Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Clinicopathological Characteristics of Histopathologically Confirmed Eyelid Lesions: A Retrospective Single-Center Study

Ahu Yılmaz

dr.ahuyilmaz@gmail.com

Cemil Tascıoglu City Hospital

Ismail Gokturk

Cemil Tascıoglu City Hospital

Research Article

Keywords: Eyelid lesions, Basal cell carcinoma, Chalazion, Histopathology, Periocular tumors, Squamous cell carcinoma

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10568308/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Title

Clinicopathological Characteristics of Histopathologically Confirmed Eyelid Lesions: A Retrospective Single-Center Study

Running Title

Clinicopathological Characteristics of Eyelid Lesions

Authors

Ahu Yılmaz, MD[1]

İsmail Göktürk, MD[1]

Affiliation

[1]Department of Ophthalmology, Prof. Dr. Cemil Taşcıoğlu City Hospital, University of Health Sciences, Istanbul, Türkiye

Corresponding Author

Ahu Yılmaz, MD

Department of Ophthalmology

Prof. Dr. Cemil Taşcıoğlu City Hospital

University of Health Sciences

Istanbul, Türkiye

E-mail: dr.ahuyilmaz@gmail.com

ABSTRACT

Background

Eyelid lesions comprise a broad spectrum of benign, malignant, and non-neoplastic conditions originating from various periocular tissues. Because many lesions exhibit overlapping clinical features, distinguishing benign from malignant pathology based solely on clinical examination may be difficult. Histopathological evaluation remains the gold standard for establishing a definitive diagnosis, particularly in recurrent or atypical lesions. This study aimed to evaluate the clinicopathological characteristics of histopathologically confirmed eyelid lesions treated at a tertiary referral ophthalmology center and to identify demographic factors associated with malignant pathology.

Methods

This retrospective observational study included 161 consecutive patients who underwent surgical excision of eyelid lesions between January 2023 and December 2025 at a tertiary referral center. Only lesions with definitive histopathological diagnoses were included. Demographic characteristics, lesion location, and histopathological findings were analyzed. Histopathological diagnoses were categorized as benign neoplastic, malignant neoplastic, or non-neoplastic inflammatory lesions. Continuous variables were compared using the independent-samples t-test, whereas categorical variables were analyzed using the chi-square or Fisher's exact test. Binary logistic regression analysis was performed to identify independent predictors of malignant pathology.

Results

A total of 161 patients (88 women and 73 men) with a mean age of 72.6 ± 11.4 years were included. Benign and non-neoplastic lesions accounted for 70.2% of all cases, whereas malignant lesions represented 29.8%. Nevus was the most common benign lesion, while basal cell carcinoma

accounted for 87.5% of malignant tumors. Malignant lesions were located predominantly in the lower eyelid (62.5%). Patients with malignant lesions were significantly older than those with benign lesions (p=0.020). Logistic regression analysis demonstrated increasing age as an independent predictor of malignant pathology (OR 1.05; 95% CI 1.01–1.09; p=0.018), whereas sex was not significantly associated with malignancy.

Conclusions

Benign lesions constituted the majority of surgically excised eyelid lesions; however, nearly one-third were malignant. Increasing age and lower eyelid localization were associated with malignant pathology. Routine histopathological examination remains essential for accurate diagnosis, particularly in elderly patients and in recurrent or atypical lesions clinically resembling chalazion.

Keywords

Eyelid lesions; Basal cell carcinoma; Chalazion; Histopathology; Periocular tumors; Squamous cell carcinoma

INTRODUCTION

Eyelid lesions encompass a wide spectrum of benign, malignant, and non-neoplastic conditions arising from the epidermis, adnexal glands, melanocytes, mesenchymal tissues, and inflammatory structures of the periocular region. They represent one of the most common disorders encountered in ophthalmic and oculoplastic practice because of their high prevalence, cosmetic impact, and potential to impair eyelid function and ocular health. Although most eyelid lesions are benign, malignant tumors require prompt recognition because delayed diagnosis may result in local tissue destruction, orbital invasion, regional lymph node involvement, and, in advanced cases, distant metastasis. [1,2]

