Closed globe injuries, ocular and social consequences

Trauma is the set of local and general disorders that arise from the action of a violent foreign agent.

Eye trauma is a pathology commonly found in ophthalmology.

In order to have a clear definition of eye trauma I will use the Birmingham Eye Trauma Terminology System

	Definition	Findings
Eyewall	Sclera ,cornea	
Closed globe injury	No full- thickness wound of eyewall.	Sometimes a lamellar laceration can be found
Contusion	The injury is either due to direct energy delivery by the object (e. g., choroidal rupture) or to the changes in the shape of the globe (e. g., angle recession)	
Open globe injuries	Trauma in which the contusive agent produces a solution of continuity. Wound in all the thickness of the eye wall	Corneal and scleral ruptures Retina, choroid can be intact or herniated
Lamellar laceration	Partial- thickness wound of the eye wall	Closed globe injury
Laceration	Full- thickness wound of the eyewall, caused by a sharp object	The wound occurs at the impact site by an outside- in mechanism
Penetrating injury	Entrance wound	If more than one wound is present, each must have been caused by a different agent
Intraocular foreign body	It is a penetrating injury with therapeutic and prognostic implications	It can complicate with endophthalmitis

Perforating injury	Two lacerations in the thickness of the eye wall wall produced by a projectile type	Both wounds caused by the same agent
Rupture	An injury in the thickness of the eye wall caused by a blunt object. Impact induces a momentary increase in intraocular pressure and a centrifugal mechanism of rupture of the eyepiece by an indirect mechanism (internally) away from the impact site, usually in a minimal resistance area	

Contusions - although they don't represent the same urgency as open eye trauma, require careful and urgent assessment, with correct and complete examination of the ocular traumatic lesions, in order to apply appropriate therapeutic behavior.

Except for eyeball rupture, eye contusions do not require immediate treatment, but the patient should be monitored over time.

Urgency factors in eye contusions:

- decrease in visual acuity
- shallow anterior chamber
- irregular pupil
- chemosis
- hyphaema
- vitreous hemorrhage
- changes in intraocular pressure - hypotension or hypertension

The consequences of eye trauma have a long-term impact on the patient's quality of life, but they also have social repercussions, represented by the incapacity to work, days spent in hospital and treatment cost.

The most common trauma consequences are:

a) Traumatic cataract – represented by the partial or total lens opacification, that occurs after contusions, can be developed immediately or later on and is part of the traumatic contusion syndrome of the anterior pole - Frenkel syndrome. It manifests through a drop in visual acuity, at the slit lamp exam we can detect snow flake anterior and posterior subcapsular cataract.

b) secondary posttraumatic glaucoma - represents a heterogeneous group of disorders resulting from different traumas as mechanism and etiology, that they

all share in common an increase in intraocular pressure followed optic nerve damage

c) orbital fractures – they can affect one or more orbital walls. If we take into account, the mechanism of action they ca be classified as blow out or blow in
d) post traumatic midriasys
e) traumatic hyphema – represents the accumulation of blood in the anterior chamber, can be secondary to iris or ciliary body damage. The most frequent mechanism is the rupture of the anterior face of the ciliary body.
f) lens malposition – complete zonular fibers rupture leads to luxation and partial zonular fibers ruptures leads to subluxation (anterior or posterior)

The purpose of this paper is to follow the clinical evolution of closed globe injuries from the moment they presented to the emergency room until discharge, to study the most affected ocular structures and the impact it has on the visual acuity and the complication that follow eye trauma, how it affects the patient and represent a cost for the society.

The inclusion criteria for the study were as follows:

- the patient has a closed ocular trauma according to the BETT classification
- the moment of trauma has to be between 01.01.2008 – 31.07.2016
- patient needs to be admitted in the ophthalmology clinic of the Academic Emergency Hospital of Sibiu
- Patient needs to have written in the observation sheet all the parameters followed in this study: age, sex, residence, visual acuity and intraocular pressure on admission and discharge, anterior and posterior pole examination

The exclusion criteria from the study were as follows

- any patient that had an open globe injury according to the BETT clasication
- patients who have suffered eye damage through chemical or thermal burns
- patients that were not admitted or went for treatment in another clinic
- patients that suffered a close globe injury in another period than the one mentioned in this study
- patients that had incomplete observation sheets

The study included 194 traumatized eyes of 188 patients, some of whom had bilateral ocular trauma. The study was retrospective and prospective, patient data were taken from the observation sheets, from Sibiu County Clinic Hospital from 01.01.2008 to 31.07.2016.

