

Visual Outcome of Ocular Trauma and its Medicolegal Interpretation in a Tertiary Care Hospital, Karachi

Raffat Rasool¹, Erum Shahid², Roohi Ehsan³, Hira Ahmed⁴, Shazia Fehmi⁵, Arshad Sheikh⁶

Abstract

Objective: To evaluate visual outcome of ocular trauma and its medicolegal interpretation in a tertiary care Hospital, Karachi.

Methods: This was a prospective, cross-sectional observational study conducted at Abbasi Shaheed Hospital, Karachi. Data was collected through non probability consecutive sampling technique. Study duration was 12 months, from 14 September 2014 to 15 September 2015. Inclusion criteria were patients of both genders aged between 18 - 60 years, presenting with ocular trauma in the outpatient department or admitted through emergency in the department of Ophthalmology. The exclusion criterion was patients suffering from all extra ocular injuries. Patients were followed up for a period of 6 months. Statistical analysis was done through SPSS version 20.0

Results: There were 99 patients, with mean age of 31.6 ± 18.5 SD years. Males were 74.7% and 82 (82.2 %) were unskilled. Closed globe injury was seen in 54 (54.5%) and open globe in 45 (45.5%). Nine percent of the patients were assault cases and 90.9% cases were accidental. Corneal injury was seen in 43 (71.6%) and scleral injury in 5 (8.3%) of the patients. At the time of trauma 39.4% patients presented with 6/60 visual acuity, in early post op period 50.5% were 6/6, whereas at six-month follow-up 90.9% patients were with 6/6 visual acuity. Wilcoxon Signed Ranks Test showed P-value less than 0.01.

Conclusion: It was concluded that the major outcome of ocular trauma was impaired visual acuity, which improved significantly on regular follow ups. Medicolegal interpretation of ocular trauma is imperative and should be accounted properly. It should be exercised by the medicolegal officer, to not give final report before atleast 6 months of follow up in case of poor visual outcome. Moreover, educate the person to demand compensation during this period.

Keywords: Eye injuries, visual acuity, forensic medicine

IRB: Approved by Ethical and Scientific Review Committee, Karachi Medical and Dental College. Ref # 0016/14. Dated: 22nd September 2014.

Citation: Rasool R, Shahid E, Ehsan R, Ahmed H, Fehmi S, Sheikh A. Visual Outcome of Ocular Trauma and its Medicolegal Interpretation in a Tertiary Care Hospital, Karachi [Online]. Annals ASH KMDC 2020;25:

(ASH & KMDC 25(3):124;2020)

Introduction

An eye is apparently a small but a critical organ of the body structure. In addition to the fact that it is significant for the appearance of an indi-

^{1,3}Department of Forensic Medicine and Toxicology,

^{2,6}Department of Ophthalmology,

^{4,5}Department of Anatomy,

Karachi Medical and Dental College

Correspondence: Dr. Raffat Rasool
Department of Forensic Medicine and Toxicology,
Karachi Medical and Dental College
Email: raffatrasool49@gmail.com

Date of Submission: 16th March 2020

Date of Acceptance: 28th November 2020

vidual, its capacity is additionally significant for personal satisfaction .

Prevalence of ocular injury directly or indirectly is high in South Asian societies. Assault causing trauma to eyes also becomes a concern of legal authorities. Mechanical injuries by using criminal force fall under three main categories medicolegally i.e. accidental, suicidal and homicidal. Differentiation of each special trauma and its outcome by using criminal force becomes an ambient of legal procedure³.

According to Qisas and Diyat Act of Pakistan, the definition of hurt in eye injuries comes under two sections of law namely *Itlaf-e-udu* (structural loss of eye(s) and *Itlaf-e-Salahiyat-e-udu* (functional loss of either or both eyes). If certified by the examiner, it is a punishable offence.

Doctors, in medicolegal services, are summoned by the court to give evidence as expert witness. They verify the loss and thus help the court in dispensation of justice. Epidemiologically, worldwide approximately 1.6 million people become blind due to ocular injuries. In addition, there are 2-3 million people who are visually impaired bilaterally and 19 million who are unilaterally impaired. The commonest cause of unilateral blindness is ocular trauma. This ocular trauma continues to be a significant because of morbidity due to visual loss/impairment and therefore diminished quality of life of the affected person⁵.

The causes of sustaining ocular trauma may be fight, fall or foreign body at work or road traffic accident. All have medicolegal connotations in terms of punishment to the offender and/or compensation for the loss⁶.

