ORIGINAL ARTICLE

Evaluation of Possible Prognostic Factors Affecting Visual Outcome of Traumatic Cataract Surgery Secondary to Open Globe Injury

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ABSTRACT

Purpose: To evaluate the visual outcome of traumatic cataract surgery secondary to open globe injury (OGI) and to investigate the factors affecting visual prognosis.

Materials and Methods: The medical records of 46 eyes which underwent traumatic cataract surgery secondary to OGI between July 2002 and April 2013 were reviewed retrospectively. Demographic features, detailed history of OGI and ophthalmological examination were obtained and the factors affecting the final visual acuity (VA) were analyzed.

Results: The mean follow-up was 68±56 (range 6-213) months and the mean age was 25±17.5 (range 1-70) years. The most common type of OGI was penetrating injury seen in 33 (71.7%) eyes. Location of wound was zone I in 32 (69.6%) eyes. Forty-three (93.5%) eyes had intraocular lens (IOL) implantation with IOL in the bag in 31 (72.1%) eyes. The most common performed surgical technique was phacoemulsification in 24 (52.2%) eyes, followed by aspiration in 18 (39.1%) and intracapsular cataract extraction in 4 (8.7%) eyes. There was a significant positive correlation between the initial and final best corrected visual acuity (BCVA) (r=0.332; p=0.024). No difference was observed in the final BCVA regarding the type of injury (p=0.387), surgical techniques (p=0.77) and location of IOL (p=0.565). The eyes with wound in zone I had better final BCVA than zone III (p=0.028).

Conclusion: Initial VA is a significant prognostic factor for final VA in traumatic cataract patients. Also, zone I injury is associated with better visual prognosis. The type of OGI, surgical technique and location of IOL are not prognostic factors influencing the final visual outcome.

Keywords: cataract**,** open globe injury, phacoemulsification, traumatic cataract.

INTRODUCTION

Open globe injury (OGI) is the most serious type of ocular trauma that may result in severe vision loss due to anterior and posterior segment pathologies affecting visual prognosis. Traumatic cataract is among the complications which can occur immediately or several years after eye injury.[1]

The proportion of traumatic cataract has been reported in 27-65% of the ocular trauma cases and 39% of OGIs in different studies.[2,3] Development of traumatic cataract is usually observed in case of direct contact to the crystalline lens by a foreign object or by blunt trauma to the globe. In most of the cases, the traumatic cataract obscures the visual axis and necessitates surgery, but it can also rarely remain as a localized and non-progressive lens opacification that does not necessitate surgery as a result of minor injury.[2]

Removal of traumatic cataract can be performed as a primary procedure during the repair of an OGI or a second procedure at another session.[4] Primary removal has the advantage of avoiding the second operation and diminishing the cost and time while the secondary removal has the advantages of better visibility, less preoperative and postoperative inflammation and accurate intraocular lens (IOL) calculation.[2,4] Primary removal is recommended if the lens capsule is ruptured and lens materials are presented into the anterior chamber to inhibit the risk of lens particle related uveitis, glaucoma and to improve the visibility of the posterior segment.[2,4,5]

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Management and surgery of traumatic cataract diverges from senile cataract due to damage to other ocular tissues such as zonular dialysis, posterior capsule tear, iris trauma, poor visibility due to corneal haze. Therefore, prognostic factors and achievement rates for these two types of cataract may differ.

In our study, we aimed to evaluate the visual outcome of traumatic cataract surgery secondary to OGI and to investigate the factors affecting visual prognosis.

MATERIALS AND METHODS

In this study, the medical records of 46 patients who underwent surgery for traumatic cataract secondary to OGI between July 2002 and April 2013 were analyzed retrospectively. The study was carried out in accordance with the ethical principles of the Declaration of Helsinki and permission was obtained from the ethics committee of Akdeniz University Faculty of Medicine (date: 15/05/2013, decision no: 92-109).