Basal cell carcinoma (BCC) is the most common malignant eyelid tumor worldwide[2,3], accounting for approximately 80–90% of all periocular malignancies. Squamous cell carcinoma (SCC), sebaceous gland carcinoma (SGC), and malignant melanoma are less common but generally exhibit more aggressive biological behavior. Increasing age, chronic ultraviolet (UV) radiation exposure, fair skin phenotype, immunosuppression, and previous skin malignancy have consistently been identified as major risk factors for eyelid cancer. Owing to greater cumulative UV exposure, malignant tumors occur predominantly in the lower eyelid. [2–4]

Despite advances in slit-lamp biomicroscopy, dermoscopy, and high-resolution ocular imaging, differentiating benign from malignant eyelid lesions solely on clinical examination remains challenging. Benign lesions such as papillomas, nevi, cysts, and chalazia frequently mimic malignant tumors, whereas early BCC or SGC may initially present with nonspecific clinical findings. Consequently, histopathological examination remains the diagnostic gold standard and should be performed for all surgically excised eyelid lesions, particularly when lesions are recurrent, atypical, or demonstrate an unusual clinical course. [1,3,6,10]

Interpretation of pathology-based studies requires consideration of an important source of selection bias. In routine ophthalmic practice, uncomplicated chalazia are commonly treated conservatively or by incision and curettage without histopathological evaluation. Therefore, pathology-based series inevitably underestimate the true frequency of chalazion while relatively enriching the study population with clinically suspicious lesions. Nevertheless, several studies have shown that lesions initially diagnosed clinically as chalazion may ultimately prove to be sebaceous gland carcinoma or, less commonly, basal cell carcinoma following histopathological examination. These findings emphasize the importance of maintaining a high index of suspicion, particularly in elderly patients and in recurrent or atypical lesions. [10–12]

The reported distribution of eyelid lesions varies considerably among different geographic regions because of differences in ethnicity, environmental ultraviolet exposure, referral patterns, and healthcare systems. Furthermore, many published studies originate from pathology registries or dermatology departments and may not accurately represent the spectrum of lesions encountered in tertiary ophthalmology centers. Contemporary clinicopathological studies including both neoplastic and histopathologically confirmed non-neoplastic lesions remain relatively limited. [1,5–7]

Therefore, the present study aimed to evaluate the clinicopathological spectrum of histopathologically confirmed eyelid lesions treated at a tertiary referral ophthalmology center. In addition to describing the distribution of benign, malignant, and non-neoplastic lesions, we investigated demographic and anatomical factors associated with malignant pathology and emphasized the continuing importance of routine histopathological examination in the management of eyelid lesions.

METHODS

Study Design

This retrospective observational study was conducted at the Department of Ophthalmology, Prof. Dr. Cemil Taşcıoğlu City Hospital, University of Health Sciences, Istanbul, Türkiye. Medical records of consecutive patients who underwent surgical excision of eyelid lesions between January 2023 and December 2025 were reviewed.

This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement for observational studies.

Ethical Approval

The study protocol was approved by the Prof. Dr. Cemil Taşcıoğlu City Hospital Clinical Research Ethics Committee (Approval No: E-48670771-514.99/2026) and adhered to the tenets of the Declaration of Helsinki. Owing to the retrospective design and use of anonymized data, the requirement for written informed consent was waived by the Ethics Committee.

Study Population

Patients who underwent surgical excision of an eyelid lesion with a definitive histopathological diagnosis were included. Both neoplastic and histopathologically confirmed non-neoplastic inflammatory lesions were analyzed to provide a comprehensive overview of surgically managed eyelid lesions.

Consecutive eligible patients who underwent surgical excision of an eyelid lesion during the study period were included to minimize selection bias. Cases with incomplete clinical records, unavailable histopathological reports, or inadequate tissue specimens were excluded before statistical analysis.

Data Collection

The following variables were recorded:

.Age

.Sex

.Laterality

.Anatomical location (upper eyelid, lower eyelid, medial canthus, lateral canthus)

Data extraction was performed using standardized electronic medical records.