Depending on the affected area, we used a 3-zone classification:

- Zone I - superficial lesions of bulbous conjunctiva, sclera, cornea
- Zone II - anterior chamber, iris, crystalline
- Zone III - retina, vitreous, optic nerve and uvea

According to the trauma type the lesions were classified as follows:

- contusions
- lamellar laceration (non-penetrating)
- superficial foreign bodies (conjunctival, corneal)
- mixed mechanism

In order to be able to statistically process the data we categorized the visual acuity in the following groups:

Visual acuity	Tabel Correspondent
≥0.5 (1/2)	1
0,3 – 0,2 (1/3 – 1/5) (including)	2
0.16 – 0.025 (1/6 – 1/40)	3
0.02 (1/50), counting fingers, hand movement, light perception	4
No light perception	5

For each patient, the intraocular tension was recorded and included in one of the following situations:

- hypotension <9 mmHg
- normal tension 10 - 21 mmHg
- hypertension 22 mmHg

The OTS score was calculated in gross value for every patient according to it's visual acuity and slit lamp exam (anterior and posterior pole). Every patient was assigned to it's corresponding score class.

Conversation of the visual acuity found on admission in points.

Variables		Number of points
No light perception		60
Light perception or hand movement		70
1/200 – 19/200	0,005 – 0,95	80
20/200 – 20/50	0,1 - 0,4	90
≥20/40	≥ 0,5	100

Rupture	-23
Endoftalmitis	-17
Penetrating lesions	-14
Retinal detachment	-11
Afferent pupillary defect	-10
Total	

Table 1 Correlation between visual acuity and ocular trauma score

From the obtained value, we substracted the number of points for each lesion in the table.

I have recorded the gross number of points for every patient and assigned them to a score class. I have than compared the visual acuity on discharge with the probability calculated from the table.

Conversion of the points in percentages in order to assess the prognosis of visual acuity:

Total number of ponts	OTS Score	No light perception	Ligh perception/ hand movmenet	1/200 - 19/200 0.005-0,095	20/200 - 20/50 0,01-0,4	≥20/40
0 – 44	1	74%	15%	7%	3%	1%
45 – 65	2	27%	26%	18%	15%	15%
66 – 80	3	2%	11%	15%	31%	41%
81 – 91	4	1%	2%	3%	22%	73%
92 – 100	5	0%	1%	1%	5%	94%

For data preprocessing and analysis I have used Microsoft Excel and SPSS (IBM).

The descriptive analysis in case of categorical variables (environment, gender, traumatized eye (OT), type of trauma, area, traumatism conditions, visual acuity at admission and discharge (AVI, AVE), intraocular pressure at admission and discharge (IT, TE)) consisted of numerical and percentage determinations, and in the case of the continuous variables (age, number of days of hospitalization, number of days with incapacity to work, derived variable - STS score) , median, interquartile interval (IQR). For the comparative study, the Student T, ANOVA tests were used to compare the respective media for the association of the qualitative variables with the Chi-Square test, the significance level considered was 0.05.

In the period proposed for this study, 01.01.2008 - 31.07.2016, 9302 patients were hospitalized. Of these, we included 188 patients with 194 traumatized eyes. These patients suffered a closed globe injury according to the Birmingham Eye Trauma Terminology System

An average number of M = 21.55 (SD = 7.58) patients / year was reported in the ophthalmology service with a maximum achieved in 2013 by 33 patients and a minimum of 10 patients reached in 2016, with the mention that in 2016 we only studied the first 6 months.

I have analyzed for each year the patient's distribution for each month and watched if there was a period when there was an increased number of cases.

For the mentioned period the, the fewest patients where in February (N=10, 5.2%), and the most where in November (N=25, 12.9%), with an average per month, for all the 9 years of M= 16.54 (SD = 4.03) patients.

