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Compression Dressing versus Noncompressive Transparent Eye Shield after Ptosis Surgery

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Background: We aimed to investigate the effect of compression dressing on edema, ecchymosis, pain, and ocular surface irritation after ptosis surgery.
Methods: After ptosis correction [anterior levator reinsertion (and resection) (ALR), if necessary additional blepharoplasty], the eye was randomized for compression dressing or transparent eye shield. Edema and ecchymosis were scored on a four-point rating scale by a blinded observer 1 day (D1), 1 week (D7), and 8 weeks (D56) after surgery; the same was done for scar formation regarding redness and bulging at D7 and D56. Aesthetic outcome was ranked by patient and blinded observer using the Global Aesthetic Improvement Score at D1, D7, and D56. Postoperative pain was scored using a visual analogue scale (0 to 10) at D1. Impairment after surgery by dressing or eye shield was evaluated at D1.
Results: Ecchymosis, edema, scar formation, and aesthetic outcome ranked by the patient and blinded observer did not differ between the groups with compression dressing and eye shield at any day of follow-up ($P > 0.05$). Postoperative pain and impairment were the same in both groups ($P > 0.05$). One case of corneal erosion occurred in the group with compression dressing at D1 ($P = 0.342$). At D7, corneal staining was increased in the group without compression dressing ($P = 0.930$).
Conclusions: Compression dressing after ALR does not reduce ecchymosis, edema, or postoperative pain and has no effect on early scar formation or aesthetic results. To prevent corneal erosion caused by the dressing, it can be omitted after ALR without inferiority for the early postoperative results. *(Plast Reconstr Surg Glob Open 2024; 12:e5548; doi: 10.1097/GOX.0000000000005548; Published online 23 January 2024.)*

INTRODUCTION

Upper eyelid ptosis is most often caused by involutional changes in the aging eyelid.[1] It leads to a droopy eyelid covering the pupil and, therefore, visual field impairment. Anterior levator reinsertion (and resection) (ALR) is one of the main techniques for correction of involutional ptosis.[2,3] It is often advised that the eyelids should be patched using a compression dressing after upper eye lid surgery, to minimize postoperative edema and ecchymosis.[4] However, postoperative complications resulting from the dressing are observed. Ocular surface irritation (OSI) including corneal staining and erosion can occur due to contact of the dressing with the ocular surface, especially after ALR when there is lagophthalmos[5] due to tightening of the levator apponeurosis. The patient's vision is impaired by the dressing and severe complications (eg, retrobulbar hemorrhage) may be detected with delay underneath the bandage.[4]

The aim of this study was to investigate whether compression dressing of the eyelid after ALR indeed leads to a reduction of postoperative edema and ecchymosis or if the above-mentioned OSI is observed more frequently if the eyelid is covered with a compressive bandage.

METHODS

We conducted an observer-blinded, randomized, controlled trial, from July 1, 2020 to January 10, 2023. Patients with involutional upper eyelid ptosis who were scheduled for ALR at the University Eye Hospital of Ludwig-Maximilians-University Munich were asked to participate in the study. Exclusion criteria were previous surgery on the upper eyelid, previous eye lid trauma, congenital ptosis, or coagulation disorders. The study protocol was reviewed and approved by the institutional review board of the Ludwig-Maximilians-University Munich (reference

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no.: 20-304). The tenets of the Declaration of Helsinki were followed throughout the study. All patients participated in the study voluntarily and were informed of their right to abandon it at any chosen time without having to provide a reason. Informed consent was obtained in written form.

As estimation of SD for the primary outcome measure ecchymosis on a four-point rating scale was not possible, sample size calculation was based on pain with a difference of one point on the pain visual analogue scale considered to be clinically relevant. With an estimated SD of 1.5, a power (ß) of 0.80, and two-sided significance level (α) of 0.05, a minimum of 36 cases were enrolled in the study.

