The eye area is considered attractive when it shows typical youthful-looking features. Prantl et al. found that an even pretarsal show or tarsal platform show is generally perceived as youthful and attractive. When pretarsal show is less or uneven, as in lateral hooding, a person is perceived as looking more tired. Making an eye more attractive can be achieved by removing redundant upper eyelid skin or by elevating the eyebrow, or both. However, elevating the eyebrows cannot always be recommended. Elevating the whole eyebrow can result in a tired and sad expression, whereas elevating only the lateral part of the eyebrow can result in a surprised appearance. Special attention must be paid to the shape of the skin excision of the upper eyelid in patients who have a normal eyebrow position to achieve a homogeneous distribution of the pretarsal show.

Traditional versus Laterally Extended Upper Blepharoplasty Skin Excisions: Objective and Patient-Reported Outcomes

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Background: Different skin excision shapes may result in different aesthetic outcomes after upper blepharoplasty.

Methods: Two skin-only excision shapes were evaluated objectively and subjectively in 28 matched patients with laterally extended skin excision (group A) or traditional elliptical skin excision (group B). The pretarsal show, lateral eyebrow height, amount of scarring (evaluated with the Patient and Observer Scar Assessment Scale), and patient-reported aesthetic results (evaluated using FACE-Q) were scored and compared at 6 and 12 months postoperatively.

Results: In both groups, pretarsal show improved significantly after blepharoplasty. The homogeneity of pretarsal show improved significantly in the lateral extension group (group A) together with slightly more pretarsal show (0.5 to 0.8 mm at central pupil region) at 6 and 12 months of follow-up compared with group B (P = 0.004). A trend was observed in the exocanthion 45-degree measurement, in which group A had 0.6 mm greater pretarsal show 6 months postoperatively. Homogeneity of the pretarsal show had improved significantly in group A, but not in group B, at 12 months after blepharoplasty. No other significant differences were observed between the groups regarding pretarsal show measurements or FACE-Q scores. Both groups showed descent of the lateral eyebrow, but this was only significant in group B. Group B showed 1.4 to 2.0 mm more descent compared with group A. Scarring and adverse effects scores were low in both groups and did not differ.

Conclusion: Laterally extended skin excision and traditional elliptical skin excision both result in positive aesthetic results, but the laterally extended skin excision technique is accompanied by a slightly more favorable outcome. (Plast. Reconstr. Surg. 151: 73, 2023.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, III.

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lateral excision, and in a higher position, to eliminate the lateral hooding. Which skin excision design is preferable remains unclear. To the best of our knowledge, no study has compared various excision shapes to assess the aesthetic result. The aim of this study was to compare the outcomes of traditional elliptical skin excisions with those of wide lateral skin excisions in terms of pretarsal show and eyebrow height measurements, patient-reported aesthetic results, and scarring.

**PATIENTS AND METHODS**

**Study Design**

A multicenter prospective trial was undertaken at the Department of Oral and Maxillofacial Surgery of the University Medical Centre Groningen and at the Treant Schepel Hospital, Emmen, the Netherlands. Two blepharoplasty techniques were compared. Traditional elliptical skin excision was performed at the University Medical Centre Groningen. Laterally extended skin excision was performed at the Schepel Hospital. The study protocol was approved by the institutional review board of the University Medical Centre Groningen (METc 2019/557) and registered in the Netherlands Trial Register (ID NL7886). Written informed consent was obtained from all study participants.

**Study Population**

All consecutive healthy male and female White patients between the ages of 30 and 70 years who attended a consultation about dermatochalasis of both upper eyelids and in whom an upper blepharoplasty was indicated at the Schepel Hospital between November of 2018 and June of 2019 were asked to participate (group A). The consultation and procedure were performed by one maxillofacial surgeon (J.S.). Patients were excluded if they had a history of ocular or orbital trauma, eyelid or eyebrow region surgery, other facial cosmetic surgical or nonsurgical procedures, any current ophthalmic disease, blepharoptosis, or significant eyebrow ptosis.

These participants were matched to participants from another larger trial (group B) that was performed by the same research group at the University Medical Centre Groningen between February of 2018 and October of 2019. Inclusion and exclusion criteria were the same.