Ophthalmic injuries are also common in Pakistan as documented in medical literature, but they are rarely considered as medicolegally important and therefore reported infrequently⁷.

Due to lack of medicolegal literature on eye injuries, the certifying doctor i.e. medicolegal officer faces difficulty in certifying and testifying the ocular trauma. Medicolegal cases usually do not present immediately after infliction of trauma. They present at varying time interval of the trauma, which may be weeks or days. It is the duty of a designated doctor to ascertain realistic and actual assessment of injuries by a careful history and thorough examination⁸.

Abbasi Shaheed hospital is a tertiary care hospital, also entrusted for teaching purpose. Annually ophthalmologists in the department of ophthalmology, Abbasi Shaheed Hospital Karachi attend a large number of patients only with ocular problems. A study conducted at Abbasi Shaheed Hospital in 2014 had reported high frequency of closed eye trauma i.e. 64% and open eye injury i.e. 36%⁹.

Therefore, consultants have to contribute observations and experiences in the medical literature for promotion of medical knowledge. After in depth search of data no study, up to our knowledge, has been conducted on the medicolegal reporting of ocular injuries in our country.

This study aims at finding the exact outcome of ocular injuries reported at a tertiary care centre, its medicolegal aspect and outcome of the injury. This study will help the doctors to analyse such cases with intensive care and certify its severity according to the law. It will help the patients in terms of compensation and insurance claims. The objective of the study was to evaluate the visual outcome of ocular trauma and its medicolegal interpretation in a tertiary care Hospital, Karachi.

Patients and Methods

This was a prospective and cross sectional observational study. The duration of the study was 12 months, from 14 September 2014 to 15 September 2015. It was carried out after the approval from Ethical and Review committee of the hospital. The sampling technique was non probability consecutive sampling. Patients were recruited from the outpatient department and emergency of Ophthalmology department of Abbasi Shaheed Hospital. The inclusion criteria of the study were ocular trauma patients, both genders and 18 - 60 year old. The exclusion criteria were patients suffering from all extra ocular injuries and those who did not give consent. Sample size calculation by Raosoft software where alpha was 5%, confidence interval was 95%, and response distribution of 50% and population size of 126. The calculated sample size was 99.

History and examination of the patients with ocular trauma presenting in the department of Ophthalmology was recorded in a separate proforma. They were classified into accidental or homicidal (assault). Visual acuity was assessed at the time of examination and at every follow up on Snellen's chart. Lid and periocular tissues were examined with torch for colour of bruises, swelling, abrasion or cut. Slit lamp bio microscope examination was

Table 1. Baseline Characteristics of studied samples (n= 99)

Characteristics		n	%
Age Group	18 - 25 years	57	57.6
	26 - 40 years	15	15.2
	>40 years	27	27.3
	Mean ± SD	31.6 ± 13.15	
Gender	Male	74	74.7
	Female	25	25.3
Occupation	Skilled	17	17.2
	Unskilled	82	82.8
Etiology	Accidenta	190	90.9
	Homicidal (assault)	9	9.0
Object	Sharp	21	21.1
	Blunt	78	78.7
Nature of Injury	Closed globe	54	54.5
	Open globe	45	45.5
Site of injury	Globe	60	60.6
	lids	39	39.4
Globe injuries	Cornea	43	71.6
	Comeo-scleral	12	20
	Scleral	05	8.3
Repair	Surgical	45	45.5
	Conservative	54	54.5
Systemic illness	Diabetes	3	3.0
	Hypertension	2	2.0

Table 2. Frequency of ocular injuries

Ocular injuries	Frequency	Percentage %
Lid cut	16	16.1
Punctal cut	2	2.0
Ecchymosis & edema	21	21.2
Subconjunctival haemorrhage	30	30.3
Conjunctival foreign body	9	9
Corneal abrasion	27	27.2
Corneal foreign body	11	11
Corneal cut	17	17.1
Scleral cut	5	5.0
Infective keratitis	6	6.0
Hyphema	12	12.1
Traumatic cataract	8	8.0
Lens subluxation	2	2.0
Vitreous hemorrhage	2	2.0
Macular edema	3	3.0
Macular hemorrhage	1	1
Choroidal tear	1.0	1.0