Surgical Procedure, Dressing, and Postoperative Recommendations

ALR was performed in all patients, under local anesthesia using bupivacaine 0.5% with epinephrine 0.0005% (1:200 000, JENAPHARM). Skin incision was performed using a 15 scalpel. In patients with additional dermatochalasis, blepharoplasty was performed as a first step of the surgical procedure, removing the redundant skin. The levator aponeurosis was then prepared by opening the orbital septum and separating it from the Muller muscle. After reinsertion of the levator at the tarsal plate, the redundant amount of levator aponeurosis was resected. Bipolar coagulation was used for hemostasis. Skin closure was performed by using resorbable 6.0 Vicryl sutures (6-0 Vicryl, coated, RB1, violett, V302H, Ethicon, Inc., Johnson & Johnson, Raritan, N.J.) in the central part of the wound stabilizing the skin lid crease and if necessary, in cases with additional blepharoplasty, by using nonresorbable 7.0 Ethilon sutures (7-0 Ethilon, P-6, black, 1647G, Ethicon, Inc., Johnson & Johnson, Raritan, N.J.) temporally. Mixed antibiotic and steroid ointment (dexa-gentamicin, eye ointment, dexamethasone 0.3 mg/g and gentamicin sulfate 5.0 mg/g, Ursapharm, Saarbrücken, Germany) was applied to the eye and eyelid. Immediately after the surgery, a randomization procedure was carried out to determine if the lid was patched with a compression dressing or not. If not, a transparent eye shield was applied. In bilateral procedures, the eye the surgeon started performing surgery on was determined by the randomization procedure, and the second eye was covered in the different form (for example, for a bilateral case, the randomization procedure determined compression dressing for the first eye, and on the second eye, the transparent eye shield was applied). For the compression dressing, a moist gauze compress was applied as the bottom layer, followed by a dry gauze compress (Kompressen, gauze swabs, Nobamed Paul Danz AG, Wetter, Germany) and an eye pad (NOBALUMENAL - steril, eye pad, Nobamed Paul Danz AG, Wetter, Germany) fixed with a flexible adhesive patch (3M Blenderm, tape, 3M Company, St. Paul, Minn.) (Fig. 1). In the other cases, a transparent noncompressive eye shield (BVI Visitec, Universal Eye Shield, Waltham, Mass.) was applied (Fig. 2). The dressing was left in place for 24 hours. All procedures, including the installation of the dressing, were performed by a single surgeon (A.S.).

Takeaways

Question: Is there an effect of compression dressing after ptosis surgery on the early postoperative results?

Findings: There was no difference in edema, ecchymosis, early scar formation, pain, or aesthetic outcome whether a compression dressing was used or not. One case of corneal erosion was noticed in the group with compression dressing.

Meaning: To prevent corneal erosion caused by a compression dressing and discomfort after ptosis surgery, it can be omitted without inferiority for the early postoperative result.

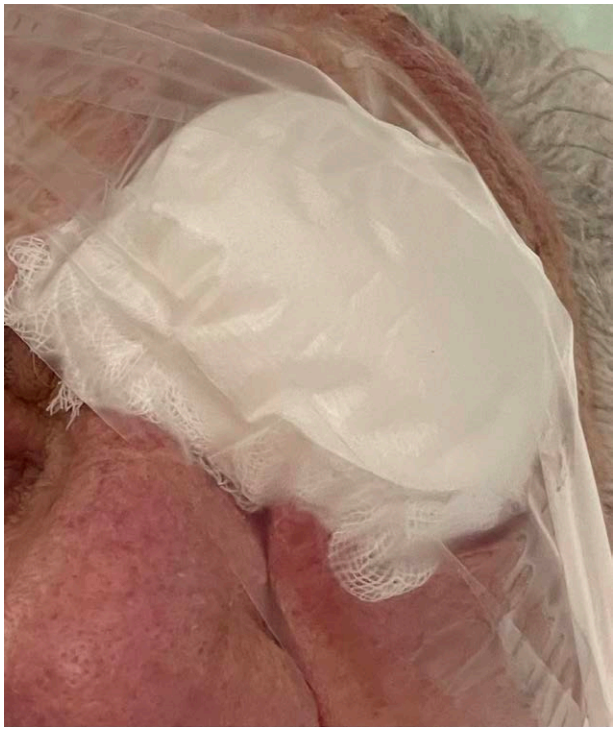

Fig. 1. Postoperative compression dressing consisting of a moist gauze compress as bottom layer, followed by a dry gauze compress and an eye pad fixed with a flexible adhesive patch.

The postoperative procedures were the same for all patients. Interval cooling by applying a cooling pad (Medimex Kalt-Warm Kompresse, Medimex GmbH, Limburg, Germany) for 15 minutes followed by a pause of 15 minutes and a 45-degree upright position of the upper body within the first 24 hours after surgery was recommended and administered by the nurses as patients were hospitalized for the first 24 hours after surgery. Furthermore, no sports, sauna, or swimming within the first week after surgery was recommended and Bepanthen ointment was applied on the lower fornix at night for the first 8 weeks. Sutures were removed if Ethilon was used 1 week after surgery. From 1 week after suture removal, scar massage was recommended two times a day using hydrocortisone ointment.

