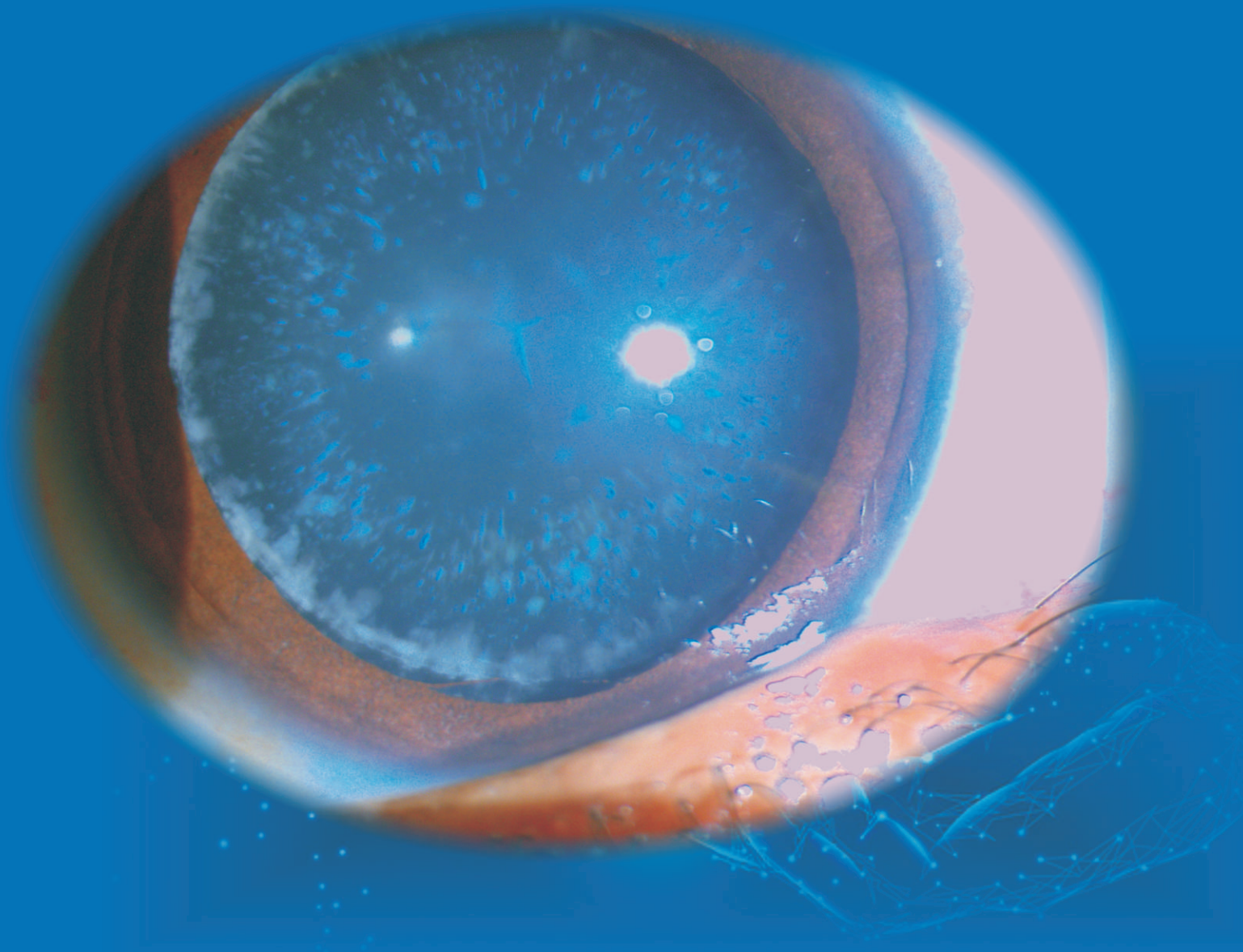
ISSN : 2250-1916

Volume 2, 2021

UP JOURNAL OF OPHTHALMOLOGY



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CONTENTS

Cover Photo

Blue Dot with Sutural Cataract

Courtesy : Dr Shalini Mohan

" The art of living is neither careless drifting on the one hand nor fearful clinging to the past on the other.It consists in being sensitive to each moment, in regarding it as utterly new and unique,in having the mind open and wholly receptive."

