

A New Classification of the Lateral Dermatochalasis of Upper Eyelids

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Background: Eyelid dermatochalasis is an abnormal distention of the upper eyelid. This article presents a new classification of the lateral dermatochalasis (LDC) of the upper eyelids, which compares the pre- and post-blepharoplasty results and matches its results with those of the well-established Jacobs classification (JEC).

Methods: LDC classification includes four degrees: grade zero—absence of dermatochalasis; grade 1—lower edge of dermatochalasis above the intersection of the lacrimal caruncle with the edge of the upper eyelid; grade 2—between the intersection of the lacrimal caruncle with the edge of the upper eyelid and the lower edge of the iris at the pupillary midpoint; and grade 3—lower edge of dermatochalasis below the lower edge of the iris. This study was conducted in 100 dermatochalasis cases in patients between 38 and 79 years of age (mean = 59.3) and submitted to upper blepharoplasty.

Results: No statistically significant association was found between the LDC and JEC methods ($P = 0.583$). In both classifications, the eyelid dermatochalasis was reduced after blepharoplasty ($P < 0.001$). However, changes in the degrees of dermatochalasis before blepharoplasty were detected in 100% by LDC, and 41% by JEC. The degree of improvement of dermatochalasis observed by LDC after blepharoplasty showed greater specificity.

Conclusions: This new classification, LDC, is specific for the lateral eyelid dermatochalasis, which is based on exact anatomical points, and is easy to perform. LDC is superior to JEC, easy to be applied, and effective and specific in detecting variations in dermatochalasis after blepharoplasty. (*Plast Reconstr Surg Glob Open* 2021;9:e3711; doi: 10.1097/GOX.0000000000003711; Published online 23 July 2021.)

INTRODUCTION

Eyelid dermatochalasis is an abnormal distention of the upper eyelid skin.¹ Its etiopathogenesis is secondary to aging, gravity pull and chronic descent, and inflammatory processes.^{2,3} Dermatochalasis can overlap the upper eyelid and, by gravity, leads to mechanical ptosis of the upper eyelid and reduces the upper and lateral visual fields associated with other clinical manifestations.⁴ The aging face presents skin relaxation and atrophy of the adipose tissue, with a downward displacement of the eyebrows and upper eyelids. This dermatochalasis may be laterally prolonged to the periorbital and temporal regions outside the eyelid.⁵⁻⁹ Temporal dermatochalasis has been described as lateral hooding, lateral heaviness, and lateral

drooping.¹⁰⁻¹⁵ In this context, dermatochalasis can be classified generically as primary, due to intrinsic factors, and secondary, due to disorders in the adjacent tissues.⁵

The frontal region, the eyebrows, and the upper eyelids have a particular interaction with changes in their structure. The passive and active rise of the frontal region and the eyebrows may result in a minor rise of the upper eyelid in the presence of dermatochalasis, which can improve the visual field.¹⁶ Therefore, eyelid dermatochalasis must be considered with its lateral extension in the temporal region as an aesthetic and functional unit.^{5,7-9}

Surgical treatment of the eyelids includes the aging elastosis with drooping of muscles due to their hypotrophy. Herniation and hypotrophy of the fatty pockets enhance the eyelids and lead to skin ptosis and ectropium with a lessening in ligaments.¹⁷

The first attempt to classify this region was subjective.¹⁷ Guinot proposed a classification of the aging of the face, in which dermatochalasis, which he called “drooping eyelids,” did not consider its intensity.¹⁸ Other authors classify eyelid dermatochalasis as moderate and severe, without specifying any parameter.^{10,19} Laville et al studied the genes associated with dermatochalasis using visual

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patterns in photographic images, but they did not classify them.²⁰ Dermatochalasis of the periorbital region is difficult to measure because it is not an anatomical structure with defined limits.^{21–24}

Jacobs et al assessed 7764 patients with eyelid dermatochalasis and classified this disorder specifically for the eyelid (JEC) as follows: A—normal, eyelid skin does not touch the eyelashes; B—mild, touches the eyelashes; C—moderate, covers the eyelashes; D—severe, covers the eye.²⁵ However, this classification is not applied to the dermatochalasis prolonged laterally to the frontal region and does not evaluate the entire dysmorphia.

