

To Compare the Efficacy and Safety of Diode Laser Cyclophotocoagulation and Cyclocryotherapy in Refractory Glaucoma in Kashmiri Population

Rahila Ramzan¹, Asif Amin Vakil², Sabia Rashid³

¹Senior Resident, Post Graduate Department of Ophthalmology, GMC Srinagar.

²Assistant Prof. Post Graduate Department of Ophthalmology, GMC Srinagar.

³Prof. Post Graduate Department of Ophthalmology, GMC Srinagar.

Corresponding Author: Rahila Ramzan

ABSTRACT

Objective: To compare the efficacy and safety of Diode Laser Cyclophotocoagulation and Cyclocryotherapy in Refractory Glaucoma in Kashmiri Population

Material and method: 60 patients, who presented to the Department of Ophthalmology, Govt. Medical College Srinagar between July 2016 and May 2018, were included in the study. Patients of both genders, ranging from 1 to 62 years of age, were included in the study. This is a prospective, interventional case series involving 60 eyes of 60 patients with refractory glaucoma and no previous cycloablation.

Results: 60 eyes of 60 patients were treated. All patients completed at least 6 months follow up and were included in the study. Mean follow up was 11 months ranging from 6 months to 22 months. Mean age of the patients was 41 years. (Range 1-62 years). Visual acuity was PL to 6/60. The mean pre treatment IOP of 60 eyes (of 60 patients) was 50.9 ± 12.8 mmHg. In CDP Group Mean IOP at 1, 6 and 12 months was 24.9 ± 12.0 mmHg, 26.9 ± 10.7 mmHg and 27.8 ± 10.9 mmHg respectively. In Cyclocryo Group Mean IOP at 1, 6 and 12 months was 34.1 ± 11.0 mmHg, 29.9 ± 9.8 mmHg and 31.8 ± 8.7 mmHg respectively.

Conclusion: Transscleral diode laser cycloablation is highly effective in lowering intraocular pressure with less complication rate as compared to cyclocryotherapy. High success and low complication rate combined with portability, durability and easy to learn technique makes diode laser cycloablation the treatment of choice for refractory and complex glaucoma.

Key words: VA (Visual acuity); CDP (cyclophotocoagulation); IOP (Intraocular pressure); PL (Perception of light)

INTRODUCTION

Refractory glaucoma is the term used for glaucoma resistant to conventional management. [1] This includes maximally tolerated medical therapy, one or more than one glaucoma surgeries with or without antimetabolites. Multiple factors contribute to the failure of intraocular pressure control during glaucoma management. Glaucoma more likely to become refractory includes

neovascular, inflammatory, post retinal surgery, post traumatic and rare conditions like aniridia and congenital anterior chamber anomalies. Cyclodestructive procedures are used when glaucoma becomes resistant to conventional medical and surgical procedures. These procedures destroy the non pigmented and pigmented epithelium of the ciliary body leading to decrease in aqueous production and thus

drop in intraocular pressure. Modalities tried for cyclodestruction are cryotherapy and laser photocoagulation of the ciliary body using energy of different wavelengths. [2-7] Of these cyclocryotherapy and Nd: YAG laser cyclophotocoagulation are more commonly used.

Several method used when an initial filtering procedure is not adequate to control the refractory glaucoma and when resumption of medical therapy, revision of original surgery, repeat filtering surgery at a new site, or aqueous shunt implantation is not successful; finally all cyclodestructive procedures reduce aqueous secretion by destroying part of the secretory ciliary epithelium portion of the ciliary body including cyclocryotherapy, contact and non-contact trans-scleral thermal lasers such as continuous-wave with the 1064-nm Nd:YAG, argon, and portable 810-nm semiconductor Diode laser. [8-11]

Cryotherapy, the original technique, is increasingly being supplanted by laser photocoagulation, originally with the 1064-nm Nd: YAG laser and lately with the portable 810-nm semiconductor Diode laser. [9-10] Laser cycloablation is generally considered to be better tolerated and perhaps more effective than cyclocryotherapy. [10-11]

MATERIALS AND METHODS

This is a prospective, interventional case series involving 60 eyes of 60 patients with refractory glaucoma and no previous cycloablation. All patients signed an informed consent for the Ciliary body ablation procedures, after an explanation of the risks and benefits. Ethical clearance has been taken from Ethical clearance Committee of GMC Srinagar. Cyclophotocoagulation was performed under local anaesthesia (A sub-Tenon or peri bulbar) with the Laser settings arc 1.5-2 sec and 1500-2000 mW with semiconductor Diode laser system (810 nm laser wavelength) with a spherical polished tip oriented by a handpiece, "G-Probe." Duration was set at 2000 ms (2 seconds), and the initial power setting was 1750 MW.