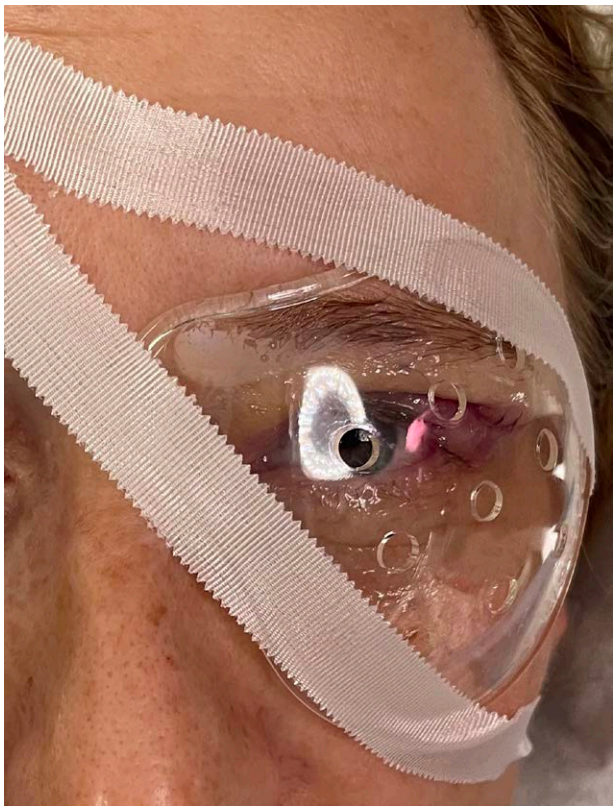

Fig. 2. Postoperative transparent eye shield.

Clinical Examination and Evaluation

Best corrected visual acuity (BCVA) was tested preoperatively and 1 day (D1), 1 week (D7) and 8 weeks (D56) postoperatively. Bell phenomenon was evaluated preoperatively. At D1, patients were asked to score the pain they experienced in the first 24 hours postoperatively in the upper eyelid by means of a visual analogue scale ranging from 0 (no pain at all) to 10 (unbearable pain). In addition, they were asked whether they experienced impairment by the dressing or eye shield. At D1, D7, and D56, patients evaluated the aesthetic result using the Global Aesthetic Improvement Scale (GAIS; 1 = worse, 2 = no change, 3 = improved, 4 = much improved, 5 = very much improved). Corneal staining [Oxford Grading Scale (OGS); 0 = absent, 1 = minimal, 2 = mild, 3 = moderate, 4 = marked, 5 = severe] and corneal erosion (0 = absent, 1 = lower third of the cornea, 2 = half of the cornea, 3 = more than half of the cornea) were examined using fluorescein staining and a slit lamp. Photographs were taken at D1, D7, and D56. Based on those photographs, the blinded author L.R. scored the degree of ecchymosis and swelling at D1, D7, and D56 by using a four-point rating scale with the following response options: 0 = no, 1 = minimal, 2 = moderate, 3 = severe. Additionally, also based on the photographs, the blinded author L. R. scored the scar regarding redness and bulging (0 = no, 1 = minimal, 2 = moderate, 3 = severe) and the aesthetic result compared with the preoperative photographs using the GAIS (see above) at D1, D7, and D56.

Table 1. Demographic Information of Group 1 (Compression Dressing) and Group 2 (Transparent Eye Shield) Patients

		Group 1 (n = 21)	Group 2 (n = 19)	*P*
Sex	Female	12 (57.1%)	11 (63.2%)	0.698
	Male	9 (42.9%)	7 (36.8%)	
Age	Mean (SD)	69.7 ± 9.9	67.8 ± 9.1	0.555
Race	White	21 (100%)	18 (100%)	1.000
BCVA (preoperative)	Median (min–max)	0.63 (0.25–1.0)	0.63 (0.3–1.0)	0.400
Blepharoplasty		20 (95.2%)	18 (94.7%)	0.942

At D7–D56, patients were asked if they followed the postoperative instructions.

Statistical Analysis

Statistical analysis was performed using SPSS 26.0 for Windows (SPSS Inc., IBM Company, Chicago, Ill.). A *P* value of less than 0.05 was considered statistically significant. The Wilcoxon signed rank test for nonparametric data was used to analyze whether scores for pain, edema, ecchymosis, scar redness, scar prominence, corneal staining, corneal erosion, and differences in BCVA were significantly different between the pressure dressing and transparent eye shield only group at different time intervals after ALR.

RESULTS

A total of 50 cases (30 patients) were included in this study. However, due to patients missing in follow-up and insufficient compliance with postoperative instructions, only 40 cases (24 patients) could be included for statistical analysis. Of those, 16 patients underwent bilateral surgery, and eight underwent unilateral. Compression dressing (group 1) was used in 21 (52.5%) cases, and transparent eye shield (group 2) in 19 (47.5%). Both groups were similar regarding age (group 1: 69.7 ± 9.9 versus group 2: 67.8 ± 9.1, $P = 0.555$) and sex (group 1: women 57.1 versus men 42.9%, group 2: women 63.2 versus men 36.8%, $P = 0.698$). All patients in both groups were of White race. There was no difference in preoperative BCVA between the groups [0.63 (0.25–1.0) versus 0.63 (0.3–1.0), $P = 0.400$]. Nearly all cases of both groups underwent additional blepharoplasty [95.2% (20) versus 94.7% (18), $P = 0.942$; Table 1 and Fig. 3].