OBJECTIVE

Based on the gap in the classification of dermatochalasis, which extends laterally to the eyelids, and the absence of exact anatomical references for anthropometric studies before and after surgical treatment of this disorder, a new classification of dermatochalasis of the upper eyelid and its lateral region (LDC) is presented here.

METHOD

This study was approved by the research ethics committee (no. 3.300.231), was included in the Platform Brazil (no. 10115318.1.0000.5125), and all participants have signed the free and informed consent.

Digital photographs of 100 eyelids of 50 patients (nine men and 41 women; age 39–79 years; average age 59.3 years) were studied before and after blepharoplasty of the upper eyelid due to bilateral dermatochalasis (Tables 1, 2).

The LDC classification includes four degrees:

- Grade 0—absence of dermatochalasis, in the lateral region of the orbit.
- Grade 1—lower edge of dermatochalasis (LED) is located above the intersection of the lacrimal caruncle with the edge of the upper eyelid.
- Grade 2—between the intersection of the lacrimal caruncle with the edge of the upper eyelid and the lower edge of the iris at the pupillary midpoint, even when the LED is at the same level of the intersection of the lacrimal caruncle with the edge of the upper eyelid.
- Grade 3—LED below the lower edge of the iris, even when it is at the same level of it.

This classification uses well-defined references of anatomical points (Table 3), and may be assessed in frontal digital photographs, using horizontal lines as parameters to certify the correct anatomical points (Figs. 1–2). In specific cases, where dermatochalasis reaches the limit between two degrees, generating doubts, one should opt for the highest degree. Existing wrinkles in the periorbital region that do not originate from the fold of dermatochalasis were not considered in the classification. When the lower eyelid overlaps the lower edge of the iris, a small digital circle to define the place of the iris has been placed in the photograph to allow for the classification to be conducted properly (Fig. 3).

Table 1. Gender and Age of Patients

Case	Gender	Age (y)
1	F	62
2	F	60
3	F	70
4	M	55
5	F	54
6	F	73
7	M	65
8	M	67
9	F	61
10	F	71
11	F	58
12	M	68
13	F	60
14	F	61
15	F	56
16	F	61
17	M	58
18	M	59
19	F	50
20	F	67
21	F	54
22	F	51
23	F	77
24	F	54
25	F	58
26	F	56
27	F	65
28	F	75
29	F	56
30	F	58
31	F	54
32	F	70
33	F	69
34	F	55
35	M	66
36	F	60
37	F	79
38	F	52
39	F	53
40	F	51
41	F	56
42	F	39
43	F	52
44	F	41
45	F	41
46	F	53
47	M	66
48	F	44
49	M	66
50	F	58

F, feminine; M, masculine.

The LDC and JEC results were analyzed using statistical tests. The absolute (n = sample size) and relative (percentages) frequencies were described as categorical variables (Tables 2, 4). The correlation of the LDC and JEC categorizations were assessed using the Cramer’s V statistical test (Table 5). The association between two categorical variables were considered “weak” for a degree less than 0.40; “moderate,” between 0.40 and 0.70; and “strong” for greater than 0.70. The pre- and post-blepharoplasty sizes were compared based on the intensity of dermatochalasis by the JEC and LDC methods, using nonparametric tests (Tables 6, 7). All results were considered significant for a Pvalue less than 0.05.

RESULTS

Comparing the preoperative dermatochalasis based on the two studied classifications, LDC and JEC, the results were quite different (Tables 2, 4). More than half of the patients were considered to have normal eyelids

Table 2. Results of LDC and JEC before and after Surgery and the Change of Grade after Surgery

