

## Role of Pan Retinal Photo Coagulation in The Management of Proliferative Diabetic Retinopathy

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### Abstract:

**Introduction:** Diabetic retinopathy is a micro vascular complication of both type 1 and type 2 diabetes mellitus. The prevalence of DR in south India was 17.6% and the prevalence of diabetic retinopathy (DR) in patients with diabetes was recently estimated to be 34.6% in rural central India. The causes for blindness being vitreous haemorrhage, tractional retinal detachment, macular oedema, epiretinal membrane in the natural course of the disease, approximately 50% of patients with very severe NPDR (non proliferative diabetic retinopathy) progress to PDR (proliferative diabetic retinopathy) within 1 year. This study explains the role of pan retinal photo coagulation in the management of proliferative diabetic retinopathy. Objectives of this study were to study the safety of pan retinal photocoagulation in the management of proliferative diabetic retinopathy patients and to study the effect of pan retinal photocoagulation in preventing blindness in proliferative diabetic retinopathy patients.

**Methodology:** This is an observational longitudinal study of 50 proliferative diabetic retinopathy patients who underwent pan retinal photocoagulation from May 2012 –October 2013 and were followed-up for 1 year.

**Results:** In the first group having visual acuity (6/18 -6/24), same visual acuity was maintained in 73.3% eyes. Visual acuity increased to 6/9-6/12 in 21.53% eyes and reduced to 5/60 in 5.17% eyes due to macular edema occurring post pan retinal photo coagulation or due to an advancement of the disease itself. There was regression of neo vascularisation seen at 6 weeks follow up, in the second group having visual acuity (6/36 - 6/60). In the third group, 29.4% eyes bettered to 6/36-6/60 vision, whereas 70.6% eyes maintained the same baseline visual acuity of 6/60.

**Conclusion:** Pan retinal photo coagulation is a safe and effective method to control the condition of diabetic retinopathy. Visual acuity is maintained as before and even improved after pan retinal photo coagulation at 1yr follow-up in majority of the cases.

**Keywords:** PRP-Pan Retinal Photocoagulation, NPDR- Non Proliferative Diabetic Retinopathy, PDR- Proliferative Diabetic Retinopathy

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### I. Introduction

Diabetic retinopathy is a micro vascular complication of both type 1 and type 2 diabetes mellitus. The condition is a leading cause of new onset blindness in many industrialized countries and is an increasingly more frequent cause of blindness elsewhere. WHO has estimated that diabetic retinopathy is responsible for 4.8% of the 37 million cases of blindness throughout the world<sup>1</sup>. In India, the reported prevalence of diabetic retinopathy varies between 5 and 28 percent<sup>2</sup>. Global prevalence of diabetic retinopathy was 93 million and 17 million with proliferative diabetic retinopathy<sup>3</sup>. The prevalence of DR in south India was 17.6%<sup>4</sup> and the prevalence of diabetic retinopathy (DR) in patients with diabetes was recently estimated to be 34.6% in rural central India<sup>5</sup>.

Rates of blindness in ETDRS patients following the development of proliferative retinopathy are remarkably lower. Legal blindness is reduced to less than 5 percent in 5 years for patients with proliferative retinopathy. Severe vision loss is reduced to 1%<sup>6</sup>. Diabetic retinopathy is the most frequent cause of new cases of blindness among adults aged 20-74 years. The World Health Organization under its vision 2020 initiative aims to control eye diseases, and diabetic retinopathy is one among them. The causes for blindness being vitreous haemorrhage, tractional retinal detachment, macular oedema, epiretinal membrane in the natural course of the disease, approximately 50% of patients with very severe NPDR (non proliferative diabetic retinopathy) progress to PDR (proliferative diabetic retinopathy) within 1 year.<sup>7</sup> This study explains the role of pan retinal photo coagulation in the management of proliferative diabetic retinopathy, in the last four decades pan retinal photocoagulation has become the standard of care for proliferative diabetic retinopathy<sup>8</sup>. It involves applying laser burns over the entire retina, sparing the central macular area. Neovascularization of the disc (NVD), is an early indicator of proliferative diabetic retinopathy requiring panretinal photocoagulation. It remains the gold standard for preventing blindness and maintaining baseline visual acuity in cases of proliferative diabetic retinopathy. Therefore this study aims at assessing the visual outcome following PRP in PDR patients.

Objectives of this study were to study the safety of pan retinal photocoagulation in the management of proliferative diabetic retinopathy patients and to study the effect of pan retinal photocoagulation in preventing blindness in proliferative diabetic retinopathy patients.

## II. Materials and Methods

This is an observational longitudinal study of 50 proliferative diabetic retinopathy patients who underwent pan retinal photocoagulation from May 2012 –October 2013 and were followed-up for 1 year.

**Inclusion criteria:** The patients included were those who presented with proliferative diabetic retinopathy.

**Exclusion criteria:** Patients presenting with advanced media opacities and maculopathy, with bad baseline visual acuity, nephropathy and other extra ocular complications were excluded from the study

**Method of Examination:** Detailed fundus examination was done using indirect ophthalmoscopy and slit lamp biomicroscopy with +90 D or+ 78 D lens. Fundus photographs were taken. The eyes were graded using ETDRS grading system. Ocular parameters were assessed at baseline and at follow-up visits by recording the best-corrected visual acuity, intraocular pressure, slit lamp examination, retinal examination and gonioscopy were done Fundus fluorescein angiography was done in 30 patients to confirm the presence of new vessels and to distinguish between severe non proliferative diabetic retinopathy and proliferative diabetic retinopathy. A complete PRP was performed with IRIDEX IRIS MEDICAL OCULIGHT G2 with wavelength of 532 nm. A total number of 2000-3000 burns were delivered using 300-500m spot sizes in two to three sittings. The number of visits and the number of burns needed to complete the initial treatment was also recorded. The fundus photographs were taken using TOPCON TRC 50DX RETINAL CAMERA. The need for additional laser treatment was decided by the clinical presentation, 3-6 months follow-up examinations. If the lesions persisted, further scatter photocoagulation was done. In cases of non-resolving vitreous haemorrhage affecting the vision or a traction retinal detachment, the patients were referred for vitrectomy and endolaser photocoagulation.