Above mentioned words of Alan W. Watts hold so much wisdom and guidance especially in this current chaotic covid era, which has not only burdened the medical resources but has also severely impacted our mental health. Indeed seeking knowledge and learning proves to be an effective tool in combating the fear of unknown and brings in cultivating faith and hope of a peaceful future.

I congratulate the editor Dr, Shalini Mohan for her sincere efforts in improving the sccientific material and for the upcoming issue of UPIJO.

Wishing all the readers a great scientific treatise and an insightful learning experience. Happy learning.

Dr. Shrikant, MS

President, UPSOS
Former Professor & Head, Regional Institute of Ophthalmology
Institute of Medical Science BHU, Varanasi
Presently Prof. & Head Department of Ophthalmology
Heritage Institute of Medical Sciences, Varanasi

Postponement of elective eye surgery – Do we need to be careful?

Dear Members,

The life is heading towards normal post COVID pandemic and post Mucormycosis epidemic. The patients of eye ailments who were hiding in their shell due to pandemic are coming up and showing willingness for surgery. But the striking feature that is very much evident is postponement of surgery due to abnormal investigations. The study done by Bamashmus etal in 2010 showed hypertension being the most common factor for cancellation of surgery on the day of elective surgery.[1] In our scenario, the most common reason found was uncontrolled blood sugar. The total 482 subjects admitted in a month for cataract surgery had underwent various investigations and out of these 42 (8.7%) had uncontrolled blood sugars on the day of surgery. This is alarming situation and we all need to gear up to handle this in association with our medical colleagues.

Presenting before you another edition of UP Journal of Ophthalmlogy. I thank all the contributors for their efforts and excellent articles in the subject. I also extend my heartfelt gratitude to President Dr Shrikant, Secretary Dr Mohita Sharma and CSC Dr Deepak Mishra for their support. I also wish to extend sincere thanks to the team members of editorial board who have really worked hard.

Stay safe and healthy.

Warm regards

Dr Shalini Mohan

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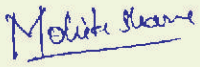
Dear Members,

Welcome to COVID times !! In an era where almost everything seems to have come to a standstill the UP Journal of Ophthalmology continues to come out and impart scientific knowledge to all its members. This journal signifies that life can never stop and scientific upgradation is a continuous process.

As a State society UPSOS is committed to imparting scientific knowledge. On behalf of the whole executive committee my Congratulations to the editor and the editorial team.

As doctors we took the hippocratic oath and promised to serve humanity. My appeal to all our dedicated members is to continue to work whole heartedly and simultaneously be updated about all precautions which can keep you safe. Take special care of yourself especially from the ophthalmology point of you. And since workload is less ours being mostly an elective branch, spend more timing reading good journals like this one. You also have the opportunity to do what you never got the time to do. In this one important thing is studies and publishing. So let's get started on this academic front too. And hope to see more contributions of structured study results from our own state of Uttar Pradesh.

Stay safe, stay healthy and stay working



Dr Mohita Sharma,

General Secretary, UPSOS

Laser Treatment in Presbyopia

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Presbyopia definition :

Presbyopia is the physiological, progressive age-related loss of accommodation, mostly affecting individuals in their middle age, regardless of any underlying refractive error, causing difficulty in sharply focusing for near vision.[1,3]

Its correction has always been challenging for the refractive surgeon. The static methods for its correction seek to increase the depth of focus, which include: monovision, corneal inlays, presby LASIK, corneal shrinking techniques (conductive keratoplasty, laser thermal keratoplasty and intrastromal femtosecond laser-based procedures), multifocal IOLs .[4] The dynamic methods such as scleral implants and accommodative IOLs attempt to restore accommodation.[4] A corneal approach seems the safest, since it is the less invasive procedure.

