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Case Report of Visual Outcomes after Post-Operative Optical Iridectomy in Corneal Opacities

Tanveer M[1]*, Altaf S[2], Batool Z[3] and Sohail W[4]

[1]M Phil Optometrty, Al Shifa Trust Eye Hospital, Pakistan

[2]Professor and head of Department of Pediatric Ophthalmology, Al Shifa Trust Eye Hospital, Pakistan

[3]B.Sc Hons in Optometry and Orthoptics, Al Shifa Trust Eye Hospital, Pakistan

[4]MS Healthcare Management, Al Shifa Trust Eye Hospital, Pakistan

***Corresponding author:** Mehreen Tanveer, M Phil Optometry, Al Shifa Trust Eye Hospital, Rawalpindi, Pakistan, Tel: 00923319320861; Email: mehreen623@gmail.com

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Abstract

Individuals with segmental corneal opacities benefit from improved vision due to the clean entrance pupil created by optical iridectomy. In situations where keratoplasty is not an option, a region of clear peripheral cornea can produce retinal images that are consistent with good visual acuity. Studies evaluating the visual outcomes after postoperative optical iridectomy have produced encouraging findings. After the iris tissue that was impeding light transmission through the cornea is removed, patients have improved visual acuity. A notable reduction in visual disturbances such halos, glare, and blurry vision were also observed. Cases include in this study are less than five years old. This study aims to explore the impact of optical iridectomy on the quality of life of patients with central corneal opacity. Individuals with glaucoma who have bilateral corneal opacities, Peter's anomaly and patients receiving optical iridectomy following glaucoma pressure management were included in this study. IOP needs to be monitored carefully, especially in children whose anterior chambers are shallow or flat. When a patient has bilateral central corneal opacity, one of the greatest ways to prevent amblyopia is through optical iridectomy. This study showed that with the result of successful of optical iridectomy procedure, there is a significant improvement in visual acuity in patients where keratoplasty is not possible.

Keywords: Sclerocornea; Peters Anomaly; Trabeculodysgenisis

Abbreviations: OI: Optical Iridectomy; PKP: Penetrating Keratoplasty; DALK: Deep Anterior Lamellar Keratoplasty; IOP: Intra Ocular Pressure.

Introduction

The cornea is a transparent, avascular tissue that serves as an anti-infection structural barrier for the eye [1]. Cornea contributes to two-third of the refractive power of the eye. In both the superior and inferior cornea, the limbus is widest. The cornea is aspheric and convex. The cornea's thickness gradually increases from the center to the periphery [2]. Corneal opacity is the loss of the cornea's natural transparency. The individuals may have hazy corneas from birth or develop them shortly after. Sclerocornea, ears in Descemet membrane (usually due to forceps trauma

or congenital glaucoma), ulcers (infection), metabolic (e.g., mucopolysaccharidosis), peters anomaly, edema (e.g., congenital hereditary endothelial dystrophy [CHED], posterior polymorphous dystrophy, congenital hereditary stromal dystrophy [CHSD], glaucoma), and dermoid are among the differential diagnosis for congenital corneal opacities. The acronym STUMPED can help with recalling these diagnoses [3].

The most effective treatment for corneal opacity is penetrating keratoplasty. However, there is a very high risk of transplant rejection and failure in eyes with extensive deep corneal vascularization. Once more, the problems associated with keratoplasty are made worse by the lack of high-quality donor tissue in the face of rising demand, especially in this region of the world [4].

Different approaches might be used to manage a central corneal opacity. Good visual outcomes have been observed when rigid gas-permeable contact lenses are used to treat nebular or macular corneal opacities [5,6]. The purpose of adopting rigid gas-permeable contact lenses for these types of opacities is to replace the cornea's unevenly scarred surface with the contact lens's optically regular surface. However, in cases of leucomatous corneal opacities, a contact lens may not be able to improve the visual outcome. Eyes with congenital or acquired central corneal opacity, an optical sector iridectomy has been successfully carried out with comparatively satisfactory visual outcomes [4]. Patients suffering from segmental corneal opacities can see better thanks to optical iridectomy, which produces a clear entrance pupil. Where keratoplasty is not an option, a region of clear peripheral cornea can yield retinal pictures consistent with acceptable visual acuity. Promising results have been reported from studies examining the visual outcomes following postoperative optical iridectomy. Patients benefit from increased visual acuity as a result of better light transmission through the cornea due to the removal of the iris tissue that was obstructing it. A considerable decrease in visual disturbances such glare, halos, and fuzzy vision is felt by many people [4].

