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A Study of Clinical Profile of NA-AION and Application of OCT in its Evaluation

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ABSTRACT

To study the clinical profile and OCT evaluation (Rnfl and gcl) in NA-AION It was an observational, cross sectional study. Thirty patients with history of sudden diminution of vision were studied in 1yr duration (Sept 2019-Aug 2020). A neuro-ophthalmic examination performed on all patients including visual acuity, RAPD assessment ,colour vision, visual fields and fundus examination. Systemic evaluations were done.OCT scans were done for both eyes of each patient using nerve fibre layer and macular analysis protocol. Similar age match control group were taken. Male patients showed dominance (60%). Reduced VA, colour vision defect, reduced contrast sensitivity was observed. Average RNFL thickness in NA-AION patients were 178.20±99.54µm,94.23±12.23 µm in healthy controls ($p<0.0001$). Quadrant Rnfl thickness was maximum in superior quadrant 239.83±129.87µm($p<0.01$). Average GCL±IPL thickness were 68.78±18.06 µmin NA-AION,83.30±8.32 µm in control group ($p<0.0002$), respectively.Sectoral GCL thinning was observed maximum in superotemporal sector 63.20±23.46µm($p<0.001$). Differentials of optic neuropathy should be evaluated for defective vision, colour vision, RAPD and optic disc abnormality with field defects. OCT quantifies RNFL thickness and GCL thinning in ischemic ON.

INTRODUCTION

NA-AION refers to the occurrence of sudden vision loss due to acute damage to the optic nerve. This condition is characterised by optic disc swelling that gradually resolves over a period of weeks, resulting in visual field defects. Eventually, the optic disc becomes pale and its shape is altered[1]. NA-AION typically manifests in eyes characterised by a diminutive optic disc diameter and a small cup, resulting in disc swelling accompanied by hyperemia[2]. Optical coherence tomography (OCT) is a noninvasive method of imaging the eye. It utilises low coherence interferometry to produce high-resolution, cross-sectional images of the retinal nerve fibre layer (RNFL) by measuring the backscatter of infrared light[3]. The images have a resolution of up to 10µm and are obtained in real-time measuring the retinal nerve fibre layer (RNFL) can provide an unbiased assessment of nerve swelling or nerve degeneration by analysing the ganglion cell complex. Optical coherence tomography (OCT) can assist in identifying early damage to the nerve fibres and may be able to predict visual outcomes[4].

MATERIAL AND METHODS

It was observational, cross-sectional study carried out in the tertiary health care, Rewa (M.P) during the period of September 2019 to August 2020. On the basis of clinical features presence of RAPD and optic disc appearance cases were diagnosed as NA-AION. Similar age matched group, healthy controls were taken.

Inclusion criteria:

- Patients with NA-AION
- Age criteria 18-65 years

Exclusion criteria:

- Patient with any opaque media, Age <18 years,>65years
- Patient with DR,CRVO, Pseudopapilloedema, Retinitis Pigmentosa, Myopia etc

Medical history-History of any systemic disease like diabetes, hypertension hypercholesterolemia. Ophthalmic history- Ophthalmic history were taken for diminision of vision (DOV) with onset, duration and progression. History of any ocular trauma or surgery or prolonged use of any topical medication or defective colour vision was taken. Systemic examination-Systemic disease associations were ruled out if any.
Ophthalmic examination-Ophthalmic examinations were performed with visual acuity test, intraocular pressure (IOP) measurement, ocular movements examination, RAPD assessment ,Slit lamp examination of both eyes, visual field analysis, colour vision test, contrast sensitivity test, Fundus examination by indirect and direct ophthalmoscopy:

- **Visual acuity (VA):** Record of visual acuity (BCVA) by Snellen's chart at 6 meter distance at time of presentation. VA>6/12 considered as normal, VA<6/12 as mild vision loss, VA <6/18 as moderate vision loss (MVL) ,VA <6/60 as severe vision loss (SVL), visual acuity less than 3/60 of Snellen's chart referred as blindness. This criteria was considered
- **RAPD assessment:** Swinging flash light for 3 sec pause in each eye in a darkroom and grading done as 1-4 and 5, similar as Bell *et al*.[5] described in their study
- Anterior segment examination done by slit lamp bio microscope. By using humphrey's field analyser (HFA) visual field test was performed and field defect noted
- Colour vision test done by ishihara's pseudo isochromatic plates (38 plate's series) and recorded. The number of plates correctly identified with each eye was recorded (eg.10/21). If only control plate was identified then it was also recorded. On the basis of colour vision interpretation was done as colour deficient (read test plates≤13), colour blind(able to identified only control plate) and normal colour vision (read test plates≥14)
- Contrast sensitivity evaluation was done by Pelli-Robson chart at 1m distance in each case with individual eye and recorded in log units. A Pelli-robson CS score of 2 considered as normal. CS score <2 signified as poorer score
- **Fundus examination:** Dilated fundus examination performed to evaluate disc findings, under headings margins, colour, shape ,size, cup disc ratio ,disc edema and pale disc evaluation, any haemorrhages, exudates, vessels details

RESULTS

The male dominance(60%) was seen in NA-AION. The mean age of presentation was 52±14 yrs. Eight eyes (26%) presented with severe visual loss. Eighteen eyes (60%) with high grade RAPD. Ten eyes (33%) were colour deficient. Inferior Altitudinal field defects were in 25%. Fundus examinations showed sectoral pallor with blurr margins (70%). Thirty% patients were hypertensive and diabetic. Mean ±SD value of average RNFL thickness in NA-AION (30 eyes), fellow eyes (30 eyes)were 178.20±99.54 µm, 94.23±12.23 µm in healthy controls (p<0.0001). Quadrant Rnfl thickness was maximum in superior quadrant 239.83±129.87µm and121±60µm in control group (p<0.01). Average GCL±IPL thickness were 68.78±18.06 µmin NA-AION,83.30±8.32 µm in control group (p<0.0002),