Histopathological diagnoses were reviewed independently by experienced pathologists before inclusion in the final analysis

Clinical diagnosis

Histopathological diagnosis

Histopathological diagnoses were classified as:

Benign neoplastic lesions

Malignant neoplastic lesions

Non-neoplastic inflammatory lesions

Histopathological Evaluation

All excised specimens were routinely fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin. Histopathological diagnoses were established by experienced pathologists according to the World Health Organization Classification of Skin Tumours (5th edition).

Outcome Measures

The primary outcome was the histopathological distribution of eyelid lesions.

Secondary outcomes included:

prevalence of benign and malignant lesions;

anatomical distribution;

demographic factors associated with malignancy;

independent predictors of malignant pathology.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics (IBM Corp., Armonk, NY, USA). Continuous variables were assessed for normality using the Shapiro–Wilk test and are presented as

mean ± standard deviation (SD). Categorical variables are presented as frequencies and percentages. Between-group comparisons were performed using the independent-samples t-test, chi-square test, or Fisher's exact test, as appropriate. Binary logistic regression analysis was used to identify independent predictors of malignant pathology. Odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated. A two-sided p value <0.05 was considered statistically significant.

All available data were analyzed, and no imputation method was required because cases with incomplete datasets had been excluded before statistical analysis.

RESULTS

During the study period, 174 patients underwent surgical excision of eyelid lesions. Thirteen patients were excluded because of incomplete clinical information or unavailable histopathological reports. Consequently, 161 patients met the eligibility criteria and were included in the final analysis

Patient Characteristics

A total of 161 consecutive patients who underwent surgical excision of eyelid lesions between January 2023 and December 2025 met the inclusion criteria. The study population consisted of 88 women (54.7%) and 73 men (45.3%), with a mean age of 72.6 ± 11.4 years (range, 28–91 years).

Histopathological examination classified 113 lesions (70.2%) as benign or non-neoplastic and 48 lesions (29.8%) as malignant. Patients with malignant lesions were significantly older than those with benign lesions (78.9 ± 9.5 vs. 69.8 ± 10.2 years, p=0.020). No statistically significant association was observed between sex and malignant pathology (p=0.41). The demographic and clinical characteristics of the study population are summarized in Table 1.

Histopathological Distribution of Eyelid Lesions

Histopathological examination demonstrated a broad spectrum of eyelid lesions. Among benign and non-neoplastic lesions, nevus was the most frequent diagnosis (39/161, 24.2%), followed by chalazion (32/161, 19.9%), papilloma (29/161, 18.0%), seborrheic keratosis (3/161, 1.9%), and other benign lesions (10/161, 6.2%).

Among malignant lesions, basal cell carcinoma (BCC) accounted for 42 of 48 malignant tumors (87.5%), whereas squamous cell carcinoma (SCC) represented the remaining six cases (12.5%).

The complete histopathological distribution of eyelid lesions is presented in Table 2.

Anatomical Distribution

The anatomical distribution differed considerably according to histopathological diagnosis.

Among benign lesions, the upper eyelid was the most frequently affected anatomical site (46/113, 40.7%), followed by the lower eyelid (35/113, 31.0%), lateral canthus (24/113, 21.2%), and medial canthus (8/113, 7.1%).

In contrast, malignant lesions demonstrated a marked predilection for the lower eyelid, where 30 of 48 tumors (62.5%) were located. Eight malignant lesions (16.7%) involved the upper eyelid, six (12.5%) the medial canthus, and four (8.3%) the lateral canthus.

The anatomical distribution of benign and malignant lesions is summarized in Table 3.

Predictors of Malignancy

Binary logistic regression analysis identified increasing age as an independent predictor of malignant pathology. Each one-year increase in age was associated with an approximately 5% increase in the odds of malignancy (odds ratio [OR], 1.05; 95% confidence interval [CI], 1.01–1.09; p=0.018).

Sex was not independently associated with malignant disease (OR, 1.22; 95% CI, 0.65–2.28; p=0.53). Detailed regression results are presented in Table 4.

Nevus was the most common benign diagnosis, whereas basal cell carcinoma was the predominant malignant tumor. Malignant lesions occurred predominantly in the lower eyelid and increasing age was identified as an independent predictor of malignant pathology.

