ORIGINAL ARTICLE

Spectrum of Ocular Pathologies Leading to Evisceration and Enucleation: A Tertiary Care Set Up Study

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ABSTRACT

Objective: To determine the spectrum of ocular pathologies leading to evisceration and enucleation in a tertiary care hospital.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Al-Shifa Trust Eye Hospital, Rawalpindi, from 6th January 2025 to 12th January 2026.

Materials and Methods: A total of 120 patients who underwent evisceration or enucleation were included in the study. Non-probability consecutive sampling technique was used. Data was collected on a self-structured proforma that included sections for demographics, clinical presentation, diagnosis/indication for surgery, B-scan ultrasonography findings, histopathological findings, surgical procedure, implant placement, and preventability status**.** Data were analyzed using SPSS version 25. Age was expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Chi-square test and Fisher–Freeman–Halton exact test were applied for association between categorical variables, and independent samples t-test was applied for comparison of mean age between traumatic and non-traumatic groups. A p-value of ≤0.05 was considered statistically significant.

Results: The mean age was 40.4 ± 17.9 years. Male patients were more frequently affected, 78 (65.0%). Evisceration was performed in 74 (61.7%) patients, while enucleation was performed in 46 (38.3%) patients. Ocular trauma was the most common indication, 52 (43.3%), followed by endophthalmitis/panophthalmitis, 24 (20.0%), and corneal ulcer/perforation, 16 (13.3%). Most patients presented with no perception of light, 88 (73.3%), and 92 (76.7%) cases were classified as preventable. Histopathology mainly showed inflammatory/infective changes, 62 (51.7%). A statistically significant association was observed between indication and preventability ($p < 0.001$), while gender showed no significant association with etiology, procedure, or visual acuity.

Conclusion: Ocular trauma and infective ocular pathologies were the leading causes of evisceration and enucleation, and most cases were potentially preventable. Early referral, timely treatment of ocular infections, and preventive eye safety measures may reduce severe ocular morbidity and the need for globe removal procedures.

Key Words*: Enucleation, Evisceration, Endophthalmitis, Pakistan.*

Introduction

Evisceration and enucleation are definitive globe-removal procedures performed and visual recovery is not possible when ocular tissue is severely damaged.[1] These procedures are commonly indicated in non-salvageable eyes affected by severe ocular trauma, uncontrolled intraocular infection, painful blind eye, and intraocular malignancy.[2] Although these surgeries may relieve pain, remove infected or malignant tissue, and improve socket rehabilitation, they represent the final stage of severe ocular morbidity and may have functional, cosmetic, and psychological consequences for patients.[3]

Preventable visual impairment remains an important global eye health concern.[4] Severe ocular trauma and advanced ocular infections are among the important

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Received: April 8, 2026 ; Revised: June 05, 2026
Accepted: June 06, 2026
https://doi.org/10.57234/jiimc.june26.3005

causes of irreversible ocular damage that may ultimately require evisceration or enucleation.[5] In low- and middle-income countries, delayed presentation, inadequate use of protective measures, occupational injuries, limited access to specialist eye care, and delayed referral may increase the risk of progression to non-salvageable ocular disease.[6,7]

Ocular trauma is an important cause of monocular visual loss, particularly among young and economically active individuals.[8] Similarly, endophthalmitis, panophthalmitis, and microbial keratitis can result in irreversible structural damage when diagnosis or treatment is delayed.[9] Studies from South Asia and Pakistan have also shown that ocular trauma and infective ocular conditions contribute substantially to severe visual morbidity, supporting the need for timely referral, early treatment, and community-level preventive strategies.[10,11]

Despite advances in ophthalmic diagnosis and treatment, many patients in developing countries present to eye clinics or tertiary hospitals at an advanced stage, often with no perception of light and marked structural damage of the globe. Radiological assessment and histopathological examination in such cases may demonstrate findings such as disorganized globe, retinal detachment, necrosis, inflammation, infection, or tumor. Studying the pattern of clinical presentation, underlying diagnosis, imaging findings, histopathology, and preventability is important for identifying avoidable causes of globe removal and planning preventive eye care strategies.

