

Profile of Destructive Ocular Surgery and its Indications: A Twelve-Year Review from Eastern Nepal

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ABSTRACT

Background: Destructive ocular surgeries are performed for many conditions ranging from trauma to tumours, where the eyes cannot be salvaged. The objective of our research was to study the profile of destructive ocular surgery and their indications.

Methods: This retrospective study reviewed all patients who underwent evisceration, enucleation, and exenteration at B.P. Koirala Institute of Health Sciences, a tertiary eye hospital in Eastern Nepal, between January 2008 and December 2019. Medical records on patient demographics, type of surgery performed, and an indication of surgery during the study period were reviewed.

Results: One hundred thirty-four patients underwent destructive ocular surgeries. The median age of patients undergoing surgery was 14.5 (3-50) years. Children aged ten years or less accounted for 46.3% of the total patients. Fifty-two percent were male. The left eye was affected in more than half of the cases (56.7%). Enucleation was the most performed destructive ocular surgery (76 cases, 56.7%). Intraocular and ocular adnexal malignancy was the most common overall indication (62 cases, 46.3%). Ocular infection (19 cases, 41.3%) and trauma (15 cases, 32.6%) were the most common indication of evisceration. Retinoblastoma accounted for most cases of enucleation (43 cases, 56.6%). Malignancy was the only indication of exenteration (12 cases, 100%).

Conclusions: Enucleation was the most common destructive ocular surgery. Malignancy accounted for most of the cases of destructive eye surgery, followed by ocular infection. Ocular infection and trauma were the most common indication of evisceration, whereas retinoblastoma and eyelid malignancy were responsible for most of the cases of enucleation and exenteration, respectively.

Keywords: Eye; globe; infection; neoplasia; orbit

INTRODUCTION

Destructive ocular surgery (DOS) is a surgical procedure that involves permanent removal of the entire globe or parts of the globe.¹ It is a management option offered to a patient when further retention of the globe is likely to affect the health of the eye, general health, or survival of the patient.²

DOS includes three operative procedures: evisceration, enucleation, and exenteration. The overall indications of the DOS are similar globally, but the indications that require these procedures vary. Ocular infections are the most common indication in developing countries, whereas malignant tumors in developed countries.³⁻¹⁰ This could be due to the difference in the pattern of ophthalmic diseases in different countries as well as

the level of care that is available in the management of these diseases.⁷

The purpose of our research was to study the profile of DOS and its indications in Eastern part of Nepal.

METHODS

Our study reviewed medical records of all patients who underwent evisceration, enucleation and exenteration between 1st January 2008 and 31st December 2019 at B.P. Koirala Institute of Health Sciences (BPKIHS), an academic institution and a tertiary level care centre in eastern Nepal. An approval from Institutional Review Committee (Reference no.: IRC/1788/020) of BPKIHS was obtained for this study and the research was conducted according to the principles of the Declaration

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of Helsinki.

Information on patient demographics, indications and types of surgery were obtained from our medical record section. Records with incomplete data were excluded from the study. Collected data were entered in Microsoft Excel version 2016 and all statistical analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS) Statistics version 11.5. Descriptive statistics were reported as mean for continuous variables and frequencies for categorical variables.

RESULTS

A total of 134 patients underwent DOS during the study period of 12 years. Fifty-two percent (70 patients) were male. The median age of the surgery was 14.5 (3 -50) years. The youngest child was nine days male, who underwent enucleation for retinoblastoma. The oldest was 88 years male, who underwent evisceration for anterior staphyloma. Children up to ten years underwent DOS the most (Table 1). DOS was performed on the left eye in 76 cases (56.7%). One child underwent enucleation in both of the eyes for bilateral retinoblastoma.

Table 1. Age distribution of patients undergoing DOS (n=134).

Age group (years)	Frequency (n), Percentage
0-10	62, 46.3%
11-20	14, 10.4%
21-30	10, 7.5%
31-40	6, 4.5%
41-50	12, 9.0%
51-60	11, 8.2%
≥61	19, 14.2%

Enucleation was the most performed DOS accounting for more than half of the cases (56.7%) followed by evisceration (34%) and exenteration (9%).