**Equipment Used:** Slit lamp biomicroscope-TOPCON, Indirect ophthalmoscope –KEELER, Fundus camera-NIKON WITH TOPCON IMAGENET, Argon laser-IRIDEX, 90D,78D,20D-OCULAR, Direct ophthalmoscope –HEINE 200 PLUS

## III. Results

A total of 130 eyes of 90 patients had received PRP during the study period. Of these 38 eyes of 30 patients lost follow-up due to death or change of address or some other illness. 92 eyes of 60 patients were followed-up. Of these 12 eyes of 10 patients received PRP initially elsewhere. Hence, 80 eyes of 50 patients were analyzed in the study.

Mean age group of the patients was 53yr. Mean duration of diabetes mellitus (DM) Type-I was 11 yrs. Sex distribution of proliferative retinopathy was Male-80%, Female-20%. The most affected age group was 51-60 yrs. In 31-40 age groups, only 1subject was male and no females, in 41-50 age groups 14 were males and 5 females. In 51-60 age groups, males were 19, females were 5 and 61-70 age group, males were 6 and only single female patient. Distribution of proliferative retinopathy was Early PDR-59 Eyes (73.7%), High risk PDR- 21 Eyes (26.25%).

**Base Line Visual Acuity and follow up**

Group	Visual Acuity	No. of Eyes	Percentage
1	6/18 -6/24	58	70.6%
2	6/36 -6/60	16	21.3%
3	5/60 – 3/60	6	8.2%
	Total	80	100%

Of these, in the first group same visual acuity was maintained in 73.3% eyes. Visual acuity increased to 6/9-6/12 in 21.53% eyes and reduced to 5/60 in 5.17% eyes due to macular edema occurring post pan retinal photo coagulation or due to an advancement of the disease itself. In the second group, 16.5% eyes improved to 6/24 vision, whereas 60.9% maintained the same and 22.6% reduced to 5/60. There was regression of neo vascularisation seen at 6 weeks follow up. Stabilization of the disease and resolution of macular edema helped in improvement of the visual acuity in this group. Recent onset of maculopathy resulted in decreased vision in 22.6% of the patients. In the third group, 29.4% eyes bettered to 6/36-6/60 vision, whereas 70.6% eyes maintained the same baseline visual acuity of 6/60. There was regression of new vessels seen after 6 weeks follow-up in 57% of the eyes.

#### IV. Discussion

The present study attempted to evaluate the visual outcomes of PRP. In the ETDRS, vitreous or pre-retinal haemorrhage was the major cause of visual loss and this is an important indicator for serious intraocular disease<sup>9</sup>. In a long-term study (10 years) on the visual outcome of PRP for PDR, progression of lens opacities, chronic macular oedema, vitreous haemorrhage, macular traction, and neovascular glaucoma were the main causes of visual loss.<sup>10</sup> In our follow up of 1 year we found no vitreous hemorrhage or pre retinal hemorrhage but macular oedema was found.

In the present study Panretinal photocoagulation is well tolerated by the patients, without interfering significantly with their quality of life in accordance with the study made by Tsilimbaris MK et al all studied on 20 patients with bilateral proliferative diabetic retinopathy treated with panretinal photocoagulation his study revealed that Panretinal photocoagulation although destructive in nature, is well tolerated by the patients, without interfering significantly with their quality of life<sup>11</sup>

PRP significantly reduces the risk of severe vision loss in PDR patients by 50% in accordance with the study done by ETDRS and DRS control trials. In our study also, 80 eyes who underwent PRP visual acuity improved in 21.1%, visual acuity was maintained in 70.6% and decreased in 8.2% which was more than the ETDRS and DRS studies.<sup>12,13</sup>

In the present study, most of the patients who had under gone pan retinal photocoagulation maintain good visual acuity which is in accordance with the study done in 2003 by Chew EY et al<sup>14</sup> who conducted a follow up study of the 214 surviving patients enrolled originally at the Johns Hopkins Clinical Center for the Early Treatment Diabetic Retinopathy Study (ETDRS), which was a clinical trial designed to evaluate the role of laser photocoagulation and aspirin treatment in patients with diabetic retinopathy. It was concluded that laser treatment seems to be associated with maintenance of good long-term visual acuity for most patients. The need for laser scatter photocoagulation with long-term follow-up seems to be high.

#### V. Conclusion

To prevent development of retinopathy, it is necessary to carry out regular ophthalmic check-up, to qualify the patients for pan retinal photo coagulation as early as possible. Pan retinal photo coagulation is a safe and effective method to control the condition of diabetic retinopathy. The best functional results are achieved in early proliferative diabetic retinopathy eyes than in high risk PDR. More number of cases presented with peripheral retinal neo-vascularisation and there is good regression of these new vessels elsewhere with pan retinal photo coagulation. Visual acuity is maintained as before and even improved after pan retinal photo coagulation at 1yr follow-up in majority of the cases.

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