In Pakistan, recent data remain limited regarding the spectrum of ocular pathologies leading to evisceration and enucleation in tertiary care hospitals. There is also limited local evidence on the relative contribution of traumatic and non-traumatic indications and the proportion of cases that may be preventable. Therefore, this study was conducted to determine the spectrum of ocular pathologies leading to evisceration and enucleation and to assess their preventability in a tertiary care hospital.

Materials and Methods

This descriptive cross-sectional study was conducted at Al-Shifa Trust Eye Hospital, Rawalpindi, from 6th January 2025 to 12th January 2026. Ethical approval was obtained before the start of data collection from the Ethical Review Committee of Al-Shifa Trust Eye Hospital, Rawalpindi, under reference number ERC-24/AST-24, dated 10 July 2024. The research synopsis was also approved by the Research Evaluation Unit, College of Physicians and Surgeons Pakistan, under reference number CPSP/REU/OPL-2023-114-2632, dated 21 August 2024.

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from adult patients before recruitment. In patients below 18 years of age or those unable to provide consent, written informed consent was obtained from parents or legal guardians, and consent was taken where applicable. Patient identity and clinical information were kept confidential throughout the study.

The sample size was calculated using the WHO sample size formula for estimating a single population prevalence :$n = Z^2 p(1 - p) / d^2$, where $Z = 1.96$ at 95% confidence level, $p = 0.12$ was the anticipated population prevalence of ocular emergencies reported by Qayyum et al.[12], and $d = 0.06$ was the required absolute precision. The calculated sample size was approximately 113 patients. To improve the power of analysis and compensate for record incompleteness, the final sample size was increased to 120 patients.

A non-probability consecutive sampling technique was used. Patients aged 5–80 years, including pediatric ≥ 5 years and adolescent patients, and either gender who underwent evisceration or enucleation. Evisceration was defined as removal of intraocular contents with preservation of the scleral shell, while enucleation was defined as removal of the entire globe. Patients with incomplete medical records, missing operative details, unavailable histopathology reports where required, or previous globe removal surgery performed outside the study hospital were excluded.

Data were collected by a self-structured proforma developed after reviewing relevant literature and institutional clinical records[13, 14] and reviewed by the Ophthalmology Department for content relevance before data collection. It included separate sections for demographic details, clinical presentation, diagnosis/indication for surgery, radiological

 https://doi.org/10.57234/jiimc.june26.3005

findings, surgical procedure, histopathological findings, implant placement, and preventability status.

Demographic variables included age, gender, and affected eye laterality. Age was recorded in completed years and categorized into class intervals of ≤20 years, 21–40 years, 41–60 years, and >60 years for analysis, as adapted from previous studies on destructive eye procedures and ocular morbidity patterns.[15, 16] Clinical variables included presenting visual acuity, etiology, diagnosis/indication for surgery, and type of globe removal procedure. The diagnosis/indication for surgery was categorized as ocular trauma, endophthalmitis/panophthalmitis, corneal ulcer/perforation, painful blind eye, intraocular tumor, and others. Tumor cases were recorded as a single broad category of "intraocular tumors." Specific tumor subtypes, such as retinoblastoma or melanoma, were not separately documented in the data collection proforma.

Clinical assessment included visual acuity at presentation, which was categorized as no perception of light, perception of light, or other visual status. B-scan ultrasonography was performed, where clinically indicated to assess posterior segment and globe status and radiological findings were categorized as disorganized globe, retinal detachment, vitreous hemorrhage, and intraocular mass lesion**.** Excised ocular specimens were sent for histopathological examination where indicated, and findings were categorized as inflammatory/infective changes, necrosis, tumor, and others.

