

Efficacy of adhesive strips to reduce postoperative periorbital edema and ecchymosis following rhinoplasty

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Background/aim: Periorbital edema and ecchymosis may develop following rhinoplasty. The aim of this study was to assess the efficacy of adhesive strip application on the upper and lower eyelids to reduce postoperative edema and ecchymosis following rhinoplasty.

Materials and methods: The eyelids of one side were randomly selected, and an adhesive strip of standard size and number was applied at the end of the operation. The strips were removed at postoperative day 3; photos of the eyes were taken at days 3 and 7. Edema and ecchymosis were graded on a scale from 1 to 4. The ecchymosis areas on the lower and upper eyelids were measured and compared in square centimeters.

Results: The mean ecchymosis area of the lower eyelid on the side of the adhesive strip and on the side without the strip was 1.63 cm² and 3.32 cm² in the early period, respectively. It was 1.15 cm² on the upper eyelid on the side of the adhesive strip, and 1.87 cm² on the side without the strip. It was 0.224 cm² on the side of the adhesive strip, and 0.498 cm² on the side without the adhesive strip in the late period.

Conclusion: Applying adhesive strips reduces periorbital edema and ecchymosis.

Key words: Adhesive strip, ecchymosis, edema, rhinoplasty

1. Introduction

Rhinoplasty is one of the most common plastic surgery procedures. Periorbital edema and ecchymosis may occur following rhinoplasty, and reducing these complaints improves the patient's postoperative comfort and satisfaction (1). Postoperative edema and ecchymosis cause delay in patients' returning to daily life and have adverse effects on their social life. What patients expect from an operation currently is to return to daily routines as soon as possible (2,3).

The edema and ecchymosis that develop in the periorbital area during the postoperative period are the major morbidity of rhinoplasty and may present as a slight color change, or be as high as to cover the visual field (4,5). Edema and ecchymosis are usually caused by inflammation and hemorrhage in the soft tissues. The grade of edema and ecchymosis is affected by many factors, such as the patient's coagulation condition, surgical procedure, duration of operation, preoperative medical therapies, and presence of osteotomies. Various methods have been used to reduce edema and ecchymosis,

including types of osteotomies, open or closed rhinoplasty techniques, steroids, and use of decongestants (6–10). In addition to applying strips to the nasal dorsum following rhinoplasty using different techniques and at different times, procedures are performed with different techniques on the periorbital area to reduce edema and ecchymosis (11–13). The objective of this study was to assess the efficacy of applying adhesive strips on the periorbital area following rhinoplasty to reduce postoperative edema and ecchymosis in the early and late periods.

2. Materials and methods

2.1. Study design

The study was reviewed and approved by the Erciyes University ethics committee.

Forty patients who underwent rhinoplasty with the same surgical technique between January 2016 and June 2016 were included in the study after their informed consent was obtained. The surgical operations and postoperative care were carried out by the same surgeon. Patients with a previous septorhinoplasty procedure, bleeding disorder,

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external nasal deviation, hypertension or any other systemic diseases, or who smoked, used chronic drugs, or took herbal medicines were excluded from the study.

2.2. Technical details

All of the patients underwent open rhinoplasty under normotensive general anesthesia.

Anesthesia was induced with remifentanyl (0.2 µg/kg per min) and propofol (2–3 mg/kg), and was maintained with remifentanyl (0.1–0.2 µg/kg per min) and propofol (5–6 mg/kg). All patients underwent median oblique and internal lateral osteotomies with the same surgical instruments. Patients' eyelids on one side were randomly selected prior to the surgery, and at the end of the operative procedure, adhesive strips (Steri-Strip, Nexcare, 3M Health Care Co., St. Paul, MN, USA) of 6 mm and 12 mm width were applied to the upper and lower eyelids respectively, extending from the medial canthal region to the lateral

orbital rim. No additional procedure was performed on the eyelids of the other side (Figure 1). The patients had a postoperative rest with head and neck elevated at 20°–30°. No additional systemic steroids, periorbital cold compresses, or periorbital local medications were used. Postoperatively, all the patients received the same analgesic protocol (intramuscular administration of 2 × 100 mg diclofenac sodium).

2.3. Postoperative assessment and scoring

The adhesive strips on the eyelids were removed on postoperative day 3. Photos of the periorbital areas was taken on days 3 and 7 using a standard technique, light, distance (2 m), and objective aperture (50 mm). The patients' upper and lower eyelids were individually assessed by a plastic surgeon, who was blinded to the procedure, and who graded the periorbital ecchymosis on a standard scale from 1 to 4 (Table 1).



