

Common Causes of Eye Enucleation among Patients

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Abstract

Background: We investigated the contributing causes and factors leading to eye enucleation procedure among the patients referred to the ophthalmology clinic of the Center Eye Hospital in Tehran, Iran. **Patients and Methods:** We retrospectively analyzed the clinical records of patients referred to the ophthalmology clinic of the Center Eye Hospital in Tehran, Iran, in the past 3 years. The data retrieved were analyzed. **Results:** A total of 313 patients underwent eye enucleation during the past 3 years. The average age of the patients was 36.7 years (range: 20–44 years). Two hundred and eight patients (66.5%) were males and 105 (33.5%) were females. One hundred and sixty-nine patients had the right eye enucleation while 144 patients had the left eye enucleation. The various procedures included enucleation (83%), evisceration (13.4%), and exantration (3.6%). The factors leading to these procedures included trauma (33.2%), phthisis bulbi (20.7%), tumors (15.7%), and infections (10.5%). **Conclusion:** In our study population, trauma was the main factor leading to eye enucleation. Hence, measures to increase social awareness and knowledge to reduce trauma cases are necessary as a preventive approach to reduce eye enucleation procedures. Concurrently, ophthalmologists should also pay more attention in early diagnoses and screening of eye health, especially detecting tumor cases such as retinoblastoma and postsurgical care to reduce secondary infections will be effective actions to reduce the overall rate of enucleation.

Keywords: Causes, evisceration, exantration, eye enucleation

INTRODUCTION

Eye enucleation surgery includes complete removal of eyes or cut and removal of eyeballs, which is often an end-stage treatment of ophthalmological diseases such as tumors inside balls, severe eye infections, severe ischemia to eyes, large tear causing lack of visibility, and painful blind eyes. The goal of enucleation surgery is to protect eyes against ophthalmic sympathetic risk, save patients' lives, reduce pain, and sometimes keep the patients' beauty. Since prevention can reduce the incidence of eye lesions, conducting epidemiological studies to understand the mechanisms, patterns, and factors leading to enucleation surgery is necessary to develop optimal preventive public health programs.^[1]

In a recent study from Nigeria, the most prevalent clinical indication of eye surgeries was reported to be infectious causes such as perforated corneal ulcer, endophthalmitis and panophthalmitis (32.1%), trauma (21.2%), and tumors (21.2%), while the most prevalent indication of eye enucleation in children was reported to be retinoblastoma,^[2] while several other studies have reported trauma^[1,3,4] or tumors^[5] as the most prevalent cause of enucleation. Often

the psychological effects of losing eyes are much worse than its physical problems, especially in cases of losing eyes due to trauma or unexpected malignancy. Identifying these causes can help develop suitable public health measures to minimize the influence of such psychological factors on general health. Hence, we investigated the causes leading to enucleation procedures in ophthalmological clinic of Center Eye Hospital in Tehran, Iran.

PATIENTS AND METHODS

This is a retrospective descriptive study. This study was approved by the Ethics Review Board of the Mazandaran University of Medical Sciences and was performed in accordance with the Declaration of Helsinki. The study samples included all the patients who underwent enucleation

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How to cite this article: Farokhfar A, Ahmadzadeh-Amiri A, Sheikhezadee MR, Gorji MA, Agaei N. Common causes of eye enucleation among patients. *J Nat Sc Biol Med* 2017;8:150-3.

Access this article online

Quick Response Code:



Website:
www.jnsbm.org

DOI:
10.4103/0976-9668.210006

procedure in the ophthalmology clinic of the Center Eye Hospital in Tehran, Iran, during the past 3 years ($N = 313$).

