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Periorbital Ecchymosis Post Closed Rhinoplasty: Natural History, Risk Factors, and Validation of a New Scoring System

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Background: Postrhinoplasty periorbital ecchymosis is an inevitable side effect contributing to patients' psychological aspect and early postoperative morbidity. Efforts are constantly being made to reduce ecchymosis using different methods with varying success. To evaluate treatment response, it is mandatory to have a reliable score. Several studies suggest other scoring systems, but none has been postrhinoplasty-specific, validated, and accepted. This study aimed to demonstrate the natural history of postrhinoplasty ecchymosis, find potential risk factors for worsening patterns, and suggest a useful and reliable periorbital ecchymosis scoring system for postrhinoplasty follow-up.

Methods: This prospective study included 183 patients who underwent closed rhinoplasty by the same surgeon and the same principle method. Photographs of the periorbital ecchymosis were taken on postoperative days 1, 2, and 7. The periorbital area was divided into quarters, and three independent physicians assigned the dominant color of each quarter.

Results: There were no significant variations between the three physicians' scoring. The interobserver consistency defined as an excellent scoring system reliability, according to our statistical analysis. The postoperative ecchymosis demonstrated a consistent pattern of spread over time, dominating the medial quarters on early postoperative days 1 and 2, following into the lower lateral quarters in postoperative day 7. We found no correlation between patient demographics and clinical characteristics to ecchymosis patterns and temporal spread.

Conclusions: Our study suggests a reliable and easy-to-use postrhinoplasty ecchymosis scoring system. This scoring method can be used for postrhinoplasty ecchymosis assessment and as a research-validated tool to quantify different perioperative treatments to reduce ecchymosis and estimate mid-face trauma. *(Plast Reconstr Surg Glob Open 2023; 11:e5112; doi: 10.1097/GOX.0000000000005112; Published online 12 July 2023.)*

INTRODUCTION

Nose reshaping, including rhinoplasty, was the most performed cosmetic surgical procedure in the United States in 2020 and ranked fifth worldwide in 2019, with an overall increased yearly occurrence.[1,2] Nevertheless, rhinoplasty is one of the most technically complex and challenging plastic surgery procedures and is not without possible complications and side effects.[3,4] The rate of major complications postrhinoplasty remains relatively low,[5] with risk factors most commonly affected by age and procedures requiring multiple operated sites simultaneously with rhinoplasty.[6]

One of the inevitable postoperative side effects is periorbital ecchymosis and edema, which is thought to be a result of the soft tissue damage after osteotomies and other surgical trauma[7–9] and can affect the

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immediate cosmetic results.[3] Moreover, it can influence the patient's preoperative concerns and doubts, postoperative emotional status,[10,11] and postoperative pain,[12] leading to postsurgical dissatisfaction syndrome.[13] Therefore, efforts are constantly being made to reduce ecchymosis and edema. There are an immense amount of experimental interventions, both medical and nonpharmaceutical, as well as different surgical tools, skills, and methods that have all been applied with varying success.[14–16]