After the edge of the probe is aligned with the limbus, approximately 17-19 applications are placed 270° around the limbus, with a power of 1.5-2 Wand a duration of approximately 2 seconds The power was increased in 250 MW increments to a maximum of 2000 MW until an audible 'popping' sound is heard, and then the power was reduced by 250 MW to just below that level. Approximately 2-40 burns arc (typically five per quadrant for 270 degrees of treatment) placed 1.2 mm posteriorly to the limbus over 180 °but avoiding the posterior ciliary nerves at 3 and 9 o'clock. In all cases, the probe tips were carefully examined.

In Cyclocryotherapy with the 2.5mm tip, anterior edge of the probe is placed 1mm from the corneolimb junction.3-4 cryo applications per quadrant are applied. A strong topical steroid is prescribed hourly on the day of treatment and then q.i.d. for 2 weeks. Oral non-steroidal anti-inflammatory agents are prescribed for 2 days.

Preoperative antiglaucoma medication was continued for one week. Patients were examined on the first and second postoperative days, one week, weekly for one month then monthly for eight months. Success was defined as postoperative IOP of 21 mmHg or less. Statistical analysis was done through paired t-test.

RESULTS

Table 1: Diagnostic Groups of Eyes undergoing treatment.

Type of Glaucoma	No. of Eyes
Neovascular glaucoma	19
Post retinal surgery glaucoma	14
Secondary angle closure glaucoma	04
Post Traumatic glaucoma	01
Steroid induced glaucoma	04
Primary open angle glaucoma	18
Total	60

Table 2: No. of laser sessions

No of sessions	CDP	Cryotherapy
	No of eyes n (%)	No of eyes n (%)
01	06 (20)	00 (00)
02	21 (70)	10 (33.3)
03	03 (10)	20 (66.6)
Total	30	30

Table 3: Mean intraocular pressure at baseline and follow-up. (CDP Group)

Time of Follow-up	Mean IOP(mm Hg)	ANOVA p value
Baseline	50.9 ± 12.8	
4 weeks	24.9 ± 12.0	< 0.001
24 weeks	26.9 ± 10.7	< 0.001
48 weeks	27.8 ± 10.9	< 0.001

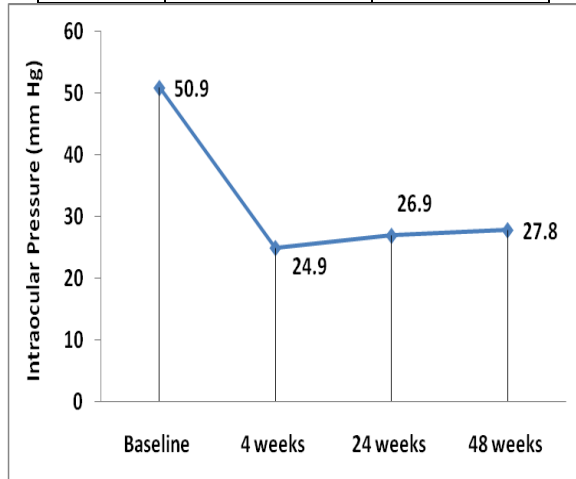


Fig.1: Mean intraocular pressure at baseline and follow-up. (CDP Group)

Table 4: Mean intraocular pressure at baseline and follow-up. (Cryotherapy Group)

Time of Follow-up	Mean IOP (mm Hg)	ANOVA p value
Baseline	50.9 ± 12.8	
4 weeks	34.1 ± 11.0	< 0.001
24 weeks	29.9 ± 09.8	< 0.001
48 weeks	31.8 ± 08.7	< 0.001

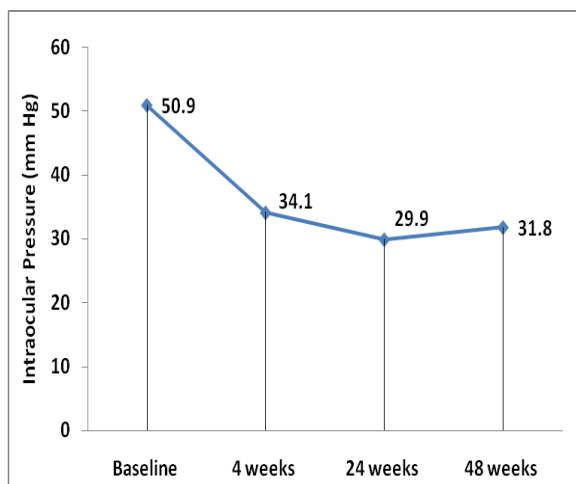


Fig.2: Mean intraocular pressure at baseline and follow-up. (Cryotherapy Group)