The children had anterior segment anomalies and partial corneal opacity at birth, but no cataract (Peter's anomaly type 1). The corneal scar in each affected eye was off-center and encroached on the visual axis. Glaucoma, if present, was managed medically or surgically, and then each eye underwent an optical iridectomy (instead of a penetrating keratoplasty). Following surgery, all patients were able to fixate and follow around the opacity. Optical iridectomy should be considered in certain cases of congenital corneal opacities. The purpose of this study is to assess the results of optical iridectomy in children with corneal opacities.

Case Presentations

Case 1

A one-year-old male reported to general OPD at AL SHIFA TRUST EYE HOSPITAL with Peter's anomaly type 1 with central corneal opacity and adherent leucoma in both eyes. Iris atrophy is present temporally. The patient has central opacity and a rather clear peripheral cornea. The visual axis was hindered by opacity, thus the patient had bilateral optical iridectomy. Iridectomy performed in the lower temporal quadrant. Before performing OI, axial lengths were measured to be 15.8mm in both eyes. The fundus appeared to be free of defects. IOP was 9 in the right eye and 14 in the left eye. Prior to OI, the patient's visual acuity was limited to light perception in three of the four quadrants. Following surgery, the patient's visual acuity was evaluated binocularly with lea gratings and found to be 2.00cpm. A six-month follow-up was provided, along with a visual stimulation task. The patient's visual state had improved after six months; now, their visual acuity is 8.00cpcm with lea gratings. Patient retinoscopy with Cyclopean 1% performed -4.00\+3.00*90 in R.E. and -2.00DS in L.E with photo brown filter is advised. The patient's IOP in B.E. was 14. At the six-month follow-up, the patient's visual acuity was 6\192 in R.E. and 6\38 in L.E.; their IOP was 16 in R.E. and 18 in L.E. The visual acuity on the most recent follow-up is 6\192 in R.E. and 6\24 in L.E. IOP was 12 in both eyes. Retinoscopy was performed and new Rx in R.E only, -1.00\-1.00*90.

Case 2

An OPD visit at ALSHIFA TRUST EYE HOSPITAL revealed that the two year old male patient had corneal opacities in both eyes along with sclerocornea, microcornea and cornea plana. IOP was somewhat elevated in L.E at 23 and 18 in R.E. Fundus exhibited no visible defects and the cup disc ratio was 0.1. The patient had bilateral lea gratings and visual status was 4.00cpcm.Timilol 0.5% and dorzolamide 2% were prescribed to patient. The patient's IOP was monitored and to avoid amblyopia, optical iridectomy was recommended. The lower nasal quadrant is the site of a bilateral optical iridectomy. Visual acuity was measured as 6\60 in R.E and 6\48 in L.E with Cardiff acuity cards. Retinoscopy with cyclopean 1% was done as a follow up procedure six months later, and RX +4.00/-4.00*180 in R.E and +3.5/-4.00*180 in L.E given. IOP measured by tonopen was normal in both eyes, 16 in R.E and 18 in L.E. Tasks including visual stimulation and pressure lowering medication continue. At the subsequent follow up, patient visual acuity on the ETDRS measured 6\60 in R.E and 6\30 in L.E, with an IOP 14 in both eyes. After the most recent follow-up, new RX given after performing retinoscopy new prescription was +2.00\-5.5*165 for R.E and +1.5\-5.00*15 for L.E. Patient's IOP was 11at the time of last visit, and their visual acuity scores were 6\60 in R.E and 6\24 in L.E.