Cases were further classified as preventable or non-preventable according to etiology, clinical diagnosis, and the possibility of prevention through early medical intervention, timely referral, protective measures, or appropriate infection control where "preventable causes" were defined as those potentially avoidable through early diagnosis, timely treatment, protective measures, or appropriate referral. Traumatic and infective causes were considered potentially preventable, while intraocular tumors, painful blind eye due to irreversible chronic pathology, and other unavoidable causes were categorized as non-preventable after clinical assessment. "Traumatic etiology" was defined as mechanical ocular injury leading to irreversible ocular damage and globe removal. "Non-traumatic etiology" included infective, inflammatory, neoplastic, degenerative, and other non-injury-related ocular causes.

Data were analyzed using Statistical Package for Social Sciences version 25.0. Quantitative variables such as age were presented as mean ± standard deviation. Categorical variables such as gender, laterality, procedure, etiology, indication, visual acuity, B-scan findings, histopathology, implant use, and preventability were presented as frequencies and percentages. Chi-square test was applied to assess associations between categorical variables, including gender with etiology, gender with procedure, gender with visual acuity, and indication with preventability. Fisher–Freeman–Halton exact test was applied where expected cell counts were less than 5. Cramér's V was used to measure the strength of association for categorical variables. Independent samples t-test was applied to compare mean age between traumatic and non-traumatic etiological groups. Effect size for the age comparison was reported using Cohen's d, Hedges' correction, and Glass's delta with 95% confidence intervals. A p-value of ≤0.05 was considered statistically significant.

Results

A total of 120 patients who underwent evisceration or enucleation were included in the study. The mean age of patients was 40.4 ± 17.9 years, with age range was 5–80 years. Most of the patients were 21–40 years of age group i.e. 49 (40.8%), whereas 16 (13.3%) patients were aged ≤20 years. Children below 5 years were not represented in the final cohort. On age-group analysis, no intraocular tumor was recorded in the ≤20 years age group. Among the 10 (8.3%) tumor cases, 3 (30.0%) were in the 21–40 years age group, 5 (50.0%) were in the 41–60 years age group, and 2 (20.0%) were in the >60 years age group. No statistically significant association was observed between age group and indication for surgery (χ^2 = 16.682, df = 15, p = 0.338; Fisher–Freeman–Halton exact p = 0.336). Male patients were more frequently affected, 78 (65.0%), compared with females, 42 (35.0%). Right eye involvement was observed in 66 (55.0%) patients, while left eye involvement was seen in 54 (45.0%) patients, showing slight right eye predominance

(Table I).

Evisceration was the most frequent surgical procedure, 74 (61.7%), compared with enucleation, 46 (38.3%). Non-traumatic etiologies were more common, 68 (56.7%), while traumatic etiology was present in 52 (43.3%) cases. The most common indication for globe removal was ocular trauma, 52 (43.3%), followed by endophthalmitis/ panophthalmitis, 24 (20.0%), and corneal ulcer/perforation, 16 (13.3%). Overall, 92 (76.7%) cases were classified as preventable, while 28 (23.3%) were non-preventable (Table II).

Most patients presented severe ocular morbidity and irreversible visual loss at the time of presentation. No perception of light was recorded in 88 (73.3%) patients, perception of light in 22 (18.3%) patients, and other visual status in 10 (8.3%) patients. B-scan ultrasonography mainly showed disorganized globe in 50 (41.7%) patients and retinal detachment in 32 (26.7%) patients, indicating severe structural ocular damage. Histopathological examination mainly revealed inflammatory/ infective changes in 62 (51.7%) cases, followed by necrosis in 30 (25.0%) cases. Orbital implant placement was performed in 82 (68.3%) patients (Table III).