The patients were aged between 3 to 81 years, the mean age for the entire group being approximately 40 years (N = 194, M = 41.01, SD = 20.557, P25 = 23, P50 = 40, P75 = 57).

Analyzing the distribution of cases according to there place of residence, for each studied year, I have observed for the urban environment, a bimodal distribution with peaks in 2008 (71%) and 2013 (76%) and an increase in the number of cases for the rural environment in the last three years of the study (68%-2014, 80%-2016).

If we compare the results obtained here with those from other studies, we found that the average age of trauma is 22 years for Egypt, 28.2 ± 12.8 for Iran, 31 for Canada.

In a study conducted in India (Role of B scan in ophthalmic trauma), the average age was 40 years, similar to what we have found in Sibiu county.

The 2-year difference between genders in Iran and observed here is not statistically significant for their study (p = 0.094), so I can say that the mean age is similar for the two genders.

Men are more likely to suffer eye injuries; in different studies the percentages vary by geographical area from 91.2% to 42.2%. The mean age for the study group is consistent with other results in literature.

For the studied group, it was observed that the distribution of age related trauma has a bimodal aspect, with a peak around 20 years, than decreases and increases again around 60 years.

This also correlates with other data found in the literature, like a study from Singapore, were it was also described a bimodal distribution with a peak betwwen 20 and 30 years, and a second peak later on, around 70 years. In the opinion of Wong TY et. all, after this age the risk

of eye trauma decreases, due to the change in lifestyle and behavioral habits, the incidence being similar to that seen in women.

For the urban and rural areas, the average age is almost the same and there are no statistically significant differences.

One of the trauma causes could be, the lack of experience or engaging in dangerous situations.

In this regard, Lipscomb claims that the incidence of eye trauma decreases with age and accumulation of experience.

Self-employed individuals have an increased incidence of trauma, ranging from inappropriate working conditions to deficiencies in the use of protective equipment, or lack of knowledge for handling certain machines.

Eye trauma has an increased incidence over the life span of patients and therefore I believe that proper protective equipment is needed. Educating patients is an important factor that could lead to a decrease of trauma in the future.

I did not find a predisposition for the right eye or left eye (OD = 47.4% and OS = 52.6% p = 0.518). These percentages are similar to other studies in the literature where the differences between the two eyes are a very small - OD 46%, OS 50% and 4% of both eyes.

In this study only 6 patients suffered and eye injury on both eyes.

Socioeconomic status is an important factor in the epidemiology of eye trauma. According to studies in Australia, Brazil, the United States and Nepal, it was concluded that eye trauma is more common in children from families with lower socio-economic status.

Traumatisms through aggression, especially domestic violence, are reported at a much lower level than in reality. I have found in this paper is that the incidence of domestic violence is higher for women in rural areas and is directly proportional with aging.

The most common trauma mechanism were contusions in a proportion of 66% (N=128, followed by mixed mechanism 19.6% (N=38), lamellar laceration 11.9% (N=23) and superficial foreign bodies 2,6% (N=5). This hierarchy is preserved regardless of the environment or gender, with the observation that in women the situation of superficial foreign bodies was not met.

The age values for contusions (M=43.59, SD=20.80) and foreign bodies (M=45.40, SD=21.37) was higher (Kruskal Wallis test, p=0.094) compared with lacerations (M=38.09, SD=18.03) or mixed mechanism (M=34.37, SD=18.90).

From the production circumstances point of view, 64,4% (N=124) of cases happened by contact with a blunt object (undetermined intent), 12.9% (N=25) aggressions by physical

force of by using a blunt object, 9.8% (N=19) while it was engaged in work, 10.8% (N=16) while cutting wood and 3.6% (N=7) in case of road accidents.

Road accidents and aggressions were found to have an average age under 40 years (M=27.86, SD=11.75; M=35.20, SD=21.02), while it was engaged in work or undetermined intent had an average of 45 years old (M=44.86, SD=15.54; M=41.20, SD=21.12), for cutting wood the average was approximately 50 years (M=51.31, SD=16.95).

The most frequent trauma mechanism that lead to corneal damage was produced by contusions (56.76%), followed by mixed mechanism (25.23%), lamellar laceration (14.41%) and fewer superficial foreign bodies (3.60%).

