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Retrospective Histopathological Study of Ocular Lesions: Single Center Experience

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ABSTRACT
The intricate and delicate structures of the ocular regions play a pivotal role in visual perception. Understanding both the normal anatomy and pathological changes within these structures is imperative for clinicians and pathologists. The rarity and subtle presentations of ocular lesions, coupled with the mimicry of clinical signs by ocular malignancies, pose significant diagnostic challenges. This study aims to explore the histopathological spectrum of ocular lesions within a single center's clinical experience. This retrospective study was conducted on the patients treated at the Laxmi Eye Institute, with histopathological analysis performed at Dhanwantari Medicare, Kamothe. A total of 72 patients, presenting with discernible ocular symptoms and requiring biopsies, were studied. Among the 72 patients, 41.67% were male and 58.33% were females. The age range of patient was 11-30 years who had the highest prevalence of ocular lesions. Cystic lesions were the most common (33.33%), followed by lipomatous lesions (23.61%), pathologically benign lesions (22.22%), ocular surface squamous neoplasia (OSSN) (9.72%), malignant lesions (5.56%) and inflammatory lesions (5.56%). The study highlights the diversity of ocular lesions and unfolds the importance of a systematic approach to diagnosis and management. Cystic lesions, while often benign, require careful evaluation. Lipomatous lesions and benign lesions necessitate monitoring due to potential growth or transformation. The identification of OSSN and malignant lesions emphasizes the need for early detection and intervention. Documenting the incidence and characteristics of various ocular conditions aids in improving diagnostic accuracy and patient outcomes.

INTRODUCTION

The intricate and delicate structures of the ocular regions play a pivotal role in the complex case of visual perception[1]. The eye, often referred to as the window to the soul, not only serves as a sensory organ but also embodies a remarkable microcosm of tissues, each with its distinct histological features. Understanding both the normal anatomy and the spectrum of pathological changes within these structures is imperative for clinicians and pathologists alike. The rarity of ocular lesions adds a layer of complexity, often concealing their fine and subtle presentations. Moreover, the challenge is compounded by the mimicry of clinical signs and symptoms of ocular malignancies, resembling more commonplace benign conditions, posing a formidable puzzle for both treating clinicians and seasoned pathologists. Geographical variations further contribute to the diversity in the pattern and frequency of ocular lesions[2]. The study of ocular histopathology has been an enduring quest for ophthalmologists, pathologists and researchers alike. While technological advancements have provided a plethora of imaging modalities for in-vivo evaluation, the true depth of ocular pathology is often revealed through histopathological analyses. Ocular regions encompass a multitude of structures, including the cornea, lens, retina, uvea and optic nerve, each with its specific functions and susceptibilities to various pathological processes[3]. In the pursuit of understanding the fine distinctions of ocular pathology, the present study presents a retrospective observational histopathological exploration, investigating into the diverse regions of the eye, all within the confines of a single center's clinical experience. This study aims to cast a wide net, scrutinizing these regions individually, elucidating the intricacies of their histopathological features.

MATERIALS AND METHODS

Study Design and Consent: A retrospective study design was employed to systematically investigate the clinico-pathological spectrum of ophthalmic lesions over a four-year period. The study was conducted at the Laxmi eye institute, serving as the primary center for the collection and analysis of ophthalmic biopsies. Histopathology studies was conducted at Dhanwantari medicare, Kamothe. The study, conducted from 2021 to 2024, spanned a four-year duration, facilitating a meticulous and comprehensive exploration of the clinico-pathological spectrum of ophthalmic lesions. Prior to the initiation of the study, ethical approval was obtained from the Institutional Ethics Committee, ensuring that the research adhered to established ethical guidelines and safeguarding the rights and well-being of the participants.

Study Population and Eligibility Criteria: A comprehensive cohort of 72 patients became integral participants in our study, meticulously selected based on stringent inclusion criteria to ensure a focused and representative sample. The study embraced patients who presented with discernible ocular symptoms necessitating a biopsy for diagnostic precision. To be eligible for inclusion, participants were required to be above the age of 5 yrs.

