Open Versus Closed Septorhinoplasty Approaches for Postoperative Edema and Ecchymosis

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Objective: The aim of this study was to compare periorbital edema and ecchymosis seen after closed (endonasal) and open (external) septorhinoplasty (SRP).

Methods: In total, 50 patients undergoing hump extraction and osteotomies were allocated to 2 groups. Group 1 consisted of 25 patients who underwent closed SRP. Group 2 consisted of 25 patients who underwent open SRP. Operation time, amount of intraoperative bleeding, and complications were recorded. Scoring of eyelid edema and periorbital ecchymosis was evaluated on the first, third, and seventh postoperative days using a scale of 0 to 4 by the first author.

Results: There was no statistically significant difference between the groups in terms of age, sex, or operation time. No significant difference was observed clinically or statistically in the scores of periorbital edema or ecchymosis between groups 1 and 2 on the first, third, and seventh postoperative days ($P > 0.05$).

Conclusions: The authors observed no clinically or statistically significant difference in comparing periorbital edema and ecchymosis seen after closed and open SRP.

Key Words: Complication, ecchymosis, edema, osteotomy, septorhinoplasty

(*J Craniofac Surg* 2015;26: 1334–1337)

Septorhinoplasty is a commonly performed procedure in otorhinolaryngology practice. Periorbital edema and ecchymosis are common complications of this procedure. The main cause of these complications is bleeding into the soft tissue, due to lateral osteotomies. Periorbital edema and ecchymosis are annoying to the patient and may cause an increase in morbidity. Thus, a rapid recovery is important for the patients. Edema and ecchymosis can be reduced with careful surgical technique, but it is not possible to prevent them completely. Use of steroids to prevent the development of periorbital edema and ecchymosis has been documented previously.[1,2] Applying pressure on osteotomy sites, postoperative taping of the nose, head elevation, and periorbital cold pack application are also commonly used techniques.[3]

The advantages and disadvantages of open (external) and closed (endonasal) rhinoplasties remain a subject of debate.[4] The open rhinoplasty approach presents obvious advantages for treating complex and difficult nasal deformities, but the incision crossing the columella and the ensuing scar can be troublesome aesthetically.[5] Through an open approach, surgeons can identify small anatomic differences not observable from the surface, operate with binocular vision, and use suture and fixation techniques that may be difficult or impossible endonasally.[6] Open rhinoplasty has the disadvantages of increased operative time, prolonged postoperative swelling, loss of nasal tip support if compensatory measures are not performed, and more profound scar contracture from completely degloving the nasal soft tissue, resulting in asymmetries revealed after long healing periods.[7]

Advantages of the endonasal approach include decreased operating times, more rapid recovery, and less significant scar contracture.[7] The advantages of closed over open rhinoplasty are that a closed rhinoplasty does not produce a transcolumellar scar; there is less subcutaneous fibrosis; tip vascularity is preserved; time to recovery is shortened.[8] There is a significantly greater loss of nasal tip projection in an open versus a closed rhinoplasty.[9] The closed approach to rhinoplasty has fallen out of favor because of the misconception that nasal tip cannot be symmetrically molded except by direct vision through a divided columella. On the contrary, the open approach could be championed for anterior septal deviation, but this similarly can be easily overcome by access through nostril. There is no intrinsic reason to avoid the open approach, but it is more invasive requiring a wider dissection; cartilage grafts are used more liberally; it tends to make the operation longer even in the best of hands.[10]

The experience of the surgeon plays an important role in dictating whether a closed or open approach is ultimately performed. Closed rhinoplasty can be much riskier than an open rhinoplasty, especially in the hands of an inexperienced surgeon.[8] A surgeon's experience and artistic sense are essential for the closed technique, in which most of the corrections are made without exposing the nasal frame. The open technique allows a greater operating range with a direct view of the nasal structure, resulting in improved precision in modeling the cartilages.[11] The open technique provides wide exposure but a columellar incision scar results. Thus, some surgeons prefer the closed technique, particularly in primary rhinoplasty. With the closed approach, no columellar incision scar results, but the exposure is poor compared with the open technique.[12] It has been argued that the final result of an open rhinoplasty is not superior to that of a well-done endonasal procedure, and one of the major disadvantages of the open technique is the visible columellar scar.[13]

Thus, open versus closed rhinoplasty has been a controversial subject for several years, and both approaches have advantages and disadvantages. The aim of this study was to compare periorbital edema and ecchymosis seen after closed and open septorhinoplasties. To our knowledge, no direct comparison of closed versus open

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Received February 28, 2014.
Accepted for publication October 5, 2014.

