

Case Report

Descemet's Membrane Injury Post YAG Peripheral Iridotomy

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Abstract: Neodymium: Yttrium - Aluminium-Garnet (Nd YAG) laser iridotomy is one of the most common laser procedures performed in the Asian continent as the proportion of Angle closure glaucoma cases is significant. The Nd YAG iridotomy appears to be a simple outpatient procedure but can result in a number of complications including haemorrhage, cataract formation, dysphotopsia, intraocular pressure elevation and corneal endothelial damage resulting in corneal decompensation at a later date. A forty one year old female patient, a case of Primary Angle Closure Suspect (PACS), who had undergone a Nd YAG laser iridotomy of both the eyes elsewhere presented to us for a second opinion. The anterior segment examination was unremarkable except for the bilateral peripheral Iridotomies. The slit lamp examination revealed three small defects in the temporal cornea at the level of the Descemet's membrane and posterior stroma overlying the iridotomy in the right eye. A specular microscopy did not reveal any endothelial damage or change in the cell morphology overlying the iridotomy or in other areas. Anterior segment Ocular Coherence Tomography (OCT) demonstrated the exact nature of the injury to the Descemet's membrane. To the best of our knowledge, it's the first case report in the literature of a Descemet's membrane injury following a ND-YAG laser iridotomy. It emphasizes the importance of accurate focus on the iris and choosing a quadrant with adequate distance between the iris and the cornea to avoid injury to surrounding structures.

Keywords: Descemet's Membrane Injury, Yag Laser PI, Laser Complications, Corneal Decompensation

1. Introduction

Glaucoma is currently the leading cause of irreversible blindness the world over [1]. Primary angle closure glaucoma is estimated to cause blindness in two to five times as many subjects as primary open angle glaucoma [2, 3]. Studies reveal that 22% of the subjects with primary angle closure suspect may progress to primary angle closure and that 28.5% of primary angle closure subjects may develop primary angle closure glaucoma within 5 years if no treatment is prescribed [4].

Laser peripheral iridotomy is considered as the standard treatment modality for primary angle closure suspect. It is considered as a simple and non-invasive technique that can be completed in an outpatient setting without the risks and severe complications associated with any invasive surgery [5, 6, 7]. Although there is low complication rate with peripheral

iridotomy but there is controversy regarding safety of this procedure for corneal endothelium, especially with respect to corneal decompensation [8-11]. Descemet's membrane injury after Laser Peripheral iridotomy is extremely rare. This case report intend to describe the possibility of descemet's membrane injury after Laser iridotomy with the aid of Anterior segment optical coherence tomography and specular microscopy for the first time in literature.

2. Case Report

A 41-year-old female came for a routine eye checkup in the OPD. She had a history of undergoing bilateral ND Yag LASER Peripheral iridotomies 6 months back. At presentation, the patient had a best-corrected visual acuity of 6/6 in both eyes. The refractive prescription was noted to be +0.50 DS in right eye and +0.50 DS/ -0.25DC * 130° in left eye with +0.75 add in both eyes. Her Intraocular pressure

was 13 mmHg in right eye and 14 mmHg in left eye without any anti glaucoma medications. There was no family history of glaucoma. Slit Lamp evaluation of right eye revealed three small circular defects in the Descemet's membrane present about 2mm inside of the temporal limbus just above the lasered PI overlying compact and clear cornea (Figure 1). The left eye had a large PI present nasally and a compact clear cornea. On fundus examination her cup disc ratio was 0.2:1 in both eyes with healthy neuroretinal rim and the rest of the ocular examination was normal. The corneal thickness was 589 μ m in right eye and 588 μ m in left eye. Visual fields performed on Humphrey Field Analyzer with 24-2 program and Sita Standard strategy were normal and VFI was 100% in right eye and 99% in left eye. OCT Nerve Head and RNFL report was within normal limits. Specular microscopy for central cornea revealed comparable findings in both eyes in terms of cell density (RE-2532, LE-2561), coefficient of variation (RE- 42, LE - 44), hexagonal architecture (RE - 36, LE - 39) and number of cells screened per mm³ (RE- 232, LE - 254). The endothelial cell morphology in the specular image showed no abnormality. Specular image around the lesion could not be obtained due to extreme periphery. Anterior- segment OCT picked up two defects in the Descemet's membrane of approximately 136 μ m and 149 μ m diameter in right eye (Figure 2) however left eye appeared normal. There was a hyperdense area in the mid stroma as well showing mid stromal scarring due to thermal burn. The anterior chamber angle was 31.44 degree in right eye and 20.91 degree in left eye. Patient was advised the need of regular follow-up for a possible corneal decompensation in future.

