



## Original Research Article

## Aetiological pattern of surgical eye removal in a tertiary care centre in Eastern India

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## ARTICLE INFO

## Article history:

Received 06-10-2020

Accepted 15-12-2020

Available online 29-04-2021

## Keywords:

Enucleation

evisceration and Exenteration

## ABSTRACT

**Background:** To determine the pattern of surgical eye removal in a tertiary eye-care facility in Eastern India.**Materials and Methods:** A retrospective case review was performed for all patients who had surgical removal of the eye between February 2011 and February 2017 at our tertiary care centre. Data collected were age, sex, diagnosis, eye affected and type of surgery, time of presentation.**Results:** In this study 159 eyes of 159 patients underwent eye removal surgery with total number of evisceration 101(63.52%), enucleation 57(35.85%) and exenteration 1(0.63%) noted from records. Mean age was 43.71±26.45 with Male:Female ratio of 1.69:1. Diagnosis was categorized into severe intractable infection 70(44.03%), trauma 34(21.38%), tumours 28(17.61%), painful blind eye 16(10.06%) and staphyloma 11(6.92%).**Conclusion:** Evisceration was preferred surgery in our study. Males were more commonly involved than female. Severe intractable infection was most common indication followed by trauma and tumour with retinoblastoma as the major indication. Painful blind eye and staphyloma was remaining indication. Causes are largely preventable and avoidable and with provision of adequate eye-care facilities this trend can be reversed.**Key messages:** Removal of eye has profound psychological, social and economical impact on an individual. To reduce this, major etiological factor prevalent in that region has to be known. Aetiology prevalent in western country or different parts of our country may not fit in our scenario and every region has its own environmental, social, educational, financial conditions and cultural beliefs that significantly affects these outcomes.© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## 1. Introduction

Surgery for removal of eye is the terminal therapeutic measure for end stage ocular disease like tumours, nonresponding endophthalmitis, panophthalmitis, severe ocular trauma, degenerative eye condition like staphyloma, painful blind eye, phthisis bulbi.<sup>1,2</sup>

Methods of surgically removing eye are enucleation, evisceration and exenteration. In First description of enucleation surgery was given by Bartisch in 1583 and later in 1781, Bear introduced evisceration when he removed

the remaining intraocular contents of an eye following an expulsive hemorrhage.<sup>3</sup> Enucleation the whole eyeball is removed, whereas in evisceration sclera and extraocular muscle are left intact, exenteration is the removal of globe, including all or part of orbital soft tissue.<sup>4</sup> In 1874, Noyes described evisceration for the management of intraocular infection.<sup>5</sup> In 1884, Mules described placing a hollow glass sphere into the eviscerated cavity.<sup>6</sup>

Evisceration requires less manipulation and consequently less inflammation and scarring of orbital tissues and extraocular muscles resulting in better implant motility and cosmetic outcome than enucleation.<sup>7</sup> Unlike

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enucleation, evisceration potentially causes exposure of uveal antigens with associated risk of sympathetic ophthalmia.<sup>8</sup> Though there is no solid evidence that evisceration is associated with an increased risk of sympathetic ophthalmia.<sup>9</sup> The causes of surgical removal of the eye vary according to location and tend to reflect the pattern of severe ocular disease, the level of development and its socio-cultural dynamics.<sup>9,10</sup>

The main aim of this study was to determine the demographic pattern, prevalent causes, and its relative importance in surgical eye removal in our tertiary care centre in eastern India, which can help to formulate appropriate intervention strategies to reduce the incidence of those diseases and hence surgical removal of the eye.