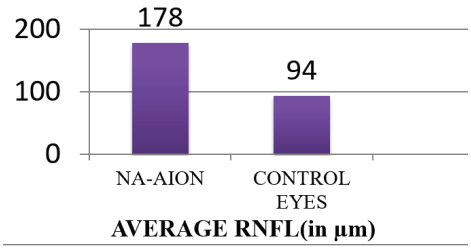

Fig. 1: Average RNFL in um

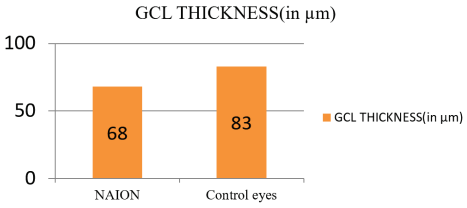

Fig. 2: Of average GCL±IPL thickness

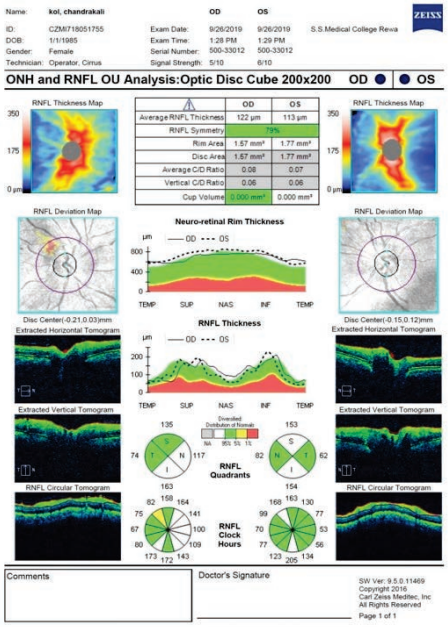

Fig. 4: OCT Scan of na-aion patient with re raised RNFL thickness

respectively. Sectoral GCL thinning was observed maximum in superotemporal sector 63.20±23.46 µm, control 83.8±9.31 µm (p<0.001).

- The values of average GCL±IPL thickness were 68.78±18.06 µm and 83.30±8.32 µm in NA-AION and in control group respectively (p<0.0002)
- **Statistical analysis:** paired t test.

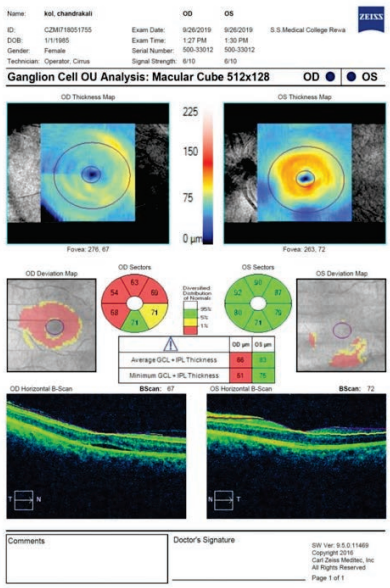

Fig. 5: OCT scan of re macula shows thinning of ganglion cell layer

DISCUSSIONS

In their study, Jyothi *et al*.[6] found that the average age of patients with NAION was 58±10 years. The average age of patients with NAION in our study was 52±14 years. In their study, Abhinaya *et al*.[7] discovered that 93.5% of the patients had a higher grade of Relative Afferent Pupillary Defect (RAPD), as well as colour vision defects. Additionally, they found that 31% of the patients had systemic associations. The findings in our study were consistent. Scherer *et al*.[8] identified that the specific visual field pattern loss observed in NAION is typically inferior and altitudinal in nature. We have identified a comparable pattern of visual field impairment. In our study, there was a significant increase in the average retinal nerve fibre layer (RNFL) thickness (178.20±99.54 µm) among patients with non-arteritic anterior ischemic optic neuropathy (NA-AION) (p<0.0001). Saxena *et al*.[9] reported a notable increase in retinal nerve fibre layer thickness (132.6±82.8µm) during the acute phase of non-arteritic anterior ischemic optic neuropathy (NA-AION). Kernstock et al.[10] and Bellusci *et al*.[11] observed a notable increase in the thickness of the retinal nerve fibre layer (RNFL) during the acute phase of non-arteritic anterior ischemic optic neuropathy (NA-AION).

In their study, D. Aggarwal *et al*.[12] found that patients with NA-AION had an average GCL±IPL thickness of 59.66±10.6 µm, which is consistent with visual field pattern loss. The study found that the average GCL±IPL thickness in NA-AION patients was 68.78±18.06 µm, with a statistically significant difference compared to other groups (p<0.0002). The

gradual reduction of ganglion cell layer (GCL) in a specific pattern resulting in loss of vision in certain areas.

CONCLUSION

Differentials of optic neuropathy should be evaluated with a detailed history, defective vision, RAPD, colour vision and optic disc abnormality with field defects. OCT provides indirect measure of axonal and neuronal loss in anterior visual pathways by quantification of RNFL and GCL thickness. Altitudinal GCC loss could be a characteristic diagnostic feature of NA-AION. GCC loss is hallmark of optic neuropathy and should be monitored for early detection and prognosis in NA-AION patient. Therefore, OCT may serve as a fast and economical test to aid in determining the NA-AION.

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