No statistically significant association was observed between gender and etiology when Chi-square test was applied to assess associations between categorical variables. For gender it was $\chi^2 = 1.528$, df = 1, p = 0.216 whereas for the procedure it was $\chi^2 = 0.002$, df = 1, p = 0.969) and for gender and visual acuity it showed $\chi^2 = 0.130$, df = 2, p = 0.937. A statistically significant association was found between indication and preventability i.e. $\chi^2 = 120.000$, df = 5, $p < 0.001$, with Cramér's V = 1.000, indicating a very strong association. Because 5 cells (41.7%) had expected counts less than 5, Fisher–Freeman–Halton exact test was also applied and confirmed the significant association (exact $p < 0.001$) (Table IV).

The mean age of traumatic cases was 38.88 ± 17.94 years, while the mean age of non-traumatic cases was 41.59 ± 17.85 years. The difference was not statistically significant by applying independent samples t-test between traumatic and non-traumatic etiological groups (t = -0.820, df = 118, p = 0.414), with a mean difference of -2.70 years and 95% CI from -9.23 to 3.82 years. Effect size analysis showed a very small effect size, with Cohen's d = -0.151, 95% CI: -0.512 to 0.211, indicating that the age difference between traumatic and non-traumatic cases was clinically negligible (Tables V and VI).

Table I: Demographic Characteristics and Laterality of Patients (n = 120)

Variable	Category	n (%)
Age (years)	Mean ± SD	40.4 ± 17.9
	Range	5–80
Age group	≤20 years	16 (13.3%)
	21–40 years	49 (40.8%)
	41–60 years	36 (30.0%)
	>60 years	19 (15.8%)
Gender	Male	78 (65.0%)
	Female	42 (35.0%)
Laterality	Right eye	66 (55.0%)
	Left eye	54 (45.0%)

Statistical test applied: Descriptive statistics and frequency analysis

Table IA: Distribution of Indications According to Age Group (n = 120)

Age group	Corneal ulcer n (%)	Endophthalmitis n (%)	Ocular trauma n (%)	Others n (%)	Painful blind eye n (%)	Tumor n (%)	Total
≤20 years	3 (18.8%)	1 (6.3%)	10 (62.5%)	1 (6.3%)	1 (6.3%)	0 (0.0%)	16 (100.0%)
21–40 years	5 (10.2%)	9 (18.4%)	22 (44.9%)	2 (4.1%)	8 (16.3%)	3 (6.1%)	49 (100.0%)
41–60 years	4 (11.1%)	12 (33.3%)	11 (30.6%)	2 (5.6%)	2 (5.6%)	5 (13.9%)	36 (100.0%)
>60 years	4 (21.1%)	2 (10.5%)	9 (47.4%)	1 (5.3%)	1 (5.3%)	2 (10.5%)	19 (100.0%)

Chi-square test and Fisher–Freeman–Halton exact test. $\chi^2 = 16.682$, df = 15, p = 0.338; Fisher–Freeman–Halton exact p = 0.336.

https://doi.org/10.57234/jiimc.june26.3005

Table II: Surgical Procedure, Etiology, Indications and Preventability (n = 120)

Variable	Category	n (%)
Procedure	Evisceration	74 (61.7%)
	Enucleation	46 (38.3%)
Etiology	Traumatic	52 (43.3%)
	Non-traumatic	68 (56.7%)
Indication	Ocular trauma	52 (43.3%)
	Endophthalmitis / Panophthalmitis	24 (20.0%)
	Corneal ulcer / Perforation	16 (13.3%)
	Painful blind eye	12 (10.0%)
	Intraocular tumors	10 (8.3%)
	Others	6 (5.0%)
Preventability	Preventable	92 (76.7%)
	Non-preventable	28 (23.3%)

Statistical test applied: Frequency analysis

Table III: Clinical, Radiological, Histopathological Findings and Implant Use (n = 120)