Pain and Impairment

At D1, the scores for pain were similar in both groups [median group 1: 0 (0-4) versus group 2: 0 (0–4), $P = 0.089$]. Of the patients, 52.4% reported discomfort with dressing, and 57.9%, with the transparent eye shield ($P = 0.726$; Fig. 4).

Edema and Ecchymosis

At D1, D7, and D56, the scores for edema and ecchymosis were comparable for both groups: Edema on D1 was 2 (1-3) versus 2 (1-3), $P = 0.321$; D7, 1 (0-2) versus 1(0-2), $P = 0.441$; D56, 0 (0-2) versus 0 (0-2), $P = 0.759$. Ecchymosis on D1 was 2 (0-3) versus 2 (0-3), $P = 0.860$; D7, 0 (0-2) versus 0 (0-2), $P = 0.467$; D56, none in both groups (Table 2 and Fig. 5).

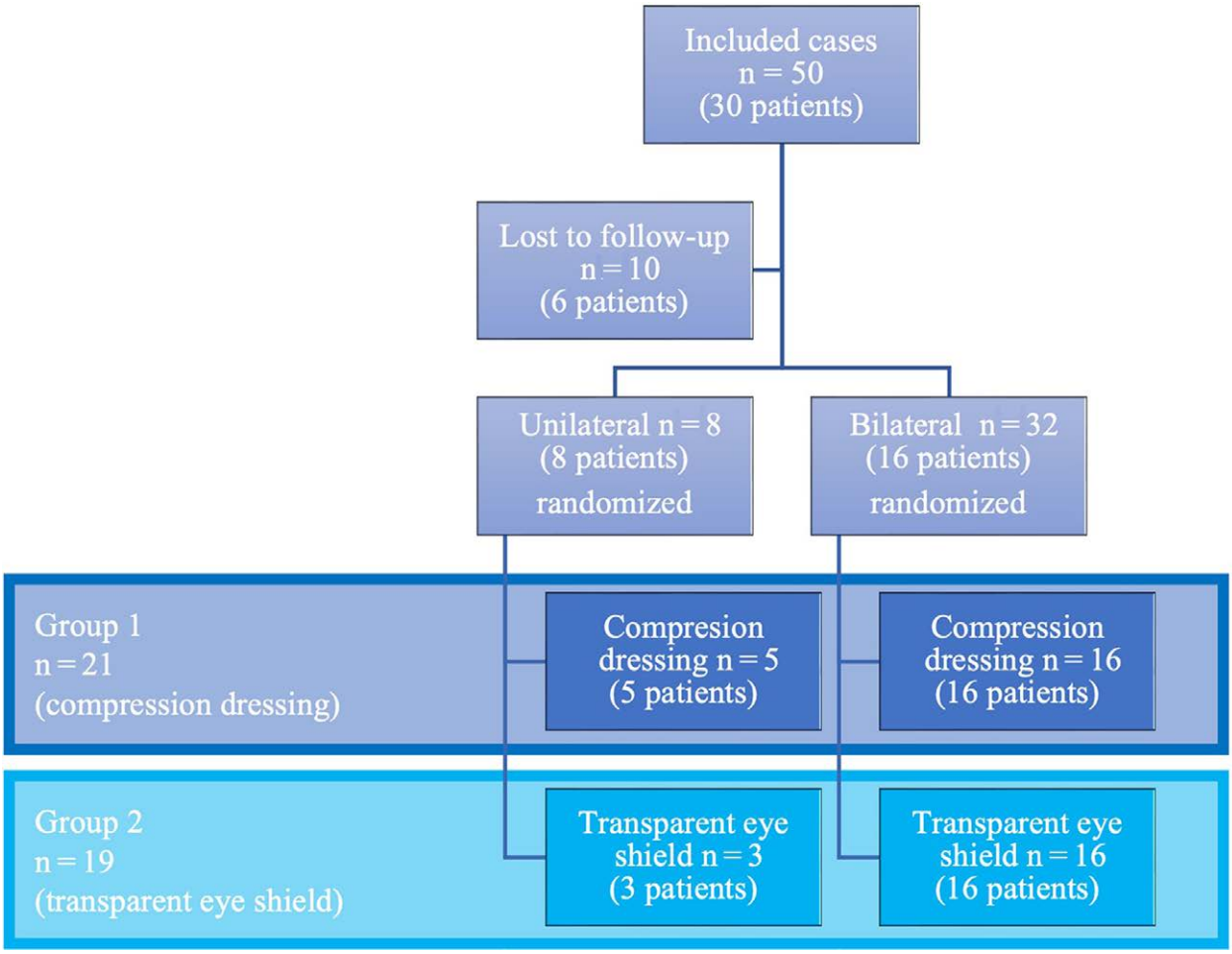

Fig. 3. Cases included in the study (n = 50). Ten cases were lost to follow-up. In total, 40 cases were included for statistical analysis. Cases were randomized to compression dressing or transparent eye shield postoperatively.