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The authors report no conflicts of interest.

ISSN: 1049-2275
DOI: 10.1097/SCS.0000000000001715

SRP in terms of postoperative edema and ecchymosis has been reported previously.

PATIENTS AND METHODS

This prospective study was performed in accordance with the Helsinki declaration of the World Medical Association and was approved by the local ethics committee. Written informed consent was obtained from each patient. In total, 50 patients who underwent closed (endonasal) and open (external) SRP with osteotomies, between the ages 20 and 36 years (28 men and 22 women) at the Elaziğ Training and Research Hospital, Otorhinolaryngology Clinic (Elazig, Turkey), between March 2012 and February 2013, were included. The 50 consecutive patients were randomly allocated to 2 groups. In group 1, a total of 25 patients underwent closed septorhinoplasties. In group 2, a total of 25 patients underwent open septorhinoplasties.

Patients with a history of diabetes mellitus, hypertension, peptic ulcer, known allergy to any drug, preoperative use of anticoagulant therapy within 5 days before the operation, hematological disorders (thromboembolic events, hamoglobinopathy, coagulopathy, and hemolytic disease), or any fibrinolytic disorder were excluded. We also excluded the patients with psychiatric problems who diagnosed beforehand with any psychiatric disorder and who focused any personal problem on their noses. For female patients, we avoided operating during or immediately before the menstrual period. In both groups, patients with complaints of chronic nasal obstruction were diagnosed with nasal septal deviation by means of an anterior rhinoscopy and endoscopic nasal examination by the first and third authors.

All of the SRP procedures were performed under intubation and general anesthesia. To reduce the introduction of confounding factors, all of the operations were performed by the first and third authors (Ö.S. and C.P.) using the same technique and equipment. After dorsal hump removal, guided and curved 4-mm lateral osteotomes were used for lateral osteotomies. Lateral osteotomies were made bilaterally without subperiosteal elevation and endonasally by performing a small incision at pyriform aperture just above the level of the anterior end of the inferior turbinate in all of the patients. Each surgeon operated on an equal number of patients in each group. During the operation, the mean arterial blood pressure was maintained at 70 to 90 mm Hg with esmolol infusion. Dorsal hump extraction and medial and lateral osteotomies were performed in all of the patients.

After completing the open SRP procedures, antibiotic-soaked nonabsorbable packs (Merocel; Medtronic Xomed, Jacksonville, FL) were placed in the nose bilaterally. Then, external nasal cast splints were used in all of the patients. During the first 24 hours after operation, patients lay down in a 45° head-elevated position. No attempt was made to control edema or ecchymosis, during surgery or the postoperative period, with pressure, steroids, or ice packs. The nonabsorbable packs in all of the patients were removed on the second postoperative day. All of the patients were given the same antibiotics (amoxicillin 1 g twice per day for 10 days) and the same analgesics (paracetamol 4 times/d for 10 days) but no topical nasal medication.

Operation time, amount of intraoperative bleeding, and complications were recorded. Intraoperative bleeding was monitored in all of the patients by measuring the level in the suction bottles. All of the fluids added to the surgical field intraoperatively were quantified and deducted from the measured blood loss.[14] Scoring of eyelid edema and periorbital ecchymosis were evaluated on the first, third, and seventh postoperative days using the scale of 0 to 4 used by 2 observers, Kara and Gökalan[15] (Figs. 1–2).

The SPSS software (version 15.00, SPSS Inc., Chicago, IL) was used for all of the statistical analyses. One-way analysis of variance (ANOVA) or Kruskal-Wallis ANOVA was used to compare variables between the groups. P values <0.05 were considered to indicate statistical significance.

RESULTS

In total, 50 patients who underwent closed and open SRP with osteotomies between the ages 20 and 36 years (28 men, 22 women, mean age ± SD 28 ± 8 years) were included. Of them, 25 underwent closed SRP (ages 21–35 years, 13 men, 12 women, mean age ± SD 28 ± 7 years) and 25 underwent open SRP (ages 20–36 years, 15 men, 10 women, mean age ± SD 27 ± 7 years). There was no statistically significant difference between the groups in terms of age, sex, or operation time.