Proper evaluation of treatment outcomes requires data comparison using a standardized scoring system. Although several studies suggest different scoring systems for periorbital edema and ecchymosis, a thorough literature review reveals that none of them has been postrhinoplasty specific, validated, and accepted.[8,17–19] In addition, recent studies demonstrate the variety of scoring systems, including minority objective assessments.[20] The first description of such a score was published in 1989 to evaluate steroid treatment. In this study, the periorbital area was artificially divided into thirds and assigned a four-point grading scale of edema and ecchymosis 24 hours postrhinoplasty.[17] In a later study in 1999, a four-point grading scale was used to assess quarters of the periorbital area for ecchymosis and edema, as determined by the rate of eyelid closure. The study demonstrated a 9-day postoperative follow-up to measure the effect of a single dose of steroids, where the upper and lower eyelids were graded separately.[18] The latter was modified in 2005 to compare osteotomy types with the same edema scoring method, but with a four-point grading scale used to assess the ecchymosis pattern in specified thirds of the periorbital area.[8] In the studies above, scales were utilized to determine postoperative effects with more than one observer grade but without additional validation or standardization attempts. Oliver et al[19] were the first to validate postoperative periorbital edema and ecchymosis scoring after several facial plastic surgery procedures, including rhinoplasty. The scoring system was named the modified "Surgeon Periorbital Rating of Edema and Ecchymosis" based on the Yucel et al score,[8] and used a separate four-point grade for both edema and ecchymosis with the added modification of an ecchymosis grade zero criterion. In this study, 73 patients completed their operative procedure; 52 and 63 patients completed the follow-up on postoperative days 2 and 7, respectively. Statically reliability of agreement was excellent between physicians. Nevertheless, this grading system lacked the specificity for postrhinoplasty status, the article itself did not assess or investigate the ecchymosis spreading pattern, and no attempt was made to discover the risk factors for ecchymosis worsening.[19] All of the scores mentioned are for the ecchymosis and the edema separately. Without standardization for the postrhinoplasty ecchymosis (PRE) scoring system, evaluating potential treatments to decrease PRE is impossible.

The main objective of this study was to find and suggest a useful and reliable periorbital ecchymosis scoring system for postrhinoplasty follow-up. Moreover, we aimed to characterize the common ecchymosis spreading over time and the risk factors for worsening predictions.

Takeaways

Question: The key problem is the lack of specific, validated, and accepted postrhinoplasty periorbital ecchymosis scoring system.

Findings: This study evaluated 183 closed rhinoplasty patients in the postoperative period, and demonstrated the periorbital ecchymosis pattern over time. Interobserver consistency of the suggested scoring method defined with excellent reliability. There was no correlation between patient demographics and clinical characteristics to ecchymosis patterns and temporal spread.

Meaning: The post–closed rhinoplasty ecchymosis scoring method was found to be reliable and easy to use, and is suggested for postrhinoplasty ecchymosis assessment, as a research-validated tool, and for medico-legal purposes.

PATIENTS AND METHODS

The hospital research ethics committee approved the research protocol, and the study was conducted by the basic principles of Helsinki (approval no.: 0016-20-NHR). Patients who underwent primary closed rhinoplasty in Galilee Medical Center were preoperatively evaluated for demographic and clinical data, including patient's age, sex, smoking status, medical history, and background disease. Blood tests were taken, including coagulation functions. Any coagulation abnormality was documented, as well as whether or not a perioperative tranexamic acid treatment was prescribed according to a specialist consultant. Data were then organized by season (winter was assigned the months from December to February; spring, from March to May; summer, from June to August; and fall, from September to November).

The same surgeon (E.S.) carried out all procedures. All patients underwent closed rhinoplasty, including medial and lateral osteotomies. Standard intraoperative medical treatment included intravenous cefamizine (1–2 g) and tranexamic acid 1000 mg. Intraoperative local anesthesia (as a nerve block) was given (a mixture of 30 mL lidocaine 2%, 0.5 mL adrenalin 1:100,000, and 2 mL sodium bicarbonate 8.4%) to the infraorbital nerve, supratrochlear nerve, and columellar base areas. Also, an injection of Lidocadren (lidocaine 2% and adrenaline 1:100,000) to the nasal septum and inferior turbinates was made. At the end of the procedure, Telfa gauze was placed intranasal, "steri-strip" dressing was placed on the dorsum, and an external nose splint was placed above. During the 2 days of postsurgery hospitalization, intravenous antibiotics, tranexamic acid, and analgesics were administered. After 2 days, the Telfa gauze was removed, and the patients were discharged with only local treatment of saline rinsing of the nasal cavity and chloramphenicol 3% cream to the nostrils. Patients were required to return after 5 days for inspection and removal of the external dressing.

Documentation of the periorbital ecchymosis spread was noted in the following manner. Each patient was photographed on a postoperative day (POD) 1, 2, and 7 for documentation and presented separately to three physicians for grading. The periorbital area was artificially divided into quarters, where the pupil was regarded as the

middle, and a dominant ecchymosis color was assigned to each quarter. The dominant ecchymosis color was selected from four predefined options: no color, purple, red, or yellow/orange.