RESULTS AND DISCUSSIONS

Out of the total 72 patients enrolled in the study, 30 individuals were identified as males, accounting for approximately 41.67% of the total participant pool. Conversely, the remaining 42 patients, representing approximately 58.33% of the total, were identified as females (Fig. 1). This gender distribution reflects a slight preponderance of females within the study population. The age distribution within our study population presents intriguing insights into the prevalence of ocular conditions across different life stages. Among the participants, the age range of 11-30 years was the most prevalent, comprising 29.17% of the total population. This was followed closely by individuals aged 51-70 years, representing 27.78% of the study population. Participants aged 31-50 years and above 70 years constituted 25% and 12.5% of the total population, respectively. The youngest age group, 1-10 years, had the lowest representation, accounting for 5.56% of the total population (Fig. 2). The concentration of individuals aged 11-30 and 51-70 years reflects the importance of early adulthood and elderly aged years in ocular health monitoring. This demographic segment often engages in activities that may predispose them to various ocular ailments, such as prolonged screen time, exposure to environmental hazards, increased occupational demands and lifestyle factors that can impact ocular health.

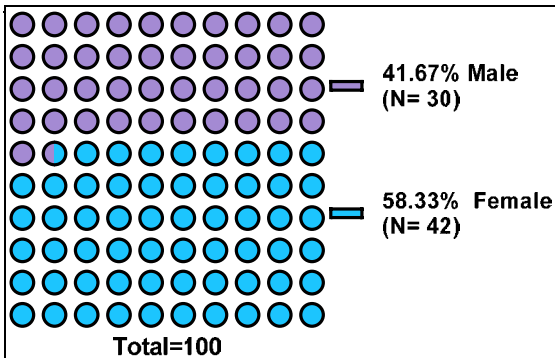

Fig 1: Gender Distribution of Patients Included in the Study

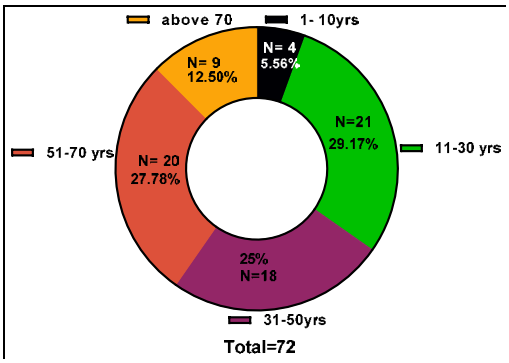

Fig 2: A Doughnut Representation Showing the Proportion of Patients Across Different Age Groups

The distribution of ocular lesions observed in our study cohort revealed a predominance of intraocular conditions over extraocular ones. Specifically, intraocular lesions accounted for 54.17% (n=39) of the total cases, while extraocular lesions constituted 45.83% (n=33) of the study population (Fig. 3). The higher frequency of intraocular lesions observed in our study can be attributed to several factors. The eye's complex internal anatomy renders it susceptible to a diverse array of pathological processes. These intraocular components play a pivotal role in visual function, making conditions affecting them more salient. Moreover, diagnostic accessibility is greater for intraocular lesions, facilitated by modalities such as fundoscopy and optical coherence tomography (OCT), enabling detailed evaluation and characterization. Additionally, certain ocular diseases are more prevalent within intraocular structures, contributing to their higher frequency. Conversely, extraocular lesions may be comparatively less frequent in this study as many patients get treated on OPD basis.