The amount of intraoperative bleeding was 148 ± 74 mL in group 1 (closed SRP) and 156 ± 68 mL in group 2 (open SRP); the difference was not statistically significant. The operation time was 82 ± 11 minutes in group 1 and 91 ± 13 minutes in group 2. The amount of intraoperative bleeding and operation time are presented in Table 1. No significant difference was observed clinically or statistically in the scores of periorbital edema or ecchymosis between groups 1 and 2 on the first, third, or seventh postoperative

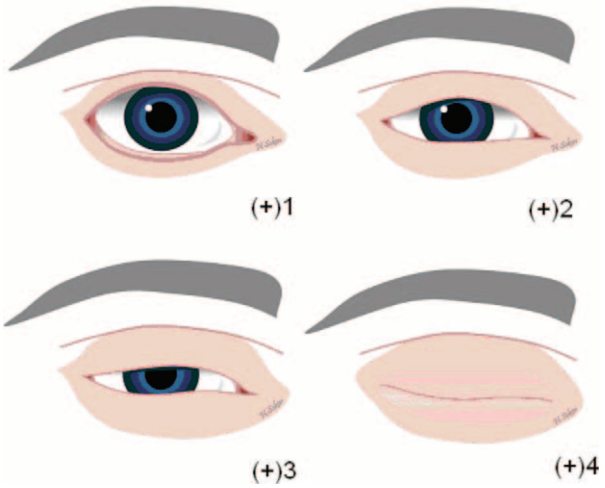

FIGURE 1. Scale for periorbital edema. 0, None; (+) 1, minimal; (+) 2, extending on to the iris; (+) 3, covering the iris; (+) 4, massive edema.

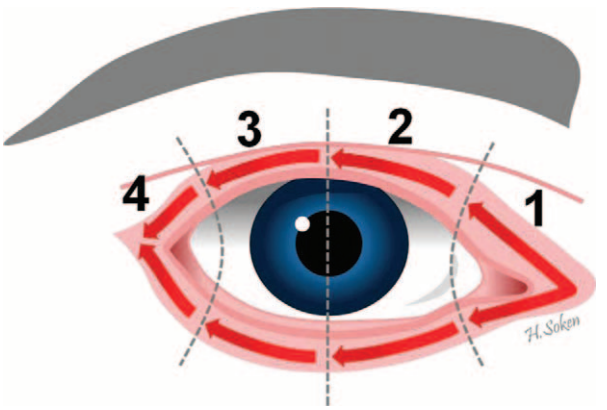

FIGURE 2. Scale for periorbital ecchymosis. 0, None; (+) 1, to the medial canthus; (+) 2, extending to the pupil; (+) 3, past the pupil; (+) 4, to the lateral canthus.

TABLE 1. Intraoperative Bleeding and Operation Times in Groups

Group No.	Amount of Bleeding	Operation Time
1 (Closed SRP)	148 ± 74 mL	82 ± 11 min
2 (Open SRP)	156 ± 68 mL	91 ± 13 min

SRP, septorhinoplasty.

days ($P > 0.05$, Table 2). Postoperative edema and ecchymosis graphics are shown in Figures 3 and 4.

DISCUSSION

Periorbital edema and ecchymosis are the typical results of the bony and soft tissue trauma during rhinoplasty procedures because of osteotomy. The disruption of angular vessels during lateral osteotomy, resulting in bleeding into the soft tissue, may be a risk factor for the development of periorbital edema and ecchymosis. Patients can return to their normal lives earlier with reduced postoperative periorbital edema and ecchymosis. Extent, duration, and quality of surgery may be other factors that increase periorbital edema and ecchymosis. Diffuse and excessive bleeding during surgery and accumulation of blood in the tissues may also do so.[3]

Septorhinoplasty alters the aesthetic appearance and functional properties of the nose, with surgical manipulation of the skin, underlying cartilage, nasal septum, and bone. The incision chosen by the surgeon classifies the rhinoplasty as open or closed. The difference between the open and closed techniques is simply the external columellar incision.[11]

There is an on-going controversy as to the advantages and disadvantages of open and closed rhinoplasties. The natural contact between skin and cartilage is detached in an open approach, and fluid collection in the subcutaneous space and its replacement with fibrous tissue can distract from the result achieved in the surgery.[16] Meticulous dissection in the open technique, through an adequate tissue plane, reduces the risk of edema and skin necrosis.[17]

From among the various techniques, the surgeon must always choose that which provides the best aesthetic result. The greatest disadvantage of open rhinoplasty is the extensive dissection of the skin over the osseocartilaginous framework. This increases operating time, persistent postoperative nasal tip edema, and numbness

