International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor (2018): 7.426

Analysis of Retinal Nerve Fiber Layer Thickness in Phacomorphic Glaucoma

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Abstract: ***Aim: To evaluate Retinal Nerve Fibre Layer Thickness on OCT in Phacomorphic Glaucoma. Materials and methods – 52 patients of acute phacomorphic glaucoma coming to Ophthalmology Department of Subharti Hospital Meerut were included in the study. After control of IOP all patients underwent cataract extraction (MSICS) and intraocular lens implantation under local anaesthesia. Patients were followed up on day one, 1 month, 3 months and 6 months postoperatively. BCVA, IOP and RNFL thickness on OCT were measured on each follow up visit. Observation and Results: Average RNFL thickness as well as RNFL thickness in all quadrants was found to be decreased in the affected eye as compared to contra lateral eye in 0CT done 6 months post operatively and it was statistically significant with p value <0.05. Conclusion: An acute episode of phacomorphic angle closure can trigger an accelerated thinning of the average RNFL occurring months post attack despite normal IOP and open angles.***

Keywords: Phacomorphic glaucoma, IOP, RNFL thickness, OCT

1. Introduction

Phacomorphic Glaucoma is a secondary angle closure glaucoma caused by a swollen and intumescent cataractous lens obstructing the drainage of angle leading to an acute elevation of intraocular pressure and potential glaucomatous optic neuropathy. It is an important disease entity in developing Asian countries including India with reported incidence of 3.91% of all cases of cataract extraction[1]. Resultant Glaucomatous Optic Neuropathy can be quantified and reported by using visual field assessments or clinical cup-disc ratio monitoring. However, both of these parameters are variable and not entirely objective especially when phacomorphic glaucoma often occurs in elderly population where dementia and neglect are common[2]. On the other hand, Optical Coherence Tomography (OCT) for Retinal nerve fibre layer thickness is non invasive, requires minimal patient cooperation and can detect early glaucomatous optic neuropathy as its damage often preceds visual field loss[3].

Aims and Objectives

To evaluate Retinal Nerve Fibre Layer Thickness on OCT in Phacomorphic Glaucoma.

2. Materials and Methods

A prospective observational study was conducted on all patients of acute phacomorphic glaucoma coming to Ophthalmology Department of Subharti Hospital, Meerut, India. All patients diagnosed with phacomorphic glaucoma between July 2017 and March 2018 were included in the study.

Inclusion Criteria

1) All patients with phacomorphic glaucoma.

Exclusion criteria

1) Patients having corneal pathology.
2) Patients with significant intraoperative complications like posterior capsule tear, descemet's membrane detachment etc. 3. Known cases of glaucoma.
3) Patients who had undergone any previous intraocular surgery.
4) Uncooperative patient.

Preoperative Evaluation

History

Examination: The preoperative assessment included

- Slit-lamp examination
- Applanation tonometry
- Gonioscopic grading of angle (using Shaffer's grading system)

Preoperative control of IOP

All patients were treated with

1) Topical beta blockers
2) Antibiotic steroid drops
3) Oral acetazolamide
4) Oral glycerol
5) Patients with presenting IOP higher than 40 mm of hg were given 20% mannitol intravenously (1-2g/kg body weight).

After control of IOP all patients underwent cataract extraction (MSICS) and intraocular lens implantation under regional anaesthesia.

Follow up

- Patients were followed up on day one, 1 month, 3 months and 6 months postoperatively
- IOP was measured by Goldman applanation tonometry on each visit.
- Best Corrected Visual Acuity was measured by Snellen chart at 6 month postoperatively.
- The trabecular-iris angle would be measured by gonioscopy at 6 months post operatively.
- 3D optical coherence tomography (Optivue, Optocol) was used to measure RNFL thickness in micrometers in both eyes at 1 month, 3 months and 4 months post operatively.

The pupils were pharamocologically dilated to atleast 5 mm prior to OCT and all scans were performed using fast scan mode by a single operator.