Inclusion criteria were that the patient had undergone primary closed rhinoplasty as mentioned. Exclusion criteria were patients who had undergone procedures that deviated from the basic principle protocol, as discussed above, and observations without pictures or those with unsatisfactory photograph quality.

Statistical analysis was carried out using IBM SPSS Statistics, version 27. For all analyses, statistical significance is a *P* value less than 0.05 (two-sided, unless mentioned otherwise).

Grading from the three physicians was analyzed first for interobserver variability by an intra-class correlation test to measure the grading system's reliability. Based on the 95% confidence interval of the intra-class correlation estimate, values less than 0.5, between 0.5 and 0.75, between 0.75 and 0.9, and greater than 0.90 indicate poor, moderate, good, and excellent reliability, respectively.[21] Next, a comparison between the sides of both eyes was made using the Wilcoxon signed rank test. To statistically determine the common ecchymosis color in each quarter and the ecchymosis pattern throughout the postoperative week, we used a chi-square test (Friedman test), comparing the results to a 25% probability for each color. Finally, we sought demographic and clinical risk factors that might negatively impact the ecchymosis pattern using the Pearson chi-square test. We pursued a relationship between such factors and the ecchymosis in a quarter that was not part of the typical pattern we found for each postoperative day.

RESULTS

Between February 2020 and March 2021, data from 196 patients and overall 485 observations were collected. After the application of excluding criteria, data from 183 patients and 447 observations were analyzed. One hundred seventy-two observations were of POD 1, 156 of POD 2, and 119 of POD 7. In total, 108 patients completed the three consecutive follow-ups. Demographic and clinical data are summarized in Table 1. The study group includes 77% female patients, with an average age of 25.9 years, 80.3% were nonsmokers, and 69.4% were without any background disease. For 94% of the patients, coagulation tests were within normal limits. An estimated 1.1% had elevated PT or PTT and were treated with perioperative tranexamic acid, while 1.6% and 2.2% showed an elevated PT or PTT, respectively, without perioperative treatment.

As demonstrated in Table 2, we found no significant interobserver variation. Analyzing data across all quarters in both eyes, Cronbach alpha ranged between 0.928 and 0.961, representing a high observers' agreement rate and excellent scoring system reliability.

In addition, there is no overall significant difference between the two sides (Table 3). The significant ecchymosis pattern and dominant color ($P < 0.001$ to all) was as follows (Fig. 1): on POD 1, there was predominant involvement of the two medial quarters with purple as the dominant color; on POD 2, the two medial and lower lateral quarters involved with color domination of purple in the upper medial quarter and red in the two lower

Table 1. Demographic and Clinical Information of the Rhinoplasty Patients

		N = 183
Age, mean (SD)		25.9 (7.8)
Sex, n (%)	Women	141 (77)
	Men	42 (23)
Current smoker, n (%)	Yes	36 (19.7)
	No	147 (80.3)
Background disease, n (%)*	Yes	56 (30.6)
	No	127 (69.4)
Coagulation abnormalities, n (%)	Non	172 (94)
	Elevated PT without treatment	3 (1.6)
	Elevated PT with treatment	2 (1.1)
	Elevated PTT without treatment	4 (2.2)
	Elevated PTT with treatment	2 (1.1)
Season of surgery, n (%)	Winter (December–February)	53 (29)
	Spring (March–May)	29 (15.8)
	Summer (June–August)	50 (27.3)
	Fall (September–November)	51 (27.9)

Background diseases (n): G6PDD (2), hypothyroidism (3), FMF (1), allergic rhinitis (35), asthma (5), Gilbert syndrome (2), Von-Willebrand factor deficiency (1), sensory-neural hearing loss (1), migraine (4), obstructive sleep apnea (2), factor 11 deficiency (1), status post percutaneous transluminal angioplasty (1), status post breast cancer (1), Reno phenomenon (1), Graves disease (1), Crohn remission (1), Ebtein anomaly (1), psoriasis (1), and alopecia (1).