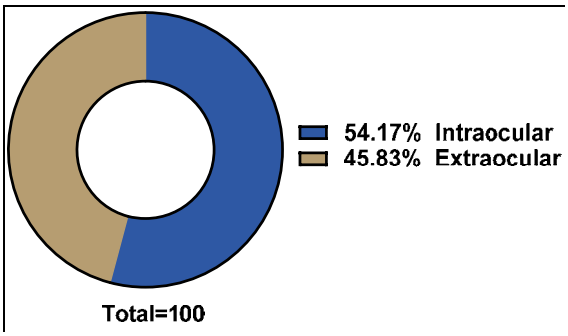

Fig 3: A Doughnut Chart Showing the Subjects with Intra Ocular and Extra Ocular Lesions

The distribution of ocular lesions observed in our study cohort reflects the diverse array of pathological conditions affecting the eye. Among the identified lesions, cysts emerged as the most prevalent i.e., 33.33% (n=24), constituting approximately one-third of the total cases (Fig. 4). These cystic lesions encompass a spectrum of entities, nonspecific cysts, dermoid cysts and inclusion cysts, each with distinct histopathological features and clinical implications. Lipomatous lesions, characterized by the presence of adipose tissue within ocular structures, were also notable in our study cohort i.e., 23.61% (n=17). These lesions encompass entities such as lipomas and adipocyte proliferation. Benign lesions and ocular surface squamous neoplasia (OSSN) were observed in 22.22% (n=16) and 9.72% (n=7) of the total cases, highlighting the spectrum of non-malignant and pre-malignant conditions encountered in clinical practice (Figure 4). Benign lesions encompass a wide range of entities, including nevi, papillomas, pyogenic granulomas and hemangioendothelioma, which although benign, may warrant monitoring or intervention based on their location and potential impact on ocular function. Conversely, OSSN represents a spectrum of dysplastic changes affecting the ocular surface epithelium, ranging from mild dysplasia to invasive squamous cell carcinoma. Malignant lesions accounted for 4 cases (5.56% of total cases) (Fig. 4). Despite their relatively lower prevalence, malignant ocular lesions pose significant clinical challenges due to their potential for aggressive behavior and metastasis. Similarly, inflammatory lesions were identified in 4 cases (5.56% of total cases) indicating the presence of inflammatory processes within the ocular tissues (Fig. 5). A. Epidermal inclusion cyst.(H and E stain), B. Pyogenic granuloma (H and E stain), C. Dermoid cyst (H and E stain), D. Dermal nevus, E. Squamous Papilloma, F. Hemangio-endothelioma, G. Ocular surface squamous neoplasia, H. Ductal adenocarcinoma, I. sebaceous carcinoma and J. Sebaceous Carcinoma. Inflammation in the eye can arise from various etiologies, such as infections, autoimmune diseases and non-infectious inflammatory conditions.

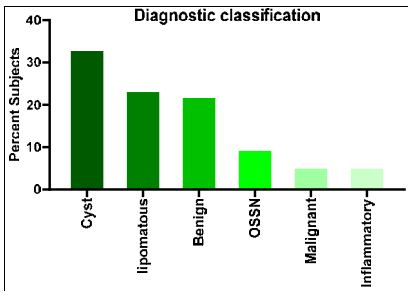

Fig 4: Bar Diagram Showing the Distribution of Different Pathological Conditions

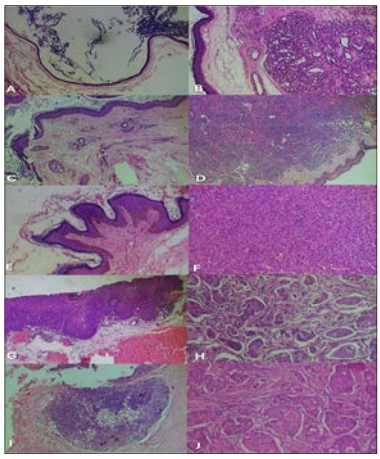

Fig 5: Histopathological Analysis of the Different Conditions

A. Epidermal inclusion cyst.(H and E stain), B. Pyogenic granuloma (H and E stain), C. Dermoid cyst (H and E stain), D. Dermal nevus, E. Squamous Papilloma, F. Hemangio-endothelioma, G. Ocular surface squamous neoplasia, H. Ductal adenocarcinoma, I. sebaceous carcinoma and J. Sebaceous Carcinoma.