Matching was done on the basis of baseline dermatochalasis severity score (per eye), sex, and age (in that order of priority) by one researcher (M.C.) using a case–control matching tool (MedCalc, version 19.4; MedCalc Software; Ostend, Belgium). Using this tool, the first 14 best matches regarding baseline dermatochalasis severity score (per eye), sex, and age were included (group B). At this stage, the researcher (M.C.) was blinded regarding all other participant data. The patients could not be blinded regarding the shape of the excision but received a unique code to anonymize the data.

**Surgical Procedure**

Three experienced surgeons (J.J., R.H.S., J.S.) performed the upper blepharoplasties. The surgical procedure was standardized before the study and took place in an outpatient environment. J.S. performed only the laterally extended excision shape (Fig. 1, left; group A); J.J. and R.H.S. performed only the traditional elliptical excision

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**Fig. 1.** (Left) Skin marking on upper eyelid with lateral extension of the excision (group A). (Right) Skin marking on upper eyelid without lateral extension of the excision (group B). Copyright © Rogier Trompert Medical Art.
shape (Fig. 1, right; group B). Before surgery, surgical landmarks and planned skin excisions were marked in both groups on upright positioned patients in a neutral gaze with a relaxed frontalis muscle. The lid crease incision was marked first, generally following the crease of the upper eyelid. In the wide laterally extended skin excisions, the technique described by Bellinvia et al. 5 was used (Fig. 1, left). A line was drawn at the top margin of the area to be excised. The first markings were made medially, 5 to 6 mm above the medial canthus. The marking was curved superiorly, leaving the thin lid skin to reach the thick skin over the super orbital rim, never going downward. The line ended laterally, over and beyond the area of lateral hooding, at the height of the medial margin of the eyebrow. The markings did not cross the eyebrow.

For the traditional elliptical excision shape, the lid crease incision was marked first, generally following the eyelid crease of the upper eyelid and extending upwards in the area of lateral hooding within the boundary of the lateral orbital rim. The upper marking was always in the thin eyelid skin, following the lower contour of the eyebrow and at least 10 mm below it. 6 The markings of this technique resulted in an elliptical shape (Fig. 1, right). For both techniques, markings did not extend beyond the medial canthus.

After marking, the patient was asked to close the eyelids gently. A smooth pair of forceps was used to grasp the excess skin above the eyelid crease incision, just until the eyelashes began to rotate upwards (pinch technique). This was considered the maximum amount of skin that could be removed safely. The surgical markings were made within these boundaries.

Then, 1.7 mL of local anesthetic (40 mg of articaine, 10 μg of epinephrine per mL) was injected subcutaneously per eye. Skin incisions were made with a scalpel following the markings and the excess skin was removed. Cauterization was used to achieve hemostasis. No orbicularis oculi muscle or fat was removed or excised. The skin was closed with a 6-0 monofilament suture intracutaneously in a running fashion combined with adhesive suture strips. In group A, an additional solitary suture was placed laterally to minimize wound tension. Instructions were given to avoid strenuous activities. Sutures were removed after 7 days.

Outcomes

Study outcomes were evaluated preoperatively and 6 and 12 months after blepharoplasty. The primary outcome was change in the visible pretarsal skin assessed from standardized photographs taken after the two skin excision techniques and between the two techniques. Pretarsal show homogeneity, patient-reported aesthetic results (FACE-Q questionnaires), 7–9 and amount of scarring (Patient and Observer Scar Assessment Scale) 10 were also assessed.

Demographic data were recorded, including age, sex, and medical history. The severity of dermatochalasis was assessed preoperatively and categorized according to a four-level photonumeric severity scale using anatomical cutoff points as normal (upper eyelid skin is not touching the eyelashes), mild (upper eyelid skin is touching the eyelashes), moderate (upper eyelid skin is hanging over the eyelashes), or severe (upper eyelid skin is hanging over the eye). 11 During surgery, the amount of removed tissue was weighed per eye and was recorded in grams.

Pretarsal Show and Eyebrow Height

Standardized digital photographs were taken before surgery of the primary gaze, with the head in a natural position, to assess pretarsal show. Each photograph was taken by the same researcher (M.H.J.H.), under the same lighting conditions, at a fixed distance between the patient, and with the same camera (Nikon D5600 AF-S DX NIKKOR VR; Minato, Tokyo, Japan). To account for size discrepancy between preoperative and postoperative photographs, a horizontal visible iris diameter, in millimeters (11.77 mm in male participants and 11.64 mm in female participants), 12 was used for calibration purposes. 13–15 The photographs were measured digitally using ImageJ software (version 1.53a; National Institutes of Health, Bethesda, MD). The following distances were measured for each eye (Fig. 2): upper palpebral sulcus at center of pupil to upper limbus at center of pupil (a); upper palpebral sulcus at exocanthion to exocanthion (b); and exocanthion to upper palpebral sulcus at a 45-degree angle (EX45) (c).