Table 1. Demographic and Clinical Characteristics of the Study Population

Variable	Benign (n=113)	Malignant (n=48)	p value
Age (years), mean ± SD	69.8 ± 10.2	78.9 ± 9.5	0.020

Female, n (%)	64 (56.6)	24 (50.0)	0.41
Male, n (%)	49 (43.4)	24 (50.0)	0.41

Table 2. Histopathological Distribution of Histopathologically Confirmed Eyelid Lesions

Histopathological diagnosis	n	%
Nevus	39	24.2
Chalazion	32	19.9
Papilloma	29	18.0
Seborrheic keratosis	3	1.9
Basal cell carcinoma	42	26.1
Squamous cell carcinoma	6	3.7
Other benign lesions	10	6.2

Table 3. Anatomical Distribution of Benign and Malignant Eyelid Lesions

Location	Benign n (%)	Malignant n (%)
Upper eyelid	46 (40.7)	8 (16.7)
Lower eyelid	35 (31.0)	30 (62.5)
Medial canthus	8 (7.1)	6 (12.5)
Lateral canthus	24 (21.2)	4 (8.3)

Table 4. Binary Logistic Regression Analysis of Predictors of Malignant Eyelid Lesions

Variable	OR	95% CI	p value
Age (per year)	1.05	1.01–1.09	0.018
Male sex	1.22	0.65–2.28	0.53

No missing demographic data were identified among the included patients

DISCUSSION

In this retrospective clinicopathological study, we evaluated 161 histopathologically confirmed eyelid lesions managed at a tertiary referral ophthalmology center over a three-year period. Benign and non-neoplastic lesions constituted approximately 70% of surgically excised lesions, whereas malignant lesions accounted for nearly one-third of the cohort. Basal cell carcinoma (BCC) was the predominant malignant tumor, nevus was the most common benign lesion, and increasing age was identified as an independent predictor of malignant pathology. Furthermore, malignant lesions demonstrated a marked predilection for the lower eyelid.

Our findings are consistent with previous clinicopathological studies reporting that BCC is the most common malignant eyelid tumor worldwide, accounting for approximately 80–90% of all periocular malignancies. Deprez and Uffer, Cook and Bartley, Bagheri et al., and Coroi et al. similarly reported BCC as the predominant malignant lesion in their series.[1,2,5,6] The proportion of BCC observed in our study (87.5% of malignant tumors) closely corresponds to these reports and further supports the well-established epidemiological predominance of BCC among eyelid malignancies. Likewise, the relatively low frequency of squamous cell carcinoma observed in our cohort agrees with previous epidemiological studies.[2,6,7]

Anatomical location is an important clinical clue in the assessment of eyelid lesions. In the present study, malignant tumors occurred predominantly in the lower eyelid, whereas benign lesions were observed more frequently in the upper eyelid. This distribution has been consistently described in previous studies and is generally attributed to greater cumulative ultraviolet radiation exposure of the lower eyelid.[2,5,6] The lower eyelid receives more direct sunlight throughout life, predisposing it to ultraviolet-induced DNA damage and carcinogenesis. In addition, although medial canthal lesions were less frequent, the proportion of malignancy in this region was relatively high. Because tumors arising at the medial canthus may invade the lacrimal drainage system, orbit, or adjacent facial structures, careful clinical assessment and complete surgical excision are particularly important.

Increasing age emerged as an independent predictor of malignant pathology in our study. Logistic regression analysis demonstrated that each additional year of age increased the likelihood of malignancy by approximately 5%. This observation is biologically plausible and consistent with previous epidemiological investigations demonstrating that cumulative ultraviolet exposure, progressive genomic instability, immunosenescence, and impaired DNA repair contribute to cutaneous carcinogenesis.[2,6,8] In contrast, patient sex was not independently associated with malignant disease, suggesting that age is a more reliable predictor of malignancy than biological sex in surgically treated eyelid lesions.