The patients' medical files were extracted, and a predesigned record sheet was completed with honesty, carefulness, impartiality, confidence, and respect to the patients' privacy. The personal information was kept confident and was not entered into the record sheets. The main pages of the patients' files used included their age and gender, clinical history, hospitalization history, surgical summary, the pathology document, and results of medical tests. The checklist in the report included the patients' file number, names, age, gender, jobs, left or right eyes (operated eye), cause of enucleation (trauma, glaucoma, and others), kind of surgeries (enucleation, evisceration, and others), type of anesthesia, the season (spring, summer, fall, or winter), type of tumor if the cause was tumor (melanoma, retinoblastoma, metastasis, and others), and trauma mechanisms (ball-lead shot, stones, wood, metals, knife, blunt, unknown, and others).

The collected data are presented as mean, standard deviation, or frequency and were analyzed using SPSS version 16 software (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc).

RESULTS

A total of 313 patients underwent enucleation procedure in the Center Eye Hospital, Tehran, Iran, during the past 3 years. Two hundred and eight of them (66.45%) were males and 105 patients (33.54%) were females. The patients' average age was 37.4 years. The age group of 20–24 years had the highest rate of enucleation.

One hundred and sixty-nine patients (54%) underwent the right eye enucleation while 144 patients (46%) had the left eye enucleation. About 40 cases (12.77%) were caused by trauma. The highest rate of enucleation was performed in summer and the lowest rate was in the winter.

Two hundred and forty-one patients (83.4%) had enucleation surgeries, 42 patients (13.4%) had evisceration, and 10 patients (3.2%) underwent exantration procedures. A significant ($P < 0.05$) difference was observed among these procedures between male and female patients.

The four main indications, which included 78.2% of the cases of enucleation, were trauma, phthisis bulbi, tumors, and infection. The total traumatic cases of enucleation were 104 patients, of which 57 were in the right eye and 47 cases were in the left eye. A total of 78 (37.5%) and 26 (24.8%) cases of trauma in male and female patients, respectively, contributed to be the main cause of enucleation. The average age of patients was 29.9 years who underwent enucleation as a result of trauma. The youngest age of enucleation was 3 years due to stroke of wood to the eye. Among the incidence of trauma, knife was the main cause (11 cases, 10.6%) [Figure 1]. Twenty-one cases of the trauma resulted in enucleation in the

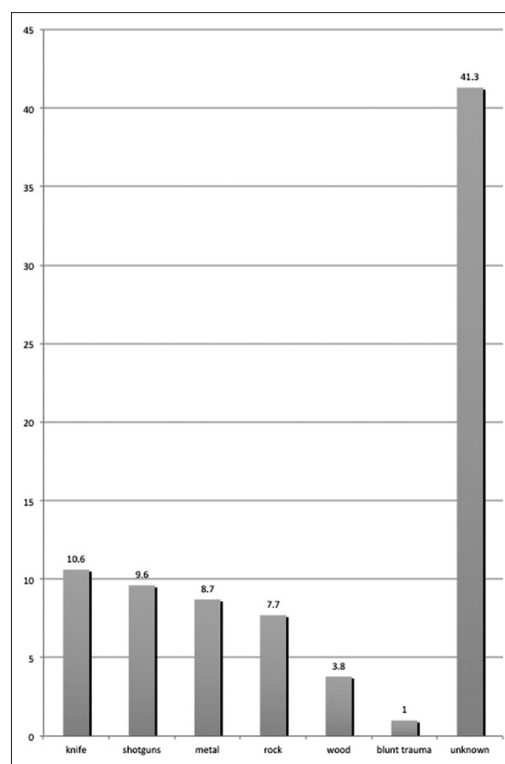


Figure 1: Various factors leading to trauma of the eye

spring, 48 cases occurred in the summer, 24 occurred in the fall, and 11 cases occurred in the winter.

The second most prevalent cause of enucleation was phthisis bulbi, which was observed in 63 patients (33 cases in the right eye and 39 cases in the left eye). Of the 63 patients with phthisis bulbi, 41 were males and 22 were females, and all of them underwent enucleation surgery. Their average age was 31.6 years. The oldest patient with phthisis bulbi undergoing enucleation was 81-year-old. Eleven cases of phthisis bulbi were in the spring, 23 cases were in the summer, 17 cases were in the fall, and 12 cases were in the winter.