Variable	Category	n (%)
Visual acuity	No perception of light (NPL)	88 (73.3%)
	Perception of light (PL)	22 (18.3%)
	Others	10 (8.3%)
B-scan findings	Disorganized globe	50 (41.7%)
	Retinal detachment	32 (26.7%)
	Vitreous hemorrhage	26 (21.7%)
	Intraocular mass lesion	12 (10.0%)
Histopathology	Inflammatory/Infective changes	62 (51.7%)
	Necrosis	30 (25.0%)
	Tumors	12 (10.0%)
	Others	16 (13.3%)
Implant use	Yes	82 (68.3%)
	No	38 (31.7%)

Statistical test applied: Frequency analysis

Table IV: SPSS-Based Inferential Analysis of Categorical Variables

Variables compared	Test applied	χ^2 value	df	p-value	Cramér's V	Interpretation
Etiology × Gender	Chi-square test	1.528	1	0.216	0.113	Not significant
Procedure × Gender	Chi-square test	0.002	1	0.969	0.004	Not significant
Visual acuity × Gender	Chi-square test	0.130	2	0.937	0.033	Not significant
Indication × Preventability	Chi-square test and Fisher–Freeman–Halton exact test	120.000	5	<0.001	1.000	Highly significant / very strong association

Statistical test applied: Chi-square test; Fisher–Freeman–Halton exact test where required; Cramér's V for effect size

Table V: Independent Samples T-test Comparing Age Between Traumatic and Non-Traumatic Etiology

Variable	Etiology	n	Mean ± SD	Mean difference	t-value	df	p-value	95% CI of mean difference
Age	Traumatic	52	38.88 ± 17.94	-2.70	-0.820	118	0.414	-9.23 to 3.82
	Non-traumatic	68	41.59 ± 17.85					

Statistical test applied: Independent samples t-test

Table VI: Effect Size Analysis for Age Difference Between Traumatic and Non-traumatic Etiology

Effect size measure	Point estimate	95% CI lower	95% CI upper	Interpretation
Cohen's d	-0.151	-0.512	0.211	Very small effect
Hedges' correction	-0.150	-0.509	0.209	Very small effect
Glass's delta	-0.151	-0.513	0.211	Very small effect

Statistical test applied: Independent samples effect size analysis

This bar chart illustrates the distribution of underlying indications among patients undergoing evisceration and enucleation. Ocular trauma was the most common indication (n = 52), followed by endophthalmitis/panophthalmitis (n = 24) and corneal ulcer/perforation (n = 16). Less frequent causes included painful blind eye (n = 12), intraocular tumors (n = 10), and other (n = 6).

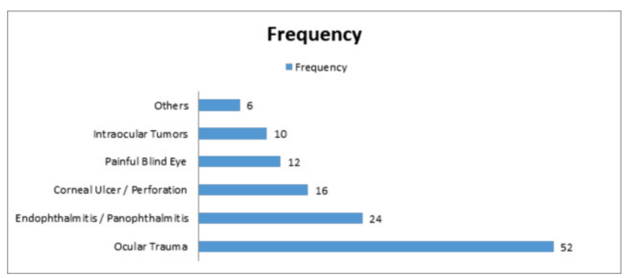

Figure 1: Distribution of Indications Leading to Evisceration and Enucleation

Discussion

The present study showed that ocular trauma was the leading indication for evisceration and enucleation, followed by infective causes including endophthalmitis/panophthalmitis and corneal ulcer/perforation. A clinically important finding was that more than three-fourths of the cases were preventable, and most patients presented with irreversible visual loss and severe structural ocular damage. These findings indicate that globe removal in this setting was not only the result of end-stage ocular pathology, but was also strongly linked with delayed presentation, preventable injury, and late management of ocular infection.