Contact with an object – undetermined intent was the most common identified circumstance in which corneal lesions were identified (65.77%), followed by cutting wood (10,81%), while it was engaged in work (10,81%), aggressions by physical force (8,11%) and road accidents (4,50%).

In 80% of cases caused by road accidents, patients had corneal edema, in the other circumstances of production, corneal edema was found between 66.67%-68.49% of cases. Corneal erosions was found in 50% of trauma cases that happened while the patient was engaged in work, in 41.10% of the cases that happened by contact with an object, undetermined intent, in 33.33% cases caused by aggression and cutting wood and only in 20% of the patients that suffered eye trauma from road accidents.

Corneal ulcers were found only in 33% of patients that sustained eye trauma during work and in 2.74% of that patients that had contact with an object – undetermined intent.

The hierarchy of areas that coincided with corneal damage is as follows: 45.95% zone II, in 38.74% zone I and in 15.32% of cases zone III.

Post-traumatic corneal injuries are perceived by the patient as a decrease in visual acuity, foreign body sensation, lacrimation, photophobia and ocular pain.

Focal or diffuse corneal injuries are common and are the result of an eye trauma produced by contusive mechanism, mixed or due to superficial foreign bodies. Most corneal lesions, such as superficial erosions, edema or foreign bodies, heal quite quickly and do not affect visual acuity in the long run.

Cornea has between 50 to 450 nerve endings, that transmit information via the ophthalmic division of the trigeminal nerve. The reason why corneal erosions are so painful is because in the cornea we find a lot of free nerve endings.

Persistent corneal edema is caused by Descemet ruptures or damage of the endothelial cells. An efficient way to evaluate endothelial cells is by specular microscopy. The endothelial layer is quite resistant to trauma and resumes its function quite quickly.

80% of the patients that sustained a road accident with ocular involvement had corneal edema.

Evolution of visual acuity was favorable, so 70.27% of patients had visual acuity at discharge better than 0.5. Regarding the intraocular pressure at discharge 84.68% showed normal values, 9.01% intraocular hypertension and 6.31% hypotension

The area affected by the trauma depends on the circumstances of production and its mechanism. If the traumatic object is larger or smaller than the orbit.

5 patients presented orbital fractures, with a percentage of 0.9%, all of them were produced by a concussion mechanism.

Orbital fractures are often associated with intracranial and ocular lesions. The most common fracture is the zygomatic one. The CT scan remains the "gold standard" in the diagnosis of orbital fractures

From the total number of cases, 17.5% (N = 34) had crystalline malposition, of which 47.06% (N = 16, 8.2% of the total cases) dislocations, 44.12% (N = 15, 7.7%) subluxated, and 8.82% (N = 3, 1.5% of total cases) subluxated IOL.

In the cases of the patients that sustained lens damage, 53.8% were males with luxated lens, 42.3% with subluxated lens and 3.8% with subluxated IOL (Chi-Square test, p=0.118), for females 50% were subluxated lens, 25% were luxated lens and 25% subluxated IOL, for the urban environment 61.5% were luxation, 30.8% were sublixations and 7.7% IOL dislocations (Chi-Square test, p=0.403) while for the rural environment 52.4% were subluxations, 38.1% luxations and 9.5% IOL dislocations.

The mean age of patients with crystalline changes was over 50 years (PFK dislocated: M = 52.67, SD = 21.82, dislocations: M = 52.75, SD = 22.64, subluxations: M = 61.27, SD = 18.88) the mean age of those who did not had any lends damage was significant (Anova test, p = 0.000) lower (M = 37.92, SD = 18.78).

Subluxation of the lens occurs when 25% of the zonular fibers have been damaged.

If the capsular bag is intact the lens remains transparent for a long period of time. In some studies, it is mentioned that 3-4 months after trauma vacuoles appear, that can become opacities later on.

Management of dislocate lens is difficult, because of the damaged capsular support, which makes capsulorhexis, phacoemulsification and IOL implantation difficult.

Surgery may be delayed if subluxation is not significant. If the subluxation is significant or the patient developed cataract, surgery is recommended.