## 2. Materials and Methods

A retrospective analysis was carried out for all patients who underwent surgical removal of the eye either via enucleation, evisceration or exenteration between February 2011 to February 2017 at a tertiary care center of Eastern India. Data collected from our medical records were age, sex, diagnosis on admission, affected eye, type of surgery, time interval between onset of disease process and presentation to ophthalmologist and self-medication or use of traditional medication prior to presentation. Primary clinical indication was divided into five groups namely intractable infection, trauma, tumour, staphyloma and painful blind eye. Cases with Intractable infection were further subdivided into sloughing corneal ulcer with endophthalmitis/panophthalmitis, post-surgical infection presenting with non-responding endophthalmitis/panophthalmitis with nil visual prognosis. Trauma cases were categorized into irreparable severely disorganized globe and with associated nonresponding infection with nil visual prognosis. Tumour was further categorized into retinoblastoma, melanoma and advanced ocular surface squamous neoplasia. Age was subdivided into three groups of below 15 years as pediatric, 15-60 years as adult and above 60 years as elderly. Time of presentation between onset of symptoms and presentation to ophthalmologist was further divided into within 2 days, within 7 days, within 2 weeks, within 1 month and beyond 1 month.

## 3. Results

In this retrospective study 159 eyes of 159 patients underwent eye removal surgery and, in all cases, written informed consent was present regarding indication of eye removal and its consequences and clearly signed by patients and its relatives and in case of minor consent was signed by guardian of patients. Signature of two consultants was also required for the eye removal surgery with proper diagnosis.

During our study period, total number of evisceration 101(63.52%), enucleation 57(35.85%) and exenteration one

(0.63%) was noted from records. Mean age of cohort was  $43.71 \pm 26.45$  (age range 3 months to 90 years). Male 100(62.89%):Female 59(37.11%) ratio was 1.69:1.

Diagnosis was broadly categorized into Severe infection 70(44.03%) cases, trauma 34(21.38%) cases, tumours 28(17.61%), painful blind eye 16(10.06%) and staphyloma 11(6.92%) [Table 1].

Severe infection was further sub-categorized into, following sloughing corneal ulcer 52(74.29%) and post-surgical infection 18(25.71%) and it constitute 69.31% of all evisceration in our study. Trauma was sub-categorized into those with non-responding infection 22(64.71%), badly lacerated non-repairable injury without infection 12(35.29%). Tumour was sub-categorized into retinoblastoma 26(92.86%), melanoma one (3.57%), advanced squamous cell carcinoma one (3.57%)[Table 1].

Data was also analyzed for aetiological pattern of eye removal surgery in different age groups as depicted in Table 2.

In paediatric age group total 35(22.01%) eye removal surgeries were recorded with retinoblastoma being major aetiological factor about 26(74.29%) cases. In children below 5 years of age 22 out of 23 cases (95.65%) and even in children between 5-10 years of age four out of eleven cases (36.36%) underwent eye removal surgery due to advanced retinoblastoma.

In adult age group out of 72(45.28%) surgery, severe infection 35(48.61%) was the main cause. Similarly, in elderly age group out of 52(32.70%) cases, severe infection 35(67.31%) was the main aetiological pattern.

About 23(44.23%) cases presenting with severe infection due to sloughing ulcer had history of use of traditional medication and over the counter use of steroid.

Total 31(59.62%) severe infection cases presented more than 2 weeks after onset of symptoms. Similarly, in cases of trauma with associated severe infection presentation was delayed by more than two days in 12(54.55%) cases and more than seven days in nine (40.91%) cases [Table 3].

In trauma cases 31(91.18%) eyes were eviscerated and three (8.82%) were enucleated [Table 1].

## 4. Discussion

Evisceration was the preferred surgery in our series and was similar to reports from other country.<sup>11–13</sup> Evisceration requires less manipulation and consequently less inflammation and scarring of orbital tissues and extra ocular muscles resulting in better implant motility and cosmetic outcome than nucleation and it is simple faster and associated with lower risk of bleeding so it was the preferred surgical option unless contraindicated or not feasible.<sup>12,13</sup>

More males had their eye removal than female in ratio of 1.69:1 in our study and this is similar to study from other countries and also study from other part of India.<sup>9,11,14–17</sup> This may be due to male are more commonly involved in