Age, gender, laterality, the object causing injury, type of injury, place of habitation (rural/urban), time interval between the injury and presentation to hospital (< 24h vs ≥ 24h), place of injury (outdoor/indoor), initial best corrected visual acuity (BCVA) after injury, location of wound, preoperative findings, the time interval between the injury and cataract surgery, the surgical technique, the site of IOL, postoperative complications, final BCVA (BCVA at the last follow-up), duration of follow-up, additional surgical procedures were evaluated. BCVA was measured using Snellen charts and all the values were converted to logMAR. The inclusion criteria were that primary injury repair, traumatic cataract surgery and follow-up examinations had to be performed in the same clinic. Patients with a follow-up period of less than 6 months were excluded from the study.

For the classification of type of OGI, the Birmingham Eye Trauma Terminology was used.[6] OGIs were categorized as lacerations or ruptures. Lacerations of the globe were subcategorized as perforating injuries, penetrating injuries, or injuries involving intraocular foreign bodies (IOFB) (Figure 1). The location of wound was defined by the Ocular Trauma Classification Group: zone I, injuries limited to the cornea; zone II, injuries limited to the anterior 5 mm of the sclera; and zone III, injuries involving more than 5 mm posteriorly from the limbus.[7]

Traumatic cataract was performed as a primary procedure during the primary repair of OGI or as a second operation. Removal of traumatic cataract was performed in 3 different surgical techniques: phacoemulsification; aspiration of cataract by bimanual irrigation/aspiration or vitrectomy probe or simcoe cannula; intracapsular cataract extraction (ICCE) (Figure 2). If there was sufficient capsular support, IOL was implanted in the bag or sulcus according to the posterior capsule status (Figure 3). In case of insufficient capsular support, IOL was fixated to sclera using 10/0 prolene suture. In those cases that accurate IOL power calculation was impossible, biometry of the fellow eye was

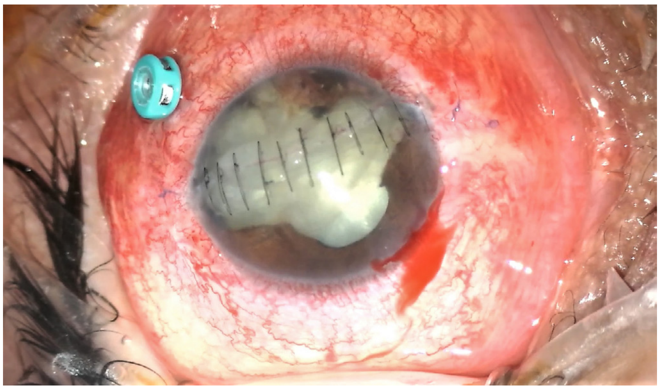

Figure 1: *Traumatic cataract, which the anterior capsule is torn as a result of penetrating injury due to knife trauma in Zon I.*