In this study the incidence of traumatic cataract was 9.8% (N=19). Of the male patients (N = 149), 9.4% (N = 14) had cataract, and among females (N = 45) 11.1% (N = 5) = 0.462) and in the urban environment (N = 99), 8.1% (N = 8) showed cataract and 11.6% (N = 11) among rural patients (N = 95) (chi square test, p = 0.282).

Patients with traumatic cataract had an higher average age M=53.42, SD=24.47) than the patients (Mann-Whitney test, p=0.011) who didn't have this complication (M=39.85, SD=19.49). This difference is maintained regardless of gender, with a difference within environments of roughly 10 years for males and 25 years for females (males: M=49.14, SD=27 vs. M=39.64, SD=19.56, p=0.163; females: M=65.40, SD=8.98 vs. M=40.53, SD=19.38, p=0.011).

Traumatic cataract has been caused in 94.7% (N=18) by contusions and in 5.3% (N=1) in cases by mixed trauma, in the majority of cases (78.9%, N=15) was caused by contact with a blunt object, undetermined intent and there were no cases reported while they were at work.

In 78.9% of cases was caused by contact with a blunt object undetermined intent, in 10.5% was caused by road accidents and in 5.3% of cases caused by aggression or cutting wood.

Traumatic cataract is usually unilateral, has a quick evolution compared with the cataract that develops in systemic disease or the age related cataract that is bilateral and has a slow evolution.

The use of substances with a cataractogenic effect such as steroids, miotics, amiodarone should be considered and excluded.

When crystalline damage is due to a contusive trauma, there are certain local signs that the examiner may notice: Vossius ring - a circular pigment depot in the form of a complete or incomplete ring on the anterior capsule as a result of a contusive trauma, post-traumatic mydriasis, corneal edema.

The degree of lens opacity after a traumatic incident depends on a number of factors, from the production mechanism to the object or the way in which it had the impact, the impact site, the kinetic energy emitted by the impact, the absence or presence of the protective devices and the existence a local or systemic associated pathology.

There are certain criteria for choosing the type of artificial lens, such as the type of cataract, the integrity of the crystalline capsule and the zonule. Acrylic, foldable implants are preferred, and hydrogel and silicone implants should are avoided.

Posterior capsule or zonular fibers may be affected as a result of the trauma incident, which may lead to a series of intraoperative complications.

There are studies that have demonstrated that intraocular lenses of the Artisan iris-claw type are a better alternative to visual acuity rehabilitation with a lower complication rate compared to anterior angle camera implants or anchorage to the scleral of the IOL.

Of the 194 traumatized eyes, 76.3% were without intraocular pressure changes, 5.2% with hypertonia and 5.2% with hypotonia, and 13.4% with glaucoma posttraumatic.

Secondary posttraumatic glaucoma was most commonly encountered in cases of contact with an object, undetermined intent (glaucoma: N = 16, 61.5%, no changes: N = 92, 62.2%), followed by: (glaucoma: N = 5, 19.2%, no changes: N = 16, 10.8%), woodcutting (glaucoma: N = 4, 15.4% glaucoma: N = 1, 3.8%, unchanged: N = 24, 16.2%). As a result of road accidents, there were no patients with post-traumatic secondary glaucoma complications (glaucoma: N = 0, no changes: N = 6, 4.1%).

The evolution of patients with intraocular hypertonia at admission was favorable from the point of view of intraocular pressure, so 57.1% of the patients had controlled pressure on discharge, 28.6% had intraocular hypertonia and 14.3% intraocular hypotonia.

The patients with ocular hypertension should have annual checkups and the following parameters should be assed: intraocular pressure, optic nerve had aspect, RNFL and optic nerve analysis, macular ganglion cell layer and visual field.

From the results of this study I can state that 15.4% of the patients with secondary glaucoma also had traumatic cataract, and from the patients with normal ocular pressure, only 6.8% had traumatic cataract.

Angle recession that varies between 180-240 degrees is a risk factor for developing secondary glaucoma.

In this study I have found that patients with lens malposition had 4-fold higher risk of developing glaucoma, than patients who had an ocular trauma without subluxation of the lens.

I have not found a statistical correlation between posttraumatic retinal detachment and secondary glaucoma

I did not find a predisposition for the right or left eye for the appearance of secondary glaucoma after trauma.