To assess the homogeneity of the pretarsal show, upper palpebral sulcus at center of pupil to upper limbus at center of pupil and exocanthion to EX45 subtractions were undertaken to provide a difference score.

To assess lateral eyebrow height, the distance between the exocanthion and the lower margin of the eyebrow was measured for both eyes (Fig. 2).

FACE-Q Questionnaires

FACE-Q questionnaires were filled in preoperatively and at 6 and 12 months. 7–9 The FACE-Q modules refer to the eyes in general, upper eyelids, forehead and eyebrows, overall face, age appearance appraisal, age appraisal, social functioning,
and satisfaction with outcome. The scale scores range from 0 (worst) to 100 (best), except for the age appraisal scale, which ranges from –15 (best) to +15 (worst). Included is a module with a checklist measuring adverse effects.

Patient and Observer Scar Assessment Scale

The validated Patient and Observer Scar Assessment Scale (version 2.0/NL) was used 12 months postoperatively. There are two separate domains: a patient domain and an observer domain. The patient scale consists of seven questions: six asking about specific scar characteristics (ie, pain, itch, color, stiffness, thickness, and regularity) and the seventh rating the overall opinion of the scar site. The observer scale consists of six questions concerning rate scar vascularity, pigmentation, pliability, thickness, relief, and surface area, providing the total score. The seventh observer question is on the overall opinion of the scar. All questions are answered on a Likert scale ranging from one to 10, with one equal to no difference between the scar and noninjured skin and 10 representing the most difference. The total score of both scales entails adding the scores of each of the six items (range, 6 to 60). The lowest score, 6, reflects normal skin, whereas the highest score, 60, reflects the worst scar imaginable.

Sample Size and Statistical Analysis

The sample size calculation of our primary outcome was based on pretarsal show measurements. In the study by Prantl et al.\(^1\) the mean measurement between the upper palpebral sulcus and the upper limbus was 26.1 (percentage of iris width) for the 15% most attractive eyes and 38.8 (percentage of iris width) for the 15% most unattractive eyes, with a standard deviation of 15.6 (percentage of iris width). For the sample size calculation, we used a horizontal visible iris diameter of 10 mm\(^13\) for millimeter conversion purposes. We considered a difference of 1.3 mm (difference between the most attractive and the most unattractive eyes) a clinically relevant difference. All measurements were carried out per eye of each participant. A sample size of 14 patients (28 eyes) was needed per treatment group to detect a difference of 1.3 mm in pretarsal show between the groups at 6 and 12 months, with a 0.05 level of significance and a power of 80%, allowing for a 10% attrition rate and 10% for possible nonparametric testing (G*Power version 3.1.9.6; University of Kiel, Germany).

Data were analyzed using IBM SPSS Statistics version 23.0 (IBM Corp., Armonk, NY). The Shapiro-Wilk test, Kolmogorov-Smirnov test, and graphical interpretation of normal Q-Q plots were used to determine the distribution of the data. Baseline characteristics and the amount of removed skin during surgery were summarized descriptively and differences were assessed. Independent samples \(t\) test was used to assess differences in age and the amount of tissue removed between groups A and B at baseline. The Fisher exact test was used to evaluate differences in sex and dermatochalasis severity scores between groups A and B at baseline.

The generalized estimating equation (GEE), a statistical model that measures adjusted differences by taking possible confounding factors into account, was used to assess the differences in pretarsal show and pretarsal show homogeneity between groups A and B. The GEE model included the pretarsal show measurements, baseline pretarsal show, sex, age, dermatochalasis severity score, and the amount of skin removed during surgery. Before GEE model fitting, the following variable selection procedure was applied. First, we determined which variables were of clinical relevance to the outcome variable. We achieved consensus among experts (A.V., R.H.S., J.J., J.S.) about the following possible confounding variables: baseline values of the outcome variable, age, sex, dermatochalasis severity score, and amount of tissue removed during surgery. Then, different correlation structures

