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Original Research Article

Visual and Surgical Outcome in Paedriatic Corneal Repair and Traumatic Cataract

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Abstract:

Introduction: Ocular trauma with corneal tear repair and traumatic cataract is an important cause of preventable ocular morbidity. Visual and surgical outcome of pediatric open globe injuries of zone I zone II corneal injury repair and traumatic cataract has diverse presentations, it mandatory to customize the management approach as per the need and benefit of patient.

Aim: To report associated ocular injuries, visual and surgical outcome in pediatric open globe injuries of zone I and zone II corneal injury repair with traumatic cataract.

Methods: A retrospective study done in Department of Ophthalmology RIMS, Ranchi, Jharkhand from August 2019 to August 2020 with permission from Hospital Ethical committee. 20 eyes of 20 patients with zone I 12 (60%) and zone II 8 (40%) of ocular trauma repair and traumatic cataract removal 9(45%) in open globe injuries were taken from the hospital records and evaluated. Details of All patients with relation to detailed history, systemic and local examination with relevant investigations were noted. Associated ocular injuries and decision regarding IOL implantation to be done as a primary or secondary elective procedure was analysed from the data.

Results: Mean age was 7.2 +2.2 years. 12 patients (60%) suffered penetrating injury in contrast to eight (40%) with blunt trauma. Pre operative visual acuity >6/6012(60%) cases. The final visual acuity of >6/60 5(25%) was higher than in zone II in 4(20%) in 8(40%) visual acuity was assessed by Snellen chart or Landlot C chart for preverbal children. Surgical outcome in terms of primary traumatic cataract removal with primary corneal tear repair 5(25%) and secondary traumatic cataract removal with primary corneal tear repair 11(55%). Primary corneal tear repair with traumatic cataract removal along IOL implantation was done in four (20%) cases. Intraoperative complications included presence of iris and vitreous prolapse, hyphema, lens capsule disruption .Postoperative complications included iris laceration, vitreous prolapse, fibrinous uveitis, secondary glaucoma, retinal detachment and repeat corneal tear in already repaired cornea.

Conclusion: Ocular trauma is an important cause of significant visual impairment. Delayed intervention can lead to devastating complications. The present study showed primary corneal tear repair with or without traumatic cataract removal helps in maintain globe integrity, minimizing associated ocular complications and increasing visual prognosis. Zone II injuries have poor visual outcome as compared to zone I injuries.

Keywords: Openglobe Injury, Amblyopia, Penetrating Injury.

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Introduction

Ocular trauma with paedriatic corneal tear and traumatic cataract is an important cause of preventable ocular morbidity. Ocular trauma in children accounts for 8% to 14% of the total injuries [1]. Paedriatic corneal injuries due to ocular trauma are the leading cause of acqred unilateral blindness in the world with a prevalence of 2% leading to corneal opacification [2]. Open globe injury occurs due to involvement of a sharp object, high- impact blunt trauma or high velocity projectiles. Zone II open globe injuries in children are more severe and associated with more complications and surgical procedures, longer hospitalization and a poor visual prognosis as compared to Zone I injuries. Deprivation Amblyopia due to media opacity is more likely to result in severe long-term reduction in visual acuity than the original physical damage. History taking, proper clinical examination and adequate investigations with imaging, especially computed

tomography are mandatory in proper management of paedriatic ocular trauma cases. Early and timely surgical intervention is a key to success for better visual and surgical outcome. A customized approach with primary aim to restoration of globe integrity, clearing of visual axis and optical correction is mandatory. Timing of cataract surgery and IOL implantation in setting of trauma is still debatable .A critical evaluation is required in deciding whether to opt for cataract management with primary repair or go for a second sitting management of traumatic cataract associated with corneal tear. Visual rehabilitation is a great challenge as prognosis is dependent on multiple factors. Adequate measures for prevention of secondary Amblyopia and strabismus is crucial to management of cases of paedriatic ocular trauma. The present study reports visual and surgical outcome of paedriatic zone I and zone II of open globe injury with corneal injury repair and traumatic cataract removal referred from various parts of central India like Bihar, Jharkhand and Orissa. In the present study, varied presentations were reviewed this made it mandatory to customize the management approach as per the need and benefit of patient.

Material and Methods

A retrospective on comparative observational study done in Department of Ophthalmology RIMS, Ranchi, Jharkhand from August 2019 to August 2020 with permission from Hospital Ethical committee. Data was collected from the hospital records. 20 eyes of 20 patients with zone I 12 (60%) and zone II 8 (40%) of ocular trauma repair and traumatic cataract removal 9 (45%) in open globe injury. Informed consent was taken from the guardians of all paedriatic patients. A total no of 20 patients were reviewed out of which 14 (70%) were males and six (30%) were females. The mean age of patients was 7.2+2.2 years.

