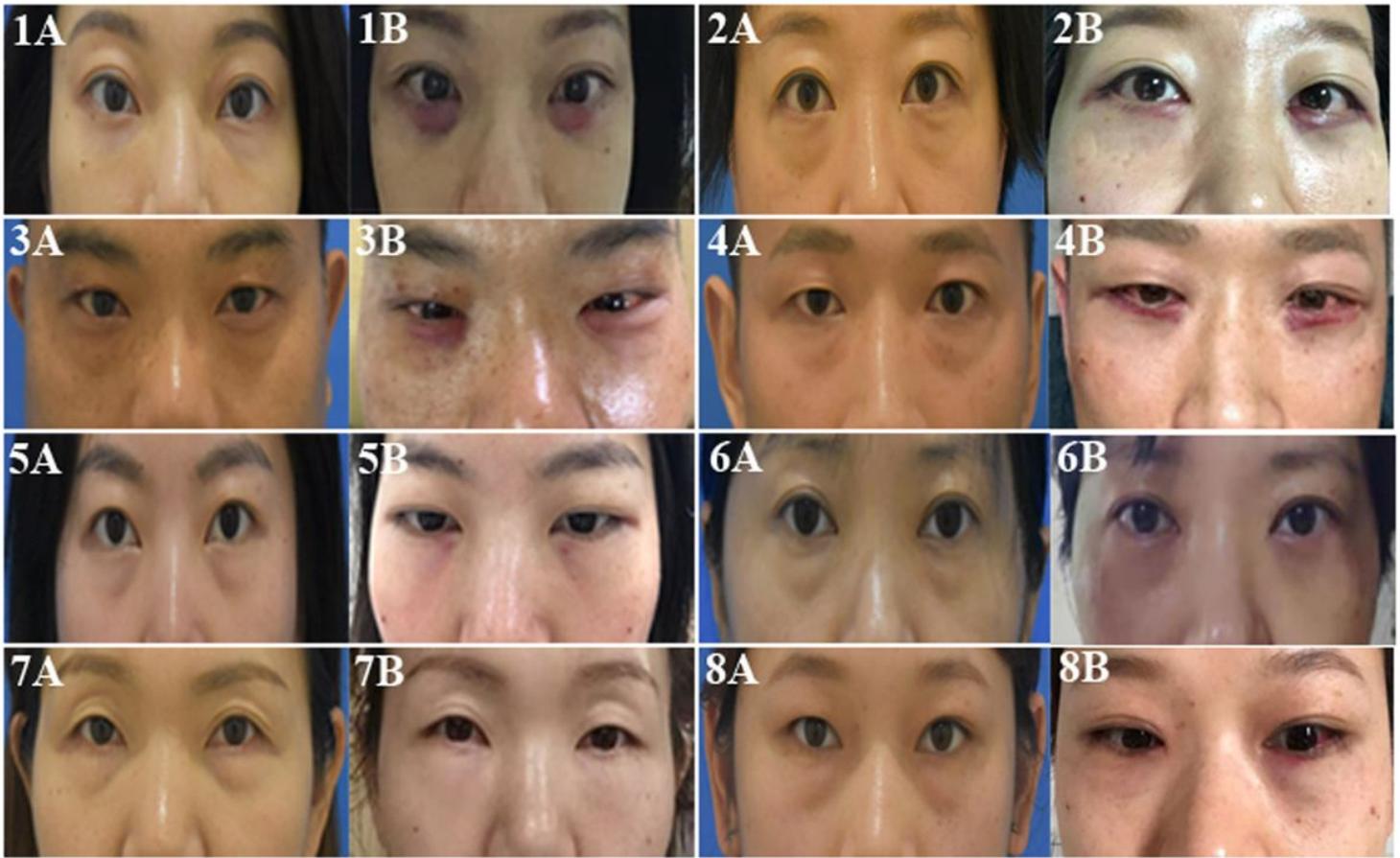


Figure 5

Continuous observation among pre- and postoperative photographs at 5 days in both groups. 1A-1E, Pre- and postoperative photograph at immediately, 24 hours, 3 days and 5 days of a young female patient, showing mild to moderate bruising and bulbar conjunctival congestion after removing the lower eyelid bags using the traditional transconjunctival blepharoplasty. 2A-2E Marked improvement of lower eyelid bags 5 days after the procedure with ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer.