Table 3. Visual Acuity from Baseline to six month follow-up

Visual Activity	Time of Trauma		Post Trauma		Six Month Follow-up		p-value
	n	%	n	%	N	%	
VA 6/6	35	35.4	50	50.5	90	90.9	P<0.01*
VA 6/9	1	1.0	6	6.1	1	1	
VA 6/12	6	6.1	19	19.2	4	4	
VA 6/18	7	7.1	9	9.1	2	2	
VA 6/24	2	2.0	3	3.0	-	-	
VA 6/36	9	9.1	4	4.0	-	-	
VA 6/60 or > 39	39.4		8	8.1	2	2	

*p<0.05 considered significant using Wilcoxon Signed Ranks

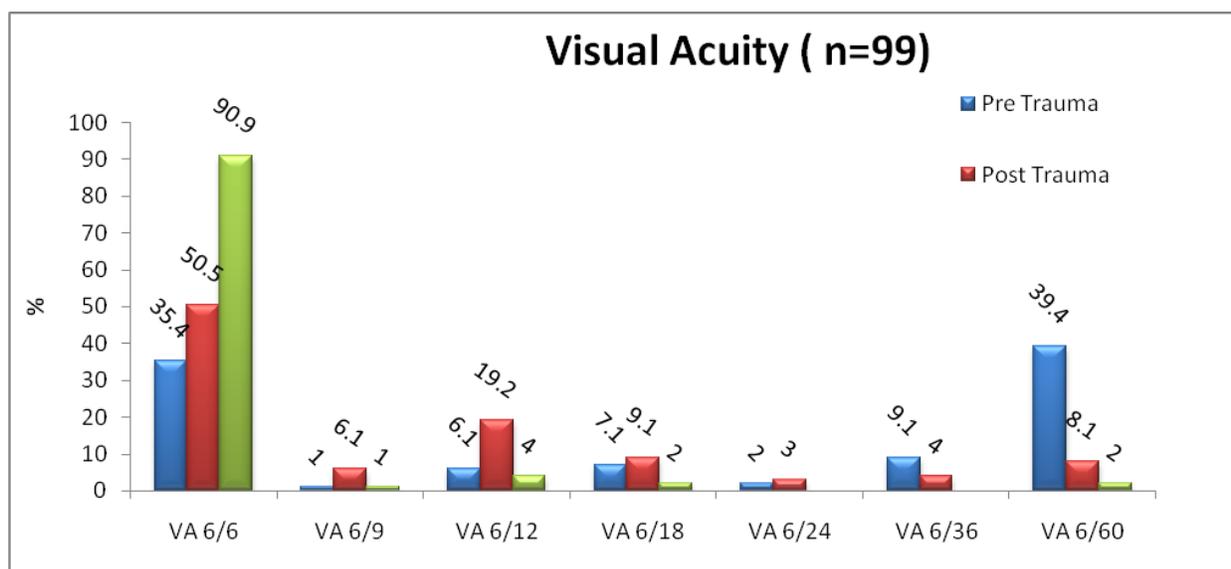


Fig 1. Showing visual acuity at the time of trauma, post trauma and 6 month follow up (green bar) VA at 6 months

carried out for ocular tissues. Conjunctiva was examined for subconjunctival haemorrhage, infection carried out for ocular tissues. Conjunctiva was examined for subconjunctival haemorrhage, infection or any foreign body. Cornea and sclera were checked for corneal abrasion, corneal cut, corneo-scleral cut and scleral cut. Ocular examination was done to check anterior chamber for hyphema, iris for iridodialysis and traumatic aniridia, lens for cataract, subluxation or dislocation and vitreous for vitreous haemorrhages. Light reflexes were examined with torch for direct, indirect and relative afferent pupillary reflex. Fundus examination was done to rule out macular edema, choroidal tears, retinal detachment, retinal tear or retinal haemorrhages. Intra ocular pressure was measured with Goldman Applanation Tonometer where required. Ultrasound B scan was carried where fundus was not visible. X-ray and CT scan was done to rule out orbital fractures and intra ocular foreign body. Blunt trauma was treated with conservative management and penetrating injuries with surgical repair. Surgery was done at the same hospital. These patients were followed up for a period of 6 months. On every visit visual acuity was assessed on Snellen's chart and anterior and posterior segments were examined.

Data was collected and analysed using IBM-SPSS version 20.0. Frequencies with percentages were calculated for all categorical data and means with standard deviation (SD) were calculated for numerical data. Wilcoxon signed ranks test was used to measure the differences in visual acuity from baseline to six months of follow-up. Bar chart was used to give graphical presentation of data. P value of less than 0.05 was considered statistically significant.

