The Role of Dynamic Ultrasound Biomicroscopy in Defining Laser Treatment in Pigment Dispersion Syndrome/ Pigmentary Glaucoma. A Case Series

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ABSTRACT
Background: To assess utility of Dynamic UBM (in light & dark room illuminations) in deciding laser Iridotomy in Pigment Dispersion Syndrome(PDS)/ Pigmentary Glaucoma (PG)
Method: Prospective interventional cohort study. Eyes with PDS/PG underwent UBM under light & dark by same operator. Presence of Iris Concavity(IC), Iridolenticular Contact(ILC), Iridozonular Contact(IZC) & Irido-Ciliary Process Contact(ICC) were quantified & LASER Iridotomy was advised. Post-LASER, UBM was redone at 4-6 weeks & later.
Results: UBM was done in 10 eyes of 6 pts with PDS/PG. 4 eyes (40%-group 1) had IC under light with ILC. In 6 eyes (60%; group2) UBM was redone under dark, picking up IC in 5 eyes (50%). In group 2,5 eyes had ILC (1 eye each with IZC & ICC also). 8 of the advised 9 eyes underwent Nd-YAG PI. 6(75%) eyes showed reversal of reverse pupillary block at mean follow up of 11.33wks.
Conclusion: UBM in different room illuminations can be useful in deciding LASER treatment in PDS/PG to restore normal iris configuration.
Key words: UBM, Laser Treatment, Glaucoma, Biomicroscopy

INTRODUCTION

Pigment dispersion syndrome (PDS) is characterized by a persistent loading of iris pigments in the trabecular meshwork(TM). Pigmentary glaucoma (PG) is a secondary open-angle glaucoma (Pavlin) which features elevated intraocular pressure (IOP) and functional or morphological glaucomatous damage in addition to features of PDS. PDS eyes are potentially at risk of PG. It is more commonly associated with myopia and young males. PDS/PG demonstrate a change in the anatomical structure of iris (posterior bowing of the peripheral iris) that leads to recurrent contact of the iris pigment epithelium and lens-zonular diaphragm, causing dispersion of iris pigments. Bowing of the iris also occurs in conditions such as during blinking, accommodation or physical exercise. But along with iris bowing the lens concavity also increases, creating a ‘reverse pupillary block’ under these conditions. Using ultrasound Biomicroscopy (UBM), the presence of iris concavity (IC) and irido-zonular contact (IZC) in PDS eyes was first showed by Potash et al. It was also proved that laser Iridotomy could restore a normal iris configuration.

This is a Case Series of PDS/PG patients evaluated with dynamic UBM. The term ‘dynamic’ here refers to the measurement of the various outcome measures in terms of darkness (closed dark room) and brightness (normal room illumination). Here different parameters were assessed in these TWO states to identify any significant differences between the two settings and to define the utility of this dynamic UBM procedure & its relation with the Post Laser Iridotomy results for PDS/PG in terms of the outcome measures.

PURPOSE: To assess the utility of UBM, in light and dark room illumination, in deciding the treatment of PDS/pigmentary glaucoma with Nd-YAG Laser Iridotomy.
Outcomes Measures:
1. Primary Outcome: [A] evidence of reverse pupillary block/Irido-Lenticular Contact/ Irido-Zonular Contact/ Irido-Ciliary Contact under dark illumination only, on UBM; [B] Reversal of reverse pupillary block after Nd-YAG peripheral iridotomy as documented on UBM.
2. Secondary outcome: [A] IOP control

MATERIALS AND METHODS
It is a Prospective, Interventional Case Series study carried out at Glaucoma Services, Sadguru Netra Chikitsalaya, Chitrakoot. The period of study was from Nov’ 2010- May’ 2011.

Inclusion Criteria: PDS was identified by: (i)a positive phenylephrine test (i.e., noticeable pigment dispersion into the anterior chamber after pupil dilatation) and/or mid-peripheral radial iris trans-illumination defects, and/or Krukenberg spindle (Fig1) on Slit Lamp Examination, (ii) hyperpigmentation of TM on gonioscopy (Fig 2); and PG which was diagnosed in those patients presenting as above who also showed: (i) glaucomatous visual field (VF) defects in at least one eye (ii) optic disc cupping consistent with a glaucomatous optic neuropathy; and (iii) IOP may or may not be raised.