Table 2. The Interobserver PRE Color Scoring Variability

	Cronbach Alpha	Average Intra-class Correlation (95% Confidence Interval)*
Right eye, upper medial quarter	0.961	0.961 (0.954–0.967)
Right eye, upper lateral quarter	0.956	0.955 (0.948–0.962)
Right eye, lower medial quarter	0.928	0.927 (0.913–0.938)
Right eye, lower lateral quarter	0.946	0.945 (0.935–0.953)
Left eye, upper medial quarter	0.948	0.947 (0.937–0.955)
Left eye, upper lateral quarter	0.946	0.946 (0.937–0.954)
Left eye, lower medial quarter	0.931	0.930 (0.918–0.941)
Left eye, lower lateral quarter	0.953	0.952 (0.944–0.959)

*Intraclass correlation coefficient in each periorbital quarter for the three observer's grading.

Table 3. Comparison of the PRE Colors between Right and Left Eyes

	Quarter	Z Value	*P**
POD 1	Upper medial	−0.406	0.684
	Upper lateral	−0.093	1.000
	Lower medial	−0.605	0.500
	Lower lateral	−1.390	0.173
POD 2	Upper medial	−1.091	0.386
	Upper lateral	−0.115	0.948
	Lower medial	−1.573	0.129
	Lower lateral	−0.976	0.342
POD 7	Upper medial	<0.001	1.000
	Upper lateral	−0.272	0.863
	Lower medial	−0.539	0.672
	Lower lateral	−2.632	0.009

*Wilcoxon signed rank test.

