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Original Research Paper

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OPTICAL IRIDECTOMY: AN ALTERNATIVE TO PENETRATING KERATOPLASTY IN CORNEAL OPACITY

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ABSTRACT

INTRODUCTION: The corneal opacity is common among farmers and stone mine workers. Often minor corneal injury mistreated by quacks result in corneal opacity. Optical iridectomy creates a clear visual line to retina and improving vision in patients without requiring penetrating keratoplasty.

MATERIALS AND METHODS: The records of 15 patients who underwent optical iridectomy from January 2017 to January 2018 were reviewed retrospectively. Fifteen patients with leucomatous corneal opacities with some clear cornea had undergone optical iridectomy. In five patients there was cataract so simultaneous extra capsular surgery was also performed. The optical iridectomy site was selected after slit-lamp examination. To rule out posterior segment pathology, indirect ophthalmoscopy after pupillary dilatation and B-scan ultrasonography was done. Visual acuity was assessed pre- and postoperatively by snellens chart.

RESULTS: Mean age of patients was 23years to 52 years. The follow-up period was between 2 to 12 months. For optical iridectomy the inferonasal quadrant was preferred when possible. No intraoperative or postoperative complications were observed. Visual acuity improved to 6/18 to 6/60 in five patients and eight patients had visual acuity with in 6/60 to 1/60, rest two of them did not show any improvement despite having a clear red reflex.

CONCLUSIONS: In cases where peripheral clear cornea is available optical iridectomy is an valuable alternative to penetrating keratoplasty. It is a low cost and early rehabilitation procedure. It can be done at any eye center doesn't require eye bank and organ transplant permission.

KEYWORDS : Optical iridectomy, Corneal opacity, Penetrating keratoplasty

Introduction

We evaluate visual outcome of optical iridectomy in cases of leucomatous corneal opacities. The corneal opacity is common in western Rajasthan among farmers and stone mine workers. Often minor corneal injury mistreated by quacks result in corneal opacity. Not all of them have easy access to tertiary care and some are unwilling for keratoplasty. The scarcity of donor material and the risk of graft failure is a reason to look for other methods for improving vision. Optical iridectomy creates a clear visual line to retina and improving vision in patients with central corneal opacities. An area of clear peripheral cornea can produce retinal images compatible with good visual acuity. It is especially useful in areas where the facility for corneal transplantation is not available and post operative care & follow-up is difficult.

Methods

The records of 15 patients who underwent optical iridectomy from January 2017 to January 2018 were reviewed retrospectively. These patients had leucomatous corneal opacity for various reasons. (Table 1) The uncorrected visual acuity and best-corrected visual acuity (BCVA) were recorded and the anterior segment was thoroughly evaluated by a slit lamp biomicroscope before the surgery. Only those patients who had some amount of clear peripheral cornea were selected. When pharmacologically dilated with atropine eye drop most patients showed improvement in vision. Posterior segment examined by indirect ophthalmoscopy after pupillary dilatation and B-scan ultrasonography. Of fifteen cases, ten had corneal opacities after healed keratitis, two after trauma; two had trachoma and in one due to chemical burn. The optical iridectomy was undertaken in cases in which one sector of the cornea and lens was clear. Postoperatively, the eyes were evaluated on day 1, and 1 week and 4 weeks following surgery for similar parameters. Postoperative vision and any associated ocular signs were noted.

Optical iridectomy technique

A detailed patient history was taken including uncorrected visual acuity, best corrected visual acuity (BCVA), intraocular pressure, and best visual acuity after dilatation and, using a stenopic slit, slit lamp biomicroscopy of the anterior segment to look for the size and depth of the corneal opacity, the quadrant of clear cornea. **(Figure 1 a)** Posterior segment pathology was ruled out by indirect ophthalmoscopy after pupillary dilatation and B-scan ultrasonography.

