Archives of
Ophthalmological Research

Original Article

DOI: 10.51271/AOR-0057

Regional histopathologic differences between nasal and temporal upper eyelid tissues in blepharoplasty specimens

Elmas Yüksel Şükün*[1], Sibel Sipahioğlu[1], Işıl Çiçekdağı[2]

[1]Department of Ophthalmology, Alanya Training and Research Hospital, Antalya, Turkiye
[2]Department of Medical Pathology, Alanya Training and Research Hospital, Antalya, Turkiye

Cite this article: Yüksel Şükün E, Sipahioğlu S, Çiçekdağı I. Regional histopathologic differences between nasal and temporal upper eyelid tissues in blepharoplasty specimens. *Arch Ophthalmol Res.* 2026;3(3):57-60. doi:10.51271/AOR-0057

Received: 12/08/2026 ◆ **Accepted:** 21/09/2026 ◆ **Published:** 24/09/2026

ABSTRACT

Aims: To investigate histopathologic differences between the nasal and temporal portions of upper eyelid blepharoplasty specimens in dermatochalasis.

Methods: This retrospective observational study included 82 eyes with available nasal and temporal upper eyelid excision specimens. The number of dilated lymphatic vessels, maximum lymphatic vessel diameter, elastic fiber count, macrophage count, and capillary count were evaluated separately in both regions. Paired comparisons were performed using the paired-samples t-test or Wilcoxon signed-rank test, as appropriate.

Results: The study included 82 eyes from 41 patients. The mean age was 59.1±8.56 years; 26 patients (63.4%) were female and 15 (36.6%) were male. The nasal region showed significantly higher values for dilated lymphatic vessel count (6.99±1.79 vs 6.51±1.36; p<0.001), elastic fiber count (3.32±0.93 vs 3.06±0.91; p=0.003), and capillary count (13.46±3.14 vs 12.84±3.25; p<0.001). No significant differences were found for maximum lymphatic vessel diameter [239.29±57.71 micrometers (μm) vs 242.05±59.49 μm; p=0.228] or macrophage count (26.67±2.70 vs 26.40±2.63; p=0.101).

Conclusion: Regional histopathologic differences were observed between the nasal and temporal portions of upper eyelid blepharoplasty specimens. The nasal region showed higher counts of dilated lymphatic vessels, elastic fibers, and capillaries than the temporal region.

Keywords: Dermatochalasis, blepharoplasty, upper eyelid, histopathology, lymphatic vessels, elastic fibers

INTRODUCTION

Dermatochalasis involves histopathologic changes beyond age-related upper eyelid skin laxity, including lymphatic vessel proliferation and dilatation, stromal edema, elastic fiber loss, and macrophage accumulation.[1-3] These findings have been associated with subclinical inflammation, elastolysis, and secondary lymphostasis.[1-3] However, histopathologic studies of dermatochalasis remain limited, particularly those directly comparing different anatomic regions of the upper eyelid within the same individual.[2,3]

The upper eyelid does not behave as a clinically uniform structure. Dermatochalasis has been described as part of the broader pathophysiologic process of periorbital aging and appears to involve multilayered structural alterations beyond simple skin excess.[4,5] More recent reports have also shown that dermatochalasis may exhibit different clinical and histologic subtypes and that histopathologic changes do not necessarily follow the same pattern in all cases.[6,7] These observations suggest that histopathologic changes may vary across different regions of the upper eyelid.

Dermatochalasis may be associated not only with cosmetic concerns but also with functional symptoms.[8] Upper eyelid blepharoplasty therefore remains one of the standard surgical approaches for its treatment.[4] Against this background, identifying regional tissue differences is relevant both for understanding the pathobiology of dermatochalasis and for improving tissue characterization in blepharoplasty planning.

Given the regional differences in upper eyelid anatomy and lymphatic organization,[4,5] we hypothesized that histopathologic changes associated with dermatochalasis may not be uniformly distributed across the upper eyelid. Therefore, the present study aimed to compare nasal and temporal blepharoplasty specimens from the same eye with respect to lymphatic vessel number and diameter, elastic fiber count, macrophage count, and capillary count. We

***Corresponding Author:** Elmas Yüksel Şükün, dr.elmas.yuksel@gmail.com

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

hypothesized that these histopathologic parameters would differ between the nasal and temporal regions.

METHODS

Ethics

The study was approved by the Alanya Alaaddin Keykubat University Faculty of Medicine Clinical Researches Ethics Committee (Date: 01.04.2026, Decision No: 06-03) and was conducted in accordance with the principles of the Declaration of Helsinki.