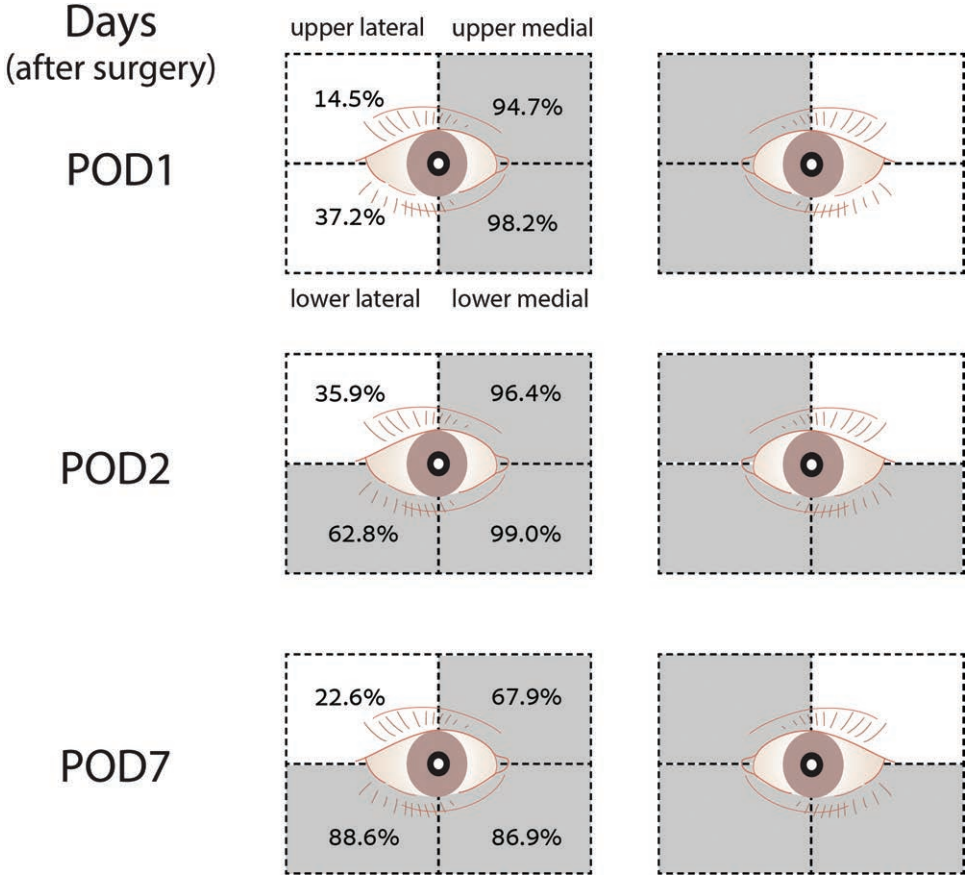

Fig. 1. Postrhinoplasty periorbital ecchymosis pattern over postoperative time. Each colorized quadrangular represents periorbital quadrant involved by ecchymosis in each postoperative day ($P < 0.001$). The percentage represents the ecchymosis involvement for each periorbital quadrant in each postoperative day among all subjects tested.

quarters; on POD 7, the same pattern as on POD 2 was demonstrated, but with different color distribution: red in the upper medial quarter, and yellow/orange in the two lower quarters (Table 4).

In all 328 observations of POD 1 and POD 2, as opposed to POD 7, there was no ecchymosis involvement isolated to the lateral quarters without the involvement of the medial quarters. Also, there was no isolated ecchymosis involvement of the upper lateral quarter at all observations.

We did not find any consistent risk factor for the worsening ecchymosis pattern. (**See table 1, Supplemental Digital Content 1,** which displays the possible risk factors for ecchymosis involvement in lower lateral quarter on postoperative day 1. **http://links.lww.com/PRSGO/C647**.) (**See table 2, Supplemental Digital Content 2,** which displays the possible risk factors for ecchymosis involvement in upper lateral quarter on postoperative day 1. **http://links.lww.com/PRSGO/C648**.) (**See table 3, Supplemental Digital Content 3,** which displays the possible risk factors for ecchymosis involvement in upper lateral quarter on postoperative day 2. **http://links.lww.com/PRSGO/C649**.) (**See table 4, Supplemental Digital Content 4,** which displays the possible risk factors for ecchymosis involvement in upper lateral quarter on postoperative day 7. **http://links.lww.com/PRSGO/C650**.)

DISCUSSION

Prior postoperative periorbital ecchymosis and edema scores have been published.[8,17–19] In 2018, Oliver et al published the only validated score named the modified Surgeon Periorbital Rating of Edema and Ecchymosis. This score has been demonstrated to have excellent reliability among staff physicians, but it is not postrhinoplasty-specific and takes about 3 minutes to complete, according to the authors.[19] When reviewing the studies above, it is important to note that there is a coordination between the pattern of postoperative periorbital ecchymosis and the periorbital edema over time. In addition, when inspecting the intraobserver reliability by Oliver et al, throughout most comparisons, the kappa value was relatively lower in the edema comparison versus the ecchymosis comparison, though it was not statistically examined.[19] Therefore, to create a simple but reliable scoring system, we conducted a postrhinoplasty periorbital ecchymosis grading system regardless of periorbital edema. We performed a proper validation with multiple observer comparisons. Our results