After giving peribulbar anesthesia a conjunctival flap was made with the conjunctival scissors and electrocautery was performed near the limbus. A limbal incision was given with cresent knife and anterior chamber entered with 2.8mm keratome. The anterior chamber was formed with 2% hydroxypropyl methyl cellulose Pupillary sphincterotomy was performed in the region of clear cornea predecided by the stenopic slit before surgery. Sphincterotomy was performed by angled vannas scissors after lifting the pupillary edge by injecting viscoelastic under it. An anterior chamber wash was performed with the balanced salt solution to remove the residual viscoelastic and air was injected into the anterior chamber. If required interrupted corneosclearal sutures were placed to close the wound and air was replaced with balanced salt solution. **(Figure 1 b)**

The patient was postoperatively prescribed 0.3% moxifloxacin eye drops four times a day, 0.1% dexamethasone phosphate eye drops four times a day, 1% tropicamide eye drops three times a day and 0.5% timolol eye drops twice a day if required. The eye was evaluated on day 1, and 1 week and 4 weeks following surgery for the parameters of uncorrected visual acuity, BCVA, anterior segment evaluation by slit lamp biomicroscope and fundus evaluation.

Results

Mean age of patients was 23years to 52 years. The follow-up period was between 2 to 12 months. All the patients had accurate projection of rays and hand movement before surgery. For optical iridectomy inferonasal quadrant was preferred when possible. No intraoperative or postoperative complications were observed. Visual acuity improved to 6/18 to 6/60 in five patients and eight patients had visual acuity with in 6/60 to 1/60, rest two of them did not show any improvement despite having a clear red reflex. (Table 1)

Discussion

A central corneal opacity can be managed by alternative methods. Rigid gas-permeable contact lenses have been tried successfully in nebular or macular corneal opacities with good visual outcome [5]. The aim of using rigid gas-permeable contact lenses for such opacities is to replace the irregular scarred corneal surface with the optically regular surface of the contact lens. However, a contact lens may not be successful in improving visual outcome in leucomatous corneal opacities.

An optical sector iridectomy has been performed successfully with reasonably good visual results in eyes with congenital [8] or acquired central corneal opacity [2,3,4]. In eyes with a coexisting cataract along with corneal opacity, cataract extraction with an intraocular lens implantation is essential for visual improvement. The intraoperative use of Trypan blue dye enhances the visibility of the capsule during surgery [5]. An optical iridectomy, if performed in these eyes, can give rise to problems related to the edge effect of the intraocular lens.

In the our study, one patients had bilateral corneal opacity **(Figure 1 c)** patients had merely ambulatory visual acuity due to corneal opacity. The increase in visual acuity by performing this procedure lasts a long time and is very satisfying to the patients, especially those who are one-eyed. The visual gain with this surgery may not be very much but it enables them to perform their day-to-day routine activities without being dependent on others. A corneal transplant may be ideal but if the graft fails they might lose even the ambulatory vision and become dependent on family members. A regraft in such cases carries a worse prognosis. Moreover, in developing countries like India, poor socioeconomic status and ignorance stands in the way of regular follow-up following surgery and thereby hinders early identification of complications like rejection or infection. A poor ocular surface and suture-related problems that may be neglected due to ignorance and irregular follow-up are major risk factors associated with corneal graft infection [9]. Poor personal hygiene is another factor increasing the risk of graft infection and subsequent failure.

In our study, 10 eyes had more than two quadrants of deep vascularisation. Hence, these eyes were at great risk for development of graft rejection following a cornea transplant. So in these eyes a less demanding procedure like optical iridectomy with cataract surgery may be more helpful for the patient. Although the peripheral part of the human optical system does not form as sharp an image as the central part, the pupillary sphincterotomy aids in the addition of peripheral bundle of rays so that a relatively clear image is produced by the peripheral rays superimposed on the blurred image of the central rays [3]. For attainment of good visual acuity by this surgery, the peripheral cornea should be clear. In our cases, the peripheral cornea was clear except in two eyes with chemical burn, in which there was slight haze in the periphery as well. However, these patients also attained reasonably good vision by which they could carry out their routine activities. The commonest site for sphincterotomy was nasal or inferonasal as it is good for both distance and near vision and because the area is not covered by the lid. In four eyes, however, iridectomy was performed superiorly as the corneal opacity was more towards the inferior side and the superior cornea was clear.