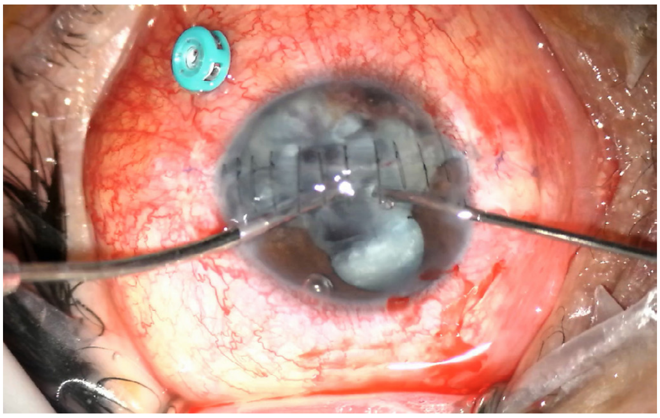

Figure 2: *Aspiration of soft white cataract by vitrectomy probe.*

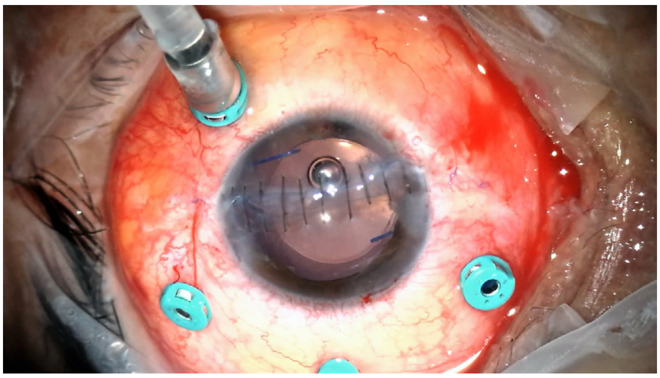

Figure 3: *Intraocular lens implanted in the sulcus due to posterior capsule rupture.*

used. In pediatric patients younger than 2 years of age, IOL implantation was delayed till reaching the age of 2 years.

Patients were examined 24h, 3 days, 1 week, 4 weeks after cataract removal. If the eye was stable, the follow-up was continued once in every 3 months for the 1st year; and then once in 6 months in the 2nd year; and once in a year in the late follow-up period. Patients underwent a full ophtalmologic examination at every visit and essential procedures or treatments such as pars plana vitrectomy (PPV) for retinal detachment (RD), YAG laser posterior capsulotomy for posterior capsular opacification (PCO) or anti-glaucomatous drops for secondary glaucoma were fulfilled. All children under the age of 9 years were evaluated for amblyopia and occlusion therapy was performed.

Statistical Analysis

Mean±standard deviation (SD), median, minimum, maximum as basic descriptive statistics for numerical variables; frequency (n) and percentage (%) for categorical variables were given. The assumption of normality for numerical variables was tested with the Shapiro-Wilk test. Two-Sample t-test, Mann-Whitney U test, One-Way Analysis of Variance (ANOVA) or Kruskal-Wallis test was applied for numerical variables in group comparisons; Chi-square test was applied for categorical variables. Dunn test was used as post-hoc test. Wilcoxon test was used to determine whether there was a significant difference between dependent measures. Spearman correlation coefficient was calculated to determine the relationship between numerical variables. $p < 0.05$ was considered statistically significant in all analyzes. All analyzes were performed with SPSS 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) package program.

RESULTS

Forty-six eyes of 46 patients from all age groups, with 37 (80.4%) male and 9 (19.6%) female, were included in the study. The mean age at presentation was 25.1±17.5 (range 1-70) years. The mean follow-up was 68±56 (range 6-213) months. The follow-up of 26 patients was over 5 years, and 7 patients have been followed-up for more than 10 years. Nineteen (41.3%) patients were aged < 18 and 27 (58.7%) were ≥ 18 years (Table 1).

The most common object causing injury was wooden-vegetative declared in 23 (50%) eyes followed by metal in 14 (30.4%), glass in 6 (13%), rubber-plastic in 2 (4.3%) eyes and stone in 1 (2.2%) eye (Table 1).

Regarding the type of OGI, penetrating injury was seen in 33 (71.7%) eyes, rupture in 7 (15.2%), IOFB in 4 (8.6%) and perforating injury in 2 (4.3%) eyes. Of the 4 IOFB, 3 were in the posterior segment (2 metal and 1 wooden-vegetative object) and 1 (metal object) was stuck in the lens. Location of the wound was zone I in 32 (69.6%), zone II in 12 (26%) and zone III in 2 (4.3%) eyes (Table 1).

The time interval between the injury and cataract surgery was 4.8±12 months (range 0.05 - 72) (Table 1). This period was longer in patients < 18 years in comparison to patients aged ≥ 18 years and it was statistically significant (p=0.028).

Phacoemulsification was performed in 24 (52.2%) patients; 18 (39.1%) patients underwent aspiration of cataract by bimanual irrigation/aspiration, vitrectomy probe or simcoe cannula; and 4 (8.7%) patients underwent ICCE (Table 1).