Table 4. Ecchymosis Color Comparison in Each Quarter

		P (Chi-square Value, df)*	Dominant Color (n, %)
POD 1	Right eye, upper medial quarter	$P < 0.001$ (145.721, 3)	Purple (94, 54.7)
	Right eye, upper lateral quarter	$P < 0.001$ (211.826, 2)	Without (147, 85.5)
	Right eye, lower medial quarter	$P < 0.001$ (154.558, 3)	Purple (90, 52.3)
	Right eye, lower lateral quarter	$P < 0.001$ (81.012, 2)	Without (112, 65.1)
	Left eye, upper medial quarter	$P < 0.001$ (150.047, 3)	Purple (104, 60.5)
	Left eye, upper lateral quarter	$P < 0.001$ (211.407, 2)	Without (147, 85.5)
	Left eye, lower medial quarter	$P < 0.001$ (147.767, 3)	Purple (90, 52.3)
	Left eye, lower lateral quarter	$P < 0.001$ (134.047, 3)	Without (104, 60.5)
POD 2	Right eye, upper medial quarter	$P < 0.001$ (137.795, 3)	Purple (91, 58.3)
	Right eye, upper lateral quarter	$P < 0.001$ (148.359, 3)	Without (102, 65.4)
	Right eye, lower medial quarter	$P < 0.001$ (71.115, 2)	Red (87, 55.8)
	Right eye, lower lateral quarter	$P < 0.001$ (64.410, 3)	Red (65, 41.7)
	Left eye, upper medial quarter	$P < 0.001$ (150.667, 3)	Purple (98, 62.8)
	Left eye, upper lateral quarter	$P < 0.001$ (132.205, 3)	Without (98, 62.8)
	Left eye, lower medial quarter	$P < 0.001$ (131.897, 3)	Red (85, 54.5)
	Left eye, lower lateral quarter	$P < 0.001$ (72.410, 3)	Red (73, 46.8)
POD 7	Right eye, upper medial quarter	$P < 0.001$ (21.874, 3)	Red (45, 37.8)
	Right eye, upper lateral quarter	$P < 0.001$ (181.807, 3)	Without (93, 78.2)
	Right eye, lower medial quarter	$P < 0.001$ (111.151, 3)	Orange/yellow (78, 65.5)
	Right eye, lower lateral quarter	$P < 0.001$ (113.571, 3)	Orange/yellow (79, 66.4)
	Left eye, upper medial quarter	$P < 0.001$ (25.639, 3)	Red (47, 39.5)
	Left eye, upper lateral quarter	$P < 0.001$ (172.059, 3)	Without (91, 76.5)
	Left eye, lower medial quarter	$P < 0.001$ (51.445, 2)	Orange/yellow (76, 63.9)
	Left eye, lower lateral quarter	$P < 0.001$ (149.134, 3)	Orange/yellow (87, 73.1)

*Chi-square test.

show a symmetrical pattern of ecchymosis spreading over time for both eyes, starting in the medial quadrant of eyelids on POD 1, following medial and lower lateral quadrants of eyelids on POD 2 and 7, with varying dominant ecchymosis color. Reviewing the literature for ecchymosis spreading patterns over time poses challenges due to using different scoring systems. Yet, in each scenario, the scores are characterized by a low to high grade according to medial to lateral ecchymosis spread.[8,17–19] Griffies et al demonstrate the result of the ecchymosis pattern on POD 1 alone after preoperative steroid treatment, with wider ecchymosis spreading area in the placebo group and a similar spreading area in the treatment group when compared with our results.[17] Kara et al investigated the impact of pre- and postoperative single-dose steroid treatment versus the placebo group across 55 patients, performing dorsal hump removal and only lateral osteotomies and following the ecchymosis results for 9 days. The ecchymosis behavior did not entirely correspond with our results: on POD 1, the medial area was impacted, but on POD 2, the upper eyelid showed average involvement in the lateral area, especially in the placebo group. On POD 7, there was no ecchymosis involvement of the lateral quarters at all, but just of the medial upper and lower eights.[18] Gurlek et al[22] performed open rhinoplasty with osteotomies and investigated the impact of several medications on ecchymosis on PODs 1, 3, and 7, using a similar scale as that of Kara et al,[18] but without distinguishing between the upper and lower eyelids; so it is incomparable to our results.[22]