Fifty cases of enucleation were caused by tumors, with thirty male patients and twenty female patients. Twenty-seven cases of them had the right eye enucleation and 23 patients had the left eye enucleation. Of the fifty cases, 32 patients had retinoblastoma, 29 patients underwent enucleation surgery, and three patients had exantration. The average age of the patients undergoing enucleation due to retinoblastoma was 3.7 years, the youngest patient was 2-month-old and the oldest patient was 17-year-old.

The nonretinoblastoma tumors included ten cases of melanoma, three cases of basal cell carcinoma (BCC), two cases of squamous cell carcinoma, two cases of sarcoma, and one case of metastasis of renal tumor. The patients' average age was 47.35 years, and 11 of them had enucleation surgery and seven of them had exantration. Twenty cases of enucleation caused by tumors happened in the spring season, 15 cases happened in the summer, six cases in the fall, and eight cases in the winter.

The number of enucleation cases due to endophthalmitis was 33, with 20 male patients and 13 female patients. Their average age was 61.6 years. Twenty-three of them had evisceration and ten had enucleation. Nineteen patients were operated on their right eye and 14 patients in their left eye. In terms of endophthalmitis and seasonal correlation, ten cases were in the spring, 13 cases happened in the summer, nine cases in the autumn, and one case in the winter.

The oldest case of enucleation caused by painful blind eye was 29-year-old, and all of these patients underwent enucleation surgeries. Eighteen of the patients were males and 11 were females. Fourteen had enucleation in their right eye and 15 in their left eye. Their average age was 52.68 years and the age range was 15–84. The enucleation caused by painful blind eye was more prevalent in the autumn.

Eighteen cases of enucleation were caused by auto-evisceration and perforated cornea, and five of these patients underwent enucleation surgery and 13 had evisceration. Eight were male patients and ten were female patients. The average age of the patients undergoing auto-evisceration was 59.88 years (range: 18–80) and ten cases were in the right eye and eight were in the left eye. Eight cases occurred in the spring, four cases in the summer, and six cases in the autumn.

Their average age of the patients undergoing secondary eye enucleation surgery was 51.92 years (range: 7–105 years). Ten patients had enucleation surgeries and three had evisceration. One case happened in the spring, five in the summer, three cases happened in the autumn, and four in the winter. Seven cases of secondary eye enucleation surgeries were in the right eye and six cases were in the left eye.

Other causes of eye enucleation surgeries were staphyloma, one case of severe proptosis or meningioma that was administrated exantration. In the archives of Bu Ali Sina Hospital in Sari, there were five cases of eye enucleation during the 3 years. Their average age was 61.6 years (range of 38–96 years). Four cases happened in the spring and one in the winter. The cause of eye enucleation in two cases was painful blind eye, two cases by infection, and in one case, the perforated eye globe was the cause of eye enucleation and all of them had enucleation surgeries.

DISCUSSION

In the present study, we investigated the factors leading to enucleation of eye in a referral hospital in Tehran, Iran. The total number of traumatic causes leading to eye enucleation surgeries was higher in males, which may be due to their job-related activities. Such higher incidence among men is previously reported from several other geographical regions.^[6-13]

Trauma, phthisis bulbi, tumors, and infection were identified to be the four major factors leading to enucleation surgeries, which was specifically higher in the 20–24 years age group. In a study by Obuchowska *et al.*, trauma was reported as the most

frequent cause of enucleation (36%), followed by malignant tumor (20.7%), glaucoma (19.6%), phthisis bulbi (9%), and endophthalmitis (8.1%). The majority (92.1%) of intraocular tumors were histologically confirmed as melanomas.^[14]

