TRANSSCLERAL CYCLOPHOTOCOAGULATION IN THE MANAGEMENT OF NEOVASCULAR GLAUCOMA

Hari Ramakrishnan[1]

[1]*Assistant Professor, Department of Ophthalmology, Dr. SMCSI Medical College, Karakonam, Trivandrum, Kerala.*

ABSTRACT

BACKGROUND

Neovascular glaucoma is a highly intractable form of secondary glaucoma caused by the development of a fibrovascular membrane in the angle of the anterior chamber. It can occur following a variety of diseases, but diabetes mellitus and central retinal vein occlusion are the commonest causes implicated. Initial management of neovascular glaucoma involves use of antiangiogenic agents, laser or cryotherapy and medical therapy or filtering surgery for reducing intraocular pressure. However, cyclodestructive procedures or enucleation is required for cases of intractable glaucoma. The present study was undertaken to assess the role of transscleral cyclophotocoagulation in the management of neovascular glaucoma.

MATERIALS AND METHODS

Twenty one eyes of twenty one patients with intractable glaucoma were treated with transscleral cyclophotocoagulation and assessed for control of intraocular pressure and relief of symptoms.

RESULTS

There was significant reduction in intraocular pressure and relief of symptoms following the procedure in all patients.

CONCLUSION

Transscleral cyclophotocoagulation is a safe and effective procedure in the control of intraocular pressure in intractable cases of neovascular glaucoma.

KEYWORDS

Neovascular Glaucoma, Proliferative Diabetic Retinopathy, Central Retinal Vein Occlusion, Cyclophotocoagulation.

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BACKGROUND

Neovascular Glaucoma (NVG) is a highly intractable form of secondary glaucoma caused by the development of a fibrovascular membrane in the angle of the anterior chamber. It can occur following a variety of diseases, but Proliferative Diabetic Retinopathy (PDR) and Central Retinal Vein Occlusion (CRVO) are the commonest causes implicated.[1,2] Neovascular glaucoma is a feared condition because it is difficult to treat and the prognosis is guarded in most cases. Retinal hypoxia has been found to be the basic cause for this condition. Hypoxic retina is believed to produce angiogenic factors. Vascular Endothelial Growth Factor (VEGF) being the most important.[3,4] This leads to formation of new vessels. Neovascular glaucoma occurs when a fibrovascular membrane develops in the angle and obstructs the flow of aqueous humour resulting in persistent elevation of intraocular pressure.

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Corresponding Author:
Dr. Hari Ramakrishnan,
'Sree Valsam', TC 13/1031,
Kannammoola, Trivandrum, Kerala.
E-mail: drhariramakrishnan@hotmail.com
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The symptoms of neovascular glaucoma are distressing, the visual loss severe and glaucoma intractable. Current management of this condition involves treating the hypoxic retinal areas with laser or cryotherapy and use of antiangiogenic agents as initial treatment followed by antiglaucoma medications and filtering surgery to reduce intraocular pressure.[5,6,7,8,9] However, the glaucoma remains intractable in many patients in spite of initial management and these cases require cyclodestructive procedures or enucleation. The present study was undertaken to assess the effectiveness of contact transscleral cyclophotocoagulation in reducing the intraocular pressure and providing symptom relief in cases of intractable neovascular glaucoma.

AIM

To assess the effectiveness of contact transscleral cyclophotocoagulation in reducing the intraocular pressure and providing symptom relief in cases of intractable neovascular glaucoma.