Case	Side	Preoperative		Postoperative		Changed		Case	Side	Preoperative		Postoperative		Changed		
		JEC	LDC	JEC	LDC	JEC	LDC			JEC	LDC	JEC	LDC	JEC	LDC	
1	Right	A	3	A	0	No	Yes	26	Right	C	3	A	1	Yes	Yes	
	Left	A	3	A	0	No	Yes		Left	B	3	A	1	Yes	Yes	
2	Right	D	3	A	0	Yes	Yes	27	Right	A	3	A	1	No	Yes	
	Left	D	3	A	0	Yes	Yes		Left	A	3	A	1	No	Yes	
3	Right	D	3	A	1	Yes	Yes	28	Right	A	3	A	1	No	Yes	
	Left	D	3	A	1	Yes	Yes		Left	A	2	A	1	No	Yes	
4	Right	D	3	A	1	Yes	Yes	29	Right	A	3	A	0	No	Yes	
	Left	D	3	A	1	Yes	Yes		Left	A	2	A	0	No	Yes	
5	Right	A	2	A	0	No	Yes	30	Right	B	3	A	1	Yes	Yes	
	Left	A	2	A	1	No	Yes		Left	B	3	A	0	Yes	Yes	
6	Right	A	3	A	2	No	Yes	31	Right	B	3	A	0	Yes	Yes	
	Left	A	3	A	2	No	Yes		Left	A	2	A	0	No	Yes	
7	Right	C	3	A	0	Yes	Yes	32	Right	B	3	A	2	Yes	Yes	
	Left	C	3	A	0	Yes	Yes		Left	A	3	A	2	No	Yes	
8	Right	D	3	A	2	Yes	Yes	33	Right	A	3	A	0	No	Yes	
	Left	D	3	A	1	Yes	Yes		Left	A	3	A	1	No	Yes	
9	Right	A	2	A	1	No	Yes	34	Right	A	3	A	1	No	Yes	
	Left	A	3	A	0	No	Yes		Left	A	3	A	1	No	Yes	
10	Right	A	3	A	2	No	Yes	35	Right	C	2	A	1	Yes	Yes	
	Left	A	2	A	1	No	Yes		Left	D	2	A	1	Yes	Yes	
11	Right	A	3	A	0	No	Yes	36	Right	A	3	A	0	No	Yes	
	Left	B	3	A	0	Yes	Yes		Left	A	3	A	1	No	Yes	
12	Right	B	2	A	1	Yes	Yes	37	Right	A	3	A	0	No	Yes	
	Left	B	2	A	1	Yes	Yes		Left	A	3	A	0	No	Yes	
13	Right	A	3	A	0	No	Yes	38	Right	B	3	A	0	Yes	Yes	
	Left	A	3	A	0	No	Yes		Left	B	3	A	0	Yes	Yes	
14	Right	A	3	A	0	No	Yes	39	Right	C	3	A	0	Yes	Yes	
	Left	A	2	A	1	No	Yes		Left	C	3	A	0	Yes	Yes	
15	Right	A	2	A	0	No	Yes	40	Right	A	3	A	0	No	Yes	
	Left	A	2	A	1	No	Yes		Left	A	2	A	0	No	Yes	
16	Right	B	3	A	1	Yes	Yes	41	Right	A	3	A	1	No	Yes	
	Left	A	3	A	0	No	Yes		Left	A	3	A	1	No	Yes	
17	Right	A	3	A	0	No	Yes	42	Right	A	2	A	0	No	Yes	
	Left	A	3	A	0	No	Yes		Left	A	2	A	0	No	Yes	
18	Right	D	2	B	1	Yes	Yes	43	Right	D	3	A	0	Yes	Yes	
	Left	C	3	A	1	Yes	Yes		Left	D	3	B	0	Yes	Yes	
19	Right	A	3	A	0	No	Yes	44	Right	A	3	A	0	No	Yes	
	Left	A	2	A	0	No	Yes		Left	B	3	A	1	Yes	Yes	
20	Right	D	2	A	0	Yes	Yes	45	Right	A	2	A	1	No	Yes	
	Left	C	2	A	0	Yes	Yes		Left	A	2	A	0	No	Yes	
21	Right	A	2	A	0	No	Yes	46	Right	A	1	A	0	No	Yes	
	Left	A	3	A	0	No	Yes		Left	B	2	A	0	Yes	Yes	
22	Right	A	1	A	0	No	Yes	47	Right	D	3	A	0	Yes	Yes	
	Left	A	1	A	0	No	Yes		Left	C	3	B	1	Yes	Yes	
23	Right	A	2	A	0	No	Yes	48	Right	A	3	A	0	No	Yes	
	Left	B	2	A	0	Yes	Yes		Left	A	3	A	1	No	Yes	
24	Right	A	3	A	0	No	Yes	49	Right	B	3	A	0	Yes	Yes	
	Left	A	3	A	0	No	Yes		Left	A	2	A	0	No	Yes	
25	Right	A	3	A	0	No	Yes	50	Right	C	3	A	0	Yes	Yes	
	Left	C	3	A	1	Yes	Yes		Left	C	3	A	0	Yes	Yes	
Total changed after surgery:								JEC =	41			LDC =	100			