Ocular Surface Disease

At D1, D7, and D56, scores for corneal staining and erosion were comparable for both groups: Corneal staining on D1 was 0 (0-2) versus 0 (0-4), $P = 0.163$; D7, 0 (0-3) versus 1 (0-2), $P = 0.930$; D56, 0 (0-2) versus 0 (0-2), $P = 0.762$. Corneal erosion on D1 was 0 (0-1) versus 0 (0-0), $P = 0.342$; none in both groups at D7 and D56 (Table 2 and Fig. 6).

GAIS

At D1, D7, and D56, GAIS of patients and blinded ophthalmologist were comparable for both groups: GAIS for patients on D1 was 3 (2-5) versus 3 (1-5), $P = 0.573$; D7, 4 (3-5) versus 4 (2-5), $P = 0.423$; D56, 4 (2-5) versus 5 (3-5), $P = 0.685$. GAIS for the ophthalmologist on D1 was 3 (2-5) versus 3 (1-5), $P = 0.833$; D7, 4 (2-5) versus 4 (2-5), $P = 0.655$; D56, 5(3-5) versus 5(3-5), $P = 0.988$ (Table 2 and Fig. 7).

Scar

At D7 and D56, the appearance of the scar was similar in both groups: Redness on D7 was 1 (0-3) versus 1 (0-3), $P = 0.676$; D56, 1(0-2) versus 1(0-2), $P = 0.067$. Bulging on D7 was 1(0-2) versus 1(0-2), $P = 0.253$; D56, 0 (0-2) versus 0 (0-1), $P = 0.979$ (Table 2 and Fig. 8).

Visual Acuity

Changes of BCVA of both groups were marginal and similar between both groups: D1, -0.12 (-0.4 – 0.2) versus -0.13 (-0.5-0.2), $P = 0.956$; D7, 0.01 (-0.4 – 0.4) versus 0.04 (-0.37 – 0.37), $P = 0.642$; D56, 0.02 (-0.2-0.2) versus 0.14 (-0.2 versus 0.4), $P = 0.041$.

DISCUSSION

To the best of our knowledge, this is the first study investigating the effect of postoperative compression dressing after ptosis surgery. Besides protecting the surgical wound from bacterial infection, compression dressing is used to prevent venous bleeding or serous discharge,[6] knowing that compression promotes coagulation by reducing the blood flow, which is part of the Virchow coagulation triad.[6,7] In contrast, our study reveals that compression dressing after ALR does not affect the postoperative degree of ecchymosis either at the first postoperative day or in the further course of recovery.

After surgical procedures, the manipulation of tissues causes inflammation leading to accumulation of interstitial fluids causing postoperative swelling and edema.[8] The lymphatic system is responsible for

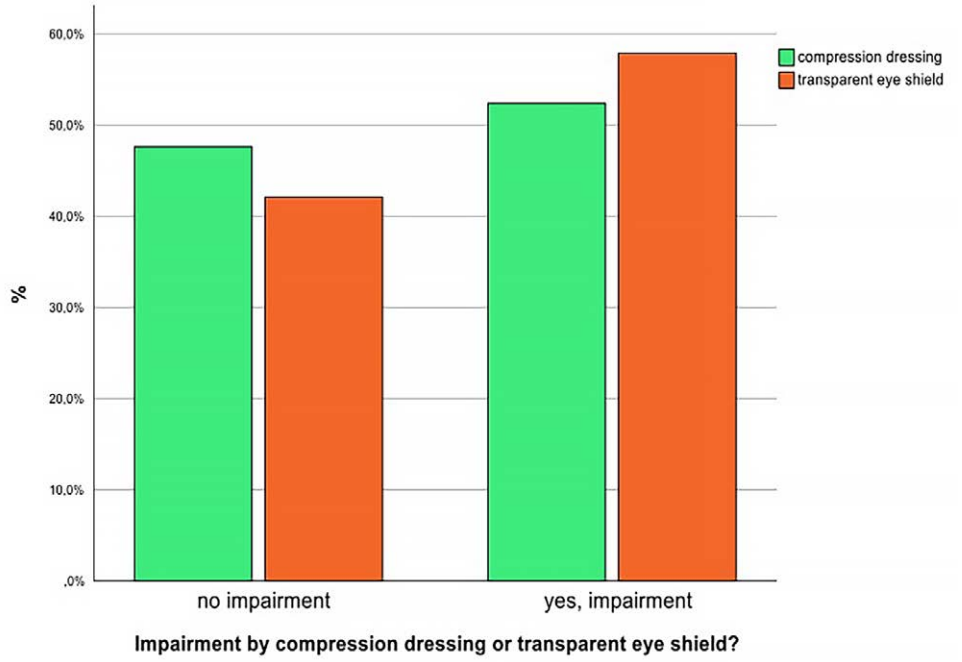

Fig. 4. Postoperative impairment by compression dressing or transparent eye shield stated by the patients at D1.