MATERIALS AND METHODS

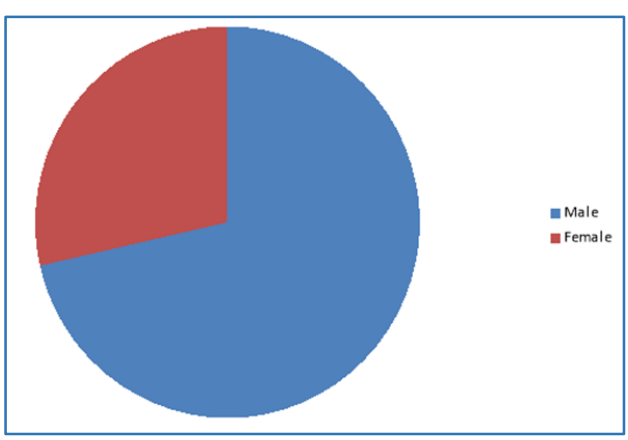
This was a prospective study of 21 eyes of 21 patients conducted at Chaithanya Eye Hospital and Research Institute from August 2004 to November 2005. Consecutive patients with intractable neovascular glaucoma who had not responded to initial management with lasers or anti-VEGF

agents along with antiglaucoma medications or filtering surgery were included. Patients who had intolerable pain were considered for treatment. Eyes with good visual potential were excluded. The study was approved by the institutional ethical committee. A detailed history was taken with particular reference to diabetes mellitus, systemic hypertension, cardiovascular disease and ocular diseases. Both eyes were examined in detail including refraction, slit lamp biomicroscopy, fundus examination, intraocular pressure measurement and gonioscopy. B scan ultrasonography and visual field charting were performed in relevant cases. A general examination was also carried out. Investigations like blood sugar estimation, serum cholesterol, glycosylated haemoglobin, urinalysis and renal function tests were done whenever required. The clinical presentation, aetiological factors and treatment modalities undertaken for each case were evaluated. Eyes with poor visual potential who had distressing ocular symptoms in spite of initial management (laser/anti-VEGF injection followed by antiglaucoma medications or filtering surgery) were subjected to contact transscleral cyclophotocoagulation with diode laser. A written informed consent was obtained prior to the procedure. Diode laser was delivered using a G probe 2 mm behind the limbus. An average of 2000 mW energy was used and treatment was done for 180 degrees. 15 patients were symptomatically better with less pain and their intraocular pressure also came down with 180° of cyclophotocoagulation. Symptoms were not relieved and intraocular pressure remained high in 6 patients. For these patients with poor control of symptoms, the remaining 180 degrees was treated after 6 weeks. Postoperatively, topical steroids, cycloplegics and oral analgesics were prescribed. Patients were followed up at regular intervals after treatment and were assessed for control of symptoms, reduction in intraocular pressure and need for continuing topical antiglaucoma medications. All cases had a follow up period of not less than 3 months following treatment.

Observation and Results

Out of the 21 patients who were included in the study, 15 were males and 6 were females.

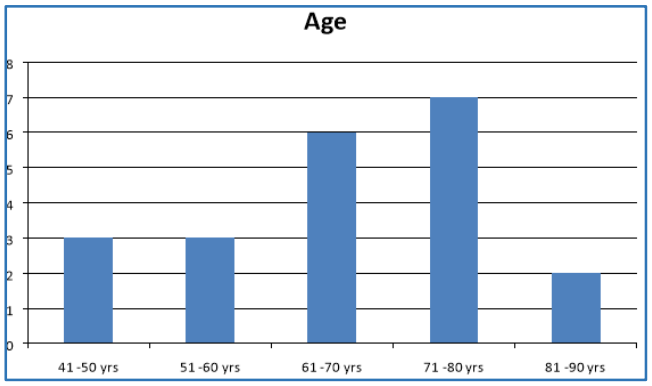
Sex Distribution



Sex distribution of the patients (male: 15, female: 6)

Age Distribution

The age of the patient ranged from 48 to 84 years with a mean age of 68.19 years.



The commonest cause of NVG encountered were CRVO and PDR, 10 cases each. One patient had combined occlusion of central retinal artery and vein.

All patients were on topical antiglaucoma medications before the procedure. The mean pretreatment IOP was 48.47 with a range of 36 to 68 mmHg. The mean post treatment IOP was 26.19 with a range of 16 to 32 mmHg. There was statistically significant reduction in the intraocular pressure following treatment (p=0.00) by T test.