Figure 1. A. Using adhesive strips on the left lower and upper eyelids; B. Postoperative day 3; C. A view of day 3 with eyes closed; D. A view of day 7; E. Side view of the side without application of strips (day 7); F. Side view of the side with application of strips.

Table 1. Eyelid ecchymosis and edema scoring scale.

| Rating | Ecchymosis | Edema |
|--------|--|--------------------------|
| 0 | No ecchymosis | No edema |
| 1 | Medial one-third of upper and/or lower eyelids | Mild edema |
| 2 | Medial half of upper and/or lower eyelids | Moderate edema |
| 3 | Entire upper and/or lower eyelids | Severe edema |
| 4 | Entire upper and/or lower eyelids and/or conjunctiva | Complete (massive) edema |

2.4. Measurement of ecchymosis area

All the measurements were performed by means of AutoCAD 2013 software (Autodesk, San Rafael, CA, USA) (Figure 2). The horizontal diameter of the iris was considered to be 10 mm in each patient in order to optimize the measurement (11). The palpebral rim distance, which was considered the distance between the medial and lateral canthi, was measured with reference to the value of the iris after photos were taken with eyes open. The areas of ecchymosis were measured with reference to the palpebral rim distance after photos were taken with eyes closed.

2.5. Statistical analysis

Statistical analysis of data obtained from all parameters was performed using Statistical Package for the Social Sciences (SPSS v.17.0.0, IBM, Chicago, IL, USA). Mean, median, minimum, maximum, and standard deviation of all data were calculated. Comparisons were made using a Mann-Whitney U test, Wilcoxon signed ranks test,

and chi-square test. A P value of <0.05 was considered significant.

3. Results

3.1. Demographic characteristics

Of the patients, 28 were females and 12 were males. The mean age of the patients was 25.2 (range: 18–40) years. The mean duration of the operation was 112 min (range: 88–136).

3.2. Score analysis of ecchymosis

The mean score for ecchymosis on the lower eyelid was 2.83 ± 0.38 in the group not receiving adhesive strips and 1.25 ± 0.53 in the group receiving adhesive strips on postoperative day 3 (Mann-Whitney U test, $P < 0.05$). The same score was 1.33 ± 0.48 in the group not receiving adhesive strips and 0.25 ± 0.44 in the group receiving adhesive strips on postoperative day 7 (Mann-Whitney U test, $P < 0.05$) (Table 2).

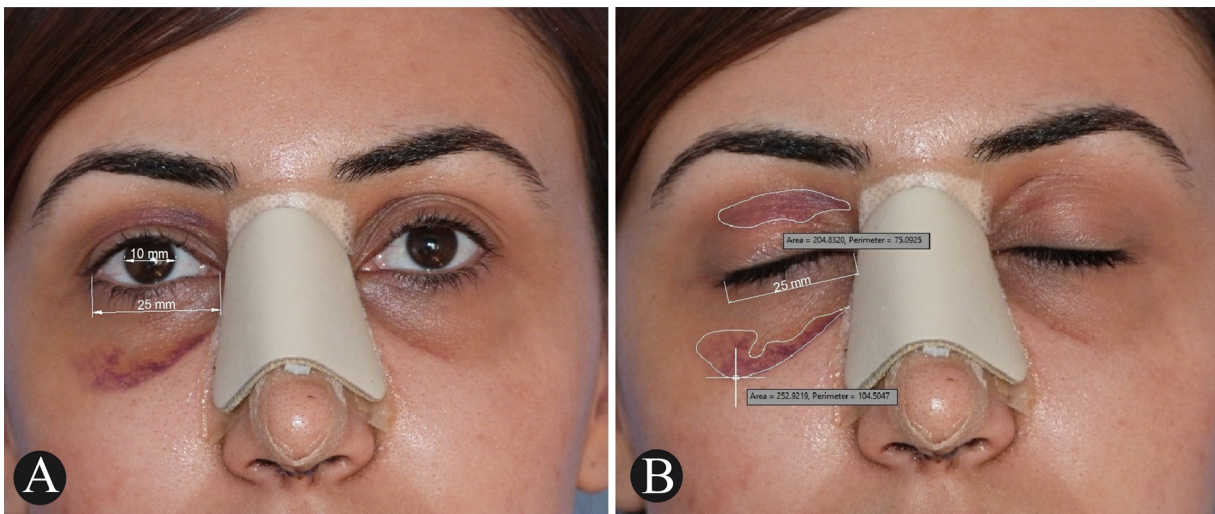


Figure 2. A. Measurement of palpebral rim distances; B. ecchymosis area by AutoCAD 2013 software.