Results

Total number of the patients in our study was 99 with mean age of 31.6 ± 13.5 SD years. Ages between 18 to 25 years were 57.6% and more than 40 years were 27.3%. Among them, 74 (74.7%) were males and 82 (82.2 %) of them were unskilled. Patients presenting with closed globe were 54 (54.5%) and open globe were 45 (45.5%). Cornea was involved in 43 (71.6%) and sclera was

seen in 5 (8.3%) of the patients. Patients requiring surgical repair were 45 (45.5%). Table 1. presents the demographic characteristics of studied samples. Among them, 90 (90.9%) cases were accidental and 9 (9.0%) were homicidal or assault cases.

Ocular injuries are further classified according to the anatomical site in Table 2. Ecchymosis was seen in 21.1% and lid cut in 16.1% of the patients. Subconjunctival haemorrhage was seen in 30.3%, corneal abrasion in 27.2%, hyphema in 12.1, cataract in 8.0 and vitreous haemorrhage in 2% of the patients. Details are given in Table 2.

Visual acuity of patients is reported in Table 3. At the time of trauma, 39.4% patients were found with visual acuity 6/60, at post trauma 50.5% of patients were found with 6/6 visual acuity. At six-month follow-up 90.9% of patients were found with 6/6 visual acuity. Wilcoxon Signed Ranks Test was used, that showed P-value less than 0.01.

Fig 1 shows graphical representation of visual acuity of the patients at the time of trauma, post trauma and at 6 month follow up.

Discussion

Ocular trauma is one of the leading causes of ocular morbidity. Approximately every year, 1.6 million people lose their vision due to ocular trauma. Hence ocular trauma is a critical ordeal which needs to be addressed properly¹⁰.

Medicolegal cases (MLCs) presents to a significant part of the clinical ophthalmological practice. The medicolegal report shapes the reason for the narrative clinical proof in court. It must be organized, correct, precise, and unbiased. A legitimate medicolegal report requests minute expert assessment alongside clear documentation. MLC may suggest further cases against the blamed, protection claims, clinical carelessness cases, and labourers' pay issues. The results have numerous aspects including lawful, social, and financial¹¹.

In this study, mean age of the patients was 31.6 ± 13.15 SD years. A study conducted in Peshawar, published in 2016, reported that the mean age of patients that suffered from ocular war

injuries was 29.34 ± 5.35 years¹². Amjad et al had reported that 32.5% of their patients were between 21 to 30 years of age⁸. Study published in Nepal had reported that 26.30% patients were between 21-30 years of age¹³. In our study, 57.6% patients were between 18- 25 years of age. Young age individuals are more prone to mishaps at work places and road traffic accidents due to their social and adventurous activities. However, ocular injuries in this young age group cause great economic loss as it is the most productive age group economically¹³.

In this study 74.7% of the patients were males. Similar results were reported by Baig R et al, which also reported high incidence of eye injuries among male patients in Karachi¹⁴. Amjad et al had also reported 65% male patients with trauma in their study⁸. In the study by Timsinha et al, 69.32% were males¹³. Globally male gender is reported to be more vulnerable for ocular injuries. This is explained by increase outdoor, occupational and sports activities of males along with risky adventure seeking behaviour. All of these factors carry a high risk of injuries in men¹³. In a study by Baig R et al, majority of males had experienced facial and ocular trauma in road traffic accidents in Karachi¹⁴.

In our study 54.5% of patients suffered from closed globe injuries and 45.5% were found with open globe injuries. Closed globe injuries reported by Wasfy et al, were 75.5% and open globe were 25.5% of their patients¹⁵. Timsinha et al, had reported 100% of their cases with closed globe injuries¹³.

In our study 39.4% patients had 6/60 best corrected visual acuity (BCVA) at the time of trauma, similarly study published by Zeeshan et al in 2019 presented 39.7% cases with BCVA less than 6/60¹⁶. Total 50.5% patients were found with 6/6 BCVA in early postoperative period and 90.9% with 6/6 BCVA at six month post trauma with significant p - value from baseline to follow up time period. A study conducted by Iqbal U in 2019 revealed only 29.5% improvement in BCVA post trauma¹⁷. Better visual outcome was seen in our patients, due to lid involvement in 39.4% where globe was spared. Most patients in our study generally presented with mild injuries including subconjunctival haemorrhages, conjunctival and corneal foreign bodies and corneal abrasions. Patients with vitreous

haemorrhage and choroidal tear had guarded prognosis. Traumatic cataracts were successfully treated with intra ocular lens implantation. Most of the patients (99.2%) reported by Timsinha et al were cured and discharged¹³. Voon et al had reported 82.70% of their ocular injury patients with BCVA of 6/6 to 6/9¹⁸.