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**Fig. 2.** Pretarsal show and lateral eyebrow measurements. The blue line represents the lateral eyebrow measurement. The measurements of the left eye were identical to those of the right eye. a, Upper palpebral sulcus at center of pupil to upper limbus at center of pupil (USP-ULP); b, upper palpebral sulcus at exocanthion to exocanthion (USEX-EX); c, exocanthion to upper palpebral sulcus at a 45-degree angle (EX-EX45). Copyright © Rogier Trompert Medical Art.
(exchangeable, M-dependent, unstructured) were tested. The working correlation structure was chosen on the basis of the goodness of fit (Corrected Quasi Likelihood under Independence Model Criterion). The model with the lowest information criterion was used for further analysis, which was the exchangeable correlation structure for all variables. Residuals were plotted in a histogram to assess assumptions for using GEE, and all residuals showed a Gaussian distribution.

We considered *P* values less than 0.05 to be statistically significant. Missing data were not imputed. For the lateral eyebrow height, the GEE model included the lateral eyebrow height, baseline lateral eyebrow height, sex, age, dermatochalasis severity score, and the amount of skin removed during surgery. All residuals showed a Gaussian distribution. Differences between the groups’ FACE-Q scores from the different time points also were evaluated using GEE. The GEE model included FACE-Q scores, baseline FACE-Q scores, sex, age, dermatochalasis severity scores, and amount of skin removed during surgery. The baseline FACE-Q scores for Satisfaction with Outcome were not part of the GEE model because no baseline Satisfaction with Outcome (ie, before surgery) exists. All residuals showed a Gaussian distribution. Different correlation structures (exchangeable, M-dependent, unstructured) were tested and the model with the lowest information criterion was used, which was the exchangeable correlation structure in all cases.

Differences in FACE-Q scores before and after blepharoplasty, pretarsal show measurements, and eyebrow height were analyzed using the Friedman test and pairwise comparisons were performed. All postoperative FACE-Q scores were compared with each group’s baseline FACE-Q scores.

Descriptive statistics regarding Patient and Observer Scar Assessment Scale scores were summarized and differences between groups A and B were analyzed using the Mann-Whitney *U* test. Descriptive statistics are provided as median (Q1; Q3).

The Fisher exact test was used to evaluate differences in adverse effects (FACE-Q) between groups A and B.

**RESULTS**

Baseline characteristics are shown in Table 1. There were no significant differences at baseline regarding age, sex, dermatochalasis severity score,
or amount of removed skin during surgery. One participant (group A) was excluded from the 12-month analysis because of a malignancy. For both procedures, representative preoperative and postoperative photographs are shown in Figures 3 and 4.

**Pretarsal Show**

After surgery, all the pretarsal show (Table 2) measurements had improved, with the majority having improved significantly. In group B, no significant increase in exocanthion to EX45 was observed compared with baseline. The homogeneity of the pretarsal show had improved significantly in group A by the 12-month follow-up; this was not observed in group B. There were no other significant differences between the 6-month and 12-month follow-ups.

The GEE showed significant outcome differences between groups A and B regarding the central pupil (upper palpebral sulcus at center of pupil to upper limbus at center of pupil) pretarsal show measurement. On average, patients in group A had 0.5 mm more pretarsal show (regression coefficient \( \beta \), 0.5; \( P = 0.032 \)) than patients in group B 6 months postoperatively and 0.8 mm more at the 12-month follow-up (regression coefficient \( \beta \), 0.8; \( P = 0.004 \)). The other pretarsal show measurements were not significantly different between groups A and B. A trend was observed in the EX45 measurement (\( P = 0.068 \)) in which group A had 0.6 mm more pretarsal show compared with group B 6 months postoperatively.

**Eyebrow Height**

The lateral eyebrow showed a descent in both groups, but this was only significant for group B at both 6 months (\( P = 0.001 \)) and 12 months (\( P < 0.001 \)) follow-up. The differences between the 6-month and 12-month follow-up were not significant.

The GEE showed significant differences between groups A and B in lateral eyebrow height. The median postoperative lateral eyebrow height (Table 2) in group B was 1.4 mm (6-month follow-up; \( P = 0.029 \)) to 2.0 mm (12-month follow-up; \( P = 0.007 \)) lower compared with group A.

**FACE-Q**

Table 3 shows both groups’ median (Q1; Q3) FACE-Q scores. All postoperative FACE-Q scores

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Fig. 3. (Left) Preoperative photograph of a participant from group A. (Right) Photograph 12 months after upper eyelid blepharoplasty with lateral extension of the excision.