The study of ocular pathology is essential due to the intricate and diverse nature of the eye as a special sensory organ. Understanding the normal anatomy of the eye and recognizing the spectrum of pathological changes that can affect its structures are crucial for clinicians and pathologists alike. However, the rarity of many ocular lesions adds complexity to their identification, as their presentations can be subtle and easily overlooked. Moreover, ocular malignancies often mimic benign conditions, leading to challenges in accurate diagnosis and appropriate management. The significance of this work lies in its contribution to addressing these challenges[4]. The distribution of ocular lesions observed in our study cohort reflects the diverse array of pathological conditions affecting the eye. Cysts, the most prevalent pathology observed in our study (33.33%, n=24), include a variety of subtypes including non-specific cysts, dermoid cysts and epidermal inclusion cysts, each with distinct histopathological features and clinical implications. Dermoid cysts, on the other hand, are congenital lesions that arise from ectodermal tissue, often containing hair follicles and sebaceous glands. Epidermal inclusion cysts typically result from trauma or surgical procedures, where epithelial cells become entrapped within the ocular tissue. The high prevalence of cystic lesions in our cohort underscores the importance of recognizing their diverse presentations and potential impact on vision. Dermoid cysts, for example, although benign, can cause significant cosmetic concerns and may obstruct vision if they grow large enough or are in critical areas such as the cornea or conjunctiva[5]. Lipomatous lesions, comprising 23.61% of the cases, are characterized by the presence of adipose tissue within the ocular structures. Lipomas are tumors of adipose tissue that can occur in various parts of the eye, including the orbit, eyelid and conjunctiva[6]. While typically asymptomatic, large lipomas can cause functional impairments, such as ptosis or proptosis, depending on their location. Xanthelasma, a lipid-rich deposit, is another form of lesion that can develop in the eyelids, often presenting as yellowish plaques. Although primarily cosmetic, in some cases, xanthelasma may indicate systemic lipid metabolism disorders[7]. The identification and management of lipomatous lesions require careful consideration of their size, location and potential impact on ocular structures. Benign lesions constituted 22.22% of our cases and include a wide range of entities such as nevi, papillomas, pyogenic granulomas and hemangioendothelioma. Nevi are pigmented lesions that are usually benign but require monitoring due to the potential for malignant transformation into melanoma[8]. Papillomas, often caused by human papillomavirus (HPV), can affect the conjunctiva and eyelids, presenting as small, wart-like growths[9]. Vascular tumors, such as pyogenic granulomas and hemangioendothelioma, arise from abnormal growth of blood vessels due to various triggers. Pyogenic granulomas typically develop in response to trauma, irritation, or hormonal changes, leading to rapid proliferation of small blood vessels and the formation of a red, raised and often bleeding lesion. These tumors are commonly found on the conjunctiva or eyelid[10,19]. Hemangioendothelioma, on the other hand, is a rarer vascular tumor that originates from endothelial cells and can range from benign to more aggressive forms. It manifests as a slow-growing mass that may cause proptosis, visual impairment, or other ocular complications depending on its size and location[10,19]. OSSN represents a spectrum of dysplastic changes affecting the ocular surface epithelium, ranging from mild dysplasia to invasive squamous cell carcinoma[11]. In our study, OSSN accounted for 9.72% of the cases. These lesions are particularly significant due to their potential for malignancy. Risk factors for OSSN include ultraviolet radiation exposure, HPV infection and immunosuppression, particularly in patients with HIV/AIDS[12]. Early detection and treatment of OSSN are crucial to prevent progression to invasive carcinoma, which can threaten vision and ocular integrity.