**Table 1:** Distribution of aetiology and type of surgery for eye removal performed in our centre

Aetiology	Frequency	Percentage (%)	Type of surgery		
			Evisceration	Enucleation	Exenteration
Severe Intractable Infection	70/159	44.03	70		
A. Secondary to ulcer	52/70	74.29			
I. Traditional medicine/Steroid exposure	23/52	44.23			
B. Secondary to surgery	18/70	25.71			
Trauma	34/159	21.38	31	3	
A. Irreparable injury	12/34	35.29			
B. With associated severe infection	22/34	64.71			
I. Traditional medicine/Steroid exposure	1/22	4.54			
Tumours	28/159	17.61		27	1
A. Retinoblastoma	26/28	92.86			
B. Melanoma	1/28	3.57			
C. Advanced OSSN	1/28	3.57			
Painful Blind Eye	16/159	10.06		16	
Staphyloma	11/159	6.92		11	

**Table 2:** Demographic and aetiological distribution in different age group

	Paediatric age group (<15years)	Adult age group (15-60 years)	Elderly (>60 years)
Number of cases	35(22.01%)	72 (45.28%)	52 (32.70%)
Male:Female ratio	26:9	42:30	32:20
Aetiology			
Severe Intractable Infection	0	35 (48.61%)	35 (67.31%)
A. Secondary to ulcer		30/35(85.71%)	22/35(62.86%)
B. Secondary to surgery		5/35(14.29%)	13/35(37.14%)
Trauma	5 (14.29%)	22 (30.56%)	7 (13.46%)
A. Irreparable injury	3/5(60.00%)	8/22(36.36%)	1/7(14.29%)
B. With associated severe infection	2/5(40.00%)	14/22(63.64%)	6/7(85.71%)
Tumours	26 (74.29%)	1 (1.39%)	1 (1.92%)
A. Retinoblastoma	26/26(100%)		
B. Melanoma		1/1(100%)	
C. Advanced OSSN			1/1(100%)
Painful Blind Eye	1 (2.86%)	7 (9.72%)	8(15.38%)
Staphyloma	3 (8.57%)	7 (9.72%)	1 (1.92%)

outdoor and high-risk activity that predispose them to ocular trauma.

The mean age in our study was 43.71±26.45 (range 3 months- 90 years) is similar study from rural area of south-eastern Nigeria (47.6±20.2 years) this is the active age group of our society and removal of eye not only had psychological impact but also severely affects social and economical development of our society.<sup>18</sup>

Intractable infection was the major indication in our study constituting 44.03% of all cases of eye removal surgery and is similar to report from other study.<sup>11,19–21</sup> This may due to poor socio economic environment and poverty with limited access to eye care facility. Our centre being a referral centre these types of no responding cases are being referred to our hospital due to lack of basic medical and surgical facility in primary care center. Moreover about 32.70% of patients with sloughing ulcer had tried

**Table 3:** Distribution of cases according to duration between onset of symptoms and presentation to our centre

Duration	<2 days	2-7 days	7-14 days	<1month	>1 month
Total number of cases	7	27	26	32	67
Severe Intractable Infection		11	17	31	11
C. Secondary to ulcer		11	10	31	11
D. Secondary to surgery			7		
Trauma	7	16	9	1	1
C. Irreparable injury	7	4			1
D. With associated severe infection		12	9	1	
Tumours					28
D. Retinoblastoma					26
E. Melanoma					1
F. Advanced OSSN					1
Painful Blind Eye					16
Staphyloma					11

traditional medication and/or steroid prior to presentation, and is similar to study from rural India where 47.7% of corneal ulcer patients had used traditional medication prior to presentation leading to advanced disease and delayed presentation.<sup>22</sup>

Late presentation was also an additional contributing factor of advanced disease. More than half of severe infection due to ulcer cases presented 2 weeks after onset of symptom and was similar to study from other rural areas.<sup>11</sup> Poverty, illiteracy, traditional medication, inaccessibility to basic eye health facility all contributed to late presentation