Table 2. Lower and upper eyelid ecchymosis grades.

| Grade of ecchymosis | Lower eyelid | | | | Upper eyelid | | | |
|---------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
| | Day 3 | | Day 7 | | Day 3 | | Day 7 | |
| | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) |
| 0 | 2 | 0 | 30 | 0 | 0 | 0 | 35 | 16 |
| 1 | 25 | 0 | 10 | 27 | 22 | 2 | 5 | 22 |
| 2 | 11 | 7 | 0 | 13 | 18 | 20 | 0 | 2 |
| 3 | 2 | 33 | 0 | 0 | 0 | 18 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean grades | 1.25 (±0.53) | 2.83 (±0.38) | 0.25 (±0.44) | 1.33 (±0.48) | 1.45 (±0.5) | 2.41 (±0.58) | 0.125 (±0.33) | 0.62 (±0.57) |

In the assessment of ecchymosis on the upper eyelid, the mean score for ecchymosis was 2.41 ± 0.58 in the group not receiving adhesive strips and 1.45 ± 0.5 in the group receiving strips at postoperative day 3 (Mann–Whitney U test, $P < 0.05$). The mean score was 0.62 ± 0.57 in the group not receiving adhesive strips and 0.12 ± 0.33 in the group receiving adhesive strips at postoperative day 7 (Mann–Whitney U test, $P < 0.05$). In the assessment of edema of lower eyelids, the mean score for edema was 2.5 ± 0.51 in the group not receiving adhesive strips and 1.54 ± 0.58 in the group receiving adhesive strips on postoperative day 3. The scores were 1.2 ± 0.41 and 0.75 ± 0.44 respectively on postoperative day 7 (Mann–Whitney U test, $P < 0.05$) (Table 3). In the assessment of edema of the upper eyelids, the score for edema was 1.87 ± 0.44 in the group not receiving adhesive strips and 1.37 ± 0.49 in the group receiving adhesive strips on postoperative day 3. The scores were 0.70 ± 0.46 and 0.33 ± 0.48 on postoperative day 7 (Mann–Whitney U test, $P < 0.05$), respectively. No significant differences were found between age and sex and the ecchymosis and edema parameters (Mann–Whitney U test, $P > 0.05$).

3.3. Area measurement of ecchymosis

The ecchymosis area measured on the lower eyelid was 3.32 cm^2 in the groups not receiving adhesive strips and 1.63 cm^2 in the group receiving adhesive strips on postoperative day 3 (Mann–Whitney U test, $P < 0.05$). On postoperative

day 7, it was 1.04 cm^2 in the group not receiving adhesive strips and 0.47 cm^2 in the group receiving adhesive strips (Mann–Whitney U test, $P < 0.05$) (Table 4). The ecchymosis area measured on the upper eyelid was 1.87 cm^2 in the group not receiving adhesive strips and 1.15 cm^2 in the group receiving adhesive strips on postoperative day 3 (Mann–Whitney U test, $P < 0.05$). On postoperative day 7, it was 0.49 cm^2 in the group not receiving adhesive strips and 0.224 cm^2 in the group receiving adhesive strips (Mann–Whitney U test, $P > 0.05$).

No allergic reactions or secondary complications developed in relation to the application of adhesive strips.

4. Discussion

There is no common consensus on reducing ecchymosis and edema following rhinoplasty, but it is known that quick postoperative reduction of edema and ecchymosis is important for patients to return to their social life earlier (1). Many different methods have been used to reduce postoperative edema and ecchymosis, such as steroids, decongestants, various surgical techniques, and different approaches to lateral osteotomy (6–12).

The literature has demonstrated the effects of steroids on reducing edema and ecchymosis; it is a routine procedure to use steroids at most clinics, although methods of use and dose vary (2,4–9). Kargı et al. demonstrated that preoperative and intraoperative (as well as on

Table 3. Lower and upper eyelid edema grades.

| Grade | Lower eyelid | | | | Upper eyelid | | | |
|-------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
| | Day 3 | | Day 7 | | Day 3 | | Day 7 | |
| | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) |
| 0 | 0 | 0 | 10 | 0 | 0 | 0 | 27 | 12 |
| 1 | 20 | 0 | 30 | 32 | 25 | 6 | 13 | 28 |
| 2 | 18 | 20 | 0 | 8 | 15 | 32 | 0 | 0 |
| 3 | 2 | 20 | 0 | 0 | 0 | 2 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean grades | 1.54 (± 0.58) | 2.5 (± 0.51) | 0.75 (± 0.44) | 1.2 (± 0.41) | 1.37 (± 0.49) | 1.87 (± 0.44) | 0.33 (± 0.48) | 0.70 (± 0.46) |