Malignant lesions, although less prevalent (5.56%, n=4), pose significant clinical challenges due to their potential for aggressive behavior and metastasis. The malignant lesions identified in our study include basal cell carcinoma, sebaceous carcinoma and adenocarcinoma ductal. Basal cell carcinoma is the malignant tumor of the eyelid, typically presenting as a slowly growing, painless nodule[13]. While it rarely metastasises, it can cause significant local tissue destruction if not treated promptly[14]. Sebaceous carcinoma, on the other hand, is an aggressive tumor of the sebaceous glands, often affecting the eyelids. It can mimic benign conditions, leading to delayed diagnosis and has a higher risk of local recurrence and regional metastasis compared to basal cell carcinoma[15]. Additionally, adenocarcinoma of the lacrimal or meibomian ducts, while rare, can manifest as a rapidly growing mass with a high potential for local invasion and distant metastasis[16]. Melanoma, although rare, is the most lethal primary ocular malignancy due to its aggressive nature and potential for distant metastasis. The early diagnosis and management of these malignant lesions are imperative to improve patient outcomes and preserve vision[18]. Inflammatory lesions accounted for 5.56% of the cases in our study, indicating the presence of inflammatory processes within the ocular tissues. Inflammation in the eye can arise from various etiologies, such as infections, autoimmune diseases and non-infectious inflammatory conditions. Common inflammatory ocular conditions include uveitis, scleritis and conjunctivitis. Uveitis, an inflammation of the uveal tract, can be caused by infections (e.g., toxoplasmosis, tuberculosis), autoimmune diseases (e.g., sarcoidosis, rheumatoid arthritis), or idiopathic factors. Scleritis, an inflammation of the sclera, is often associated with systemic autoimmune conditions such as rheumatoid arthritis and granulomatosis with polyangiitis. Conjunctivitis, inflammation of the conjunctiva, can be caused by infections (bacterial, viral) or allergic reactions[17]. The management of inflammatory ocular conditions involves addressing the underlying cause and may include the use of anti-inflammatory or immunosuppressive medications.

The clinical implications of the diverse pathological conditions observed in our study are multifaceted, necessitating a comprehensive approach to diagnosis and management. Cystic lesions, while often benign, require careful evaluation to determine their potential impact on ocular function and cosmetic appearance. Surgical excision may be warranted for symptomatic or cosmetically concerning cysts. Lipomatous lesions, although typically benign, should be monitored for growth and potential impact on surrounding ocular structures. Surgical intervention may be necessary for large or symptomatic lipomas. Benign lesions, such as nevi and papillomas, require regular monitoring to detect any signs of malignant transformation. OSSN, given its pre-malignant potential, necessitates prompt intervention, often involving surgical excision, cryotherapy, or topical chemotherapeutic agents such as mitomycin C or interferon alpha-2b. Malignant lesions, including basal cell carcinoma, sebaceous carcinoma and adenocarcinoma ductal require a multi disciplinary approach involving surgical excision, radiotherapy and systemic therapy for advanced cases. Early detection and intervention are critical to improve prognosis and preserve ocular function. Inflammatory lesions necessitate a thorough evaluation to identify the underlying cause, which may involve laboratory tests, imaging studies and systemic evaluations. The management of inflammatory ocular conditions often involves the use of topical or systemic corticosteroids, immunosuppressive agents and antimicrobial therapy for infectious etiologies. Patient education and regular follow-up are essential to monitor disease progression and treatment response. By documenting the incidence and characteristics of various ocular conditions over time, this study provides valuable insights into their patterns and frequencies. Such information not only aids clinicians in making accurate diagnoses but also helps pathologists in interpreting ocular specimens effectively.

CONCLUSION

Understanding ocular pathology is crucial due to the complex nature of the eye and the spectrum of conditions it can develop. Identifying these conditions accurately is challenging, particularly given their subtle presentations and potential mimicry of benign conditions by malignancies. This study contributes to addressing these challenges by documenting the incidence and characteristics of various ocular conditions, aiding clinicians and pathologists in diagnosis and interpretation of specimens. The distribution of ocular lesions indicates the need for a systematic approach to their diagnosis and management. Further research should focus on elucidating risk factors, pathogenesis and optimal treatment strategies. Advances in imaging, molecular diagnostics and targeted therapies offer promise for improving outcomes. Moreover, raising awareness among healthcare providers and patients about the importance of early detection and intervention can enhance ocular health and overall quality of life.