Follow up of patients with glaucoma should be done on the same machines, visual filed or OCT, in order to be able to accurately assess progression, and for an optimal therapeutic decision.

The most affected zones affected by close globe injuries are the cornea 21.7% and anterior chamber 20.4%, followed by conjunctiva and iris 16.8% each, eyelids 11.5%, lens 6.7% vitreous 4.3% and orbit 1.8%.

The average number of hospitalization days varied between M = 7.56 (SD = 4.18) for the cornea and M = 9.53 (SD = 4.98) for the iris. The minimum number of days of hospitalization ranged from 1 (in the case of eyelid, conjunctiva, lens) and 3 (in the case of orbiting), respectively 11 in the case of macular hemorrhage while the maximum number of days of hospitalization varied between 19 (vitreous hemorrhage) and 23 (in the case of anterior chamber and iris).

The average number of days of incapacity to work varied between M = 1 (SD = 4.13) in the case of the lens damage and M = 7.11 (SD = 9.48) in the case of the orbit. The maximum number of days of incapacity for work varied between 20 (in the case of the lens being affected) and 31 days.

Visual prognosis depends on several factors. If we use the Ocular Trauma Score and analyze the recommended parameters for calculating it, we can have a general idea of how the traumatized patient can evolve.

Closed globe injuries have a better outcome than open globe injuries, the last ones leading to a decreased visual acuity do to corneal lesions, either scars, leucomas or posttraumatic induced astigmatism.

36.6% of patients had an ocular trauma score of 3, 27.8% had an ocular trauma score of 5, 20.1% had an ocular trauma score of 2, and 15.5% had an ocular trauma score of 4. OTS score of 3 and 4 where the most common for both genders, and a difference was observed for the OTS of 4 in favor of females (24.5% vs. 12.8%), respectively in the OTS of 2 for males (21.5% vs. 15.6%).

The OTS score correlated with visual acuity at discharge (right eye: Spearman correlation coefficient = 0.314, p = 0.000, left eye: Spearman correlation coefficient = 0.263, p = 0.000).

I think this score is useful in the initial assessment of the patient, the tracking parameters are easily identifiable and are part of the clinical examination, in addition it gives the clinician an objective picture of the patient's prognosis for each case. We must not forget that this score is accurate for 4 out of 5 patients.

Pediatric ocular traumas can lead to low visual acuity, or even unilateral blindness, and may have a negative impact on child's development.

I have looked at the demographic profile of children who are prone to eye trauma and the circumstances in which the trauma, the mechanism of action and the evolution of visual acuity have occurred.

In the period 01.01.2018 to 31.07.2016 29 patients were included in the study with the age lower or equal to 18 years. They all sustained a close globe injury according to BETTS and have presented to the hospital within 24 hours since the traumatic incident.

From the 29 patients included, 73.91% were males, with a sex ratio of 3.83:1, and 51.72% where the rural environment. As for adults, males are more prone to traumatic incidents, results that correlate with other studies found in literature.

62.07% of the recorded traumatic incidents found in males, were caused by contusion, with no significant difference between urban and rural areas. For females mixed mechanism was the cause of 66.67% of injuries.

Zone 2 was the most affected (in 51.725 of cases) regardless of the place of residence, followed by zone 1 and zone 3. In terms of gender differentiation, for male's zone 2 remained the most affected, and for females' zone 1 and zone 2 showed the same number of cases.

Regarding the circumstances in which the accident occurred, the vast majority of the traumatic incidents were caused by contact with an object – undetermined intent. O limitation of this study is given by its retrospective nature and by the fact, that under the mentioned classification there were also included incidents that happened in sports or maybe some aggressions in which object where thrown.

Aggressions are the second most common cause of ocular trauma in males.

The average age for both genders was 13,14 years with a standard deviation of 4.11 years, results that are consistent with other findings of a study conducted in Pakistan, where the average age was 15 years, with a standard deviation of 3.48.

There was only one case of trauma while the patient was engaged in work, a 16-year-old male, and one road accident, there were no cases of superficial foreign bodies.

On admission 38% of patients had a visual acuity equal or better with 0.5, during hospitalization the evolution was favorable, therefore on discharge 86.21% of the patients had a visual acuity better than or equal to 0.5.