Table 5: Complications

Complications	CDP	Cryotherapy
	No of eyes n	No of eyes n
Anterior segment inflammation	02	04
HypHEMA	01	03
Moderate to severe pain	04	08
Hypotony	01	07
Vitritis	00	01
Neurotrophic ulcer	00	02
Total	08	25

RESULTS

60 eyes of 60 patients were treated. All patients completed at least 6 months follow up and were included in the study. Mean follow up was 11 months ranging from 6 months to 22 months. Mean age of the patients was 41 years. (Range 1-62 years). Visual acuity was PL to 6/60. The diagnostic groups of patients receiving treatment are shown in Table 1. Neovascular glaucoma was found to be the most common cause of refractory glaucoma in our patients followed by Primary open angle glaucoma and post retinal detachment surgery.

The mean pre treatment IOP of 60 eyes (of 60 patients) was 50.9 ± 12.8 mmHg. The effect of treatment at 1, 6 and 12 months is shown in Fig 1.

In CDP Group Mean IOP at 1, 6 and 12 months was 24.9 ± 12.0 mmHg, 26.9 ± 10.7 mmHg and 27.8 ± 10.9 mmHg respectively.

In Cyclocryo Group Mean IOP at 1, 6 and 12 months was 34.1 ± 11.0 mmHg, 29.9 ± 09.8 mmHg and 31.8 ± 08.7 mmHg respectively.

Maximum number of treatment sessions in our patients were 3 (Table 2). There were 3 eyes (10%) and 20 eyes (66.66%) that received treatment thrice in CDP Group and cryotherapy Group respectively. 21 (70%) and 10 eyes (33.3%) that received treatment twice in CDP Group and cryotherapy Group respectively and 06 (20%) eyes and (0%) eyes that received treatment once in CDP Group and cryotherapy Group respectively.

Complications are tabulated in table 5. In our study we observe more complications in cyclocryo group as compared to CDP group.

DISCUSSION

Diode laser cycloablation has developed an acceptable track record for the treatment of refractory glaucoma. [12-14] It has also been tried as a primary surgical treatment in different types of glaucoma. [15-17] Complications profile is acceptable and most authors have reported insignificant and

transient complications like pain and inflammation. [18-20] Some surgeons are trying it as an alternative to drainage implant surgery in complex glaucomas. [21]

No standard protocol has yet been agreed upon for the energy settings. Different settings have been used ranging from 1.5 Watts to 2.5 Watts for 1-2 seconds. [22-24] We used a power of 1.8-2.1 W titrating with the pop sounds. Spencer and Vernon used a fixed setting and did not alter it to hear the pop sound. [24]

In our study the mean pre treatment IOP of 60 eyes (of 60 patients) was 50.9 ± 12.8 mmHg. The effect of treatment at 1, 6 and 12 months is shown in Fig 1. In CDP Group Mean IOP at 1, 6 and 12 months was 24.9 ± 12.0 mmHg, 26.9 ± 10.7 mmHg and 27.8 ± 10.9 mmHg respectively.

In Cyclocryo Group Mean IOP at 1, 6 and 12 months was 34.1 ± 11.0 mmHg, 29.9 ± 09.8 mmHg and 31.8 ± 08.7 mmHg respectively.

This is comparable to other studies mentioned above where a decrease of 20%-65% in mean IOP has been reported.

Regarding the number of treatment sessions again there is no agreement on how many times the procedure should be repeated. Spencer and Vernon repeated the procedure up to five times. [24] We had a maximum of 3 sessions in our series. Brancato et al [20] and Bock et al [25] had a retreatment rate of 65% and 70% respectively. Nouredin et al [22] recommend that a high power setting results in better IOP control and lesser need for re-treatments.

Most serious adverse effects of this therapy are hypotony and phthisis. Rates reported are highly variable. In our series there was no case of phthisis and hypotony occurred only in 1 patient in CDP Group and in 07 patients in Cyclocryo Group.

CONCLUSION

Cyclocryotherapy was the most commonly used method previously but it has now been replaced by Laser Cyclophotocoagulation, which causes less

pain and is associated with less inflammation, hypotony and phthisis. Our results confirm that transscleral diode laser cycloablation is highly effective in lowering intraocular pressure with less complication rate as compared to cyclocryo therapy. High success and low complication rate combined with portability, durability and easy to learn technique makes diode laser cycloablation the treatment of choice for refractory and complex glaucoma.

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How to cite this article: Ramzan R, Vakil AA, Rashid S. To compare the efficacy and safety of diode laser cyclophotocoagulation and cyclocryotherapy in refractory glaucoma in Kashmiri population. *Int J Health Sci Res*. 2018; 8(8):41-45.