Reviewing the ecchymosis spread, the overall result of this study was similar to the latter,[18] with medial half-eyelid ecchymosis involvement in the first postoperative days and diminishing over time to ecchymosis impact in all medial quadrants in both eyelids on POD 7.[22] Yucel[8] and Oliver et al[19] divided the eyelids into six artificial parts and described the ecchymosis spreading. Yucel investigated the impact of external versus internal osteotomy on the ecchymosis on PODs 2 and 7 with most open-rhinoplasty techniques. This article's results lack the ecchymosis demonstration spreading over the time period described.[8] The results of Oliver et al show that the average ecchymosis spreading tends to cover the medial half periorbital area on POD 2 and minimal medial area ecchymosis on POD 7,[19] which is also not consistent with our data. In the latter three studies,[8,19,22] it is more difficult to compare the grading systems to our results due to the unknown exact ecchymosis pattern concluded by the grade given, meaning one can only conclude about the ecchymosis spreading in the medial-lateral axis but not about which eyelid was impacted (upper, lower, or both). Other studies investigating treatments to reduce periorbital ecchymosis and edema postrhinoplasty with different osteotomy methods demonstrate the same ecchymosis pattern over time, in contrast to our results.[11,12,23]

Given our long-term rhinoplasty experience and the significant result of our study, we assert that the discrepancy in ecchymosis spreading between our ecchymosis patterns and those of the studies reviewed is a result of the difference in the surgery methods, ecchymosis color interpretation, and implication of the scales used rather than an error in our research. As we relate the yellow/orange color as ecchymosis to its chronic status, we believe that the other ranking scales considered ecchymosis as showing only as purple/red color. Unfortunately, no explanation

regarding ecchymosis color interpretation has been found in those studies reviewed. Due to the critical postoperative influence on the patient, we argue that the chronic color phase of the ecchymosis should be included in such a scale and, therefore, considered in the examination of intervention attempts.

This study has not found a case of ecchymosis involvement isolated to the lateral quarters in the first two postoperative days. Such a pattern has been seen only on POD 7. Therefore, for a patient with periorbital ecchymosis postrhinoplasty or after isolated nasal bone trauma, the involvement of the medial periorbital half is mandatory. It is a critical verified note implicating the timing of the trauma, especially for medico-legal purposes. In another study, high-resolution ultrasonography was reported to be a reliable diagnostic tool for estimating the time of nasal bone fracture, mainly in the first few days after the trauma.[24] Considering our findings, we offer a physical examination–based method using the ecchymosis color and spreading pattern to estimate the timing of recent nasal trauma.

Little is known about risk factors for those patients showing considerably worse PRE patterns. Aldosari[25] investigates the relationship between postrhinoplasty periorbital edema and ecchymosis to mean nasal skin thickness. He found a significant association between skin thickness and worse edema results but no significant relationship to ecchymosis.[25] Our study did not examine nasal skin thickness, and additional research is needed to determine the potential contribution of these factors on ecchymosis color and pattern characteristics. Another limitation of our study includes the lacking record of the Fitzpatrick skin types of the participating patients. Although no such reference was found when reviewing the literature, it can be postulated that similar ecchymosis color can be interpreted differently in different skin types.

This article introduced a statistically reliable periorbital ecchymosis grading system and demonstrated the postrhinoplasty-specific periorbital ecchymosis spreading pattern over time. As such, after illustrating the natural history of the ecchymosis spreading postrhinoplasty in this study, we suggest a novel five-point scale for postrhinoplasty periorbital ecchymosis named the postrhinoplasty ecchymosis (PRE) score. The periorbital area should be artificially divided into four quarters, with the pupil as the designated center point and ecchymosis dominant color mark.

The score, as concluded from the grading validation, is as follows (Fig. 2):

0: **no** ecchymosis.

1: ecchymosis involves the **medial half** alone—involvement of the lower and/or upper medial quarters alone without the lateral quarters.

2: ecchymosis involves the **medial half** (lower and/or upper medial quarters) and the **lower lateral quarter** without the upper lateral quarter.

3: ecchymosis involves **all quarters**.

4: ecchymosis involves the **lateral half** alone: lower and/or upper lateral quarters without the medial quarters.