TABLE 2. Mean Scores of Ecchymosis and Edema in Groups

	Group 1 (Closed SRP)	Group 2 (Open SRP)
Lower eyelid edema		
POD-1	3.16 ± 0.554*	3.20 ± 0.500*
POD-3	2.60 ± 0.707*,†	2.12 ± 0.440†
POD-7	1.96 ± 0.676*	2.00 ± 0.577
Upper eyelid edema		
POD-1	3.12 ± 0.526	3.2 ± 0.546
POD-3	2.84 ± 0.625	2.92 ± 0.640
POD-7	1.96 ± 0.611*	1.92 ± 0.640*
Lower eyelid ecchymosis		
POD-1	2.80 ± 0.646	2.88 ± 0.666
POD-3	3.04 ± 0.735†	3.00 ± 0.707†
POD-7	1.84 ± 0.473*,†	1.80 ± 0.577*,†
Upper eyelid ecchymosis		
POD-1	3.12 ± 0.726†	3.08 ± 0.812†
POD-3	3.32 ± 0.690†	3.24 ± 0.723†
POD-7	2.08 ± 0.702*,†	2.04 ± 0.611*,†

POD, postoperative day; SRP, septorhinoplasty.
*$P < 0.05$ statistically significant in the group.
†$P < 0.05$ statistically significant among the groups.

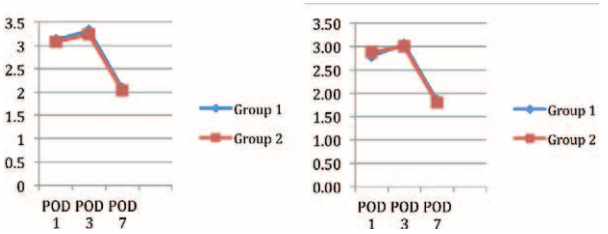

FIGURE 3. Mean ecchymosis scores of upper eyelids (on the left, y axis) and mean ecchymosis scores of lower eyelids (on the right, y axis). POD, postoperative day (x axis).

and consequent scar tissue contraction, compared with endonasal rhinoplasty.[11] In this study, we found no statistically significant difference between the groups in terms of operation time. Sheen[13] stated that the final result of an open rhinoplasty was not superior to a well-done closed procedure and advocated the closed technique that is more effective and less damaging than the open technique.

The relation between postoperative ecchymosis and periosteal elevation is a relatively controversial issue.[18] Kara et al[3] observed that to create subperiosteal tunnels before lateral osteotomy increased the development and severity of periorbital ecchymosis, subconjunctival ecchymosis, and edema, and they suggested performing a lateral osteotomy without creating subperiosteal tunnels. Sinha et al[19] stated that external osteotomy was an easy approach to conduct and reduced bleeding, periorbital ecchymosis, and edema. A "good" postoperative nose packing, with precise taping of both the nose and upper lip area, minimized the development of postoperative edema and stabilized the surgical result achieved. By this argument, an open rhinoplasty technique is not necessarily a guarantee of good surgical results.

In the literature, there are some studies that evaluate patients with solely closed or solely open rhinoplasty for postrhinoplasty edema and ecchymosis using similar scoring systems, as follows. In the following studies, the same scoring methods for postoperative edema and ecchymosis in the upper and lower eyelids were used: eyelid edema was graded as 0 if there was no edema, 1 if the edema was minimal, 2 if the edema extended onto the iris, 3 if the edema covered the iris, and 4 if the edema caused the eyelids to be swollen shut. Ecchymosis was graded 1 if it was only medial, 2 if it extended to the iris, 3 if the ecchymosis was lateral to the pupil, and 4 if it extended to the lateral canthus.[15]

Kargi et al[20] performed closed rhinoplasties in all of their patients. They used a similar scale to evaluate postoperative edema and ecchymosis.[15] In the control group (n = 10, no steroid administration before or after the operation), they observed that mean upper eyelid edema scores were 3, 2.5–3, 2, 1, and 0.5 on the first, second, fifth, seventh, and 10th postoperative days, respectively. Mean lower eyelid edema scores were 3.5, 3, 2, 1, and 0.5 on the first, second, fifth, seventh, and 10th postoperative days, respectively. Mean upper eyelid ecchymosis scores were 3–3.5, 3, 1.5–2, 1, and 00.5 on the first, second, fifth, seventh, and 10th

