

# CASE SERIES OF NEOVASCULAR GLAUCOMA:EARLY LIMITED TRANS-SCLERAL CYTOPHOTOCOAGULATIONS (TSCPC) AS AN OPTIONS FOR PREPARATION OF FILTERING SURGERY IN NVG PATIENTS CAN SAVE PATIENT'S VISIONS

Wan Mohd Aiman bin Wan Abdul Rahman<sup>1</sup>, Nurull Bahya Suliman<sup>2</sup>, Sujaya Sigh<sup>1\*</sup>

<sup>1</sup>Ophthalmology Department, Faculty of medicine, University Malaya, Malaysia

<sup>2</sup>Ophthalmology Department, Hospital Tengku Ampuan Rahimah Klang, Malaysia

\*Corresponding Author's Email: drsujaya@gmail.com

## ABSTRACT

Neovascular Glaucoma (NVG) is a severe form of secondary glaucoma characterized by proliferation of fibrovascular tissue in the anterior chamber angle. Clinically rubeosis iridis was seen at the pupillary margin and angle via gonioscopy. NVG results in guarded visual prognosis in view of aggressive clinical course and the difficulty in controlling the intraocular pressure (IOP). Patient treatment is individualized by taking into account patient visual prognosis, severity, level of IOP, the cause of NVG, financial issues and patient's expectations. Trans-scleral cytophotocoagulations is one of the modalities available to reduce the intraocular pressure, usually reserved for the poor prognosis eye in view of its destructive nature. TSCPC in a good prognosis eye is always used in cautions. In this case series, we present 3 case of NVG which we use the early limited TSCPC to reduce the IOP to buy time for other management in which patient have good visual outcome.

**Keywords:** TSCPC in NVG; Neovascular Glaucoma; TSCPC; CPC; Filtering Surgery

## INTRODUCTION

Neovascular Glaucoma is serious complication of ocular ischemia often present as an end stage disease resulting blindness and pain (Fong, 2011 and Hossam et al, 2020). The treatment aim is to reduce the source of ischemia such as pan retinal photocoagulations, anti- VEGF together with optimizing patient's comorbidities such as diabetes mellitus and hypertension. Ocular therapy such as antiglaucoma eyedrops and systemic medications such as acetazolamide included in the strategy to reduce the IOP. TSCPC is used to reduce the IOP thus reduce pain usually done in a poor prognosis eye. Surgical management such as trabeculectomy can reduce the IOP but it has higher failure rate in NVG. Thus glaucoma drainage device is more preferred in NVG unless patient has financial difficulties thus the former is performed. We present 3 cases of NVG where we give limited TSCPC (inferior 180 degree) in a good prognosis eye planning for filtering surgery.

## CASE STUDY

### Case 1

40 years old Malay male with newly diagnosed diabetes

mellitus presented in February 2018 to the eye clinic with sudden onset right eye (RE) blurring of vision and eye redness for the past two weeks. Patient went to the hospital and was diagnosed with RE neovascular glaucoma (NVG) secondary to proliferative diabetic retinopathy and left eye advanced eye disease. He was started with all four antiglaucoma and oral acetazolamide. His eye was not in pain and his RE visual acuity was hand movement (HM). There's RE rubeosis iridis of 360 degree and despite all the antiglaucoma his intraocular pressure (IOP) is 48 mmHg. The cornea is clear and gonioscopy shows all four quadrants closed angle. There's presence of nuclear sclerosis 1+. His right eye fundus shows cup disc ratio of 0.4, pre-retinal hemorrhage at all four quadrants, new vessels at disc and resolving vitreous hemorrhage seen. In view of the uncontrolled IOP, he was given TSCPC inferiorly 180 degree (25 shots x 1.5mw x 1.5sec). In a week the pressure falls to 42 mmHg. At the same time laser pan photocoagulation (PRP) was given until laser mark is adequate. In one month after the TSCPC, the IOP went down to 30 and patient undergoes the triple procedure i.e RE phacoemulsification/ intraocular lens implantation / and trabeculectomy with mitomycin C under local

anesthesia. The surgery was uneventful. No anti-vascular endothelial growth factor (VEGF) was given prior to the surgery. Post operatively day 1, the IOP falls down to 19mmHg and his vision improved to 6/36. During the nine months follow up, the bleb remains patent with IOP ranging (6-12mmHg) without antiglaucoma. His vision improved to 6/24 with best corrected vision of 6/12

### Case 2

A 56 years old Malay male with underlying diabetes mellitus for more than 10 years. He has done both eye cataract surgery in 2018. The RE was uneventful and has good vision of 6/6. However his LE is complicated surgery where there's posterior capsular rent. The IOL was inserted inside the bag but later noted to have subluxated intraocular lens. Later he undergo LE IOL explantation and anterior chamber lens (ACIOL) implantation. His baseline pre operative vision LE is 6/18 and his post operative vision after ACIOL insertion was 6/9. Before operation, his BE has no diabetic retinopathy with baseline cup disc ratio (CDR) of 0.4. However, eight months after operation, the patient developed RE severe non proliferative diabetic retinopathy and LE NVG secondary to proliferative diabetic retinopathy (PDR) where he presented with LE redness and high IOP of 38mmHg and his vision drop to 6/60. He was started on all 4 antiglaucoma and oral acetazolamide. In the first 3 weeks the IOP falls down between range (24-28mmHg). LE full PRP was also commenced as the cornea becomes clear. But his IOP raised again to 38 at 3 weeks and was given inferior TSCPC 180 degree (25 shots x 1.5mw x 1.5sec). The IOP falls to 18mmHg three days later and oral acetazolamide was stopped. After three weeks post TSCPC his IOP is raised again to 30mmHg but able to maintain between (14-26mmHg) with addition of oral acetazolamide. Six weeks after TSCPC, he underwent uneventful LE trabeculectomy with mitomycin C and his IOP falls down to 18mmHg without any antiglaucoma. No anti-VEGF was given prior to the surgery. During the next 8 month follow up, his IOP maintain ranging from (4-12mmHg) and his vision improved to 6/18 with best corrected vision of 6/12. His CDR LE increased from 0.4 to 0.6.