A, B, C, and D: grades of JEC; "0," "1," "2," and "3": grades of LDC.
 Changed: "Yes" = degree modification occurred. "No" = no degree modification after surgery.

(A grade), according to JEC; however, all of them presented significantly different degrees (grades 1, 2, and 3) of temporal dermatochalasis, none of which were normal (grade zero) when analyzed by LDC. All patients with B, C, and D grades in JEC had two and three degrees in LDC, with tendency toward a worse degree in LDC than in JEC. There was no statistically significant association ($P = 0.583$) between the LDC and the JEC methods (Table 5).

However, the comparison of both classifications in the postoperative period showed some similarities (Table 4). Almost all patients presented very good results, which were considered to be A grade in JEC and zero grade in LDC. No patients presented intense dermatochalasis,

such as grade D in JEC and grade 3 in LDC, in the postoperative period. According to both classifications, the eyelid dermatochalasis was reduced after blepharoplasty ($P < 0.001$) (Tables 6, 7).

A difference was observed between JEC and LDC in relation to the detection of changes in the degrees of dermatochalasis after blepharoplasty, with a 100% perception by LDC (Table 2). The degree of improvement of dermatochalasis observed by LDC after blepharoplasty showed a greater specificity, with a more varied distribution among the degrees in the postoperative period. Cases have gone from grade 3 to grades 2, 1, and 0, while cases from grade 2 have moved to 1 and 0, and all cases from grade 1 have gone to 0 (Table 7).

Table 3. Comparison between the Classification of LDC and JEC

	LDC	JEC
What is evaluated	Dermatochalasis lateral to the lateral commissure	Dermatochalasis medial to the lateral commissure
Reference structures	Lowermost point of the lower edge of dermatochalasis, the point of junction of the lacrimal caruncle with the upper eyelid and the lower edge of the iris at the medial-pupillary point	Lowermost point of the lower edge of dermatochalasis, eyelashes, and eye
Precise anatomic points are used as a reference	Yes	No
Categorization using the lower edge of dermatochalasis as a reference	Level zero—absence of dermatochalasis (normal) Level 1—above the point of junction of the lacrimal caruncle with the upper eyelid Level 2—between the point of junction of the lacrimal caruncle with the upper eyelid and the lower edge of iris at the pupillary midpoint Level 3—below the lower edge of the iris	A = normal B = touches the eyelashes C = covers the eyelashes D = covers the eyes