Trauma as the most prevalent cause of eye enucleation is concurrent with several other published literatures.^[6,9,10,15] While a few studies have reported other factors as the major cause of eye enucleation, for instance, painful blind eye was reported as the most common indication.^[16] The main types of injury included firecracker-induced eye burns, traffic and work accidents, and sharp object perforating injury. Malignant tumors (retinoblastoma: 47.5%, malignant melanoma: 27.3%) were also reported as the most common pathological diagnoses followed by phthisis bulbi (25.8%).^[17]

In our study, phthisis bulbi with the prevalence of 18.8% was the second most common cause of eye enucleation, with an average patient age of 31.5 years. However, Knezevic *et al.* reported a higher mean age of 57.81 years in their study.^[18] This difference may be due to sample size or population differences. Nevertheless, our study observations are consistent with the study of Tavakoli *et al.*^[6]

However, intraocular tumors, painful blind eyes, endophthalmitis, and ocular traumas are also reported as the most frequent causes of enucleations.^[8,10,13] In the study of Chuaqui *et al.*, 8.02% of the enucleations were performed due to glaucoma that was primarily neovascular in 42.55% of the cases or caused by trauma in 38.8% of the cases. Trauma was the third common etiology of enucleation, and it was acute in 56.26% of the cases or resulted in phthisis bulbi in 31.25% of the cases. Enucleation caused by inflammation was performed in 2.90% of the cases, out of which 52.94% of the enucleations occurred after perforation of the cornea.^[19]

The tumoral causes of eye enucleation in the present study included retinoblastoma, melanoma, BCC, sarcoma, and metastasis tumors, which were more close and similar to other studies in terms of the order of prevalence.^[10] The cause of eye enucleation seems to be more prevalent in older age group, suggesting a possible link of age and the causes of eye enucleation, indicating a need for better care by the medical teams among older patients to reduce the rate of eye enucleation. In the present study, the average age of the cases was 37.4 years, but this average age score was different in various causes of ophthalmologic injuries. In the infectious causes, the age average was 61.6 years, in tumoral causes, the age average was under 5 years, whereas for traumatic causes, the age range was 20–24 years. Several other studies have reported a similar age profile.^[1,7-10]

In the present study, endophthalmitis was identified as the fourth cause of eye enucleation (10.5%). It seems that endophthalmitis is more prevalent in older ages. While some other studies have reported infection as the main cause of eye enucleation.^[2,8] In the present study, the painful blind eyes was the fifth cause of eye enucleation. This is inconsistent

with published literature,^[1,2] again reflecting demographic differences. It is also interesting to note that conditions which influence inflammation and oxidative stress^[20-22] may directly or indirectly influence trauma, tumors, endophthalmitis, and/or infections, eventually necessitating enucleation of the eye.

In the present study, in terms of the kinds of surgeries, tumors were the only cases requiring exantration, but not evisceration. In the cases of phthisis bulbi and painful blind eye, enucleation was the only surgical approach used. Overall, 83.4% of the surgeries were enucleation, 13.4% were evisceration, and 3.2% were exantration, which is consistent with the previous reports.^[3,5,7] Contradicting this, other studies have reported evisceration as the major surgical approach.^[8,9]

We conclude that trauma, phthisis bulbi, tumors, and infection were observed to be the major factors leading to enucleation surgery. Considering the negative effect of eye removal on patients' quality of life,^[23] it is recommended that adequate public health measures are necessary to reduce cases of the eye enucleation. Some of these measures may include training general population on prevention and protection actions, including early treatment and periodical examining eye health of the people exposed to risks.

CONCLUSION

We conclude that trauma, phthisis bulbi, tumors, and infection were observed to be the major factors leading to enucleation surgery. Considering the negative effect of eye removal on patients' quality of life,^[23] it is recommended that adequate public health measures are necessary to reduce cases of the eye enucleation. Some of these measures may include training general population on prevention and protection actions, including early treatment and periodical examining eye health of the people exposed to risks.

Acknowledgments

This study is the result of a research project of Mazandaran University of Medical Sciences. We express our appreciation to the honorable deputy of technology and research education of the university and all friends who assisted us in this research.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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