Treatment Options

Medical :

Pharmacological : Fov Tears

Spectacles : Bifocals/ Progressive/monovision

Contact Lens

Surgical Treatment :

Lens procedures : Multifocal IOL
Trifocal IOL
Accommodating IOLs
Extended range of vision IOL

Corneal procedures : LASIK (Presbylasik/ Presbyond/ Monovision) Inlays

Supracor/Intracor

Sclerociliary complex modification : Scleral spacing devices/ LASER ACE procedure

Laser options in presbyopia :

Presbylasik :

The term Presby LASIK was introduced by Ruiz in 1996;[5] it is a surgical technique based on the principles of LASIK to create a multifocal corneal surface. It induces spherical aberrations to improve depth of field. It provides good near intermediate vision and reasonable distance vision.

There are 3 main types of multifocal corneal excimer laser profiles: 1) Multifocal transition profile, 2) Central Presby LASIK, 3) Peripheral Presby LASIK.

Approaches

Multifocal transition profile :

It creates a transitional vertical multifocal ablation based on the creation of an intentional decentration of a hyperopic ablation profile. There are very few reports on this technique and it was not well accepted by surgeons because it induced significant levels of vertical coma .[6]

Central Presby LASIK :

It creates a hyper positive area for the near vision at the center and the periphery is left for far vision. It is pupil dependent and an advantage is that it can be performed at the center of the cornea in myopic and hyperopic profiles, and in emmetropes with minimal corneal excision. Its main limitation is the lack of adequate alignment among the line of sight, the central pupil and the corneal vertex, inducing coma aberrations.e, the central model is more advisable to achieve multifocality due to the physiologic pupil miosis during accommodation .[7]

Peripheral Presby LASIK :

In this technique, the center of the cornea is left for distance and the periphery is ablated in a way that a negative peripheral asphericity is created to increase the depth of the field. One of its disadvantages is that when it is used in association with myopic correction, it is necessary to remove a significant amount of corneal tissue and therefore is mainly performed in hyperopes .[6]

PROBLEMS IN PRESBY LASIK

- Initial compromise on distance vision (Blurred distance vision till 3 months)
- Adaptation problems to multifocality
- Night vision problems in initial period/contrast changes
- Pupil size dependent procedure

Supracor :

Is a pupil dependent, LASIK based procedure which is performed on the TECHNOLAS 217P Excimer laser system.[8] Unlike monovision where one eye is treated for distance and the other is treated for near, this procedure treats both eyes so that both are able to focus on distance and near vision equally.

A 3mm central hyperprolate area is created which gives an add of approximately 2 dioptres.[8] It makes use of the central-near, peripheral-distance concept wherein during natural accommodation when the eye focuses on near objects, the pupil constricts and the eye looks through the near-add elevation. When the eye is looking at a distance, the pupil dilates and allows the peripheral rays to pass through the aspheric optimized periphery to improve distance vision.

Problems in supracor :

- It is predominantly a hyperopic treatment, one tends to get a myopic outcome. Leads to an unsatisfactory uncorrected distance vision in considerable amount of patients.
- With the refractive target of –0.50 D spherical equivalent, this adds to the 2.0 D near add, thereby increasing the total add power of 2.5 D So , this procedure will be more suitable for age group from : LATE 40'S
- Patients are found to have large higher order aberrations like vertical coma & quadrafoil, causing considerable visual disturbances post operatively

Supracor can be used in one eye or in both eyes depending on each patient's needs and expectations. The asymmetrical technique is performed in patients that demand both near and distance vision, the symmetrical technique is for patients that demand good near vision

In symmetrical correction:

Targets -0.5 D of myopia in both eyes[9]

Helpful in patents who demand a very good near vision.

In asymmetrical correction:

Dominant eye is done plano, & non dominant eye is done myopic by -0.5D[5]

It gives good near and distance vision

PresbyMAX :

PresbyMAX (SCHWIND eye-tech-solutions GmbH, Kleinostheim, Germany) is based on the creation of a biaspheric multifocal corneal surface with a central hyper positive area to achieve +0.75 to +2.50 D of near vision correction, surrounded by an area in which the ablation is calculated to correct the distance refractive error.[10,11] Presby MAX allows the safe and efficient treatment of emmetropic, myopic and hyperopic patients as well as patients with astigmatism whose accommodative response is restricted.