Totally, 43 (93.5%) of 46 eyes had IOL implantation, while 3 (6.5%) eyes were left aphakic (Table 1). Primary IOL implantation was done in 40 (93%) eyes, and secondary IOL implantation was done in 3 (7% - 1 in the bag, 1 in the sulcus, 1 fixated to sclera) eyes. Of the 43 eyes, IOL was implanted in the bag in 31 (72.1%) eyes, in the sulcus in 8 (18.6%) eyes and it was fixated to sclera in 4 (9.3%) eyes. In 44 (95.6%) patients, traumatic cataract was done as a second procedure and only in 2 (4.3%) patients primary removal of cataract was performed simultaneously with the repair of OGI. Of these 2 patients, 1 patient had IOL implantation in the sulcus, and the other was left aphakic after primary cataract removal and had secondary IOL implantation in the sulcus.

Except for cataract operation, 10 (21.7%) eyes were performed PPV for 12 times [4 (8.7%) for RD, 2 (4.3%) for vitreus hemorrhage, 3 (6.5%) for extraction of IOFB, 1 (2.2%) for endophthalmitis, 1 (2.2%) for macular epiretinal membrane, 1 (2.2%) for IOL drop] (Figure 4) (Table 1). The eye which was performed PPV for endophthalmitis underwent phthisis bulbi 2 years after OGI and it was eviscerated. Phthisis bulbi was also observed in a pediatric patient who underwent OGI repair due to zone II injury and underwent secondary uneventful cataract surgery with the IOL placed in the bag at the 1st month after OGI. Other additional surgeries performed are shown in Table 1.

Twenty-six (56.5%) patients applied from rural areas, while 20 (43.5%) patients applied from urban areas following OGI (Table 1). There was no statistically significant difference between admissions from urban and rural areas in terms of the time interval between OGI and presentation to hospital (p=0.369), the object causing OGI (p=0.092). Outdoor injuries were higher in both admissions from

Table 1: *Demographic details, preoperative evaluation and surgical results.*

Age , mean±SD (range ,year)		25.08±17.5 (1-70)		
Duration of follow-up, mean±SD (range ,month)		67.97±56.02 (6-213)		
The time interval between the injury and cataract surgery, mean±SD (range ,month)		4.81±11.99 (0.05-72)		
Gender, n (%)	Male	37 (80.4)		
	Female	9 (19.6)		
Laterality, n (%)	Right	25 (54.3)		
	Left	21 (45.6)		
Place of habitation, n (%)	Rural	26 (56.5)		
	Urban	20 (43.5)		
Place of injury, n (%)	Outdoor	32 (69.6)		
	Indoor	14 (30.4)		
The object causing injury, n (%)	Wooden-vegetative	23 (50)		
	Metal	14 (30.4)		
	Glass	6 (13)		
	Rubber-plastic	2 (4.3)		
	Stone	1 (2.2)		
The type of OGI, n (%)	Penetrating	33 (71.7)		
	Rupturing	7 (15.2)		
	IOFB	4 (8.6)		
	Perforating	2 (4.3)		
Location of wound, n (%)	Zone I	32 (69.6)		
	Zone II	12 (26)		
	Zone III	2 (4.3)		
Surgical technique, n (%)	Phacoemulsification	24 (52.2)		
	Aspiration	18 (39.1)		
	ICCE	4 (8.7)		
IOL status, n (%)	IOL implanted	43 (93.5)	In the bag	31 (72.1)
			In the sulcus	8 (18.6)
			SFIOL	4 (9.3)
	Aphakia	3 (6.5)		
Additional surgeries, n (%) (n = number of eyes the surgery performed)	PPV	10 (21.7)		
	Pupilloplasty	4 (8.7)		
	IOL repositioning	2 (4.3)		
	Cerclage surgery	1 (2.2)		
	Strabismus surgery	1 (2.2)		
	Evisceration	1 (2.2)		

SD, standart deviation; OGI, open globe injury; IOFB, intraocular foreign body; ICCE, intracapsular cataract extraction; IOL, intraocular lens; SFIOL, scleral fixated intraocular lens; PPV, pars plana vitrectomy

rural (65.4%) and urban (75%) areas and no statistically significant difference was observed (p=0.535) (Table 2).