Malignancy (retinoblastoma, uveal melanoma and ocular adnexal tumour) was the most common indication of DOS (Table 2). All the malignancies were proven by biopsy. Ocular trauma and infection (corneal ulcer, endophthalmitis and panophthalmitis) were the second common causes.

Table 2. Overall indications of DOS (n=134).

Indications	Frequency n(%)
Malignancy	62, 46.3%
Ocular trauma	21, 15%
Anterior Staphyloma	18, 13.4%
Corneal Ulcer	8, 6.0%
Panophthalmitis	7, 5.2%
Endophthalmitis	5, 3.7%
Phthisis Bulbi	5, 3.7%
Painful Blind Eye	3, 2.2%
Others (cosmesis, foreign body granuloma, suprachoroidal haemorrhage)	3, 2.2%

Evisceration was the second common type of DOS (n=46, 34.3%). The median age of evisceration was 39.5 (17.75 - 63.50) years. Ocular infection (corneal ulcer, panophthalmitis, and endophthalmitis) was the most common cause of evisceration followed by ocular trauma (open globe injury) (Table 3).

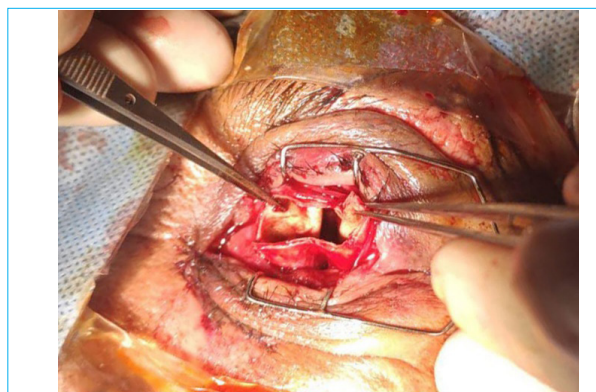


Figure 1. Evisceration being performed in a case of perforated corneal ulcer.

Table 3. Indications of evisceration (n=46).

Indications	Frequency n(%)
Ocular trauma	15, 32.6%
Corneal Ulcer	8, 17.4%
Anterior Staphyloma	8, 17.4%
Panophthalmitis	7, 15.2%
Endophthalmitis	4, 8.7%
Others (painful blind eye, phthisis bulbi, suprachoroidal haemorrhage, granuloma)	4, 8.7%

Enucleation was the most common type of DOS performed (n=76, 56.7%). Median age of enucleation was 4.5 (2.0 - 17.5) years. Retinoblastoma was the most common cause of enucleation accounting for more than half cases of enucleation (Table 4).

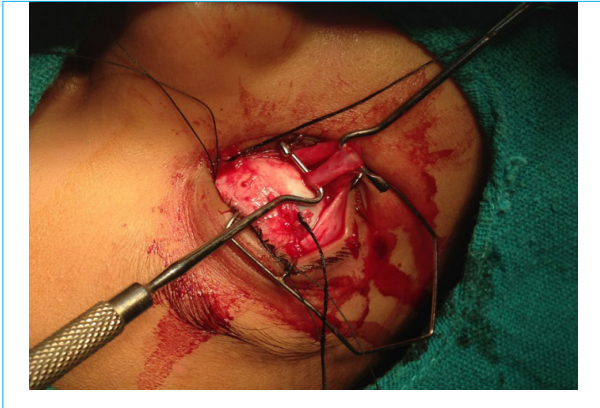


Figure 2. Enucleation being performed in a case of retinoblastoma.

Table 4. Indications of enucleation (n=76).