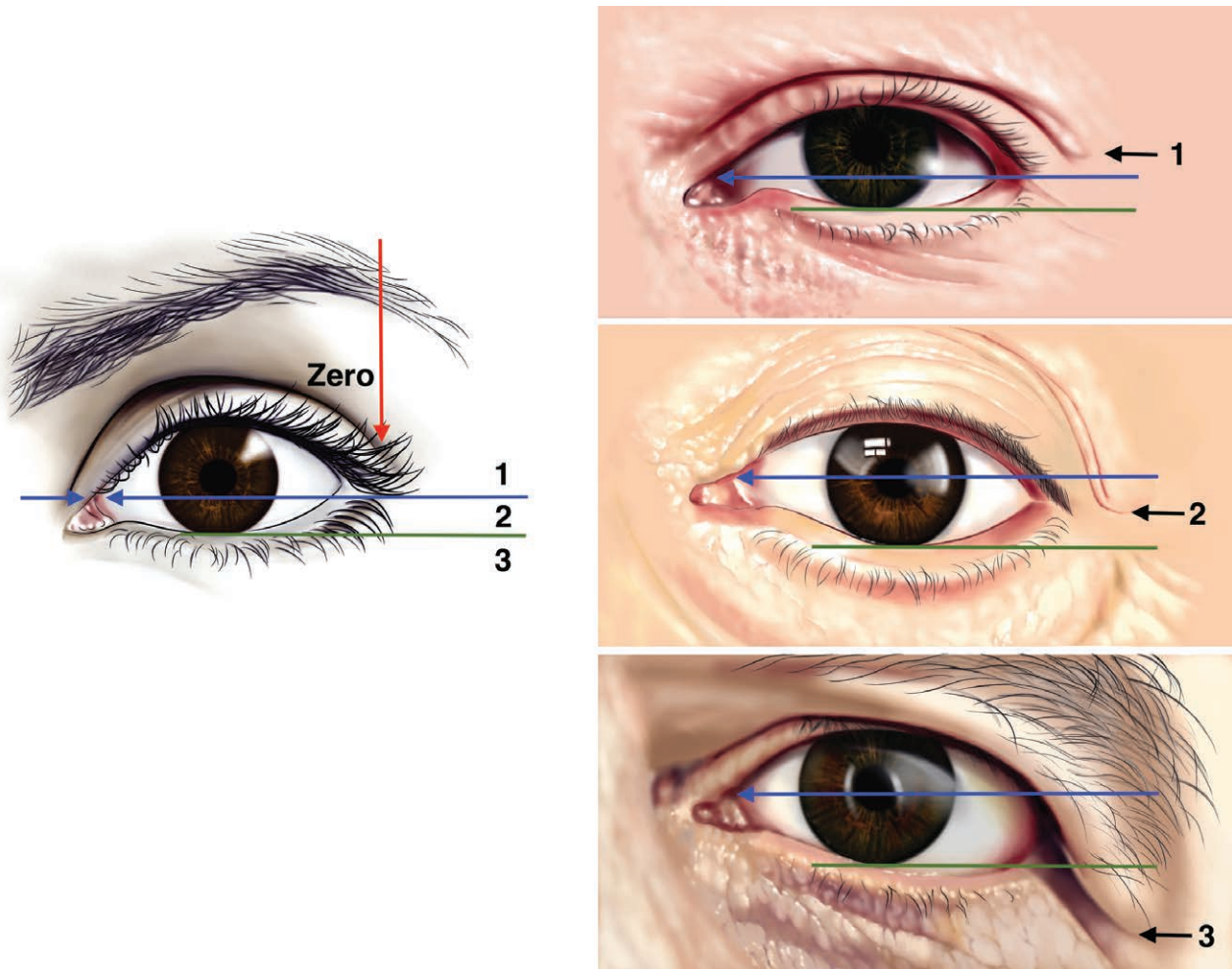


Fig. 1. Classification of dermatochalasis lateral to the eyelid. The transverse projection of the point where the lacrimal caruncle meets the edge of the upper eyelid (blue arrows), transverse projection of the medial-pupillary point on the lower edge of the iris (green lines), the orbital border in the lateral region (red arrow), and the lowermost point of the lateral dermatochalasis musculocutaneous fold, which defines the classification (black arrows). Zero, 1, 2, and 3 indicate the degree of accordance with the dermatochalasis lateral to the upper eyelid classification. Drawing by Dr. Iriam Starling.

DISCUSSION

The soft tissues of the eyelid and in its neighboring temporal region present a loosening with age, which is earlier and more intense laterally to the eyes, resulting in

dermatochalasis. This lateral disorder of the eyelid forming a single crease, may be neglected during blepharoplasty. In fact, all the existing classifications correlate only the intensity of the eyelid dermatochalasis, without observing the lateral