Blindness, especially bilateral, is a serious public health problem, has a negative effect on the patient's psychology and socioeconomic status and also on its relatives.

The World Health Organization estimates that until 2020, there will be around 76 million people worldwide affected by blindness. The number of people with visual impairments varies according to the geographical area, and from a percentage point to varies from 0.2 to 1%.

It is considered that worldwide, they are roughly around 500.000 blind people due to ocular trauma, and 30-40% of the cases with unilateral blindness are caused by ocular trauma.

The total cost (direct and indirect) which are due to ocular trauma and hard to determine, due to the difficult way of collecting data.

Ocular trauma has an economic and social impact due to the time spent in hospital, the cost of medical services and medication, the temporary incapacity to work after the traumatic incident.

The number of day spent is hospital varies from 1 to 22, with an average of 7.5 days and a standard deviation of 4.18 days, results are similar with a study conducted in Sarajevo, where the average number of days spent in hospital was 8.5 with a standard deviation of 5.6, a minim of 1 day and a maximum of 31 days.

The indirect cost is also difficult to assess, and it’s burden is carried by the health insurance system, for follow ups and medication, this being the case of patients with glaucoma, that receive free hypotensive drops.

Prevention of ocular trauma is important, because of their negative effect on the health system, by hospitalization and medication costs and also because they can limit the person capacity to work.

Conclusions

1. Ocular trauma is one of the most important causes of unilateral blindness and may have a negative impact on the psychological and socio-economic status of the patient and relatives
2. Males are more prone to injuries than females.
3. A bimodal age-based distribution of patients was observed with a peak around the age of 20 and one around the age of 60 years.
4. The average age of patients included in this study was around 41 years old.
5. For pediatric trauma, the average age was 13.14 years, and the most common traumatic mechanism were contusions and males are also more prone to injuries
6. The most common mechanism of injuries were contusions.
7. For all the years included in the study the least number of patients presented in February and the most in November.
8. I have found no predisposition for the right or left eye with regard to the incidence of trauma.
9. The most common cause of eye injuries was by contact with a blunt object undetermined intent.
10. The incidence of traumatic cataract in this study was 9.8%.
11. The average age of patients with traumatic cataract was 53 years old, regardless of the place of residence.
12. For aggressions, the average age of females is higher by 5 years than males
13. The average age of patients that sustained and eye trauma is higher for those in the rural environment.
14. On an affirmative basis, none of the patients who had a traumatic cataract were at the workplace at the time of the trauma.
15. Young patients who undergo cataract surgery have a higher risk of capsular opacification.
16. In case of a lacking capsular support the surgeon can choose, an Artisan iris-claw IOL with anterior or posterior fixation, the IOL must be chosen carefully (material and type) for each case in accordance with the surgeon's experience.
17. Patients under 40 years must be very well informed on the type of IOL that will be implanted (monofocal or multifocal) and that if a monofocal IOL is chosen and the target is emetropia, they will need reading glasses.

18. There is no significant difference on the final visual acuity if the IOL is implanted per primam or per secundam, for this statement the visual acuity of reference is 0.5 best correct vision.
19. The most common lens malposition's were luxation's followed by subluxations.
20. For 70% of the male patients that presented with lens injuries visual acuity was better on discharge.
21. The incidence of secondary post traumatic glaucoma was 13.4%.
22. Patients with lens injuries have a 4 folds' risk of developing secondary glaucoma than those with no lens damage.
23. Secondary post traumatic glaucoma can appear years after the traumatic incident, this is way these patients need long time monitoring.
24. The Ocular Trauma Score is a reliable tool that is easy to use and is accurate in providing a prognostic for the final visual acuity.
25. A decreased visual acuity on admission associated with an afferent pupillary defect is a negative prognostic factor on the outcome of the visual acuity.
26. The smaller the OTS score is, visual prognosis is more reserved.
27. The most affected anatomical part was the cornea, witch presented most often edema and erosions.
28. 80% of the patients that had an ocular trauma caused by road accidents had corneal edema.
29. Prophylactic use of antibiotics for corneal erosion is recommended.
30. Direct and indirect cost are hard to estimate accurately.
31. The hospitalization period was between 1 day and 22 days, and the average time spent in hospital was 7.5 days.