Statistical Analysis

- Data was analyzed statistically using SPSS version 19.0 statistical analysis software.
- Paired 't' test was used to compare RNFL thickness of affected and contra lateral eye

3. Observation and Results

Fifty eight consecutive cases of acute phacomorphic angle closure presented to our center during the study period. Six cases were later excluded because of defaulting follow-up after cataract extraction. All cases received SICS + IOL within 3 days of presentation to our center. There were no intra-operative complications.

- Mean age of presentation was 68.67 ± 7.3 years.
- The presenting visual acuity was light perception (LP).
- Maximum patients had postoperative BCVA in the range of 6/12-6/18.
- The presenting IOP was 44.3 ± 7.4 mmHg.
- The mean time taken from phacomorphic symptoms to ophthalmic consultation was 3.1 ± 2.8 days.
- The postoperative IOP at 6 months was 12.5 ± 4.6 mmHg without any glaucoma medication.
- All cases had an open angle configuration on gonioscopy.

Table 1: RNFL thickness at 1 month

RNFL thickness	Affected Eye(µm)	Contralateral Eye(µm)	P value
Average	107.2 ± 7.97	104.5 ± 7.4	0.3
SQ	123.6 ± 7.1	120.4 ± 7.2	0.53
IQ	134.1 ± 6.8	132.8 ± 6.9	0.52
NQ	83.3 ± 5.3	82 ± 5.4	0.55
TQ	78.1 ± 5	77.3 ± 5	0.55

Table 2: RNFL thickness at 3 months

RNFL thickness	Affected Eye (µm)	Contralateral Eye (µm)	P value
Average	94.3 ± 8.1	105.3 ± 6.71	0.1
SQ	110.5 ± 7.9	120.1 ± 6.43	0.06
IQ	127.2 ± 7.9	132.4 ± 6.3	0.062
NQ	70.1 ± 6.6	78.7 ± 5	0.09
TQ	73.3 ± 5.6	77.7 ± 4.75	0.13

Table 3: RNFL thickness at 6 months

RNFL thickness	Affected Eye (µm)	Contralateral Eye (µm)	P value
Average	85.3 ± 8.82	106.5 ± 6.32	0.012
SQ	95.1 ± 9.96	121.7 ± 5.8	0.001
IQ	105.5 ± 9.3	133.2 ± 5.9	0.001
NQ	68.4 ± 7.3	83.4 ± 4.98	0.033
TQ	67.2 ± 8.6	78.1 ± 4.3	0.032

Average RNFL thickness as well as RNFL thickness in all quadrants was found to be decreased in the affected eye as compared to contra lateral eye in 0CT done 6 months post operatively and it was statistically significant with p value <0.05.

4. Discussion

Glaucomatous optic neuropathy that occurs after a phacomorphic attack is possibly mainly attributed to the acute IOP rise. Yoles and Schwartz(1) have suggested that GON progression can occur even after elimination of the acute rise in IOP as a result of secondary apoptosis of healthy neurons bathed in the degenerative milieu created by the damaged neurons from the acute event.

In the literature, OCT for RNFL has been used to evaluate the damage after a single episode of acute primary angle closure and to offer a more objective supplement to the information provided by Humphrey visual field assessments.

Keeping this in mind, the present study was undertaken in the department of ophthalmology, Subharti Medical College, Meerut. All patients underwent complete ocular examination and after control of I0P cataract extraction with I0L implantation was done. All patients were followed up for a period of 4 months.

As shown in Table, average RNFL thickness as well as RNFL thickness in all quadrants was found to be decreased in the affected eye as compared to contra lateral eye in 0CT done 4 months post operatively and it was statistically significant with p value <0.05.

Similar to our study, a study conducted by Jacky WY Lee[4](et al) found significant thinning in the average superior and inferior RNFL on 0CT 9 months post attack.

Similarly, in studies done on PACG by CCA Sng[5], Fang AW[6] and Tsai JC[7] RNFL thickness was found to be decreased on 0CT 3 to 4 months post attack.

5. Conclusion

An acute episode of phacomorphic angle closure can trigger an accelerated thinning of the average RNFL occurring months post phacomorphic attack despite normal IOP and open angles. The RNFL thinning is most prevalent in the superior and inferior quadrants as detected by OCT.

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