Uveal prolapse [23 (50%)], rupture of anterior capsule [14 (30.4%)] and hyphema [10 (21.7%)] were the most often observed preoperative findings. Details of preoperative findings are shown in Table 3.

The most often observed postoperative complications were PCO [7 (15.2%)] and pupil irregularity [7 (15.2%)]. The length of time between cataract surgery and YAG laser capsulotomy was 49.6±31.5 (range 19-108) months. Details of postoperative complications are shown in Table 4.

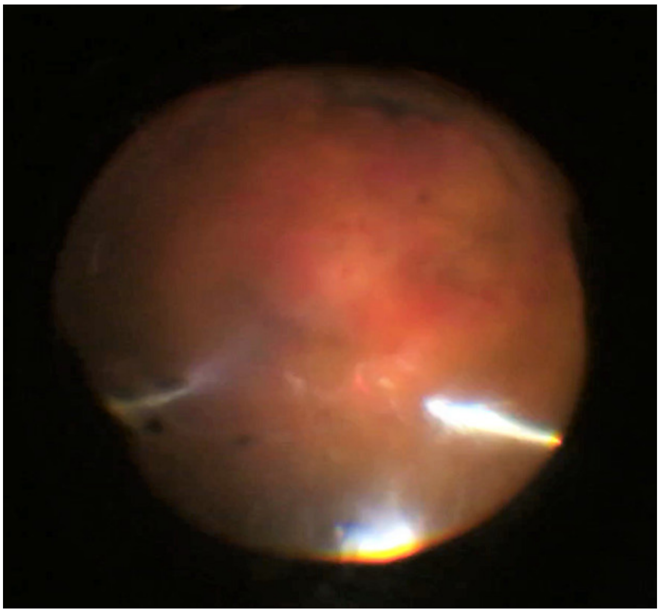

Figure 4: *Pars plana vitrectomy for vitreus hemorrhage.*

Table 2: *Comparison of admissions from rural versus urban areas in terms of the time interval between OGI and presentation to hospital, place of injury and the object causing injury.*

	Rural n (%)	Urban n (%)	p value
Time interval between the injury and presentation to hospital			
≥ 24h	18 (69.2)	11 (55)	0.369
< 24h	8 (30.8)	9 (45)	
Place of injury			
Outdoor	17 (65.4)	15 (75)	0.535
Indoor	9 (34.6)	5 (25)	
The object causing injury			
Wooden-vegetative	13 (50)	10 (50)	0.092
Metal	10 (38.5)	4 (20)	
Glass	1 (3.8)	5 (25)	
Stone	0 (0)	1 (5)	
Rubber-plastic	2 (7.7)	0 (0)	
OGI, open globe injury			

The mean initial logMAR BCVA was 1.68±0.94. The mean final logMAR BCVA was 0.84±0.83. There were 2 (4.3%) eyes with the initial BCVA of ≥ 20/40 and 18 (39.1%) eyes with the final BCVA of ≥ 20/40 (Table 5). There was a significant positive correlation between the initial and final BCVA ($r=0.332$; $p=0.024$). The improvement in the BCVA (the change between the initial and final BCVA) was found

Table 3: *Distribution of the preoperative findings after OGI.*

Preoperative findings	**n (%)**
Uveal prolapse	23 (50)
Rupture of anterior capsule	14 (30.4)
Hyphema	10 (21.7)
Lens subluxation/phacodonesis	5 (10.9)
Vitreus loss	4 (8.7)
Rupture of posterior capsule	4 (8.7)
Foreign body	4 (8.7 - 3 intravitreal, 1 in the lens)
Vitreus hemorrhage	4 (8.7)
Posterior synechia	3 (6.5)
OGI, open globe injury	

Table 4: *Distribution of the postoperative complications.*

Postoperative complications	**n (%)**
Posterior synechia	3 (6.5)
Pupil irregularity	7 (15.2)
Posterior capsule opacification	7 (15.2)
Subluxation of IOL	2 (4.3)
IOL capture	5 (10.9)
Secondary glaucoma	2 (4.3)
Endophthalmitis	1 (2.2)
Phthisis bulbi	2 (4.3)
IOL, intraocular lens	

to be similar between the age groups, < 18 (0.85±0.97) versus ≥ 18 (0.82±1.13) years ($p= 0.909$).