With the Presby MAX module, it is now possible to choose between three different treatment types.

Presby MAX Symmetric :

Treats the dominant and non-dominant eye equally regarding depth of focus and the refractive target, thus ensuring optimal near vision.

Presby MAX µ-Monovision :

This creates the same depth of focus in both eyes. However, the dominant eye focuses slightly more towards near vision. The result: A faster visual recovery and better intermediate and far vision quality.

Presby MAX ® Hybrid :

This is the latest generation and is also based on different target values. But in contrast to µ-Monovision, a different depth of focus is generated in the dominant and non-dominant eye. This ensures an extremely fast visual recovery and an especially high quality of distance vision.

Presbyond- laser blended vision :

LBV is a non-linear corneal aspheric ablation profiles combined with micro-monovision to treat presbyopia in emmetropic, myopic and hyperopic patients

Laser Blended Vision: 9-in-1 Mechanism :

- Monovision
- Vertex centration of spherical aberration
- Increased depth of focus
- Spherical aberration control [DOF without decrease quality of vision]
- Retinal image processing
- Neural summation
- Blur adaptation
- Neural suppression
- Multi-focality from epithelial lenticule

PRE REQUISITES :

- Refraction & dominance testing
- Micromonovision testing
- Routine pre LASIK evaluation
- CRS Master planning software + MEL 80,MEL 90 (Carl Zeiss)

PRESBYOND® Laser Blended Vision is similar to monovision. It offers the opportunity to achieve freedom from glasses by combining the simplicity and accuracy of Laser Vision Correction with the benefits of increased depth of field. It is an absolutely in dividualized treatment plan. This technique induces a controlled spherical aberration (to increase depth of field.[12] This micro-monovision strategy makes the image disparity from the two eyes smaller and the brain easily blends

the images together. A customized fusion of the two images for near and distance vision is created for each patient – this is called the "Blend Zone". Suitable from early 40's to late 50's

This new presbyopic profile is based on nonlinear changes in asphericity The dominant eye is mainly corrected for distance with a nominal target refraction of plano and the non-dominant eye is mainly corrected for near with a nominal target refraction of -1.50 D. As a result, the brain merges the two images, creating a blend zone, which allows the patient to see near, intermediate and far without glasses.

The important thing is to control the induction of spherical aberration to avoid increasing it above the neuro-adaptation tolerance threshold, which can cause loss of contrast sensitivity, night vision disturbances and can result in a topographic central island. To account for this, the non-linear aspheric ablation profile includes a pre-compensation factor for the induction of spherical aberration. This range was based on studies to understand the spherical aberration levels needed to increase depth of field [13,14] and the 0.56-µm spherical aberration limit above which quality of vision might be subjectively affected as previously reported.[15]

Additionally, it can be used for emmetropic presbyopia as well as presbyopia accompanied by a wide range of refractive errors (published range: +5.75 to -9.00 D Intended Use SE range -8.00D and +2.00D, with maximum 2.00D cyl) including the simultaneous correction of cylinder. Performed as a bilateral simultaneous LASIK treatment, the bilateral procedure takes 10-15 minutes and recovers in a matter of a few hours. A further component of PRESBYOND is the increase in depth of field afforded by pupil constriction during accommodation: a component that persists even in eyes that have lost the ability to change crystalline lens power during the accommodative effort. The combination of controlled induced corneal aberrations and pupil constriction gives a significant increase in depth of field on the retinal image, albeit not a perfect image. In addition, intra-retinal and cortical processing and edge detection is the final component working in PRESBYOND: the pure retinal image, which is modified by spherical aberration, is further enhanced by central processing to yield the perception of clear and well-defined edges.