Table 2. Differences in Edema, Ecchymosis, OSI (Corneal Staining and Erosion), GAIS Ranked by Patient and Observer and Scar Formation (Redness and Bluing) at D1 to D56 between Group 1 (Compression Dressing) and Group 2 (Transparent Eye Shield)

		Group 1	Group 2	*P*
Edema	D1	2 (1–3)	2 (1–3)	0.321
	D7	1 (0–2)	1 (0–2)	0.441
	D56	0 (0–2)	0 (0–2)	0.759
Ecchymosis	D1	2 (0–3)	2 (0–3)	0.860
	D7	0 (0–2)	0 (0–2)	0.467
	D56	—	—	
Corneal staining	D1	0 (0–2)	0 (0–4)	0.163
	D7	0 (0–3)	1 (0–2)	0.930
	D56	0 (0–2)	0 (0–2)	0.762
Corneal erosion	D1	0 (0–1)	0 (0–0)	0.342
	D7	—	—	
	D56	—	—	
GAIS patient	D1	3 (2–5)	3 (1–5)	0.573
	D7	4 (3–5)	4 (2–5)	0.423
	D56	4 (2–5)	5 (3–5)	0.685
GAIS observer	D1	3 (2–5)	3 (1–5)	0.833
	D7	4 (2–5)	4 (2–5)	0.655
	D56	5 (3–5)	5 (3–5)	0.988
Scar redness	D7	1 (0–3)	1 (0–3)	0.676
	D56	1 (0–2)	1 (0–2)	0.067
Scar bulging	D7	1 (0–2)	1 (0–2)	0.253
	D56	0 (0–2)	0 (0–1)	0.979

maintaining homeostasis by pulling excessive interstitial fluids and proteins from the tissues, and subsequently returning them to the bloodstream.[8] Historically, it has been believed that lymphatic drainage from the eyelids primarily is toward the preauricular basin (for the lateral eyelids) and the submandibular basin (for the medial eyelids)[9]; however, more recent studies show that the main part of the lymphatic drainage of all the eyelids is toward the preauricular basin.[10] Compression serves to augment tissue hydrostatic pressure and promote both venous and lymphatic circulation.[11] The application of compression during the initial phase of wound healing is believed to restrict the available space for the accumulation of swelling.[8] Despite this, in our study, the degree of edema was the same in both groups regardless of the use of a compression dressing.

Scar formation showed good results and was similar in both groups regardless of the use of a compression dressing in the first 2 months postoperatively. This might be explained by the general low tension in the upper eye lid area and the fact that skin incisions for ALR and blepharoplasty are performed under consideration of the relaxed skin tension lines.[12] However, as final scar formation can even take up to 1-3 years[13,14] and the latest follow-up was only two months after surgery, possible differences in the scar formation between the two groups might have not been detected.

Consistent with our results regarding ecchymosis, edema, and scar formation, the scores for aesthetic outcomes ranked by the patients and blinded observer were similar in both groups, independent of the use of a compression dressing.

In addition, the use of a compression dressing is thought to reduce postoperative pain. In our study, the majority of patients reported no postoperative pain, and among those who did, pain levels were consistent across both groups. Patients' comfort and visual acuity were