Fig. 4. (Left) Preoperative photograph of a participant from group B. (Right) Photograph 12 months after upper eyelid blepharoplasty without lateral extension of the excision.
Table 2. Pretarsal Show and Eyebrow Height before and after Surgery

<table>
<thead>
<tr>
<th></th>
<th>Pretarsal Show and Eyebrow Height</th>
<th>6 Months Postoperatively</th>
<th>12 Months Postoperatively</th>
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<tbody>
<tr>
<td></td>
<td>Preoperatively</td>
<td>Group A</td>
<td>Group B</td>
</tr>
<tr>
<td></td>
<td>1.1 (1.0; 2.5)</td>
<td>3.1 (1.9; 4.3)</td>
<td>3.0 (2.3; 3.4)</td>
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<tr>
<td></td>
<td>1.3 (0.2; 2.5)</td>
<td>3.2 (0.3; 4.3)</td>
<td>3.2 (0.3; 4.3)</td>
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<tr>
<td></td>
<td>1.8 (0.2; 3.0)</td>
<td>3.5 (2.0; 4.3)</td>
<td>3.5 (2.0; 4.3)</td>
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<tr>
<td></td>
<td>1.8 (0.2; 3.0)</td>
<td>3.5 (2.0; 4.3)</td>
<td>3.5 (2.0; 4.3)</td>
</tr>
</tbody>
</table>

The differences in the median Patient and Observer Scar Assessment Scale scores were not significant between groups A and B. The median (Q1; Q3) patient scar assessment score for group A was 8.0 (6.0; 14.0) and 6.0 (6.0; 6.5) for group B ($P = 0.054$) and overall impression was 1.0 (1.0; 2.0) for group A and 1.0 (1.0; 1.0) for group B ($P = 0.155$).

The median (Q1; Q3) observer scar assessment score was 7.0 (6.5; 7.5) for group A and 7.0 (6.0; 7.0) for group B ($P = 0.720$) and the overall impression was 1.0 (1.0; 1.5) for group A and 1.0 (1.0; 1.0) for group B ($P = 0.720$).

### Adverse Effects

Table 4 shows the number of patients who reported being bothered by an item at baseline and 6 and 12 months postoperatively. A variety of postoperative adverse effects were reported, from a mild to moderate degree, but both groups’ participants were bothered by fewer items after the upper blepharoplasty. The differences between groups A and B, including noticeable scars, were not significant.

### DISCUSSION

Patient satisfaction generally increases after an upper blepharoplasty. To the best of our knowledge, only a few studies have explored the distinct physical landmarks that define eye attractiveness before and after upper blepharoplasty. Tarsal platform masking, also known as the eyeshadow space, is considered an undesirable trait, especially when not evenly distributed (eg, with lateral hooding).

In our study, pretarsal show and patient satisfaction increased after an upper blepharoplasty, regardless of the type of skin excision. The laterally extended excision shape theoretically could provide more relief from lateral hooding than the more conventional skin excision approach. We found that EX45 (lateral area of the pretarsal platform) only increased significantly in the laterally extended skin excision group (A) and not...
### Table 3. Preoperative and Postoperative FACE-Q Scores

<table>
<thead>
<tr>
<th>FACE-Q Item</th>
<th>Preoperatively</th>
<th>6 Months Postoperatively</th>
<th>12 Months Postoperatively</th>
<th>Adjusted Difference between Groups A and B</th>
</tr>
</thead>
</table>

NA, not applicable.  
Values are median (Q1; Q3).  
*P* value of the comparison between preoperative and postoperative outcomes within a group.  
The adjusted difference is the regression coefficient from the generalized estimating equation model and represents the difference in FACE-Q scores between the treatment groups (group A group B), adjusted for baseline values, sex, age, dermatochalasis severity score, and amount of tissue removed. The 95% confidence interval is shown in parentheses.
Despite the indications in the objective (pretarsal show and lateral eyebrow height) and subjective (patient’s perceived age) measurements that favored the lateral extension group, no major differences were found among the other results between the two upper blepharoplasty excision shapes. In theory, scarring would be more noticeable in the laterally extended group, but no significant differences were found.

In conclusion, both excision shapes result in positive aesthetic results, although the laterally extended skin excision had a slightly more favorable outcome.

**ACKNOWLEDGMENTS**

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**REFERENCES**