The final component of PRESBYOND relates to the epithelial thickness profile, which takes advantage of the fact that the epithelium remodels to compensate for any change to the stromal surface curvature.[16–20]

However, for lower levels of spherical aberration pre-compensation, a similar "multi-focal" change is being made to the stromal surface according to the spherical aberration component of the ablation, but the epithelial compensatory remodelling mechanism is able to fully mask this small stromal central island from the front surface topography – so the front surface topography appears normal. The result is an epithelial thickness profile overlying the stroma that looks and acts similar to a multifocal array lens due to the difference in refractive index between epithelium and stroma (1.401 vs 1.377).[21] This is then a very mild degree of induced point-spread function to supplement general increase in depth-of-field, and is something that can be tolerated by virtually all patients.

The multi-focality remains subsurface and cannot be seen on front surface corneal topography; it can only be seen by measuring the epithelial thickness profile. This method maximizes safety by eliminating the possibility of loss of lines, reduced contrast sensitivity, and reduced quality of vision as found in multi-focal corneal approaches

In summary, PRESBYOND draws on 6 mechanisms for its success as a procedure; depth of field is increased by:

1) A specific controlled increase in corneal spherical aberration

2) A sub-surface mildly multifocal epithelial thickness profile

3) Pupil constriction during accommodation affording further depth of field increase on the retinal image (cf pinhole effect)

4) Retinal and cortical processing for increasing contrast of the retinal image monocularly

5) An anisometropia small enough to be tolerated by over 95% of patients, which as a result of the above sphericalaberration induced increase in depth-of-field produces a blend zone and enable continuous distance to intermediate tonear vision between the two eyes

6) Central cortical processing of the spherically aberrated retinal image including neuronal gating and blur-suppression, butenabling simultaneous binocular vision (i.e. not monovision) and hence preserving stereo-acuity

PRESBYOND has excellent post-op

- Contrast sensitivity
- Stereopsis
- Negligible Crossblur
- Sharper & crisp uncorrected distance & near vision

The combination of induced asphericity and micromonovision with laser blended technique has had good visual and safety outcomes [12, 22–25] but the tolerance to micro-monovision may be inconvenient especially in patients with mild presbyopia, who are less tolerant to a larger degree of anisometropia than patients with advanced presbyopia [25]

Monovision :

Presbyopia correction at the cornea can also be achieved with monovision, in which an intended anisometropia is induced, usually, the non-dominant eye is corrected for near vision, and

the dominant eye for far vision, it depends on inter-ocular blur suppression. Good visual outcomes are achieved with this technique ,[26] but there is a loss of stereopsis which is related to the degree of anisometropia,[27,28] it is generally contraindicated in patients that need a good stereopsis to perform their daily activities such as airplane pilots [35,36] or professional drivers .[27,29]

In short, achieving a multifocal cornea with stable and long term results remains a challenge [30, 8, 31, 32] to all refractive surgeons. The combination of different techniques for the correction of presbyopia (monovision, multifocality, asphericity modification) is a trending option[25] seeing that they benefit from the best qualities of each procedure

A prospective, non-comparative case series study was conducted in our hospital among 300 patients (600 eyes) with presbyopiain the age group 39 to 55 yrs (mean 47 yrs). The range of refractive errors was Myopia (-0.25 to-7.25DS), Hypermetropia (0.25 to 4DS) and Astigmatism between -0.25 to -2.75 DC,+0.25 to +1.5 DC. Target refraction was Plano for distance eyes (dominant eye) between -1.25 and -1.75 diopters (D) for near eyes based on age and micromonovision acceptance. (Non dominant eye:Target–1.5 DS (40%), –1.75 DS (53%),& –1.25 DS(in 7%))

All of them underwent routine preLASIK evaluation (Refraction, subjective acceptance, cycloplegic refraction for hypermetropic patients, slit lamp examination of anterior segment and fundus evaluation and Topography) along with Dominant eye testing and Testing for Micromonovision acceptance.