Inclusion criteria was Patients with open globe injuries of zone I and zone II corneal tear repair and traumatic cataract were included in the study. Exclusion criteria was cases with Zone III injuries, preexisting ocular co morbidities with poor visual acuity of the injured eye prior to injury, associated endophthalmitis, with intraocular foreign body, injury due to rare causes (like electric shock, X-rays) and patients with irregular follow up. The BETTS classification was used to classify open globe injuries into three anatomical zone [2-4]. Zone I include the cornea and limbus. Zone II includes injuries up to 5mm posterior to limbus [5]. Zone III includes injuries posterior to zone II and includes macula and optic nerve [6]. The following data of ocular trauma were collected. Demographic information regarding age, gender, time of injury, cause of injury, mechanism and type of ophthalmological examination including initial visual acuity, slit lamp examination, B scan, and funds examination if possible. Investigations done were ultrasound biomicroscopy, anterior segment OCT Schlemfeg is imaging for cataract density. Surgical outcome in terms of primary traumatic cataract removal with primary corneal tear repair 5(25%) and secondary traumatic cataract removal with primary corneal tear repair 11(55%). Primary cataract removal with traumatic cataract removal along IOL implantation was done in 4(20%) cases. Other surgical outcome measures included type of IOL and position of IOL. All the corneal and sclera wounds were repaired and the extent and severity of intraocular damage was evaluate. In zone I 4(20%) posterior capsule was intact so PMMA IOLs were implanted along with cataract removal and corneal tear repair. In zone, II 8(40%) cases traumatic cataract removal with or without IOL implantation was postponed for 6 weeks. Age, gender, mode of injury, time between injury and intervention was seen for a customized approach for the patient. Details like type of injury, associated complicating factors, presence or absence of RAPD, the object causing the injury, total extent of the wound, wound involving limbus or posterior 5mm to limbus. Evaluation of wound involving visual axis, vitreous loss, iris prolapse, vitreous hemorrhage, presence or absence of retinal detachment, evidence of infection on or around the wound, presence or absence of hyphema and lens status was done[7]. All eyes had a minimum follow up of 12 months period. Details of all the surgical steps was recorded. Data of visual acuity at one-year follow up and anatomical status of the eye was recorded. Any corneal scar, phthisis bulbi, pseudophakia or dislocated or subluxated IOL, retinal detachment, and glaucoma was evaluated in the eyes under study.

Results

Mean age was 7.2 +2.2 years. The study included 20 patients out of which 14 (70%) were males and 6(30%) were females. Male to female ratio was 7:3.

Blunt injury was seen in 8 (40%) patients whereas 12(60%) patients had penetrating injury. Out of 14 (70%) male patients 11(55%) received penetrating injury and 3(15%) patients received blunt injury. out of 6 (30%) females 5(25%) received blunt trauma and only 1(5%) received penetrating injury. Penetrating injury was more common in males whereas blunt trauma was more common in females. Initial visual acuity was no light perception in 2(10%) cases, 25% cases were in the range of light perception to hand movement, Visual acuity in range <6/60 12(60%) cases. Visual acuity >6/18 in 1(0.5%) cases. The final visual acuity of >6/60 5(25%) was higher than in zone II in 4(20%). Out of total 12(60%) zone I open globe injury final visual acuity was no light perception in 1 out 12(8.3%), 2 out of 12(16.6%) cases were in

the range of light perception to hand movement, 5 out of 12 (41.6%) cases had visual acuity of < 6/60. 4 out of 12 (33.3%) cases had visual acuity >6/18. The final visual acuity in zone II was no light perception in 1out of 8 (12.5%) in the range of light perception to hand movement, 4 out of 8 (50%) cases had visual acuity of < 6/60. 1 out of 8 (12.5%) had visual acuity >6/18. Intraoperative complications included hyphema 18(90%), uveal prolapse 12(60%), iridodialysis 5(25%), posterior capsule rupture 10(50%), anterior lens capsule rupture 14(70%), hypotony 9(45%) and vitreous hemorrhage 5(25%). The post operative complications included corneal opacity 9(45%) peripheral anterior synechiae 8(40%). Raised IOP 5 (25%), fibrinous uveitis 12(60%), endophthalmitis2 (10%) and retinal detachment 2(10%).