An important observation of the present study is the relatively low proportion of chalazion compared with routine ophthalmic practice. This finding should not be interpreted as reflecting the true epidemiological prevalence of chalazion but rather as an inherent consequence of pathology-based case selection. In daily clinical practice, uncomplicated chalazia are commonly treated conservatively or by incision and curettage without histopathological examination. Consequently, retrospective pathology series inevitably underestimate the true prevalence of chalazion while relatively enriching the study population with clinically suspicious lesions requiring surgical excision. This limitation should be considered when comparing pathology-based studies with population-based epidemiological investigations.[1,6]

Despite this selection bias, our findings strongly support routine histopathological examination of surgically excised eyelid lesions. Several studies have demonstrated that lesions initially diagnosed clinically as chalazion may ultimately prove to be sebaceous gland carcinoma or, less commonly, basal cell carcinoma. Özdal et al. reported the limited diagnostic accuracy of the clinical diagnosis of chalazion and emphasized the importance of histopathological confirmation, particularly in recurrent or atypical cases. [10] Similarly, Shields et al. highlighted that sebaceous gland carcinoma frequently masquerades as benign inflammatory eyelid disease, resulting in delayed diagnosis and

treatment.[11] These observations reinforce our recommendation that recurrent, atypical, or treatment-resistant eyelid lesions should routinely undergo histopathological evaluation.

Compared with many previously published studies, our investigation has several strengths. First, all lesions were confirmed histopathologically, minimizing diagnostic misclassification. Second, unlike many previous reports focusing exclusively on malignant tumors, our study included both neoplastic and histopathologically confirmed non-neoplastic lesions, providing a comprehensive overview of surgically treated eyelid lesions encountered in routine ophthalmic practice. Third, anatomical localization was analyzed systematically, allowing direct comparison of lesion distribution between benign and malignant groups. Finally, multivariable logistic regression analysis enabled identification of age as an independent predictor of malignancy after adjustment for potential confounding factors.

Several limitations should be acknowledged. This was a retrospective study conducted at a single tertiary referral center, which may limit the generalizability of the findings. Only surgically excised lesions submitted for histopathological examination were included, resulting in underrepresentation of lesions managed conservatively, particularly uncomplicated chalazia. Furthermore, follow-up data regarding local recurrence, regional metastasis, disease-specific survival, and functional outcomes were unavailable. Future prospective multicenter studies with larger patient populations and long-term follow-up are warranted to validate these findings and further clarify the epidemiology and clinical behavior of eyelid lesions. Therefore, our findings primarily reflect the spectrum of surgically managed lesions rather than the overall epidemiology of eyelid lesions in the general population.

Because this was a pathology-based surgical series, the reported frequencies should not be interpreted as the true epidemiological incidence of eyelid lesions in the general population.

Overall, the present study confirms that although benign lesions constitute the majority of surgically treated eyelid lesions, malignant tumors remain sufficiently common to justify meticulous clinical evaluation. Advanced age, lower eyelid localization, and recurrent or atypical clinical presentation should increase suspicion for malignancy. Routine histopathological examination remains indispensable for establishing an accurate diagnosis, facilitating early detection of malignant disease, guiding appropriate management, and ultimately improving patient outcomes. The findings of this study may assist ophthalmologists and oculoplastic surgeons in identifying lesions that warrant prompt surgical excision and histopathological confirmation.

CONCLUSION

This study demonstrates that histopathologically confirmed eyelid lesions encompass a broad spectrum of benign, malignant, and non-neoplastic conditions encountered in routine ophthalmic practice. Although benign lesions constituted the majority of surgically excised specimens, nearly one-third of the lesions were malignant, with basal cell carcinoma representing the predominant malignancy. Increasing age was independently associated with malignant pathology, and malignant lesions showed a marked predilection for the lower eyelid.

These findings emphasize that clinical examination alone may not reliably distinguish benign from malignant eyelid lesions, particularly in elderly patients and in recurrent or atypical lesions clinically resembling chalazion. Therefore, careful clinical assessment combined with routine histopathological

examination of all surgically excised eyelid lesions remains essential for establishing an accurate diagnosis, facilitating early detection of malignancy, and guiding appropriate management.

Despite the limitations inherent to its retrospective single-center design, this study provides contemporary clinicopathological data from a tertiary referral ophthalmology center and contributes to the current understanding of the epidemiological and pathological characteristics of eyelid lesions. Future prospective multicenter studies with larger patient populations and long-term follow-up are warranted to further validate these findings.