Study Design

In this retrospective observational study, cases with available histopathologic evaluation of nasal and temporal upper eyelid excision specimens were reviewed. Patients were included if they had undergone upper eyelid blepharoplasty, had available tissue samples from both the nasal and temporal regions, and had complete histopathologic data. Cases with incomplete histopathologic evaluation, missing nasal or temporal specimens, or insufficient records were excluded.

Demographic data were retrieved retrospectively from medical records and pathology archives. Each eye was considered a separate unit of analysis, and right and left eyes from the same patient were analyzed as separate records. Age, gender, and histopathologic parameters were documented.

The excised upper eyelid specimens were divided into nasal and temporal portions according to anatomical landmarks. The nasal portion corresponded to the medial upper eyelid tissue between the medial limbus and the medial canthus, whereas the temporal portion corresponded to the lateral upper eyelid tissue between the lateral limbus and the lateral canthus. The specimens from the two regions were submitted separately for histopathologic examination. All tissue samples were fixed in 10% buffered formalin, embedded in paraffin, and processed according to standard histopathologic protocols.

Tissue sections were stained with hematoxylin and eosin (H&E), Masson trichrome (MT), and elastic Van Gieson (EVG). In addition, immunohistochemical staining was performed using CD68 for macrophages, D2-40 for lymphatic endothelial cells, and CD34 for vascular endothelial cells.

Statistical Analysis

Histopathologic evaluation was performed under light microscopy by the same pathologist. The following parameters were assessed separately in the nasal and temporal specimens: number of dilated lymphatic vessels, maximum lymphatic vessel diameter, elastic fiber count, macrophage count, and capillary count. The number of dilated lymphatic vessels was determined by counting D2-40-positive dilated lymphatic vessels at ×100 magnification. Maximum lymphatic vessel diameter was recorded in micrometer (μm) as the largest diameter of a lymphatic vessel identified in each specimen. Elastic fiber count was assessed using EVG staining, and the number of elastic fibers observed per 20 collagen fibers was recorded. Macrophage count was determined by counting CD68-positive cells at ×400 magnification, whereas capillary count was assessed by counting CD34-positive capillary vessels at ×400 magnification. For all parameters except maximum lymphatic vessel diameter, counts were obtained from three separate microscopic fields at the specified magnification, and the mean value was used for statistical analysis.

Statistical analyses were performed using jamovi version 2.7.6. Continuous variables were summarized as mean±standard deviation, median, and minimum and maximum values, whereas categorical variables were expressed as counts and percentages. Comparisons between the nasal and temporal regions were performed using paired analyses. Distribution of variables was assessed with the Shapiro-Wilk test. Variables with normal distribution were analyzed using the paired-samples t-test, whereas non-normally distributed paired variables were analyzed using the Wilcoxon signed-rank test. Accordingly, maximum lymphatic vessel diameter and macrophage count were analyzed using the paired-samples t-test, while the number of dilated lymphatic vessels, elastic fiber count, and capillary count were analyzed using the Wilcoxon signed-rank test. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 82 eyes from 41 patients were included in the study. The mean age of the patients was 59.1±8.56 years. Of the 41 patients, 26 (63.4%) were female and 15 (36.6%) were male.

In paired comparisons, the number of dilated lymphatic vessels was significantly higher in the nasal than in the temporal region (6.99±1.79 vs 6.51±1.36, $p<0.001$). Elastic fiber count (3.32±0.93 vs 3.06±0.91, $p=0.003$) and capillary count (13.46±3.14 vs 12.84±3.25, $p<0.001$) were also significantly higher in the nasal region. In contrast, no significant differences were observed between the nasal and temporal regions in maximum lymphatic vessel diameter (239.29±57.71 μm vs 242.05±59.49 μm, $p=0.228$) or macrophage count (26.67±2.70 vs 26.40±2.63, $p=0.101$) (Table).

DISCUSSION

In the present study, the nasal and temporal portions of upper eyelid blepharoplasty specimens were directly compared within the same eye. The nasal region showed significantly higher numbers of dilated lymphatic vessels, elastic fibers, and capillaries than the temporal region. In contrast, no significant differences were found between the two regions with respect to maximum lymphatic vessel diameter or macrophage count.