Discussion

In a comparative analysis of Peter's anomaly, Donoso Rojas and colleagues found that patients who had peripheral iridectomy had the best prognosis, where as those who had PKP performed had the worst prognosis [7]. Management of the corneal opacity is critical in Peter's anomaly [8]. Penetrating keratoplasty has long been the standard procedure and the most common reason for full-thickness grafts in newborns and young children. Graft success rates in Peter's anomaly are low, with only 50-70% at 1 year and 30% at 5-10 years [9-11]. The younger the patient is when penetrating keratoplasty is performed, the more technically difficult the procedure is due to thinner corneas, scleral collapse, lens anteriorization, and positive vitreous pressure. Furthermore, there is a larger inflammatory response following surgery, increasing the likelihood of early suture loosening, which can lead to infection and rejection. Furthermore, with Peter's abnormality, other anomalies such as limbal stem cell deficit, corneal staphyloma, microphthalmia, and aniridia might complicate surgery and increase the chance of graft rejection and failure [12-14]. Keratoprostheses have been used in Peter's anomaly, particularly after several failed penetrating keratoplasties [9]. Keratoprostheses are more prone to complications than standard full-thickness grafts, including glaucoma, retinal detachment, retroprosthetic membranes, endophthalmitis, and even implant extrusion [15]. Descemets stripping, with or without endothelial keratoplasty, has been reported in more recent times [16,17]. Lastly, an optical iridectomy to create a second iris opening or to enlarge the visual axis surrounding the corneal irregularity is a feasible treatment if there is a visible region of the cornea. Although an optical iridectomy may not have the same visual potential as a successful graft treatment, it does not increase the risk of glaucoma or carry the risk of rejection. Sclerocornea, as opposed to Peter's abnormality, is characterized by diffuse or peripheral opacification of the cornea as a result of the lack of limbal stem cells and corneo-scleral demarcation [18,19]. Furthermore, the stromal collagen fibers may have uneven diameters and chaotic arrangements, resulting in decreased tissue transparency, as well as abnormalities or even the absence of both Bowmans and Descemets layers [20]. Since type I collagen makes up the majority of these fibers, it is likely that the cornea, rather than the sclera, where type III collagen is more prevalent, is where they originated [18,21]. Additionally, the anterior and mid-stroma may contain blood veins originating from the conjunctiva and episclera [20]. Together with anterior segment anomalies such iridocornal adhesions, iris hypoplasia with corectopia, posterior embryotoxon, trabeculodysgenesis, cataracts, and congenital aphakia, these corneal findings may also coexist [18]. Furthermore, sclerocornea frequently coexists with the spectrum of microphthalmia, coloboma, and anophthalmia (MAC) [22]. The magnitude, laterality, and other related ocular defects all influence how corneal opacification in sclerocornea is managed [19]. Diffuse corneal involvement presents comparable issues as Peters Anomaly. Penetrating keratoplasty is associated with a significant risk of rejection and failure in newborns and young children, particularly in those with limbal stem cell deficit [12-14]. Success rates at one year vary between 30-70% and decrease over time [11]. If anterior segment OCT or ultrasound biomicroscopy reveal an intact endothelial cell and Descemets layer, deep anterior lamellar keratoplasty (DALK) may be a viable alternative. While DALK reduces the likelihood of failure and rejection, the endothelial cell layer is frequently involved in many of these scenarios. Furthermore, executing DALK in these eyes can be hampered by tissue anomalies that cause full thickness perforation and necessitate conversion to a full-thickness transplant [23]. If there is a clearer portion of the cornea, an optical iridectomy can also be done to improve visual function [24,25]. Amblyopia is difficult to overcome in unilateral situations and should be evaluated before attempting any operation.

Individuals with sclerocornea are more likely to develop glaucoma due to the shallow to flat anterior chamber and trabeculodysgenesis [26]. Accurate IOPs can be difficult to get, as with Peter's anomaly. The look of the cornea and sclera, particularly thinning owing to buphthalmos, may be the primary indicator that IOP is high. While medical treatment should be attempted first, many of these eyes require IOP reduction surgery. Angle surgery is frequently not possible in these eyes due to a restricted or closed angle. GDD implantation may be required, but, as with Peter's abnormality, intraocular tube placement may be challenging because to the shallow anterior chamber and poor vision [27,28]. Thus, GDD placement may need to be paired with endoscopic lensectomy and vitrectomy to ensure optimal visualization and tube placement more posteriorly [28,29]. Sclerocornea is not the same as Peter's anomaly, but the management is comparable. Conservative management may be appropriate, particularly in unilateral or moderate instances. For bilateral instances, a multidisciplinary approach comprising cornea, glaucoma, retina, and pediatric ophthalmology specialists is critical to achieving the best results.

Optical iridectomy seeks to restore ambulatory vision to patients who would otherwise be severely amblyopic if not operated on. In our circumstances, both patients had bilateral OI and saw significant visual improvement, particularly in the left eye. One patient had only light perception and scored 6\192 in R.E. and 6\24 in L.E. on ETDRS. Similarly, in the second case, visual acuity improved dramatically. Although IOP is high in the second case prior to surgery, visual improvement is greater in the left eye than in the right. If

these patients are left alone without any intervention, they will develop severe amblyopia. Our patients experienced no intraoperative or postoperative problems. One essential to the effectiveness of this procedure is the preoperative selection of the iridectomy site to locate the area with the most clear cornea. Previous research has indicated that the long-term optical and anatomical success of penetrating keratoplasty in extremely young patients is highly controversial.

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