Conclusion

Optical iridectomy is a valuable alternative when penetrating keratoplasty cannot be performed. In some cases penetrating keratoplasty should not be performed as in cornea with deep stromal vascularisation, as graft success is very low in them. The peripheral clear cornea is chosen for sectoral optical iridectomy. It is a simple and safe procedure that can improve visual outcome and provide ambulatory vision to patient quickly. There is small learning curve and organ transplant permission is not required. Its result last a life time where as in corneal transplant graft there is always a risk of rejection.

Table 1 Outcome of optical iridectomy in eyes with corneal opacity

Serial number	Age (Years) & sex (M/F)	Occupation	Etiology	Preoperative Visual Acuity	Fellow eye	Postoperative Visual Acuity	Site of optical iridectomy
1	23 Male	student	Post trauma	0.01	normal	0.25	Nasal
2	45 Male	Farmer	Healed keratitis	0.01	normal	0.25	superior
3	56 Male	Farmer	Healed keratitis	0.01	normal	0.25	Nasal
4	48 Female	Farm labourer	Healed keratitis	0.01	normal	0.33	Temporal
5	38 Male	Mine worker	Healed keratitis	0.03	Healed keratitis	0.33	Inferonasal
6	39 Male	Factory worker	Post chemical burn	0.01	Post chemical burn	0.16	infronasal
7	37 Male	Farmer	Healed keratitis	0.01	normal	0.16	Nasal
8	49 Male	Mine worker	Post trauma	0.1	normal	0.1	Inferonasal
9	52 Male	Farm labourer	Healed keratitis	0.01	normal	0.16	Inferonasal
10	57 Female	Farm labourer	trachoma	0.01	trachoma	0.1	Superotemporal
11	55 Male	Mine worker	Healed keratitis	0.03	Healed keratitis	0.25	Nasal
12	62 Female	Farm labourer	trachoma	0.01	trachoma	0.25	Superotemporal
13	47 Male	Farmer	Healed keratitis	0.03	normal	0.5	Inferonasal
14	55 Female	Housewife	Healed keratitis	0.01	normal	0.25	superior
15	44 Male	Male	Healed keratitis	0.01	normal	0.16	Nasal

Figure 1.a. cornea suitable for optical iridectomy

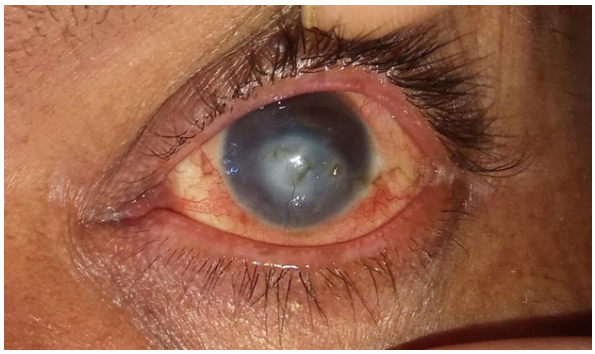

Figure 1.b. after optical iridectomy

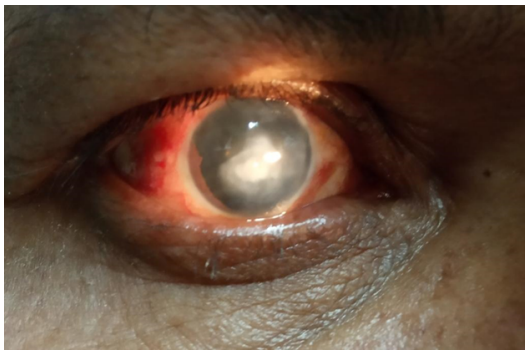

Figure 1.c. bilateral corneal opacity with clear peripheral cornea in a Stone mine worker

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