Panophthalmitis was the most common indication of evisceration in a study from North India similar to severe intractable infection being most common cause of eye removal and evisceration in our study.<sup>20</sup>

Trauma was the second most common cause of eye removal constituting 21.38%. This is similar to study from north India where 21.3% evisceration was done for irreparable globe injury and was second most common cause of evisceration.<sup>20</sup> In another study from South India by Sengupta et.al. 15% of enucleating was due to trauma and in study by Vemuganti et.al. 13% of enucleation was due to trauma.<sup>17,23</sup> However trauma was the most common cause of eye removal surgery in study from both developed and developing countries.<sup>3,12,24,25</sup> And even in trauma cases evisceration(91.18%) is preferred over enucleation (8.82%) unless contraindicated like extensive globe disruption where removal all uveal tissue is difficult by evisceration, in cases where sclera is largely intact and intraocular content is identifiable or if there is associated nonresponding endophthalmitis/panophthalmitis evisceration was preferred. In our study more than half of trauma cases presented with non-responding endophthalmitis/panophthalmitis mainly due to delayed presentation.

Advanced ocular Tumour (17%) was the 3<sup>rd</sup> most common cause of eye removal in our study and retinoblastoma alone constituted more than 90% of all

tumours. So, our study varies from those of South India where tumour was predominant cause of eye removal 49% in Vemuganti et al. study and more than 63% in Sengupta et al study and 42% by Poriccha and Aurora in children.[18,23,26]<sup>17,23</sup>

In paediatric age group nearly three-quarters of total eye removal surgery was due to retinoblastoma and in children below 5 years of age 95.65% and between 5-10 years of age 36.36% of surgery was due to retinoblastoma. High percentage retinoblastoma associated eye removal in children was due to late presentation, poor socioeconomic condition, lack of education and adequate treatment facility in primary care centre leading to delayed presentation in our centre with advanced stage where treatment other than enucleation is not feasible.

Painful blind eye constitutes 10.06% of surgical removal of eye mainly due to absolute glaucoma, higher than Okoye O et. al (5.8%) and Vemuganti et al (3%) but lower than Ababneh et. al (19%).<sup>11,12,17</sup>

Staphyloma constitute very small percentage of eye removal surgery in our series and compared to other study Vemuganti et.al (25%), Okoye et. al.(13.3%) this may be due to cultural beliefs that patient does prefer to live with the defect rather than living without an eye if they are symptom free. Only few patients get their eye removed for cosmetic reason.<sup>11,17</sup>

Pattern of surgical eye removal vary in different age groups. In children, retinoblastoma is the predominant cause in our study similar to study from vemuganti et.al, sengupta et.al, Awe OO et.al. In adult severe infection and trauma is the most common cause. In elderly severe infection, painful blind eye and trauma is the most frequent cause of surgical eye removal in our study, though in other study trauma is the most common cause in adult and elderly.<sup>17,23,25</sup>

## 5. Conclusion

This is a first of its kind study from Eastern India however such studies have been reported from Northern and Southern

India. This study gives an insight about the prevailing eye health conditions and approach of common people towards its management which is largely dependent on socioeconomic factors, literacy level, cultural beliefs and availability of adequate primary care.

The aetiological pattern seen in our scenario is largely preventable and avoidable and with intensive eye health education, like avoiding use of traditional medication and self-medication with steroids etc., consulting eye specialist on first sign of eye problem or after trauma, early diagnosis of tumour with prompt referral and with strengthening eye-care facilities this trend can be reversed.

## 6. Source of Funding

No financial support was received for the work within this manuscript.

## 7. Conflict of Interest

The authors declare they have no conflict of interest.

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**Cite this article:** Imam N, Kusumesh R, Bhaskar G, Ali MS, Sinha BP. Aetiological pattern of surgical eye removal in a tertiary care centre in Eastern India. *Panacea J Med Sci* 2021;11(1):111-115.