Indications	Frequency n(%)
Malignancy	
a. Retinoblastoma (43, 56.6%)	51, 67.1%
b. Malignant Melanoma (6, 7.9%)	
c. Ocular Surface Neoplasia (2, 2.6%)	
Anterior staphyloma	10, 13.2%
Trauma	6, 7.9%
Phthisis bulbi	4, 5.3%
Painful blind eye	2, 2.6%
Others (endophthalmitis, cosmesis)	3, 3.9%

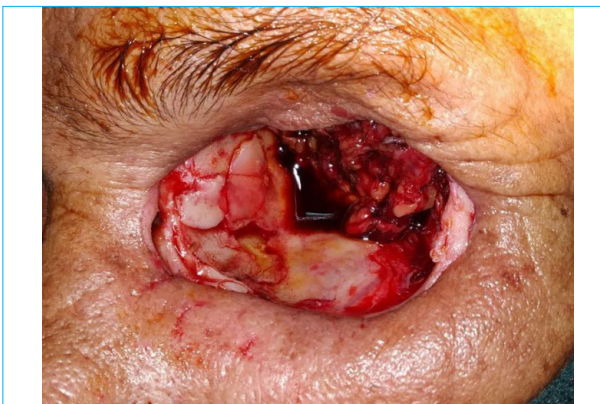


Figure 3. Post-operative picture following exenteration.

Exenteration, the most destructive of all, was the least performed DOS (n=12, 9%). The mean age of

exenteration was 50.75 ± 25.15 (3 - 77) years. All cases of exenteration were done for malignancy, squamous cell carcinoma being the most common cause (Table 5). Eyelid was the most common site of origin of the tumour for patients undergoing exenteration.

Table 5. Indications of exenteration and site of origin of malignancy (n=12).

Indications	Frequency n(%)
Squamous cell carcinoma	4, 33.3%
Sebaceous cell carcinoma	2, 16.7%
Orbital Retinoblastoma	2, 16.7%
Basal cell carcinoma, malignant melanoma, small cell carcinoma, not mentioned (one each)	4, 33.3%
Site of origin	
Eyelid	5, 41.7%
Intraocular with orbital extension	3, 25.0%
Maxilla	2, 16.7%
Orbit	1, 8.3%
Unknown	1, 8.3%

Two cases underwent total maxillectomy with orbital exenteration for maxillary squamous cell carcinoma with orbital extension with the help of head and neck surgeons.

DISCUSSION

Destructive ocular surgery is a surgical procedure that involves permanent removal of parts of the globe or the entire eye. It has not only physical but also emotional, psychological, social and economic effects on the patient, family, and community.¹¹

There are few studies on DOS in Nepal. In a study done at Nepal Eye Hospital, Kathmandu, by Pandey in 2006, the incidence of destructive ocular surgery was 1.4% (41 cases).³ Evisceration was most performed more commonly (73.17%) than enucleation (26.83%), whereas the data on exenteration was not reported. The most common cause of destructive surgery was panophthalmitis (31.71%) followed by painful blind eye (21.95%), endophthalmitis (14.63%), staphyloma (14.63%), retinoblastoma (12.20%) and crush injuries (4.88%).

Similarly, in a retrospective study on evisceration at Tilganga Eye Centre, Nepal, the incidence of evisceration was 0.03% (71 patients of total OPD visits). The most common cause was trauma (55%) followed by corneal ulcer (18%).¹² Similarly, a study on exenteration at the same hospital showed that retinoblastoma was

the most common cause of exenteration (32%) of the total of 27 patients followed by conjunctival squamous cell carcinoma (18%).¹³ Other causes of exenteration were non-Hodgkin's lymphoma (7%), malignant eyelid melanoma (7%), rhabdomyosarcoma (7%) and basal cell carcinoma (4%).

Studies done in India also show similar results. Research on exenteration in North India on 25 patients, primary orbital malignancies were the most common indication (50%) followed by lid malignancy (30%) and retinoblastoma (5%).¹⁴ Fifty-two patients underwent destructive ocular surgery in the study done in Eastern India.⁵ Evisceration was commonly performed (83%). The most common indication of DOS was panophthalmitis (25%) followed by anterior staphyloma (21%), trauma (19%) and endophthalmitis (13%). A study in Southern India showed a similar result of evisceration being the most common procedure performed in cases of infection (53.3%) followed by trauma and neoplasm.⁷

We can see from the above studies that retinoblastoma was one of the causes of exenteration. But in recent years, exenteration is rare and retinoblastoma mostly undergoes either enucleation, brachytherapy, or chemotherapy. DOS has decreased dramatically due to early screening and advanced treatment options.