Table. Comparison of histopathologic parameters between the nasal and temporal upper eyelid regions

Variable	Nasal, mean±SD	Temporal, mean±SD	Test	p-value
Dilated lymphatic vessel count	6.99±1.79	6.51±1.36	Wilcoxon signed-rank test	<0.001
Maximum lymphatic vessel diameter (μm)	239.29±57.71	242.05±59.49	Paired-samples t-test	0.228
Elastic fiber count	3.32±0.93	3.06±0.91	Wilcoxon signed-rank test	0.003
Macrophage count	26.67±2.70	26.40±2.63	Paired-samples t-test	0.101
Capillary count	13.46±3.14	12.84±3.25	Wilcoxon signed-rank test	<0.001

Patient characteristics: 41 patients (82 eyes); mean age, 59.1±8.56 years; female, n=26 (63.4%); male, n=15 (36.6%). SD: Standard deviation, μm: Micrometer

These findings demonstrate region-specific histopathologic differences within the examined upper eyelid specimens.

Previous studies have shown that dermatochalasis cannot be explained solely by age-related tissue laxity. Nagi et al.[1] and Karnaz et al.[2] described increased lymphatic vessel density and dilatation, loss of elastic fibers, stromal edema, and increased macrophage infiltration. Kashkouli et al.[3] likewise emphasized lymphangiectasia and lymphatic dilatation as recurring histopathologic features of dermatochalasis. However, previous studies have mainly compared dermatochalasis with control tissue or examined age-related differences, whereas region-specific histopathologic comparisons within the upper eyelid remain limited.[3,7] Our finding of higher lymphatic vessel and capillary counts in the nasal region suggests that these microvascular and lymphatic alterations may not be evenly distributed throughout the upper eyelid.

In our study, no significant difference was found between the nasal and temporal regions regarding maximum lymphatic vessel diameter. Kashkouli et al.[3] reported that most histopathologic parameters were similar across age groups, with the exception of lymphatic vessel diameter, which increased with age. Within the studied specimens, the regional difference was observed in lymphatic vessel number rather than maximum vessel diameter. Previous anatomical studies have also demonstrated regional organization of upper eyelid lymphatics.[9,10]

The higher elastic fiber count in the nasal region is also noteworthy. Although previous studies reported elastic fiber loss in dermatochalasis,[1-3] these observations were largely based on comparisons between dermatochalasis specimens and control tissue. In contrast, our study compared two anatomic regions within the same eyelid and therefore indicates not an absolute excess of elastic fibers in the nasal region, but rather a relatively higher elastic fiber count compared with the temporal region. Likewise, the higher capillary count in the nasal region may indicate a more pronounced microvascular difference in this compartment. However, studies directly examining regional variation in capillary distribution within the upper eyelid remain limited.

No significant difference in macrophage count was found between the nasal and temporal regions. Although previous control-based studies have reported increased macrophage infiltration in dermatochalasis tissue,[1,2] our results did not demonstrate a regional difference within the same eyelid. This may indicate that inflammatory cellular involvement represents a general histopathologic component of dermatochalasis rather than a distinctly region-specific change.

The regional differences observed in our study demonstrate histopathologic variation between the nasal and temporal portions of the examined blepharoplasty specimens. Recent studies examining orbicularis oculi muscle alterations and systemic vitamin D status further suggest that different structural and systemic factors may be associated with dermatochalasis.[11,12] You et al.[7] identified different clinical and histologic subtypes of senile dermatochalasis and demonstrated variation in histopathologic patterns among cases. Similarly, Aydemir et al.[6] investigated the relationship between histopathologic findings and systemic biochemical status, suggesting that dermatochalasis may have heterogeneous biological determinants.

Limitations

This study has several limitations. First, its retrospective design should be acknowledged. Second, both eyes of each patient were analyzed separately, although fellow eyes are not statistically independent. The lack of adjustment for within-subject correlation should therefore be considered when interpreting the results. In addition, the dimensions of the nasal and temporal specimens were not systematically recorded; therefore, potential differences in specimen size between the two regions could not be accounted for. Furthermore, only selected histopathologic parameters were evaluated, whereas collagen stromal bed depth, intrafibrillar edema, and other immunohistochemical markers were not assessed. The absence of a control group also means that the present findings reflect regional differences rather than the full spectrum of pathologic changes associated with dermatochalasis. Dermatochalasis severity was not systematically graded; therefore, its potential association with the histopathologic findings could not be evaluated. Potential confounding factors such as skin type, smoking status, cumulative sun exposure, systemic diseases, and other environmental factors were not systematically available and therefore could not be accounted for in the analyses. On the other hand, direct comparison of nasal and temporal regions within the same eye represents an important strength of the study.