Ocular trauma accounted for 52 (43.3%) cases and was the most frequent indication for globe removal in the present study. Pediatric and adolescent patients were included in the present study, with 16 (13.3%) patients aged ≤20 years; however, children below 5 years were not represented in this cohort. This is relevant because retinoblastoma, an important pediatric indication for enucleation, commonly presents in younger children. In the present dataset, no tumor case was recorded in the ≤20 years age group, and tumor cases were observed mainly in adult age groups. This finding suggests that trauma and infection were more common contributors to globe removal among younger patients in this tertiary-care cohort. However, tumor subtype was not separately documented, so retinoblastoma-specific interpretation could not be performed. This finding is comparable with previous studies in which trauma was reported as a major cause of destructive eye procedures and severe ocular morbidity. Nuzzi et al, [17] reported that trauma remains an important indication for eye removal procedures, particularly in settings where occupational hazards and limited protective measures contribute to severe ocular injury. Similarly, Madan et al. [18] reported ocular trauma as a major cause of serious ocular damage in an Indian tertiary care setting, while Khan et al, [19] also highlighted ocular injuries as an important ophthalmic problem in Pakistan. The similarity between these studies and the present findings may be explained by shared regional factors such as occupational exposure, road traffic injuries, domestic injuries, lack of protective eyewear, and delayed referral after ocular injury. However, the high proportion of traumatic cases in our study is particularly important because most patients belonged to the productive age group and males were more frequently affected. This suggests that ocular trauma has both clinical and socioeconomic consequences, as globe loss in working-age individuals may affect earning capacity, family support, psychological well-being, and long-term rehabilitation needs.

Infective ocular pathologies also contributed substantially to globe removal in this study, with endophthalmitis/panophthalmitis and corneal ulcer/perforation together accounting for 40 (33.3%) cases. This finding is consistent with Ting et al, [20] who reported microbial keratitis as an important cause of severe visual impairment, especially where diagnosis or treatment is delayed. Obaid et al, [21] also reported resistance patterns in bacteria isolated from corneal ulcers in Pakistan, which is relevant because delayed or ineffective antimicrobial treatment can increase the risk of irreversible ocular damage. In the present study, the infective burden was further supported by histopathological findings, as inflammatory/infective changes were observed in 62 (51.7%) cases. This indicates that uncontrolled infection and inflammation played an important role in progression toward non-salvageable ocular damage. The similarity with previous studies may be due to delayed presentation, self-medication, poor follow-up, delayed referral from peripheral centers, and limited public awareness regarding warning symptoms such as ocular pain, corneal opacity, progressive visual loss, or ocular discharge.

The most important contribution of the present study is the assessment of preventability. Overall, 92 (76.7%) cases were classified as preventable, and a statistically significant association was observed between indication and preventability. This finding is clinically and publicly relevant because trauma, endophthalmitis, and corneal ulceration are conditions in which early intervention may prevent progression to irreversible visual loss and globe removal. Steinmetz et al, [22] reported that a substantial proportion of global blindness and visual impairment is avoidable. This supports the present finding that most globe-removal cases were linked to preventable causes such as trauma, endophthalmitis, and corneal ulceration. In Pakistan, Jadoon et al, [23] highlighted gaps in the reach of eye

https://doi.org/10.57234/jiimc.june26.3005

health programmes, showing that many patients may remain outside timely screening, referral, and specialist-care pathways. This finding is relevant to the present study because 76.7% of patients were classified as having preventable causes, and most presented with advanced disease and no perception of light. The high preventability rate in our study may therefore reflect not only disease severity but also delayed access to eye care, weak referral systems, limited community awareness, and insufficient coverage of preventive eye health services. Strengthening primary eye care, improving referral from peripheral centers, and increasing public awareness regarding ocular trauma and infection may reduce progression to irreversible ocular damage and the need for evisceration or enucleation.

Most patients presented with no perception of light, recorded in 88 (73.3%) cases, indicating irreversible visual loss at the time of presentation. This finding explains why evisceration or enucleation became necessary in many patients. Bourne et al,[24] described the continuing burden of blindness and visual impairment globally, while Wazir and Karim [25] reported delayed presentation as an important issue in severe ocular disease in a local setting. Compared with these studies, the present study shows that delayed presentation is not only associated with poor visual outcome but also with structural ocular destruction requiring globe removal. B-scan findings such as disorganized globe and retinal detachment further indicated severe structural ocular damage, while histopathology mainly showed inflammatory/infective changes and necrosis. These findings collectively suggest that many patients reached tertiary care after the eye had already become anatomically and functionally unsalvageable.