Sl. No.	Pre-treatment IOP (mmHg)	Post-treatment IOP (mmHg)
1.	36	24
2.	56	28
3.	40	28
4.	40	30
5.	44	32
6.	42	20
7.	50	16
8.	52	28
9.	58	22
10.	50	28
11.	60	32
12.	50	28
13.	40	28
14.	68	30
15.	42	24
16.	50	28
17.	42	20
18.	44	24
19.	50	20
20.	54	30
21.	50	30

All patients reported remarkable relief from distressing symptoms following treatment. 6 patients needed 360° cyclophotocoagulation.

DISCUSSION

Neovascular glaucoma is a relatively common potentially devastating disorder caused by proliferation of new vessels in the iris and angle in response to retinal hypoxia. The commonest aetiological factors implicated in this condition are Proliferative Diabetic Retinopathy (PDR) and Central

Retinal Vein Occlusion (CRVO). Other causes include Central Retinal Artery Occlusion (CRAO), combined CRAO with CRVO, carotid artery disease, retinal arteritis and neoplasms of the retina. In the present study of 21 patients, 10 patients each had PDR and CRVO (47.6% each). One patient had combined arterial and venous occlusion (4.7%). This is similar to studies conducted by Brown et al who reported that diabetes mellitus and CRVO were the most common causes of neovascular glaucoma in their series.[10]

Current management of this condition involves treating the hypoxic retinal areas with laser or cryotherapy and use of antiangiogenic agents as initial treatment followed by antiglaucoma medications and filtering surgery to reduce intraocular pressure.[5,6,7,8,9] However, in spite of initial treatment, many of these cases continue to have progressive glaucoma and have severe pain due to raised intraocular pressure. This usually happens when there is a total synechial angle closure. The visual prognosis is very poor in these patients and control of pain becomes the primary therapeutic aim. Medical therapy for control of pain with topical steroids and cycloplegics is tried initially, but seldom works in these patients. Hence, cyclodestructive procedures form the mainstay of treatment. Cyclodiathermy and cyclocryotherapy have been performed for cyclodestruction, but diathermy has been largely abandoned as it was more destructive than other techniques. Cyclocryotherapy is performed successfully in many centres, but is reported to cause more pain and inflammation in the immediate postoperative period. The introduction of cyclophotocoagulation with laser for cyclodestruction has markedly reduced the incidence of postoperative inflammation and pain.[11] Diode laser transscleral cyclophotocoagulation has been reported to be helpful in the management of NVG.[12,13]

In the present study, all patients had distressing pain and very high intraocular pressure following initial management. There was no salvageable vision in any of the patients and treatment was aimed at control of symptoms only. All patients underwent contact transscleral cyclophotocoagulation with diode laser. The post treatment intraocular pressure was significantly lower than the pretreatment values in the majority of cases. The 6 patients who underwent 360° cyclophotocoagulation also had a drop in intraocular pressure and relief of symptoms on follow up. All patients had relief from severe pain at the time of follow up. No major complications were noted after the procedure. In the past, retrobulbar injection of absolute alcohol and enucleation were performed in intractable cases of neovascular glaucoma. With the advent of modern treatment modalities, these procedures have been largely abandoned and are only of historical importance. The newer cyclodestructive techniques have thus helped us in salvaging the eye, if not useful vision in the majority of patients.

CONCLUSION

Neovascular glaucoma is a highly intractable form of secondary glaucoma caused by the development of new vessels on the iris and angle. Salvaging an eye with this condition used to be difficult and enucleation for chronic pain was commonly done until significant developments occurred in the last two decades. Though many cases continue to progress despite aggressive initial management, development of cyclodestructive procedures has changed the picture dramatically. Cycloablation by transscleral cyclophotocoagulation is an effective method for controlling the intraocular pressure and providing relief from pain in refractory cases of neovascular glaucoma. The procedure is not associated with major complications, which have been reported with other cyclodestructive procedures. With this modality of treatment, the need for enucleation or retrobulbar alcohol injection has been practically obviated and it has become possible to salvage the eye, if not useful vision, in the majority of patients.

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