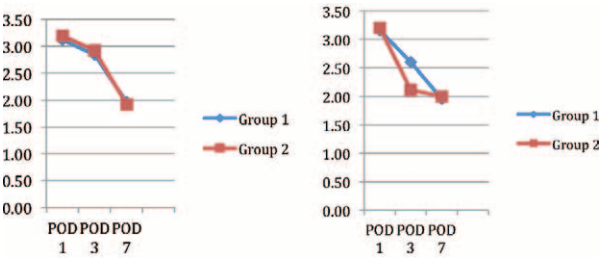

FIGURE 4. Mean edema scores of upper eyelids (on the left, y axis) and mean edema scores of lower eyelids (on the right, y axis). POD, postoperative day (x axis).

postoperative days, respectively. Mean lower eyelid ecchymosis scores were 3, 2.5–3, 2, 1, and 0–0.5 on the first, second, fifth, seventh, and 10th postoperative days, respectively.

Koc et al[21] performed open rhinoplasties in all of their patients. In the control group (n = 10, no steroid given), they reported mean upper eyelid edema scores of 2.5, 1, and 0.5 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid edema scores were 3, 3, and 1 on the first, third, and seventh postoperative days, respectively. Mean upper eyelid ecchymosis scores were 2.5, 2, and 1 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid ecchymosis scores were 3.5, 3 and 1 on the first, third, and seventh postoperative days, respectively.

Gürlek et al[22] performed open rhinoplasties in all of their patients. In the placebo group, they observed that the mean upper eyelid edema scores were 3.25, 2.5, and 1.75 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid edema scores were 3, 1.75, and 1.5 on the first, third, and seventh postoperative days, respectively. Mean upper eyelid ecchymosis scores were 3, 3.25, and 1.75 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid ecchymosis scores were 2.75, 2.75, and 1.5 on the first, third, and seventh postoperative days, respectively.

We studied closed versus open septorhinoplasties for postoperative edema and ecchymosis. Specifically, we performed closed septorhinoplasties in half of the patients and open septorhinoplasties in the other half. We used a scale similar to that of Kara and Gökalan[15] to evaluate postoperative edema and ecchymosis. In group 1, we observed that the mean upper eyelid edema scores were 3.12, 2.84, and 1.96 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid edema scores were 3.16, 2.60, and 1.96 on the first, third, and seventh postoperative days, respectively. Mean upper eyelid ecchymosis scores were 3.12, 3.32, and 2.08 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid ecchymosis scores were 2.80, 3.04, and 1.84 on the first, third, and seventh postoperative days, respectively. In group 2, we observed that mean upper eyelid edema scores were 3.20, 2.92, and 1.92 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid edema scores were 3.20, 2.12, and 2.00 on the first, third, and seventh postoperative days, respectively. Mean upper eyelid ecchymosis scores were 3.08, 3.24, and 2.04 on the first, third, and seventh postoperative days, respectively. Mean lower eyelid ecchymosis scores were 2.88, 3.00, and 1.80 on the first, third, and seventh postoperative days, respectively. We observed no clinically or statistically significant difference in the scores of either periorbital edema or ecchymosis between groups 1 and 2 on the first, third, or seventh postoperative days. We believe that because, in both closed and open SRP patients, we used the same equipment (guided, curved 4-mm osteotomes) and lateral osteotomy technique (bilateral endonasal without subperiosteal elevation). In studies of Kargi,[20] Koc[21] and Gurlek,[22] they evaluated patients with solely closed or solely open rhinoplasty for postrhinoplasty edema and ecchymosis using similar scoring system. Although, our results were similar to their results, we believe that each study should be separately evaluated within itself because the scoring system that is used in all of the mentioned studies is being evaluated by different observers. Therefore, to compare the studies with each other might be subjective rather than objective.

CONCLUSIONS

In our study, we observed no clinically or statistically significant difference in comparisons of either periorbital edema or ecchymosis after closed and open SRP. We consider that the debate regarding closed versus open rhinoplasty will likely continue, and that the personal experience of the surgeon remains the main reason for choosing the approach to rhinoplasty. Neither technique is best in all types of noses.

ACKNOWLEDGMENTS

The authors thank Prof Sadullah Sakallioglu (Cukurova University, Adana, Turkey) for statistical advice. Preparation of this paper including designing and planning except data collection was supported by Continuous Education and Scientific Research Association.

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