There was no statistically significant difference in the final BCVA regarding the type of injury ($p=0.387$), surgical techniques ($p=0.77$) and location of IOL ($p=0.565$) (Table 6). However, the final BCVA was significantly lower in aphakic eyes than the eyes with IOL in the bag ($p=0.015$) and in the sulcus ($p=0.009$).

There was statistically significant difference in the final BCVA in terms of location of wound ($p=0.022$) (Table 6). The eyes with wound in zone I had better final BCVA than zone III ($p=0.028$). There was no significant difference between zone II and zone III ($p=0.214$) and between zone I and zone II ($p=0.053$).

The main causes of insufficient visual improvement after cataract removal were corneal opacities and retinal pathologies (macular scar, RD) in this study.

Table 5: *Cross tabulation of initial versus final BCVA.*

	Final BCVA						
Initial BCVA	NLP	PL-HM	1/200-19/200	20/200-20/50	≥ 20/40	Uncooperative	TOTAL n (%)
NLP	0	0	1	0	1	0	2 (4.3)
PL-HM	0	4	5	4	7	0	20 (43.5)
1/200-19/200	1	0	3	4	4	0	12 (26.1)
20/200-20/50	0	0	1	0	4	0	5 (10.9)
≥ 20/40	0	0	1	0	1	0	2 (4.3)
Uncooperative	0	0	0	3	1	1	5 (10.9)
TOTAL n (%)	1 (2.2)	4 (8.7)	11 (23.9)	11 (23.9)	18 (39.1)	1 (2.2)	46 (100)

BCVA, best corrected visual acuity; NLP, no light perception; PL, perception of light; HM, hand movement

Table 6: *Comparison of surgical technique, location of IOL, type of OGI and location of wound in terms of final logMAR BCVA.*

	Final logMAR BCVA (mean±SD)	**Median [Minimum- maximum]**	**p value**
Surgical technique			
Phacoemulsification	0.75±0.82	0.35 [0-3]	0.77
Aspiration	0.94±0.93	0.46 [0-2.8]	
ICCE	0.93±0.54	1.15 [0.15-1.3]	
Location of IOL			
Bag	0.78±0.81	0.4 [0-3]	0.565
Sulcus	0.50±0.66	0.35 [0-2.1]	
SFIOL	0.93±0.54	1.15 [0.15-1.3]	
Type of OGI			
Rupturing	1.27±0.77	1.3 [0.22-2.2]	0.387
Perforating	0.27±0.17	0.275 [0.15-0.4]	
Penetrating	0.76±0.86	0.4 [0-3]	
IOFB	1.02±0.77	1.105 [0.1-1.8]	
Location of wound			
Zone I	0.65±0.77	0.35 [0-3]	0.022
Zone II	1.09±0.76	1.15 [0.15-2.3]	
Zone III	2.3±0.70	2.3 [1.8-2.8]	

BCVA, best corrected visual acuity; SD, standart deviation; ICCE, intracapsular cataract extraction; IOL, intraocular lens; SFIOL, scleral fixated intraocular lens; OGI, open globe injury; IOFB, intraocular foreign body

DISCUSSION

Management of traumatic cataract is a complex issue and there are many preoperative and postoperative factors reported to be affecting visual outcome.[1,8,9] Regarding the severity of damage caused by ocular trauma, the integrity of retinal and optic nerve functions are also important for visual prognosis, apart from cataract.

In this study, we investigated the initial BCVA, type of injury, location of wound, surgical technique and location of IOL as possible factors influencing final BCVA.

