



Original Article

INCIDENCE OF COMPLICATIONS IN SINGLE VS MULTIPLE TREATMENT SESSIONS OF GREEN LASER PANRETINAL PHOTOCOAGULATION FOR PROLIFERATIVE DIABETIC RETINOPATHY.

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ABSTRACT

Purpose: To determine the incidence of complications in single Vs multiple treatment sessions of green laser panretinal photocoagulation for Proliferative diabetic retinopathy.

Design: Hospital based multicentre prospective randomized study

Place: Ophthalmology Department, Peoples University of Medical & Health Sciences Nawabshah(SBA) and Shaheed Mohtarma Banazeer Bhutto Medical University Larkana.

Duration: One year

Materials and Methods: A one year prospective randomized study was carried out in 100 eyes of 60 patients undergoing Panretinal photocoagulation for Proliferative diabetic retinopathy at Department of Ophthalmology Peoples University of Health sciences Hospital between March 2009 to March 2010. Fifty Patients were treated with Argon green laser in four sessions with fifteen days interval, Proforma being given to patients for record to be presented at each visit while 50 in single session. Follow up was done at first week, one month and six months after completion of sessions. Post laser complication were recorded. Patients having Proliferative diabetic retinopathy were included in the study while patients with poor media, macular edema and unable to follow were excluded from the study.

Results: Out of 50 eyes of single session 2 developed Glaucoma, it was detected in the first two days of Pan Retinal Photocoagulation and subsided in subsequent days . One eye developed serous choroidal detachment which subsided in 4 weeks and another developed clinical macular edema which subsided at within a month follow. The other group with multisession did not developed any complication.

Conclusion: Multiple sessions of retinal photocoagulations carries lesser risk of complications and is safer procedure as compared to single session.

Key words: Pan Retinal Photocoagulation, Single session vs Multisession, Proliferative Diabetic retinopathy, Macular edema, Glaucoma, Choroidal detachment, Ciliochoroidal effusion.

INTRODUCTION:

Ocular photocoagulation uses heat produced through the absorption of light by ocular pigments. Thermal damage is caused by chemical changes that result when the ocular tissues are heated to temperatures high enough to denature proteins or other large molecules^{1,2,3}. Photocoagulation is used in the management of retinal diseases such as diabetic retinopathy, diabetic maculopathy, subretinal neovascularization, retinal vascular abnormalities, and retinal breaks or tears of various types³. Panretinal green laser photocoagulation (PRP) is commonly performed for the treatment of proliferative diabetic retinopathy, ischemic central retinal vein occlusion, and other causes of retinal ischemia⁴. Complications of PRP include thermal injury to the cornea, iris and lens, visual

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field loss, vitreous haemorrhage, macular edema, ciliochoroidal effusion, anterior chamber depth alteration and elevated intraocular pressure with or without angle closure^{4,5,6}.

Many investigators have reported a transient elevation during the first few hours after panretinal photo coagulation^{7,8}. These changes are due to the exudation of fluid from the choroids and retina. The exudation of fluid into the posterior segment causes a forward displacement of the lens-iris diaphragm. The forward movement of the iris-lens diaphragm often is associated with a rise in the intraocular pressure. The pressure probably rises because exudation of fluid into the posterior segment occurs faster than aqueous fluid can leave the anterior chamber through the trabecular meshwork, and the outflow facility usually is decreased. Another possible pathogenic mechanism is compression of episcleral veins by the flange of the fundus contact lens used in delivering the photocoagulation treatment⁹.

Ciliochoroidal effusion develops commonly after panretinal photocoagulation¹⁰. Serous choroidal detachment involves transudation of serum into the suprachoroidal space and detected by ultrasound biomicroscopy until otherwise gross. Ultrasound biomicroscopy is an imaging technique that uses high frequency ultrasound (20~55 MHz or even higher, compared to 3~15 MHz in conventional clinical ultrasound systems) to produce images of the eye at near microscopic resolution¹¹.

Macular edema can develop after PRP in patients with severe diabetic retinopathy with good visual function¹².

Shallowing of the anterior chamber may occur following PRP. Two mechanisms have been suggested. First is swelling of ciliary body, other is damage to veins returning blood from the ciliary body to the choroidal vortex system¹³.

METHODOLOGY:

A one year prospective randomized study was carried out in 100 eyes of 60 patients undergoing Panretinal photocoagulation for Proliferative diabetic retinopathy at Department of Ophthalmology Peoples University of Health sciences Hospital & Shaheed Mohtrama Banazir Bhutto Medical University between March 2009 to March 2010. Out of 100 eyes 50 underwent PRP in single session and 50 gone through PRP in 4 sessions with 15 days interval after informed consent. Major eligibility criteria in both groups considered

was patients with age of 18 and above, having type 1 or 2 diabetes, proliferative stage of diabetic retinopathy, no clinical diabetic macular edema were included while patients with poor media, earlier laser applications to the retina and those unable to follow were excluded from the study. Pre and Post laser Best corrected Visual acuity were recorded.