Various factors play an important role in determining the final outcome of ocular trauma. Adequate BCVA is a crucial predictor of eye function and its role can never be neglected in the final outcome of ocular trauma. A study conducted in India in 2017 revealed that BCVA, size of corneal tear, type of injury, zone of injury, time period between injury and treatment are significant factors determining the outcome of trauma¹⁹. While another study reported that the factors which may contribute for poor visual outcome were poor initial visual acuity, casualty onset of injury and hyphema²⁰. Thirty five percent of our patients had visual acuity of 6/6 at the time of reporting. Another study conducted in Iran in 2018, revealed that the ocular trauma score was the most statistically significant factor determining the post treatment visual acuity among patients²¹.

The medicolegal aspect of ocular trauma is of utmost importance due to its high incidence. Total 700 medicolegal claims were claimed by ophthalmologist in his 40 years practice²². Eye injuries and other types of ocular trauma must be documented properly. Record keeping must be exact, truthful and safe on the grounds that the specialist may overlook the realities in the proper method, but the records will stay accordingly, which can be successfully used in an official courtroom. Complete documentation supported by photographs should be used in medicolegal cases for compensatory purposes. A study conducted in 2014 recommended the use of photo documentation for ocular trauma patients⁹. Your patients may bite the dust, yet the records will never bite the dust, it will talk on its own.

Small sample size and cross sectional design are the limitations of this study. It is recommended that further studies should be conducted with large sample size.

Conclusion

It was concluded that the major outcome of ocular trauma was impaired visual acuity at the time of presentation after trauma. Trauma has to be managed appropriately either surgically or conservatively. However, it improves significantly with proper management and regular follow ups. Medicolegal interpretation of ocular trauma is imperative and should be accounted properly. It should be exercised by the medicolegal officer not to give final report before a minimum of 6 months follow up in case of poor visual outcome. Moreover, educate the person to demand compensation during this period.

Conflict of Interests

Authors have no conflict of interests and received no grant/funding from any organization.