Laser Blended Vision – treatment planning was done and was integrated into the CRS-Master – MEL 80 platform.Standard LASIK procedure was done with Microkeratome: AMADEUS II(Zeimer, Switzerland). The flap had 9mm diameter, 120 micron thickness with nasal hinge. This was followed by ablation with Excimer: Mel 80 flying spot laser (250Hz) (Carl Zeiss Meditec, Germany)Post operatively they were treated with Prednisolone Acetate 1%, 0.5%moxifloxacin, 0.5%CMC. Follow up was done on day 1, 1 wk, 1 month, 3 month, 6 month, 1 yr, 2yr. 24 months minimum follow up was done for all patients.

92% of eyes achieved Spherical equivalent correction within -0.50 D and 100% of eyes within -1.00 D at 1 year follow up. Monocular uncorrected distance visual acuity was 20/20(6/6) at least in 70%, 20/32(6/9) at least in 98%. Binocularly 80% read 6/6 and 100% read 6/9. Binocular uncorrected near visual acuity was N8 in 3% and N6 in 97%of patients. All patients had a satisfactory intermediate vision (n6) Binocular distance vision subjectively was better than uniocular distance vision in significant number of people (60%) A higher number of patients read 6/6 binocularly (80%) than when checked through the dominant eye alone (70%). None of the LASIK LBV patients in our series needed enhancement procedures.

Adaptation: Most patients adapted well by the third month. Myopes beyond 42 years of age adapted very easily(1wk to 1month). Hyperopes, emmetropicpresbyopes, young patients (less than 40 years) took 2-3 months, to completely adapt. Only 6 patients had occasional adaptation issues, i.e. cross blur for distance, one patient reported confusion while reading fine print after this period which improved with lubricants. Night vision symptoms: 8 patients in 300 complained in 1st month, none at 3 months. None of the eyes lost more than ½ snellens line of vision when compared to preop corrected distance visual acuity.

Conclusion :

There have been significant developments in surgery for presbyopiaover the last decade achieving relatively good outcomes but each modality has its own advantages and disadvantages and sometimes compromises. In fact the search for the restoration of true accommodation remains a challenge. Technological advancements have certainly moved surgical restoration of accommodation from a theoretical concept more into real ophthalmic practice, but much work still remains. The ophthalmologist should decide which surgical management is the best choice for each patient. The most important recommendation is to help patients to set realistic expectations, and together with the subject evaluation, predict the effectiveness of surgery.

WHAT IS THE BEST OPTION?...

TREATMENT	DIST VISION	INTERMEDIATE VA	NEAR VISION	NIGHT DRIV PROB	CONTRAST	ADAPTATIO N	SAFETY
MF IOL	FAIR	NOT SATISFACTORY	GOOD	YES	REDUCED	SLOW	FAIR
CORNEAL INLAYS	GOOD	GOOD	GOOD	YES	REDUCED	GOOD	FAIR
PRESBYLASIK	FAIR	GOOD	GOOD	YES	REDUCED	SLOW	FAIR
SUPRACOR	FAIR	GOOD	GOOD	YES	REDUCED	SLOW	FAIR
PRESBYOND	GOOD	VERY GOOD	GOOD	NO	NO CHANGE	FAST	GOOD

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Imaging Biomarkers in Diabetic Retinopathy

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Abstract :

Diabetic retinopathy (DR) is one of the leading causes of vision loss globally.[1] Among patients with DR, diabetic macular edema (DME) is the leading cause of moderate visual loss.[2] In the current era, imaging modalities[Optical coherence tomography (OCT), fundus autofluorescence (FAF), OCT angiography(OCT-A) and fluorescein angiography(FFA)] play an important role in deciding the treatment protocol as well as prognosticating outcome.This article will provide comprehensive summary of clinical applicability of OCTA derived quantitative metrics that appear to be clinically relevant to the diagnosis, classification, and management of patients with diabetes or DR.

Introduction :

Retinopathy is one of the most severe diabetes-related complications, and macular edema is the major cause of central vision loss in patients with diabetes mellitus. The initial and follow-up evaluation of patients with diabetes has been based on dilated ophthalmoscopy, fundus color photography, fluorescein angiography and optical coherence tomography (OCT). Newer imaging technologies, such as OCT angiography (OCTA), may further improve the diagnosis and management of the disease and aid us with a better understanding of DR. OCTA is a non-invasive imaging method which is able to provide a vascular map of retinal and choroidal tissues. This review is aimed at discussing the applications and advantages of OCTA in assessing DR.