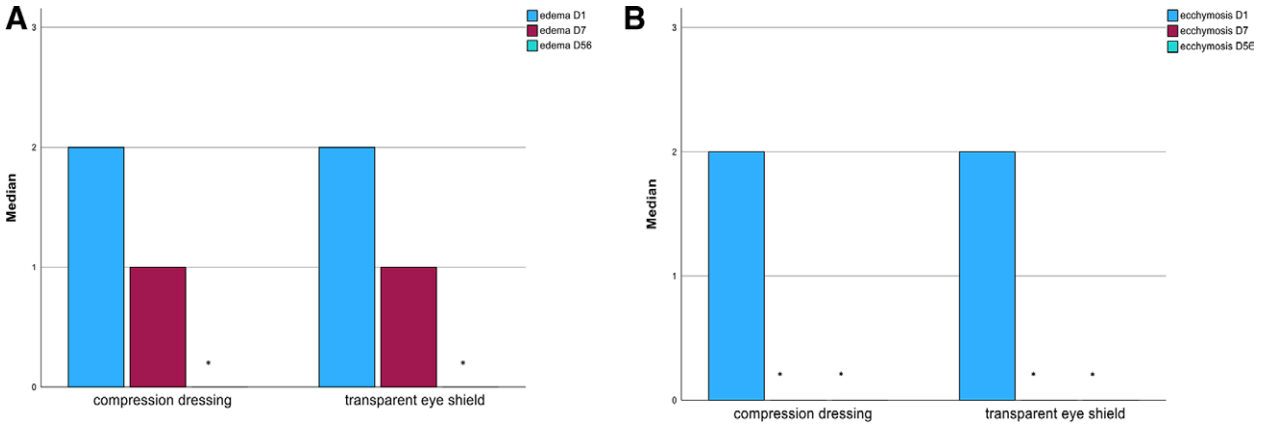

Fig. 5. Median scores for edema (A) and ecchymosis (B) at D1, D7, and D56 after ALR with postoperative compression dressing and transparent eye shield ($P > 0.05$). *Median score 0.

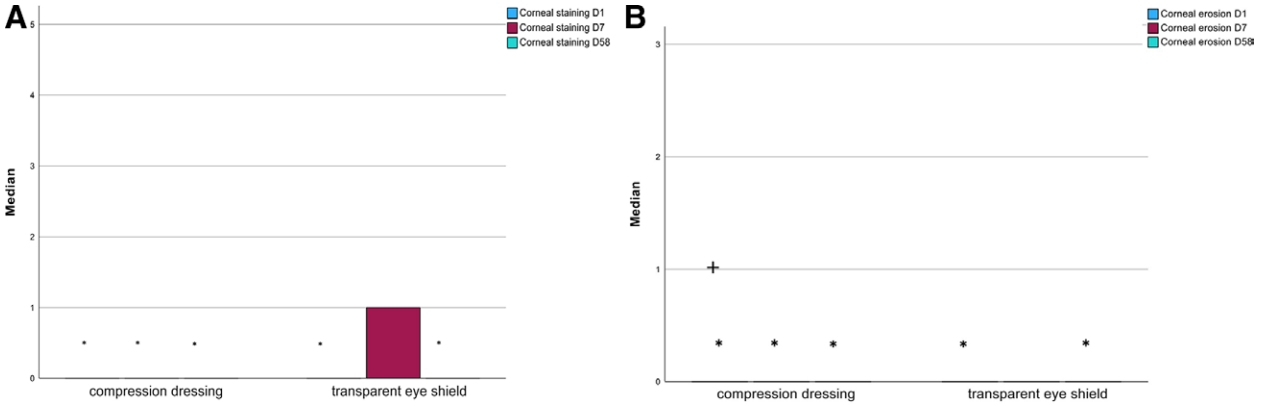

Fig. 6. Median scores for corneal staining (A) and corneal erosion (B) at D1, D7, and D56 after ALR with postoperative compression dressing and transparent eye shield ($P > 0.05$). *Median scores 0. + There was only one case of corneal erosion at D1 in the group with compression dressing.

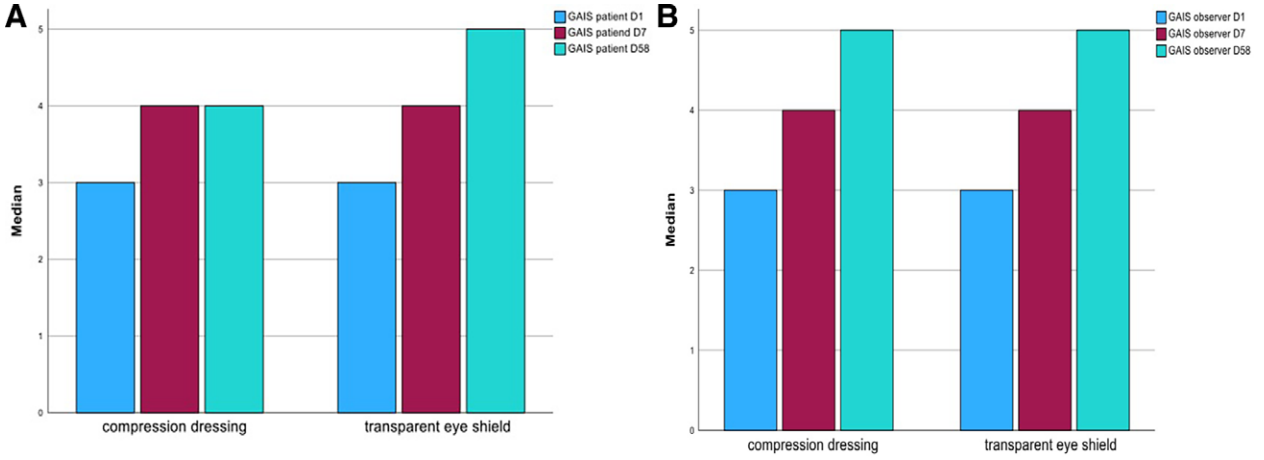

Fig. 7. Median scores for GAIS ranked by the patients (A) and blinded observer (B) at D1, D7, and D56 after ALR with postoperative compression dressing and transparent eye shield ($P > 0.05$).