REFERENCES

1. Koenig, K.M. and J.M. Gross, 2020. Evolution and development of complex eyes: A celebration of diversity. Development, Vol. 147 .10.1242/ dev.182923.
2. Kumar, R.,R.K. Adhikari, M.K. Sharma, D.R. Pokharel and N. Gautam., 2009. Pattern of ocular malignant tumours in Bhairahwa, Nepal. Internet J Ophthalmol Vis Sci., Vol. 7.
3. Pradeep, T., D. Mehra and P.H. Le., 2024. Histology, eye. In: Stat Pearls. Treasure Island (FL): StatPearls Publishing.
4. Gupta, Y., R. Gahine, N. Hussain and M.J. Memon., 2017. Clinico-Pathological Spectrum of Ophthalmic Lesions: An Experience in Tertiary Care Hospital of Central India. Journal of clinical and diagnostic research, Vol. 11 .10.7860/jcdr/2017/23589.9230.
5. Villalón, M.L., M.D.L.Á. Leal, J.R. Chávez, E.M. Santillán and I. Lares-Asseff *et al.,* 2018. Recurrent epibulbar dermoid cyst treated with amniotic membrane implant a case report. BMC Surg., Vol. 18 .10.1186/s12893-018-0426-z.
6. Starnoni, M., G.D. Santis, R. Pasini and M. Pinelli, 2020. Diagnosis and treatment of upper eyelid lipoma: A case report. Am. J. Ophthalmol. Case Rep., 20: 100-874.
7. Laftah, Z. and F. Al-Niaimi, 2018. Xanthelasma: An update on treatment modalities. J. Cutaneous Aesthetic Surg., 11: 1-6.
8. Elder, D.E., 2006. Precursors to melanoma and their mimics: Nevi of special sites. Mod. Pathol., Vol. 19 .10.1038/modpathol.3800515.
9. Buggage, R.R., J.A. Smith, D. Shen and C. Chan., 2002. Conjunctival Papillomas Caused by Human Papillomavirus Type 33. Arch. Ophthalmol., 120: 202-204.
10. Grossniklaus, H.E., W.R. Green, M. Luckenbach and C.C. Chan, 1987. Conjunctival Lesions in Adults. Cornea, 6: 78-116.
11. Yeoh, C.H.Y., J.J.R. Lee, B.X.H. Lim, G. Sundar and J.S. Mehta *et al.,* 2022. The Management of Ocular Surface Squamous NeoplAsia (OSSN). Int. J. Mol. Sci., Vol. 24 .10.3390/ijms24010713.
12. Gichuhi, S., E. Macharia, J. Kabiru, A.M. Zindamoyen and H. Rono *et al.*, 2016. Risk factors for ocular surface squamous neoplAsia in Kenya: A case–control study. Trop. Med. And Int. Health, 21: 1522-1530.
13. Pe'er, J., 2016. Pathology of eyelid tumors. Indian J. Ophthalmol., 64: 177-190.
14. Maria, A.D., G. Barone, V. Ferraro, C. Tredici and S. Manara *et al.,* 2023. Recurrence of Basal Cell Carcinoma Treated with Surgical Excision and Histopathological Analysis with Frozen Section Technique with Complete Margin Control (CMC-FS): A 15-Year Experience of a Reference Center. Cancers, 15: 38-40.
15. Al-Mujaini, A. and U. Wali, 2010. Sebaceous gland carcinoma of the eyelid. Oman J. Ophthalmol., 3: 117-121.
16. Touil, A., S.E. Abbassi, Y. Echchikhi, M. Maher, T. Kebdani and N. Benjaafar, 2017. Adenocarcinoma of the lacrimal gland: A case report. J. Med. Case Rep., Vol. 11 .10.1186/s13256-017-1412-2.
17. Solano, D., L. Fu and C.N. Czyz., 2024. Viral conjunctivitis. In: StatPearls. Treasure Island (FL): StatPearls Publishing.
18. Kaliki, S. and C.L. Shields, 2016. Uveal melanoma: Relatively rare but deadly cancer. Eye, 31: 241-257.
19. Sarwal, P. and K. Lapumnuaypol., 2024. Pyogenic granuloma. [Updated 2024 Sep 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.