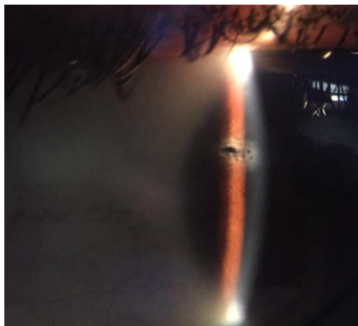


Figure 1. Anterior segment photograph of Right eye showing three small circular defects in the Descemet's membrane just above the lasered PI.

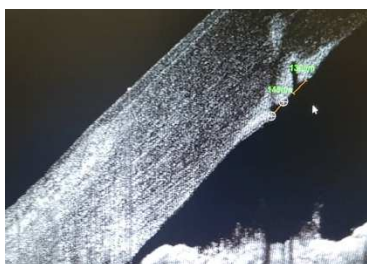


Figure 2. Anterior- Segment OCT of Right eye shows two defects in the descemet's membrane.

3. Discussion

Several reports have demonstrated complications following laser peripheral iridotomy, including dysphotopsia, iris inflammation, disorders of descemet membrane, IOP elevation, cataract, corneal decompensation, haemorrhage and posterior synechiae [12]. There is controversy regarding the safety of this procedure to the corneal endothelium. Laser PI has been demonstrated to be a relatively safe procedure; there is still a potential long-term risk of corneal changes [13, 14] for which a corneal transplantation may be indicated eventually. The longest interval between laser iridotomy and corneal decompensation reported was 8 years [11, 15]. Descemet's membrane injury is a rare clinical entity. To our knowledge, this is the first case of Descemet's membrane injury after laser peripheral iridotomy to be reported in literature. We propose the probable cause to be thermal injury due to incorrect focus of the laser beam towards Descemet's membrane leading to rupture of membrane and a probable focal loss of endothelial cells.

Focal deficit in the endothelial sheet is overcome by a sliding process in which neighboring cells move over to fill the gap. This is accompanied by enlargement of the cells to cover the original area. Thus after injury, the endothelial cell density falls, the cell area increases and the cell height decreases. Endothelium injury produces corneal edema due to loss of the specialized junctions between the endothelial cells and of pumping action of the cells at the site of injury [16]. The mechanisms proposed for endothelial damage include direct focal injury, thermal damage, mechanical shock waves, iris pigment dispersion, transient rise in IOP, inflammation, turbulent aqueous flow, time-dependent shear stress on endothelium, chronic breakdown of blood-aqueous barrier, and damage from bubbles that settled onto the endothelium.

After traumatic interruption of Descemet's membrane and the endothelial layer, the endothelial layer will resurface the defect by spread of its cells and synthesis of fresh basal lamina structurally identical to normal Descemet's layer. The current injury in Descemet's membrane by YAG laser has not caused any decompensation or edema till now but the longest interval between laser iridotomy and corneal decompensation reported was 8 years in literature so the patient was advised to review regularly.

Laser peripheral iridotomy may cause spontaneous, late onset corneal decompensation. It would be worthwhile keeping this complication at knowledge while doing peripheral iridotomy and if there is a corneal injury due to defocus, the procedure should be terminated to prevent more corneal burns which may lead to a higher chance of corneal decompensation. The laser focus should be set at zero or posterior focal shift of the aiming beam to prevent accidental corneal burns. Also it is advisable start with low energy and titrate upwards once the laser energy is delivered at desirable spot. Iridotomy shot should be given at the base of the iris crypts and also where the angle is deepest away from the cornea. Ophthalmologists, especially those in the training

should be aware of this potential complication and proceed carefully. Peripheral iridotomy, though a simple procedure could lead to complications if not done carefully.

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