CONCLUSION

As a result, among the blepharoplasty specimens examined in this study, the nasal upper eyelid region showed higher numbers of dilated lymphatic vessels, elastic fibers, and capillaries than the temporal region, whereas maximum lymphatic vessel diameter and macrophage count did not differ significantly. These findings demonstrate regional histopathologic differences between the nasal and temporal portions of the examined upper eyelid specimens. Further prospective studies incorporating standardized specimen measurements, dermatochalasis grading, and appropriate control groups are needed to determine the clinical and pathophysiological significance of these findings.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study was approved by the Alanya Alaaddin Keykubat University Faculty of Medicine Clinical Researches Ethics Committee (Date: 01.04.2026, Decision No: 06-03).

Informed Consent

This retrospective study used pre-existing anonymized patient data. No additional intervention was performed, and there was no direct patient contact. The study was approved by the Ethics Committee, and the requirement for written informed consent was waived by the ethics committee.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

Author Contributions

Concept: EYŞ, SS; Design: EYŞ, SS; Control: SS, IÇ; Data Collection and/or Processing: EYŞ, IÇ; Analysis and/or Interpretation: EYŞ, SS, IÇ; Literature Review: EYŞ; Writing the Article: EYŞ; Critical Review: EYŞ, SS, IÇ.

REFERENCES

1. Nagi KS, Carlson JA, Wladis EJ. Histologic assessment of dermatochalasis: elastolysis and lymphostasis are fundamental and interrelated findings. *Ophthalmology.* 2011;118(6):1205-1210. doi:10.1016/j.ophtha.2010.10.013
2. Karnaz A, Katircioglu YA, Ozdemir ES, Celebli P, Hucumenoglu S, Ornek F. The histopathological findings of patients who underwent blepharoplasty due to dermatochalasis. *Semin Ophthalmol.* 2018;33(3):407-411. doi:10.1080/08820538.2017.1282970
3. Kashkouli MB, Karimi N, Johari-Moghadam MM, Shayanfar N, Aghamirsalim M, Abdolalizadeh P. Dermatochalasis through decades: a histopathologic study. *Ann Plast Surg.* 2021;86(3):340-344. doi:10.1097/SAP.0000000000002489
4. Bhattacharjee K, Misra D, Deori N. Updates on upper eyelid blepharoplasty. *Indian J Ophthalmol.* 2017;65(7):551-558. doi:10.4103/ijo.IJO_540_17
5. De Biasio F, Miotti G, Zingaretti N, Castriotta L, Parodi PC. Study on the aging dynamics of the periorbital region: from observation to knowledge of physiopathology. *Ophthalmic Plast Reconstr Surg.* 2019;35(4):333-341. doi:10.1097/IOP.0000000000001247
6. Aydemir E, Malkoç Şen E, Aksoy Aydemir G, Bayat AH, Karnaz A, Aydın Türk B. Relationship between histopathological findings of patients with dermatochalasis and vitamin D deficiency. *Int Ophthalmol.* 2024;44(1):309. doi:10.1007/s10792-024-03209-3
7. You H, Kim G, Lew H. A novel classification of senile dermatochalasis: insights from clinical and histological analysis. *Graefes Arch Clin Exp Ophthalmol.* 2024;262(8):2643-2649. doi:10.1007/s00417-024-06430-z
8. Avisar I, Norris JH, Selva D, Malhotra R. Upper-eyelid wick syndrome: association of upper-eyelid dermatochalasis and tearing. *Arch Ophthalmol.* 2012;130(8):1007-1012. doi:10.1001/archophthalmol.2012.1340
9. Wu G, Yang Y, Sheng L, et al. Eyelid lymphatics: an anatomical study by microdissection. *J Craniofac Surg.* 2021;32(8):2878-2882. doi:10.1097/SCS.0000000000007759
10. Nishioka H, Takashimizu I, Yuzuriha S. Upper eyelid lymphatic anatomy is associated with blepharoplasty recovery. *J Plast Reconstr Aesthet Surg.* 2024;99:248-255. doi:10.1016/j.bjps.2024.09.079
11. Krajewska-Węglewicz L, Felczak P, Adamek D, Dorobek M. Damage to the orbicularis oculi muscle may impair the development of dermatochalasis. *Sci Rep.* 2024;14(1):2417. doi:10.1038/s41598-024-52955-y
12. Seyyar SA, Tokuc EO. Evaluation of 25-hydroxyvitamin D levels in patients with dermatochalasis. *Int Ophthalmol.* 2023;43(3):749-756. doi:10.1007/s10792-022-02474-4