Histopathological examination in the present study most commonly showed inflammatory/infective changes, followed by necrosis. This finding supports the clinical observation that infection and inflammation were major contributors to globe loss. Lavaju et al,[26] reported histopathological patterns in severe ocular disease and emphasized the role of pathological confirmation in understanding destructive ocular conditions. In the present study, histopathology added important diagnostic value because it confirmed the underlying tissue changes responsible for irreversible ocular damage. Orbital implant placement was performed in 82 (68.3%) patients, reflecting the importance of post-surgical socket reconstruction and cosmetic rehabilitation. Talpur et al,[27] discussed visual outcomes and prognostic factors in open-globe injuries among Pakistani patients; in comparison, the present study extends the local evidence by focusing on patients who progressed to globe removal and required reconstructive planning after evisceration or enucleation.

The findings of this study have important clinical and public health implications. At the clinical level, ocular trauma and infection should be treated as urgent conditions requiring early recognition, prompt referral, and timely specialist management. At the public health level, the high preventability rate emphasizes the need for workplace eye safety education, use of protective eyewear, community awareness regarding ocular emergencies, improved management of corneal ulcers, and stronger referral links between primary, secondary, and tertiary eye care services. Based on these findings, preventive strategies should focus on both trauma-related and infection-related globe loss.[1,4,20,23]

For ocular trauma, mandatory protective eyewear should be promoted in high-risk settings such as industrial work, construction, welding, and agricultural activities. Workplace safety education, enforcement of occupational eye-safety regulations, and awareness regarding road traffic and domestic eye injuries may reduce preventable traumatic ocular morbidity.[1,2,18]

For infective causes, early referral protocols should be strengthened for corneal ulceration, suspected endophthalmitis, panophthalmitis, corneal perforation, progressive ocular pain, and rapidly worsening visual loss. Primary and secondary healthcare facilities should be encouraged to refer such cases urgently to tertiary ophthalmic centers before irreversible globe damage occurs.[3,4,20]

The strength of this study is that it included clinical, radiological, histopathological, surgical, and preventability-related variables in the same patient population, which provides a more complete assessment of globe removal procedures in a tertiary care setting.

https://doi.org/10.57234/jiimc.june26.3005

Limitations

It was a single-center study with non-probability consecutive sampling, so the findings may not be generalizable to all regions. Preventability was assessed clinically, which may involve some subjective judgment. Although pediatric and adolescent patients were included, children below 5 years were not represented in this cohort, and tumor subtypes such as retinoblastoma were not separately recorded. Therefore, age-specific interpretation of pediatric tumor-related enucleation is limited. In addition, the type and setting of ocular trauma, such as blunt or penetrating injury and industrial, agricultural, domestic, or road traffic-related trauma, were not consistently available in the records; therefore, trauma subcategorization could not be performed. Future multicenter prospective studies with larger samples should record tumor subtype, mechanism and setting of trauma, and long-term psychological, cosmetic, rehabilitation and surgical outcomes to better define regional patterns and targeted prevention strategies.

Conclusion

Ocular trauma and infective ocular pathologies were the leading causes of evisceration and enucleation, and most cases were potentially preventable. Most patients presented with irreversible visual loss and advanced structural damage, reflecting delayed presentation. Early referral, timely treatment of ocular infections, use of protective eyewear, and stronger primary eye care services may reduce the need for globe-removal procedures.

Disclaimer: This study is part of compulsory research article for FCPS training and has been approved both by parent institute and REU department CPSP.

Conflict of Interest: Nil

Funding Disclosure: Nil

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors have declared no specific grant for this research from any funding agency in public, commercial or nonprofit sector.

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.

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