Exclusion Criteria: eyes with (1) any previous intra-ocular surgery and/or laser application, (2) neurological diseases inducing visual field defects, (3) trauma, (4) Fig1 (above) PEX syndrome (5) Inflammatory glaucoma.

A baseline complete ophthalmological evaluation was performed, consisting of: best corrected visual acuity assessment (BCVA) using the Snellen’s chart, slit-lamp examination (Fig 1), gonioscopy (Fig 2), Goldmann applanation tonometry (GAT) and fundoscopy (ONH/RNFL seen using 78 D lens). Two consecutive automated perimetry evaluations were performed with an automated visual field analyser (Humphrey 24-2 SITA–Standard program; Carl Zeiss Meditec Inc., Dublin, California, USA).

All those patients who were diagnosed to have PDS or PG, using above methods were then divided into 2 groups: Group 1: eyes having anatomical features of PDS/PG in normal room illumination on UBM; Group 2: eyes without anatomical features of PDS/PG in normal room illumination on UBM (Fig 2).

Both the groups underwent a UBM examination (immersion technique; no pharmacological mydriasis), first under normal room illuminated state and then under dark illuminated state. The following parameters were assessed on UBM (Ultrasound Biomicroscope, Appasamy, 50 MHz transducer) using the linear calliper provided by the instrument software, measuring to the first decimal position:
• Iris–lenticular contact (ILC): It was seen along the posterior border of the iris pigment epithelium from the pupillary border to the point at which the iris is seen to separate from the anterior lens capsule.
• Irido-zonular touch (IZT): measured along the edge of the lens to a point where the iris touched the zonule of the crystalline lens.
• Irido-ciliary contact (ICC): measured along the edge of the ciliary body to a point where the iris contact was present.

On UBM, all PDS/PG eyes with concave iris in normal room illumination and also those that were picked up in dark illuminated state were advised to undergo Nd:YAG laser peripheral iridotomy (PI). These parameters also gave us the clue to the ‘reverse pupillary block’ before laser treatment & more importantly the reversal of the ‘reverse pupillary block’ after the treatment when the patient was followed up in 1-4 weeks.
under normal room illumination with ILC. Group 2 comprised of the rest 6 eyes (60%).

When UBM was repeated under dark illumination in the group 2 patients it was able to pick up concavity of iris in 5 more eyes (50% of total eye taken for the study). In group 2, 5 eyes had ILC among which 1 eye each had IZC & ICC. 9 eyes of the total 10 eyes were advised Nd-YAG PI, out of which 8 underwent the procedure. At a mean follow up of 11.33 weeks, out of the 8 eyes which underwent Nd-YAG PI, 6 eyes (75%) showed reversal of reverse pupillary block or regaining of normal iris configuration.

On evaluating IOP (secondary outcome), the decrease in the IOP level was evident in those eyes which had an initially raised levels, corroborating to the treatment offered.

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**DISCUSSION**

In this study we conducted UBM under different room illuminations to identify the anatomical features capable of differentiating the active dispersion of pigments from the normal iris. In particular, the most important feature was related to the dynamics of the iris itself which has been proven by various previous studies. Accommodation during UBM with a fixed target has picked up fine details with relation to PDS/PG has also been studied. In our study we aimed at dealing with those eyes which had early anatomical changes of PDS/PG and also those patients who had difficulty in accommodating or were unresponsive or uncooperative to the command of the operator while conducting the UBM examination. As the clinical examination and the UBM were conducted by an experienced single examiner (TN), the risk of errors in identifying the various ocular structures was minimized.

So UBM under different room illuminations was found to be of great assistance in diagnosing various parameters of PDS/PG like ILC, IZC & Reverse Pupiliary Block. It would help diagnose subtle findings in PDS/PG eyes, those unresponsive and uncooperative patients and also in those patients having accommodation insufficiency.

**CONCLUSION**

UBM evaluation in different room illuminations detected subtle features of PDS/PG in 5 out of 6 eyes (83.33%) which did not have iris concavity or ILC in baseline conditions (normal room illuminations). Nd:YAG laser Iridotomy was performed in 8 eyes, out of which normal iris configuration was restored in 6 (75%). Therefore conducting UBM in different room illuminations can be of assistance in early diagnosis of PDS/PG and in deciding the LASER treatment in PDS/PG to restore the normal iris configuration although prospective randomized studies are still required to prove this aspect.

**REFERENCES**


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