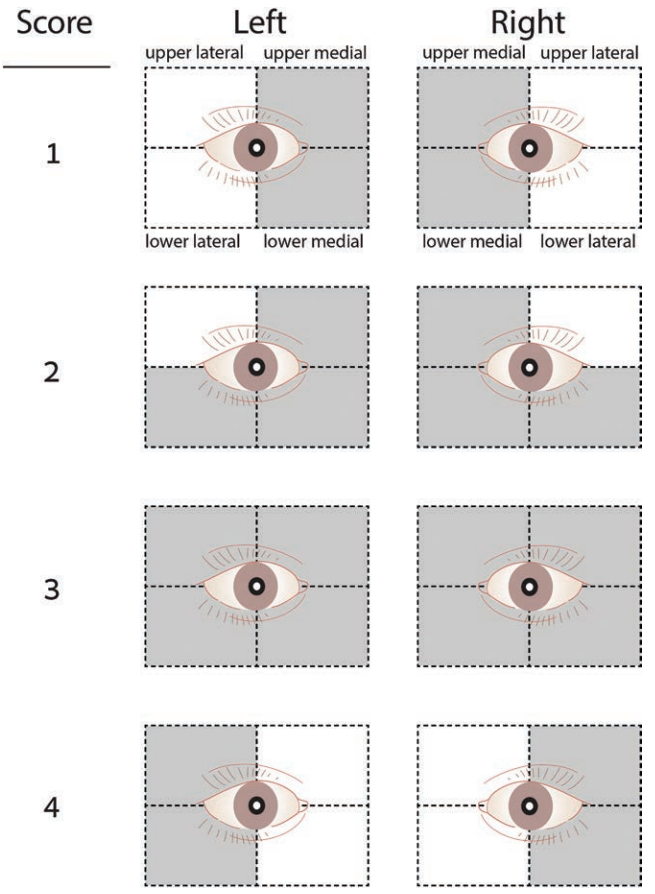

Fig. 2. Proposed PRE Score. Based on the grading validation, the PRE score is as follows: "0": No ecchymosis. "1": Ecchymosis involving the medial half only, including the lower and/or upper medial quarters without the lateral quarters. "2": Ecchymosis involving the medial half (lower and/or upper medial quarters) and the lower lateral quarter, without the upper lateral quarter. "3": Ecchymosis involving all quarters. "4": Ecchymosis involving the lateral half only, including the lower and/or upper lateral quarters without the medial quarters.

Such a score is simple, user-friendly, and takes only seconds to complete. The ecchymosis color is not part of this suggested score, but as demonstrated in this study, it is a tool for rough estimation for timing of prior rhinoplasty or potentially extrapolated for prior nasal trauma.

As mentioned above, we did not observed a case of isolated ecchymosis involvement of the upper lateral quarter alone. To include all periorbital ecchymosis spread options, and to enable possible future application of this score or a modified one in other scenarios, we included the upper lateral quarter in the fourth score. In our sample, PRE score four usually consists of cases of the late stage periorbital ecchymosis spread post closed rhinoplasty (POD 7), with involvement of the lower lateral quarter without the upper lateral quarter, mainly with yellow/orange ecchymosis color. Real-life periorbital examples of PRE scores one to four demonstrated in Figure 3.

Comparing this novel scoring system with the past methods discussed above will not be accurate because the latter includes the division of the periorbital area into

Fig. 3. Examples of real-life PRE score. A-B, PRE score 1. C-D, PRE score 2. E-F, PRE score 3. G-H, PRE score 4.

six parts[8,17,19] or eight parts,[18] whereas our score is based on only four parts. Regardless, the results of our study also imply that by reducing the number of areas monitored, it is easier to determine the ecchymosis impact. Nonetheless, the trend is the same, meaning the higher the score, the more the lateral periorbital area is impacted by ecchymosis.

CONCLUSIONS

In this study, we demonstrate the periorbital ecchymosis natural spreading postrhinoplasty. It can serve as a base for other estimations of nasal bone trauma and can be an essential tool for medico-legal purposes.

Our study suggests a useful postrhinoplasty periorbital ecchymosis scoring system. This score can be used for postoperative assessment and as a research-validated tool for further investigating different methods for reducing postrhinoplasty periorbital ecchymosis. No risk factors have been found, and additional research should be done in this field.

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DISCLOSURE

All authors have no financial interests to declare in relation to the content of this article.

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