### Case 3

A 71 year old Indian male, with underlying diabetes mellitus and hypertension has been under ophthalmology clinic follow up for his BE primary open angle glaucoma on two antiglaucoma (gutt timolast OM

BE and gutt xalatan ON BE). His baseline CDR is 0.9 both eyes. He also has no diabetic changes in both of his eyes. He also has undergone uneventful BE cataract surgery with BE post operative vision of 6/9. However on October of 2019 he was diagnosed with LE NVG for investigation of OIS/CRVO where he presented LE blurring of vision of perception of light all 4 quadrants, LE total hyphema with IOP 38mmHg. This patient was on aspirin 75mg OD but no history of trauma to the eye. His right eye has no diabetic retinopathy or any hypertensive changes. B scan of the LE shows clear vitreous. Patient was admitted to the ward and was treated acutely with all 4 antiglaucoma and intravenous acetazolamide together with topical steroids. Despite treatment given, the IOP still persistently high at 32mmHg and TSCPC was given at day 2 admission inferiorly 180 degree (18 shots x 1.5mw x 1.5sec). After 5 days in ward the IOP falls to 20mmHg and the hyphema also subsides. The oral acetazolamide was stopped. His vision improved to 6/36 ph 6/24. LE full PRP also commenced as the retina view is clear. The IOP is maintained below 20mmHg with 4 antiglaucoma until 3 weeks where the IOP increased back to 30mmHg. Oral acetazolamide was started again and the IOP able to maintain below 20mmHg. At 1 month post TSCPC, patient underwent uneventful LE trabeculectomy with mitomycin C and the IOP falls to 8 mmHg without any antiglaucoma. No anti-VEGF was given prior to the surgery. During his nine month follow up, his LE IOP maintain ranging 8-10mmHg without any antiglaucoma and his LE best corrected vision is 6/9.

### DISCUSSION

Neovascular glaucoma is secondary glaucoma which difficult to manage. It involved reducing the source of ischemia, controlling the intraocular pressure, as well as inflammation. Once NVG was diagnosed a comprehensive management is warranted. For a patient with good visual prognosis, it is a race against time.

To reduce the source of ischemia, pan retinal photocoagulation (PRP) should be initiated as soon as there's a fundus view. A good adequate laser treatment can induce regression of the NVG. A short term treatment such as intravitreal anti-vascular endothelial growth factor such as ranibizumab can also induce rapid regression of the new vessels (Moraczewski *et al.*, 2009). In the case series however, no anti-VEGF were given due to patients' financial constraints. The root cause of the ischemic drive such as diabetes mellitus should be managed properly. Prevention is better than

cure, hence diabetic retinopathy screening play an important role to detect early DR changes where patient should be managed with the medical team to control their DM. Patient who is newly diagnosed with central retinal vein occlusion (CRVO) also should optimize their comorbidities and be monitored closely for the new vessels at the angle.

Lowering the IOP as much as possible can prevent further damage of the optic nerve. Topical eyedrops such as prostaglandin analogues, beta blocker, carbonic anhydrase inhibitors, and alpha adrenergic agonist can be used. These medications will either reduce the aqueous production or increase its outflow thus reducing the IOP. Topical administrations however usually insufficient and require further surgical intervention. Topical steroids are used to reduce the intraocular inflammation as well as cycloplegics to reduce pain.

Cyclodestructive procedure such as TSCPC is an option used usually for poor prognostic eye. The procedure is hard to titrate to attain desired IOP control. It can also induce more inflammation intraocularly and excessive treatment can lead to hypotony and phthisis bulbi. However there were increasing reports of its usage as an early alternative for treating NVG (Yildirim *et al.*, 2009). As such in this case series, limited inferior 180 degree TSCPC can be useful and safe. Since the laser is not done fully for 360 degree, severe inflammation and hypotony could be avoided. The procedure was found to be useful to lower down the IOP further and buy some time before trabeculectomy with mitomycin C is done. It also preserved the conjunctiva superiorly where the bleb planned to be formed.

Trabeculectomy with mitomycin C were preferred in these cases as it is cheaper compared to GDD taking account patient's financial status. The success rate was reported up to 62.6% in 1 year and about 51% will decline in 5 years (Takahara *et al.*, 2009). GDD is a good option as the failure rate is less dependent on the inflammation compared to filtering bleb (Park *et al.*, 2011 and, Noor *et al.*, 2017).

## CONCLUSIONS

NVG requires comprehensive treatment in controlling the IOP, retinal ischemia, and inflammation either medically or surgically. In this case series, the role of limited inferior TSCPC found to be useful and safe to lower down the IOP and is a potential consideration to be included in the treatment algorithm as an early intervention before proceeding to filtering surgery in a good prognosis eye.

## Conflict of Interest

The author declares that they have no conflict of interest.

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