References

- Adamu MD, Muhammad N. Pattern of ocular trauma in Gusau, north west Nigeria [Online]. *Niger J Ophthalmol* 2017;25:11-3. Available from: <http://www.nigerianjournalofophthalmology.com/text.asp?2017/25/1/11/207370>. Accessed on: 26th October 2020.
- Balaghafari A, Siamian H, Aligolbandi K. Ocular trauma: 2 years retrospective study in Sari, Iran. *Materia socio-medica* 2013;25:230. [doi: 10.5455/msm.2013.25.230-232]
- Chaudhry MA, Raza I, Ahmad N. Prevalence of ocular trauma in different age groups and gender presenting at Nishtar Hospital, Multan [Online]. *Ophthalmology Pakistan* 2016;6:7-10. Available from: <http://www.ophthalmologypakistan.com/op/index.php/OP/article/view/108>. Accessed on: 26th October 2020.
- Burq AI, Khan MA, Javid MI. Distribution of medicolegal cases according to gender, season and weapon [Online]. *JSZMC* 2017;8:1189-91. Available from: http://www.jszmc.com/Files_pdf/JSZMCVol08No02/1189.pdf. Accessed on: 26th October 2020.
- Malik IQ, Ali Z, Rehman A, Moin M, Hussain M. Epidemiology of penetrating ocular trauma [Online]. *Pak J Ophthalmol* 2012;28:14-16. Available from: <http://www.pjo.com.pk/28/1/Irfan%20Qayyum.pdf>. Accessed on: 26th October 2020
- Alemayehu WT, Shahin S. Epidemiology of ocular injuries in Addis Ababa Ethiopia [Online]. *JOECSA* 2015;18. Available from: <https://joecsa.coecsa.org/index.php/joecsa/article/view/152>. Accessed on: 26th October 2020.
- Hassan B, Ahmed R, Li B, Noor A, ul Hassan Z. A comprehensive study capturing vision loss burden in Pakistan (1990-2025): Findings from the Global Burden of Disease (GBD) 2017 study. *PLoS one* 2019;14. [doi: 10.1371/journal.pone.0216492.]
- Amjad A, Shaheer M, Saleem Z. Etiology of ophthalmic medicolegal cases presenting to tertiary care hospital [Online]. *Professional Med J* 2019;26:1192-1196. Available from: <http://www.theprofesional.com/index.php/tpmj/article/view/2631>. Accessed on: 26th October 2020. [doi: 10.29309/TPMJ/2019.26.07.2631]
- Shahid E, Rasool R, Arshad S, Nisar S, Jaffery A. Photo Documentation In Ocular Trauma [Online]. *Int J Ophthalmol Eye Res* 2014 ;2:49-53. Available from: <https://scidoc.org/IJOES-2332-290X-02-402.php>. Accessed on: 26th October 2020
- Wilson MR, Wooten F, Williams J. Frequency and characteristics of ocular trauma in an urban population. *J Natl Med Assoc* 1991 Aug;83:697.
- Tripathy K, Chawla R, Venkatesh P, Vohra R, Sharma YR. Clinical profile of medicolegal cases presenting to the eye casualty in a tertiary care center in India. *Indian J Ophthalmol* 2016;64:422. [doi: 10.4103/0301-4738.187656]
- Naqvi SA, Malik S, Zulfiqaruddin S, Anwar SB, Nayyar S. Etiology and severity of various forms of ocular war injuries in patients presenting at an Army Hospital in Pakistan. *Pak J Med Sci* 2016;32:1543-1546. [doi: 10.12669/pjms.326.11158]
- Timsinha S, Kar SM, Ranjeetkar M. Pattern of Occurrence of Ocular Injuries and their Forensic Aspects [Online]. *BJHS* 2019;4:692 - 696. Available from: <https://www.nepjol.info/index.php/bjhs/article/view/25437>. Accessed on: 26th October 2020.
- Baig R, Ahmad K, Zafar S, Khan NU, Ashfaq A. Frequency of ocular emergencies in a tertiary care setting in Karachi, Pakistan-It is time to reduce unnecessary visits. *J Pak Med Assoc* 2018;68:1493-1495.
- Wasfy IA, Wasfy EI, Aly TA, et al. Ophthalmic medicolegal cases in Upper Egypt. *Int Arch Med* 2009;2:1. [doi: 10.1186/1755-7682-2-1]
- Zeeshan ML, Karamat JB. Frequency and Characteristics of Ocular Trauma in a Tertiary Care Hospital in Lodhran [Online]. *Pak J Ophthalmol* 2019;34. Available from: <https://pjo.org.pk/index.php/pjo/article/view/953>. Accessed on: 28th October 2020. [doi: <https://doi.org/10.36351/pjo.v34i2.953>]
- Iqbal U, Malik IQ, Iqbal H. Epidemiology of Ocular Trauma in a Tertiary Hospital Setting [Online]. *Pak J Ophthalmol* 2019;35. Available from: <https://pjo.org.pk/index.php/pjo/article/view/863>. Accessed on: 28th October 2020. [doi: <https://doi.org/10.36351/pjo.v35i1.863>]
- Voon LW, See J, Wong TY. The epidemiology of ocular trauma in Singapore: perspective from the emergency service of a large tertiary hospital. *Eye (Lond)* 2001;15:75-81. [doi: 10.1038/eye.2001.18.]
- Singh S, Sharma B, Kumar K, Dubey A, Ahirwar K. Epidemiology, clinical profile and factors, predicting final visual outcome of pediatric ocular trauma in a tertiary eye care center of Central India. *Indian J Ophthalmol* 2017;65:1192-1197. [doi: 10.4103/ijo.IJO_375_17.].
- Simanjuntak GW, Farinthska G, Simanjuntak GA, Artini W, Natali R. Risk factors for poor visual outcome in traumatic hyphema: Jakarta eye trauma study. *Niger J Clin Pract* 2018;21:921-4. [doi: 10.4103/njcp.njcp_251_17.]
- Tabatabaei SA, Soleimani M, Rajabi MB, et al. Pellet gun injury as a source of ocular trauma; a retrospective review of one hundred and eleven cases. *J Curr Ophthalmol* 2018;30:239-244. [doi: 10.1016/j.joco.2018.01.002]
- Bettman JW. Seven hundred medicolegal cases in ophthalmology. *Ophthalmology* 1990 Oct 1;97:1379-84. [doi: 10.1016/s0161-6420(90)32406-5]