Discussion

Zone I injury is most common type of open globe injury in pediatric patients (44% to 79%) [8]. Present study showed similar results with zone I injury of about 60%.

Visual outcome was better in blunt trauma cases. It may be due to a more number of capsular bag fixations of intraocular lens and a lesser number of postoperative complications [9]. Present study showed visual acuity of >6/60 in 30% cases of penetrating injury and 70% cases of blunt trauma. Brar et al., have reported a visual acuity of 20/40 in 39% eyes in penetrating trauma compared to 87% in blunt trauma after surgery [10]. Open globe injury in paedriatic cases often accompanied by lens damage. This can be managed either with simultaneous corneal suturing and cataract removal or with corneal suturing and delayed cataract removal several weeks later. The timing between trauma and cataract surgery is dependent on various factors like age, intraocular pressure and inflammation. Farr et al found children aged <4 y had worse outcome, as younger children were more susceptible to Amblyopia because of the injury [11] .Corneal repair with cataract removal and IOL implantation by small incision cataract surgery was done in 4 (20%) cases resulting in early visual rehabilitation. The risks involving repeated anesthesia and operative procedures was reduced. The same sitting procedure was technically easier to perform with a shorter period of postoperative irritation. Primary cataract removal without IOL implantation by small incision cataract surgery with corneal repair was done in 5 (25%) cases. All these cases had a ruptured anterior capsule with lens matter in anterior chamber. This carried an additional risk of inflammation and infection. Complications due to perforated anterior lens capsule was minimized and visual rehabilitation occurred earlier. Various important issues like associated iridodialysis, pupilloplasty, and iridectomy was catered. In case of zonular dialysis, cionni rings was used for IOL implantation in the bag. Anterior chamber IOL, sclera fixated lenses and iris fixated lenses are viable options and can be used in setting of inadequate capsular support [12]. IOL power calculation is a major challenge in the cases. Topo Sim K and Standard K gave best results. In present study corneal repair without cataract removal done in 11 (55%). Early removal of cataract with intraocular lens implantation 1 to 8weeks after the primary wound repair in paedriatic cases with penetrating corneal injuries can result in excellent visual and refractive outcomes with early intervention and aggressive Amblyopia treatment.

Amblyopia therapy after surgery resulted in good visual rehabilitation. The present study had certain atypical presentations like clean full thickness lacerated wound but with a very thin cornea and a repeat episode of same injury in the same eye in post op follow up period of one month. In such cases inspite of initial increase in visual acuity the results were not satisfactory. Presence of thin corneas further added on to the poor surgical outcome and late onset Amblyopia. Additional surgical procedures like optical iridectomy, iridodialysis repair, glaucoma surgeries, vitrectomy, and penetrating keratoplasty help in increasing surgical andvisual outcome [13]. Predictors of poor visual prognosis are young age, poor initial visual acuity, injury involving the visual axis, traumatic cataract, posterior segment involvement,

vitreous hemorrhage, retinal detachment; endophthalmitis [14] Posttraumatic corneal opacities can be due to scarring or band keratopathy.

Management of these conditions was done with definitive surgical treatment, especially when the central visual axis is involved, to prevent Amblyopia. [17]. Present study showed that morbidity of paedriatic corneal injuries resulting from ocular trauma might be reduced by customizing the management approach. The initial presentation of patient and evaluation of risk benefit ratio of visual and surgical management approach is mandatory for each patient.

Limitation

A major limitation of this study was a small sample size and retrospective design . Delayed presentation to tertiary referral

centers might seriously alter the visual and surgical prognosis. There is a need for future studies with prospective design and long term follows upto evolve an evidence based management protocol for open globe injury of pediatric ocular trauma.

Conclusion

Ocular trauma is an important cause of significant visual impairment. Open globe injuries comprises of 19% -58.3% of all cases of ocular trauma. All patients were young and at a growing stage. Younger children were more susceptible to Amblyopia because of the injury. In a developing country like India visual loss, psychological stress due to trauma and financial implications are matters of concern. Timely intervention to prevent posttraumatic vision loss is necessary. Delayed intervention can lead to devastating complications. Ocular morbidity due paedriatic corneal injuries can be reduced by customizing the management approach. The initial presentation of patient and evaluation of risk benefit ratio of visual and surgical management approach is mandatory for each patient.

Prevention is better than cure. Education and awareness regarding modes of injury and its complications should be availed at primary school levels. There is a need for Parents to supervise the activities of their children. Early referral to tertiary care trauma centers can prevent severe complications and result in good visual and surgical outcome in pediatric patients.

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