The most common DOS in studies done in Nigeria was evisceration most commonly due to infection, neoplasm, and trauma.^{2,6,15,16}

Yousuf et al. in their 20 years of experience at Howard University, reported evisceration most common type of DOS in their centre.¹⁷ The most common cause leading to eye removal was trauma (64%). But this research only included enucleation and evisceration. Data on exenteration was not present. In the study on exenteration at Massachusetts Eye and Ear Infirmary over ten years, squamous cell carcinoma (28%) and malignant melanoma (28%) were the most common cause.¹⁸ In the retrospective study done by Mukona et al., in Sukuru Kaguvi Eye Hospital, Harare, Zimbabwe in 362 patients from 2008 to 2013, the most common type of DOS was evisceration (46.13%) followed by exenteration (39.78%) and enucleation (14.09%). The most common cause was squamous surface neoplasia (45%) followed by a ruptured globe (22.65%) and panophthalmitis (18.78%).¹

In a study done in the same hospital in 2017 by Mangombe and Masangaise in 37 patients, the most common type of destructive ocular surgery was evisceration (51%) followed by enucleation (29.7%) and exenteration (18.9%). The main indication of DOS was trauma 32.4%

followed by panophthalmitis 21.6% and ocular surface squamous neoplasia (OSSN) 18.9%.¹⁹ This showed the decline of exenteration as compared to the past 5-year study in the same hospital as mentioned above.¹

The results of these studies show that the evisceration was the most common DOS performed.^{1-3,5-7,15-17,19} However, this is different than what our study has shown, enucleation being the most common. While other studies demonstrate ocular infection and trauma as the most common cause of DOS, our study reveals ocular malignancy as the most common cause. This may be the reason why we have higher number of enucleation cases compared to evisceration. Our study shows, malignancy (retinoblastoma, uveal melanoma and ocular adnexal) is the most common indication of DOS. Also, another reason may be the nature of referral to our hospital, which is a tertiary referral centre with specialised facilities. Our study also showed a relatively younger age of the patient with nearly half of the cases under 10 years of age, which is in stark contrast to other studies. The reason for this could be the round-the-clock availability of emergency surgery and general anaesthesia. Such cases are referred from all over eastern region of Nepal to our institute.

Thus, the overall data available shows that evisceration is the commonest procedure performed worldwide in terms of DOS. The ease with which it can be performed in less time with minimal manipulation of other ocular/orbital tissues may be the main reason for its preference. However, the trend shows the decreasing rate of DOS in recent years as newer technology evolved and awareness increased. The availability of primary health care centre at peripheral locations and a good referral system and transportation has also played a role.

The availability of newer advancements like needles and sutures, antibiotics to prevent endophthalmitis, early vitrectomy, and modified ocular surgeries has decreased the rate of evisceration after trauma. What we require is a good awareness of different sight/life-threatening diseases among the general population which can be done with the help of various communication methods and health camps. Primary health care is the best place a patient seeks medical help. So, a prompt referral from there to a higher centre can save the sight/life of the patient. For this telemedicine has proved to be a good source. If we ensure the availability of telemedicine at the primary level, it can also bring a change in the pattern and incidence of DOS in near future.

The strength of this study was its sample size and duration. The more extended period and the large sample size of the study helped us in giving good results.

There were some limitations to this study. Because of the retrospective nature of the study, patient data may have been missed because of incomplete or lost records. Since this is a single centre, tertiary hospital study, its data cannot be generalized to the population.

CONCLUSIONS

Our study suggests that the enucleation is the most commonly performed destructive ocular surgery, and the malignancy is the most common indication followed by ocular infection. Ocular infection and trauma are the most common indication for evisceration, retinoblastoma for enucleation, and eyelid malignancy for exenteration. Nearly half of our cases of DOS are children under ten years of age. Hence, public health awareness, early detection and management of malignancy and infection, and safety measures to prevent trauma is a must to decrease the incidence the destructive ocular surgery.

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