In this study, 39.1% of the eyes acquired final BCVA of ≥ 20/40. In the study of Qi et al.[1], it has been reported as 49.8%. Serna-Ojeda et al.[8] reported this rate as 58.7%, Özbilen & Altınkurt[9] as 36.7%, Shah et al.[10] as 31%. Initial BCVA was positively correlated with the final BCVA in this study. Similarly in other studies, the initial visual acuity (VA) have been reported as a significant factor affecting final VA.[1,9,11,12]

When we compared the final BCVA in terms of type of injury, we didn't observe significant difference between rupturing, perforating, penetrating injuries or injuries involving IOFB. However, in our study design, we only enrolled traumatic cataracts secondary to OGIs not the closed globe injuries (CGI). The final VA of CGI was significantly better than that of OGI in the study of Qi et al.[1], Özbilen & Altınkurt[9], Sharma et al.[13] On the contrary, Shah et al.[11] reported a better prognosis of final VA after OGIs in comparison to CGIs. Serna-Ojeda et al.[8] found no difference in final VA between OGIs and CGIs. The alterations in the results of the studies may be due to study design, injuries of other ocular tissues, surgical techniques or adequacy of surgical materials and health-care system.

We found that the eyes with wound in zone I had better final BCVA than zone II and zone III. The worst final BCVA was in the eyes with the wound in zone III. But there was only significant difference between zone I and zone III, not between zone I and zone II or zone II and zone III. Qi et al.[1], Özbilen & Altınkurt[9] reported that the eyes with wound in zone I had the best and zone III had the worst final BCVA. It can be explained by the fact that in zone III wounds, traumatic retinal detachment or maculopathy is more likely to exist. Because of that, even if traumatic cataract surgery is performed uneventfully, the expected visual outcome may not be obtained.

We could not compare primary cataract removal during the repair of OGI with secondary surgery. Because primary cataract removal was performed only in 2 eyes, while secondary surgery was performed in 44 eyes. In our clinic, unless the anterior capsule was torn and lens material scattered in the anterior chamber, it was the first choice to wait until traumatic inflammation subsides and perform secondary cataract surgery. Rumelt & Rehany[4] and Memon et al.[5] also have suggested secondary traumatic cataract surgery for the advantages of accurate IOL calculation, less postoperative inflammation, better visibility during operation, unless ocular trauma is associated with the rupture of anterior capsule. In the study of Tabataei et al.[2], no difference in terms of final VA and complications were reported between early (within the 1st week) and late (between the 1st and 2nd month) traumatic cataract surgery. Also in the study of Özbilen & Altınkurt[9], no significant difference was found between simultaneous and secondary surgery regarding the increase in the final BCVA. Sen et al.[14] have reported that both primary and secondary IOL implantation after OGI in pediatric patients had satisfactory and comparable visual outcomes, however primary IOL implantation could be considered in cases with small peripheral corneal injuries to provide early visual improvement.

In traumatic cataract surgery, different techniques can be preferred related to size of the injury on the lens such as lens subluxation or phacodonesis. Phacoemulsification is the surgical technique generally used in patients without severe zonular dialysis or lens dislocation. For the long-term stabilization of IOL, insertion of capsule tension ring or capsule tension segment may be needed in case of zonular dialysis. If the cataract is soft, only aspiration may be sufficient. In case of lens luxation, excessive instability, extremely hard cataract, or if there is endothelial problem ICCE may be preferred. Phacoemulsification (52.2%) was the most often used surgical technique for traumatic cataract removal in this study, followed by aspiration of the lens and ICCE. There was no extracapsular cataract extraction (ECCE) surgery in our group of patients. Similarly in most of the eyes, cataract have been removed using phacoemulsification technique with the rate of 69.5% in the study of Özbilen & Altınkurt[9]. Like in this study, they reported no significant difference in the final BCVA in terms of surgical technique although the eyes that underwent phacoemulsification had a vaguely higher final BCVA. Qi et al.[1] have notified that the eyes that were performed phacoemulsification had significantly better VA than ICCE, ECCE and lensectomy.