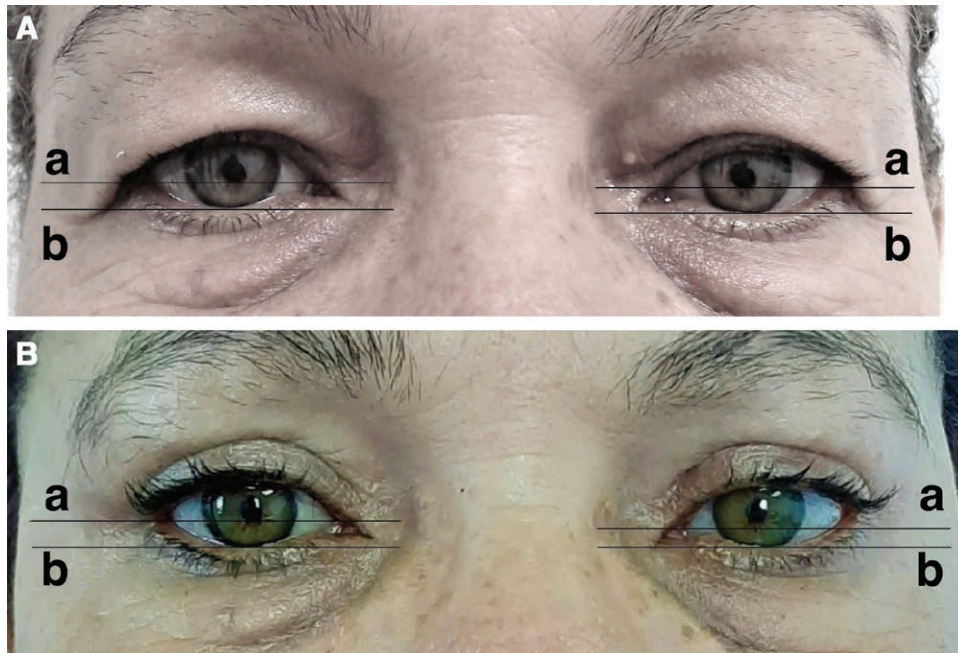


Fig. 2. Top and bottom digital lines of the face. Preoperative image (A) and postoperative image (B) showing the introduction of two lines on each eyelid. Line “a,” through the point where the lacrimal caruncle meets the edge of the upper eyelid, and line “b,” which passes through the midpoint of the lower edge of the iris.



Fig. 3. When a lower eyelid recovers the iris, a circle (yellow) must be placed over this eyelid to indicate the iris and classify grade 3 of the LDC.

dermatochalasis. Therefore, many patients that could be benefited by upper blepharoplasty are not operated on if we consider only the specific classification of the eyelid.

Dermatochalasis of the temporal region is well classified by the LDC; however, it is not considered by the JEC (Table 3). Considering that the dermatochalasis lateral to the eyelid is not defined before treatment by any classification, the postoperative assessment of the aesthetic results of the blepharoplasties also fails when revising only the eyelids. In this sense, the LDC is the only method that includes the whole aesthetic result, not only of the eyelid, but also of the temporal region.

Another important characteristic of LDC is the precise anatomical points to define the dermatochalasis that is not present in other classifications. This aspect makes it possible for a uniformity in classifying the eyelid and temporal

dermatochalasis. The lines through the anatomical points in the digital images indicate a precise classification of dermatochalasis. The JEC considers only the eyelid and joins the categories “B,” “C,” and “D” in less than a 2-mm border of the upper eyelid.

A limiting difficulty of LDC occurs when the lower eyelid overlaps the edge of the iris, making a grade 3 classification uncertain to be defined. In this case, a small digital circle to specify the place of the iris allows for a correct classification (Fig. 3).

All patients in this study had dermatochalasis in the LDC event, including those 59 eyelids considered normal by the JEC in the preoperative period (Tables 4, 6, 7). Therefore, all patients showed a well-defined improvement and their dermatochalasis after blepharoplasty was classified in greater detail when using LDC. However,

Table 4. Number of Dermatochalasis by Category and Grade

	JEC		LDC		
	Preoperative	Postoperative	Preoperative	Postoperative	
Category "A"	59	97	Grade "0"	0	59
Category "B"	15	3	Grade "1"	3	35
Category "C"	12	0	Grade "2"	28	6
Category "D"	14	0	Grade "3"	69	0
Total	100	100	Total	100	100