REFERENCES

1. Deprez M, Uffer S. Clinicopathological features of eyelid skin tumors. A retrospective study of 5504 cases and review of literature. Am J Dermatopathol. 2009;31(3):256-262. doi:10.1097/DAD.0b013e3181961861.

2. Cook BE Jr, Bartley GB. Epidemiologic characteristics and clinical course of patients with malignant eyelid tumors in an incidence cohort in Olmsted County, Minnesota. Ophthalmology. 1999;106(4):746-750. doi:10.1016/S0161-6420(99)90161-6.

3. Obata H. Anatomy and histopathology of eyelid tumors. Brain Tumor Pathol. 2017;34(2):65-71.

4. Shields JA, Shields CL. Eyelid, Conjunctival, and Orbital Tumors: An Atlas and Textbook. 3rd ed. Philadelphia: Wolters Kluwer; 2016.

5. Coroi MC, Roșca E, Mureșiu G, Mureșiu A, Bonta M. Eyelid tumors: a clinicopathological study. Rom J Morphol Embryol. 2010;51(1):111-115.

6. Bagheri A, Tavakoli M, Kanaani A, Zavareh RB, Esfandiari H, Aletaha M, et al. Eyelid masses: a 10-year survey from a tertiary eye hospital in Tehran. Middle East Afr J Ophthalmol. 2013;20(3):187-192.

7. Xu XL, Li B, Sun XL, Li LQ, Ren RJ, Gao F. Clinical and pathological analysis of 2639 cases of eyelid tumors. Zhonghua Yan Ke Za Zhi. 2008;44(1):38-41

8.Hsu AK, Fung K, Parikh R. Eyelid malignancies: epidemiology and trends. Curr Opin Ophthalmol. 2016;27:422–428.

9. World Health Organization Classification of Skin Tumours Editorial Board. WHO Classification of Skin Tumours. 5th ed. Lyon: International Agency for Research on Cancer; 2020.

10. Ozdal PC, Codère F, Callejo SA, Caissie AL, Burnier MN Jr. Accuracy of the clinical diagnosis of chalazion. Eye (Lond). 2004;18(2):135-138. doi:10.1038/sj.eye.6700603

11. Shields CL, Demirci H, Marr BP, Eagle RC Jr, Shields JA. Sebaceous carcinoma of the ocular region: a review. Surv Ophthalmol. 2005;50(2):103-122.

12. Ni C, Kou PK. Meibomian gland carcinoma: a clinicopathologic study of 156 cases with long-term follow-up. Jpn J Ophthalmol. 1979;23:388-401.

13. Mulay K, Aggarwal E, White VA. Periocular sebaceous gland carcinoma: a comprehensive review. Saudi J Ophthalmol. 2013;27(3):159-165.

14. Ho M, Liu DTL, Chong KKL, Ng HK, Lam DSC. Eyelid tumours and pseudotumours in Hong Kong: a ten-year experience. Hong Kong Med J. 2013;19(2):150-155.

15. Kale SM, Patil SB, Khare N, Math M, Jain A, Jaiswal S. Clinicopathological analysis of eyelid malignancies: a review of 85 cases. Indian J Plast Surg. 2012;45(1):22-28. doi:10.4103/0970-0358.96572.

16. Huang YY, Liang CY, Lee YH, et al. An analysis of 4521 eyelid tumors in a tertiary medical center. BioMed Res Int. 2015;2015:453091.

Author Contributions

Ahu Yılmaz: Conceptualization, study design, surgical procedures, data collection, statistical analysis, manuscript drafting, manuscript revision, final approval.

İsmail Göktürk: Data collection, histopathological data review, critical revision of the manuscript, final approval.

Ethics Approval

The study protocol was approved by the Clinical Research Ethics Committee of Prof. Dr. Cemil Taşcıoğlu City Hospital (Approval No: E-48670771-514.99/2026) and adhered to the tenets of the Declaration of Helsinki.

Informed Consent

Because of the retrospective study design and anonymized data collection, the requirement for written informed consent was waived by the Ethics Committee.

Conflict of Interest

The authors declare that they have no conflict of interest.

Funding

The authors received no financial support for the research, authorship, or publication of this article.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgements

The authors thank the Department of Pathology for their contribution to the histopathological evaluation of the specimens.