equal in both groups, regardless of the use of the postoperative choice of dressing. Surprisingly, more than half of the patients found the transparent noncompressive eye shield to be disruptive. In this first study, analyzing the effect of a compression dressing, we opted to use a transparent eye shield as a means of providing some protection

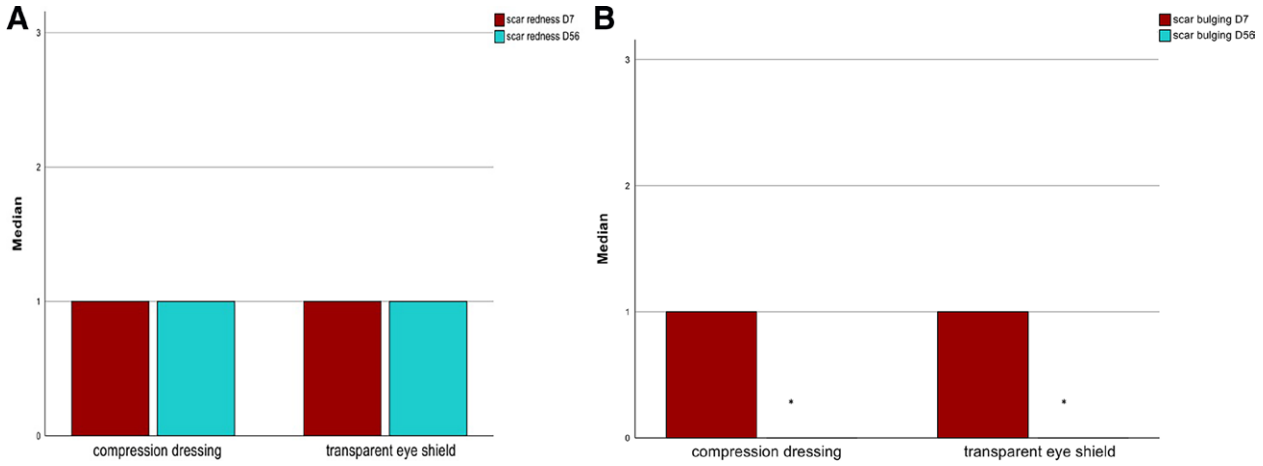

Fig. 8. Median scores for scar redness (A) and bulging (B) at D7 and D56 after ALR with postoperative compression dressing and transparent eye shield ($P > 0.05$). *Median scores 0.

to the fresh wound while still allowing patients to maintain visual acuity, given its transparent material.

With no discernible differences in postoperative outcomes resulting from the application of a compression dressing, the next logical step is to investigate postoperative outcomes in cases where no dressing or eye shield is used. A study conducted without any postoperative protection as a control group would be necessary to validate the possibility of achieving good postoperative results even without any form of protection.

Compression dressing can cause OSI by mechanical contact of the dressing to the ocular surface, resulting in corneal erosion or staining. Even though not statistically significant, the only case of postoperative corneal erosion occurred at the first postoperative day in the group with compression dressing. Corneal staining is also a clinical sign for dry eye,[15] which can occur after ALR or blepharoplasty.[16,17] Because postoperative chemosis might provoke postoperative dry eye by inducing the vicious circle of inflammation,[17] and compression is believed to reduce chemosis, this might explain the slight increase of corneal staining at D7 in the group without compression dressing. However, this finding was not statistically significant, and corneal staining was the same again at D56 in both groups.

Limitations

Interindividual tendencies for the development of edema, ecchymosis, and scar healing were not considered because the study was not designed to compare two eyes of one individual. There were only 40 cases included in this study. Investigation of rare complications (eg, retrobulbar hemorrhage) is only possible in analyses with higher case numbers. Higher case numbers would increase the validity of the investigation. As the latest follow-up was only at D56, possible differences between the two groups in a later stage were not analyzed in this study. Blepharoplasty could be a confounding variable on the outcomes of postoperative edema and ecchymosis. As nearly all patients of both groups underwent additional blepharoplasty, it was not applicable to perform a subgroup analysis for the variable of additional blepharoplasty. Further studies could analyze the differences between ALR with or without additional blepharoplasty or blepharoplasty alone.

In our study, postoperative compression dressings had no effect on edema, ecchymosis, scar formation, aesthetic outcome, postoperative pain, or discomfort compared with a transparent noncompressive eye shield. Therefore, compression dressings might be omitted after ALR to prevent corneal erosion caused.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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