Table 5. Analysis of Association between the Degree of Eyelid Dermatochalasis using LDC and JEC in the Pretreatment

LDC	JEC								Total	
	A		B		C		D		n	%
	n	%	n	%	n	%	n	%		
0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1	3	3.0	0	0.0	0	0.0	0	0.0	3	3.0
2	19	19.0	3	3.0	2	2.0	3	3.0	27	27.0
3	37	37.0	12	12.0	10	10.0	11	11.0	70	70.0
Total	59	59.0	15	15.0	12	12.0	14	14.0	100	100.0

The percentages refer to the number of cases in each cell (n) divided by the number of total cases evaluated (N = 100). *V de Crammer* = 0.153 → *P* = 0.583.
P → Probability of significance of Crammer's V test.

TABLE 6. Comparative Analysis of the Degree of Change in the Intensity of Eyelid Dermatochalasis between Before and After Blepharoplasty by JEC

JEC Pre	Post								Total	
	A		B		C		D		n	%
	n	%	n	%	n	%	n	%		
A	59	59.0	0	0.0	0	0.0	0	0.0	59	59.0
B	15	15.0	0	0.0	0	0.0	0	0.0	15	15.0
C	11	11.0	1	1.0	0	0.0	0	0.0	12	12.0
D	12	12.0	2	2.0	0	0.0	0	0.0	14	14.0
Total	97	97.0	3	3.0	0	0.0	0	0.0	100	100.0

The percentages refer to the number of cases in each cell (n) divided by the total number of cases evaluated (n = 100).

Wilcoxon test: *P* < 0.001 → pre > post

Marginal homogeneity test: *P** < 0.001 → pre > post

P → Significance probability of the Wilcoxon test.

*P** → Probability of significance of the Marginal Homogeneity test.

TABLE 7. Comparative Analysis of the Degree of Change in the Intensity of Eyelid Dermatochalasis before and after Blepharoplasty by LDC

LDC Pre	Post								Total	
	0		1		2		3		n	%
	n	%	n	%	n	%	n	%		
0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1	3	3.0	0	0.0	0	0.0	0	0.0	3	3.0
2	16	16.0	11	11.0	0	0.0	0	0.0	27	27.0
3	40	40.0	24	24.0	6	6.0	0	0.0	70	70.0
Total	59	59.0	35	35.0	6	6.0	0	0.0	100	100.0

The percentages refer to the number of cases in each cell (n) divided by the total number of cases evaluated (n = 100).

Wilcoxon test: *P* < 0.001 → pre > post

Marginal homogeneity test: *P** < 0.001 → pre > post

P → Significance probability of the Wilcoxon test.

*P** → Probability of significance of the Marginal Homogeneity test.

according to the JEC, differences after the surgical procedure were pointed out in less than half of the patients (Tables 2, 6).

LDC and JEC classifications are not antagonistic with each other and may even be complementary. The alphabetical scale used in JEC and the numerical scale used in

LDC allow for a simultaneous classification of both regions in an alphanumeric manner, specifying the intensity of the eyelid dermatochalasis and laterally to it, such as: A0, A1, A2, A3; B0, B1, B2, B3; C0, C1, C2, C3; and D0, D1, D2, D3.

According to LDC, blepharoplasty is not recommended for patients with grade 0. Surgical treatment becomes necessary at grade 1. A pivotal feature of the blepharoplasty is its extension to the lateral region of the eyelid, until reaching the anatomical point three of the LDC, and the possibility of its association with other treatments, such as the suspension of the eyebrows and facial lifting. However, the relationship between the degrees of dermatochalasis and the recommendation of specific treatment techniques requires further study on the temporal region to reach a more appropriate treatment.

CONCLUSIONS

The new classification presented herein, LDC, evaluates the intensity of lateral dermatochalasis for eyelids, is specific for this medical condition, is based on exact anatomical points, and is easy to understand and perform. This method is effective and specific in detecting changes in dermatochalasis after blepharoplasty and is useful in typifying this dysmorphia. Therefore, LDC presents advantages over other classifications in defining more precisely the aesthetic results of blepharoplasties.

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