The main factor determining the implantation of IOL after removal of the traumatic cataract is the presence of sufficient capsular support.[5] In this study, IOL implantation was performed in 93.5% of the patients. This proportion was 94% in the study of Qi et al.[1], 92.5% in the study of Serna-Ojeda et al.[8] and 97.8% in the study of Özbilen & Altınkurt[9]. IOL was implanted in the bag, which is ideal position, in 72.1% of the eyes, in the sulcus in 18.6% and it was fixated to sclera in 9.3% of the eyes in this study. In the study of Serna-Ojeda et al.[8], IOL was located in the bag in 66.5%, in the sulcus in 25% and it was fixated to iris in 1.25% of the eyes. In this study, there was no statistically significant difference in the final BCVA in terms of location of IOL. In the study of Serna-Ojeda et al.[8], it was reported that final VA was significantly better when the IOL was located in the capsular bag in comparison to sulcus implantation. Also in the study of Khokhar et al.[15], final VA was significantly better when IOL was located in the capsular bag. Different studies have emphasized that some possible reasons for this might be more inflammation with sulcus fixation and refractive shift due to different anatomical position of the IOL.[16-18] In this study, the final BCVA was significantly lower in aphakic eyes than the eyes with IOL in the bag and in the sulcus. The reason of no visual improvement after cataract removal in these eyes were macular scar and RD, that's why they were left aphakic because they had no expectation of visual improvement.

Although the rate of admissions from urban areas < 24h was higher in comparison to admissions from rural areas < 24 h, there was no significant difference in terms of the time interval between OGI and presentation to hospital in this study. In the study of Shah et al.[19], it was reported that patients residing in rural areas presented significantly later in comparison to patients residing in urban areas. This may be due to transportation problems or economics, or it may be that people living in rural areas are not educated enough to care about the results of ocular trauma. Also, Özbilen & Altinkurt[9] have reported that final BCVA was significantly better in patients who applied to hospital within the first 6h after ocular trauma. They have emphasized that early repair of OGI have provided rapid integrity of globe which prevents severe inflammation, infection and prolapse of intraocular tissues due to prolonged hypotonia. In this study, admission to hospital after OGI had been recorded only as < 24h and ≥ 24h in patients' files. Therefore, we did not have enough data to compare the time interval between the OGI and admission to hospital with the final VA.

The most often observed complication in the post-surgical follow-up was PCO (15.2%) in this study. This rate was 24% in the study of Memon et al.[5], 8.75% in the study of Serna-Ojeda et al.[8] and 22.8% in the study of Özbilen & Altinkurt[9]. In the study of Hilely et al.[20], which retrospectively examined the long-term results of traumatic cataract in 18 children, PCO was reported as 71%. In our study, PCO was observed in 4 patients aged < 18 and in 3 patients ≥ 18 years.

This study has some limitations. Because of the retrospective design, the compared data groups were not homogenous and had small sample size. Although the clinic is a tertiary center, there are many other state hospitals and private clinics for the patients referral. Also, despite the large number of ocular traumas in this region, the other reason for the small number of patients in this study is that patients discontinued follow-up after the first repair of OGI or traumatic cataract surgery. Another limitation is that the eyes with severe posterior segment injuries and low visual expectations were included in the study, and it may inhibit the visual improvement of the eye after traumatic cataract removal and negatively affect the results of the study. In addition, the effect of amblyopia on visual impairment in children included in this study could not be clearly determined. The strength of this study was the length of mean follow-up.

In conclusion, there is no standard and specific surgical technique in traumatic cataract cases. The surgical procedure depends on the extent of injury to ocular structures and the experience of the surgeon. It is possible to reach satisfactory visual outcome after traumatic cataract surgery if managed appropriately. This study revealed that initial VA is a significant prognostic factor for final VA. Also, zone I injury is associated with better visual prognosis. The type of OGI, the type of surgical technique and the location of IOL are not prognostic factors influencing the final visual outcome.

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