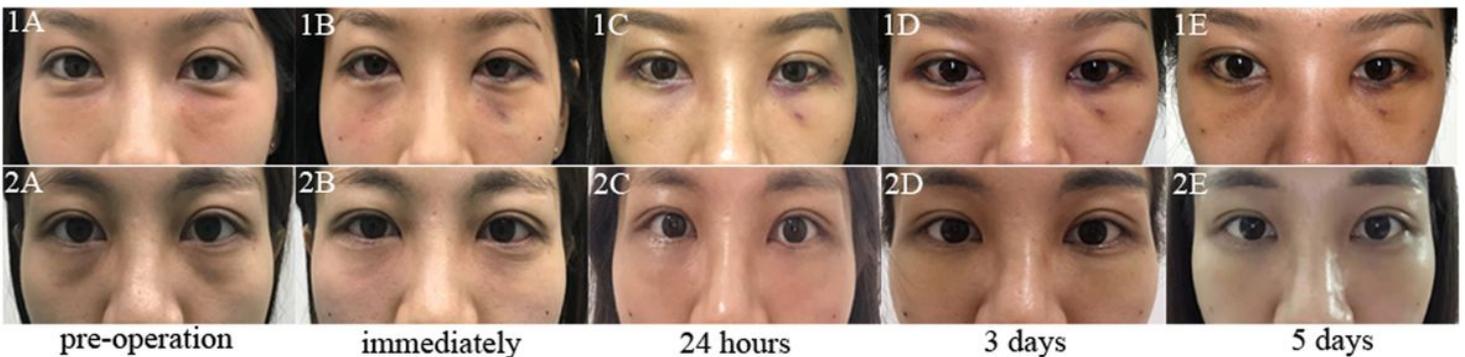


Figure 6

Postoperative complications in both groups. Pre- and postoperation photographs of patients with lower eyelid bags at 24 hours after different procedures. 1A-4B, the patients were treated by the traditional

transconjunctival blepharoplasty: 1A-1B, moderate bruise; 2A-2B, bulbar conjunctival congestion; 3A-3B, subconjunctival chemosis; 4A-4B, mild ooze blood. 5A-8B, the patients were treated by the ultra-micro transconjunctival lower eyelid bags removal combined with orbital fat transfer: 5A-5B, mild bruise; 6A-6B, mild swelling of left eyelid; 7A-7B, moderate swelling of lower eyelid; 8A-8B, mild bulbar conjunctival congestion.

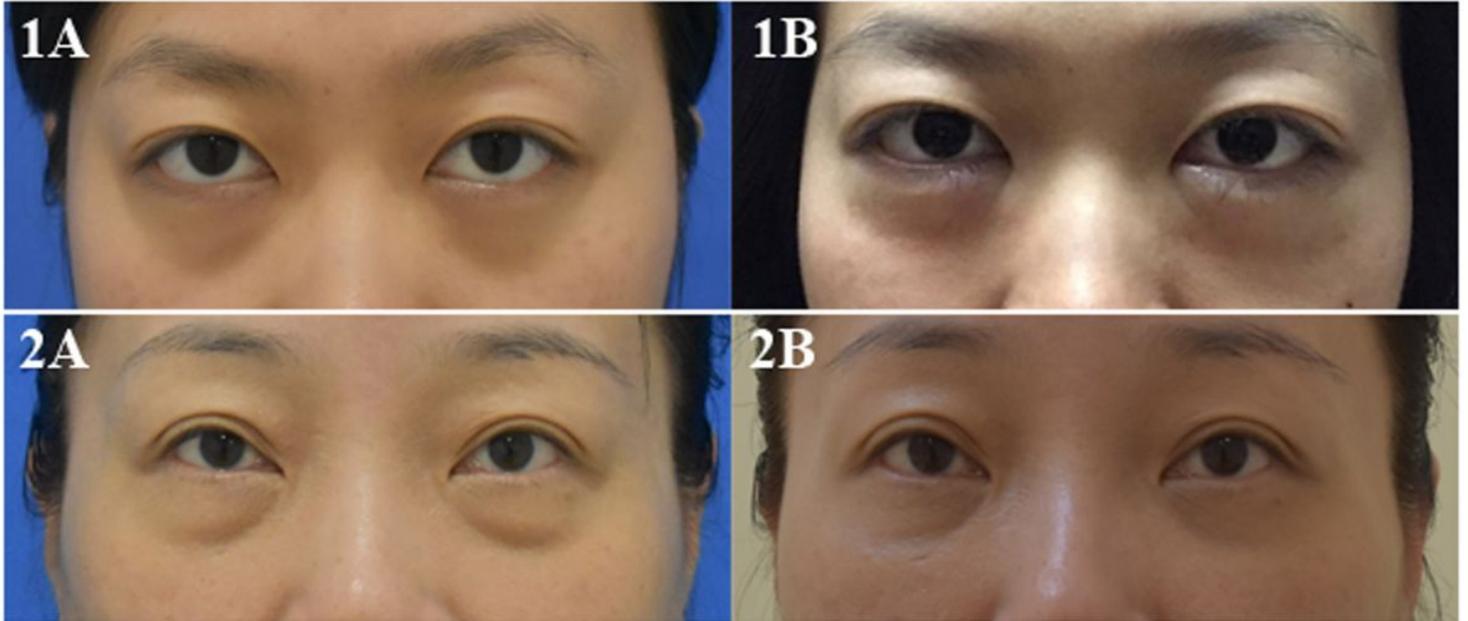


Figure 7

The observation of patients with ultra-micro transconjunctival lower eyelid bags removal but no orbital fat transfer. 1A-1B, the removal of lower eyelid bags alone of a young woman showing aggravating lacral depression. 2A-2B, the removal of lower eyelid bags alone of a middle-aged woman showing aggravating lacral depression.