Table 4. Ecchymosis area of lower and upper eyelids.

| | Lower eyelid | | | | Upper eyelid | | | |
|--|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
| | Day 3 | | Day 7 | | Day 3 | | Day 7 | |
| | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) | With adhesive strips (n = 40) | W/o adhesive strips (n = 40) |
| Mean ecchymosis area (cm^2) | 1.63 (± 0.96) | 3.32 (± 1.79) | 0.47 (± 0.27) | 1.04 (± 0.57) | 1.15 (± 0.68) | 1.87 (± 1.01) | 0.22 (± 0.13) | 0.5 (± 0.27) |

postoperative days 1 and 2) intravenous administration of dexamethasone of 8 mg reduced edema and ecchymosis (2). Studies show that preoperative administration of steroids reduced edema and ecchymosis, and repeated administration of steroids was more effective than administration of a single dose (5,14).

A study performed by Koşucu et al. reported that keeping intraoperative mean arterial blood pressure at 50–60 mmHg reduced edema and ecchymosis (15). There are some studies about topical administration of arnica and mucopolysaccharide polysulfide cream, which reduces edema and ecchymosis (16).

In surgical techniques, different approaches have been used to reduce edema and ecchymosis, such as elevation of the periost prior to lateral osteotomy, open or closed technique, and types of lateral osteotomies. Periosteal elevation is intended to reduce extravasation in the vascular structures. A study by Kılıç et al. showed that the endonasal approach reduced edema and ecchymosis in the early postoperative period, but the authors reported that no significant differences were found with lateral osteotomy (17). In general, studies in the literature show that percutaneous external osteotomy reduces edema and ecchymosis (8,13,18). Nerve blocks were shown to have an effect on edema and ecchymosis as well as on pain, and preoperative total nasal block and facial block reduced edema and ecchymosis due to the effect of adrenalin (19).

Studies have shown that applying a strip following rhinoplasty causes compression on the osteochondral frame underlying the skin and on the subcutaneous tissue, and prevents extravasation into the subcutaneous tissue, thus reducing edema (13). Hoefflin demonstrated that applying strips to the nose at postoperative weeks 4–6 reduced edema (20).

Studies have demonstrated the psychological benefits of applying strips on the nose and periorbital area as well as the physiological benefits. Postoperatively reducing edema and ecchymosis positively affects the patient's expectation from the operation, as well as their perceptions and psychological state. A study by Belek et al. showed that applying strips to cover the surface of the nose and reducing the visibility of edema and ecchymosis

towards the cheeks had a positive influence on the patient's psychological well-being (11).

Farahvash et al. studied the effects of applying strips of different lengths to cover the lower eyelid of one side and the malar area of the same patient on ecchymosis, and demonstrated that covering the lower eyelid and whole malar area reduced ecchymosis (12). Ozucer et al. indicated that keeping the strips on the nasal dorsum after removing the splint reduced edema on the nasal dorsum, and reported that this was associated with the pressure of the nasal strip (13).

The grade of edema and ecchymosis is affected by many traits of the patient as well as by surgical interventions and techniques. Edema and ecchymosis are more common in patients with hypertension, bleeding diathesis, and less subcutaneous fatty tissue, as well as in light-skinned patients (15).

In the present study, edema and ecchymosis were assessed via photographic views by a plastic surgeon who was blinded to the procedure. In the literature, edema and ecchymosis were usually assessed with this method, and so we used the same method for evaluation. Edema and ecchymosis were significantly lower on the side with strips as shown by the scoring results. As in the measurement of ecchymosis performed by Farahvash et al. (12), the palpebral rim distance was measured by standardizing the mean iris distance of 1 cm, and the areas were measured with eyes closed. The values of ecchymosis were measured and compared in square centimeters in addition to scoring. In the measurement of these areas, ecchymosis on the lower and upper eyelids was significantly lower on the side with strips.

The strips applied to the eyelid did not affect eyelid movement, and no allergic reactions or secondary complications developed related to the application of adhesive strips.

In conclusion, the use of postoperative periorbital adhesive strips is an effective, safe, and cost-efficient method to reduce periorbital ecchymosis and edema following rhinoplasty. It may allow patients to return to their daily life more quickly with less operation-related morbidity.

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