In single sitting total 1200-1600 burns (ETDRS protocol) were applied with topical anesthesia and slit lamp delivery system. In multisession 4 sittings with 2 weeks interval, 300 burns in each sitting were applied.

Laser parameters adjusted were:

Follow up was done at first week, one month and six months after completion of sessions. Post laser complications were recorded. Applanation tonometer was used to measure intraocular pressure, slit lamp biomicroscopy and indirect ophthalmoscope was used to see retinal changes.

RESULTS:

Both groups that is single session and multisession were observed on followup for development of any complication. Out of 50 eyes in single session 2(4%) developed glaucoma. The onset was within 2 days of laser photocoagulation and subsided in a week. One eye(2%) developed serous choroidal detachment which subsided in 4 weeks and another(2%) developed clinical macular edema which subsided within a month followup. The macular edema was associated with decrease in vision. The other group with multisession

TABLE 1

Burn size	200 microns
Burn duration	0.05-0.2 sec.
wavelength	Green to yellow
Intensity	Standard mild white burns
Duration	One burn width apart, no closer than one row within the arcades and two disc diameters temporal to the fovea
Extent	Arcades to at least equator

**Table 2:
Best corrected visual acuity in single session PRP**

Best corrected V/A	Pre PRP	Post PRP,1 st week	Post PRP,1 st month	Post PRP,6 th month
6/6-6/12	42(84%)	41(82%)	42(84%)	42(84%)
6/18-6/24	06(12%)	06(12%)	06(12%)	06(12%)
6/36-6/60	02(4%)	03(6%)	02(4%)	02(4%)

**Table 3:
Best corrected visual acuity in multisession PRP**

Best corrected V/A	Pre PRP	Post PRP,1 st week	Post PRP,1 st month	Post PRP,6 th month
6/6-6/12	42(84%)	42(84%)	42(84%)	42(84%)
6/18-6/24	06(12%)	06(12%)	06(12%)	06(12%)
6/36-6/60	02(4%)	02(4%)	02(4%)	02(4%)

did not develop any complication.

DISCUSSION:

Ongoing work is being done to identify the complications developing after PRP and also to minimize those complication by modifying the machine, technique and approach to the patient. The Diabetic population in Pakistan was estimated at 6.9 million in 2007 and it is projected to reach 11.5 million by the year 2025 with Pakistan ranking 5th in the IDF list¹⁴. DR is a major cause of blindness in around 4% of patients suffering from type-I Diabetes, and 1.6% of those suffering from type-II Diabetes¹⁵. PRP one of the main weapon against the vision threatening complications of diabetic retinopathy is available in the tertiary care centers of our country. Despite of the fact of patient's poor responsiveness to visit for PRP, we have investigated other factors which limits single versus multiple session PRP.ETDRS^{16,17} guidelines for setting parameters for PRP have reduced the incidence of post PRP complications . Incidence of complications while PRP done in a single visit as compared to multiple visits is still debatable.

Early transient rise in intraocular pressure is more common when PRP done in single session⁷, this fact reflects back from our study where 4% of eyes in single session developed rise in intraocular pressure but was transient and subsided in a week.

Choroidal detachment prevalence can be 40%¹¹ to 90%¹⁸ of PRP cases within three days but subsides in Seven days completely . The larger treated area was shown with the more development of choroidal detachment. This was in comparison to our study where only 2% showed serous choroidal detachment. This was because of the high frequency ultrasound available in prior studies which picks the nonclinical choroidal detachments.

Macular edema was found clinically in 2% of our cases with single session PRP which was correlated directly with the reduction in visual acuity lines while multisession had no change on macula.This was in comparison to Diabetic retinopathy clinical research network study¹⁹ showed 13% of eyes in single session at day 3 follow of PRP developed decrease in visual acuity of 10 words while 2% of the multisession group lost that much vision.This corresponded to the topographic changes in the retina where the central foveal thickness at day 3 increased to 9um in single session while 5um in 4th sitting group.While in another study²⁰ PRP had no effect on macular thickness and visual acuity in patients with severe DR without macular edema, which was determined by clinical and optical coherence tomography examination.

Dividing the PRP treatment into two or more sessions can help minimize the occurrence of adverse effects. More sessions are preferred when there is a greater risk of macular edema, decreased patient tolerance, or less clinical urgency. Some may treat one quadrant at a time in the appropriate clinical situation²¹.

Having a two-week interval between treatments is thought to be beneficial in minimizing macular edema and choroidal effusion²²
Fig: PRP, Panretinal photocoagulation

CONCLUSION:

“Multiple sessions of retinal photocoagulations carries lesser risk of complications and is safer procedure as compared to single session”.

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