Fluorescein Angiography :

Fluorescein angiography (FA) uses sodium fluorescein, to assess vascular integrity, and leakage. It can show microaneurysms (seen as punctate areas of hyperfluorescence), areas of nonperfusion (seen as sparse areas of hypofluorescence surrounded by large retinal vessels), and abnormal blood vessels, such as intraretinal microvascular abnormalities or retinal neovascularization (Figure 1). It can also indicate the presence of diabetic macular edema. While FA represents the gold standard to evaluate eyes with DR, this imaging technique is invasive and time-consuming. In addition, the fluorescein dye may unusually provoke nausea and allergic reactions.[3,4]

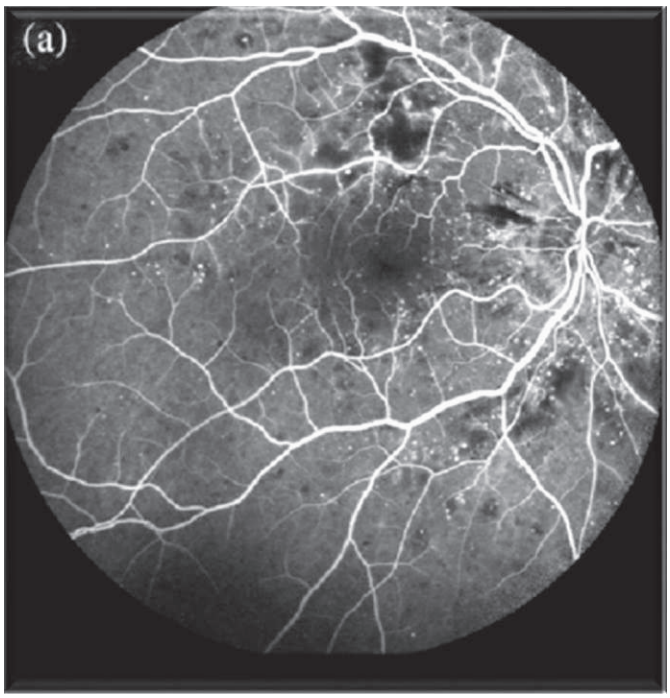

Figure 1 :
Fluorescein angiography revealing blocked fluorescence(retinal hemorrhages), pinpoint areas of hyperfluorescence (microaneurysms), and vascular staining with mild leakage in the mid-periphery with areas of capillary non-perfusion.

Optical coherence tomography (oct) oct :

works by illuminating the retina and then measuring the flying time it takes for light to be reflected back from the tissue of interest. It can provide high-resolution, 3-dimensional topographic maps of the retina non-invasively. Given its excellent reproducibility, OCT measurements of retinal

thickness are used to quantitatively and qualitatively monitor macular edema to guide the therapeutic intervention of DR .

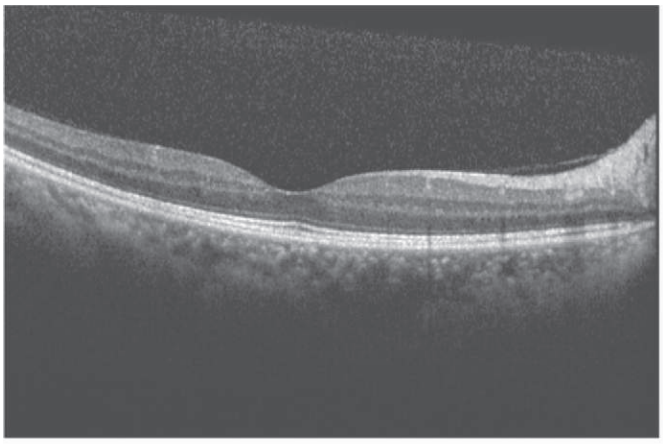

Figure 2 (a):
Widefield optical coherence tomography (OCT) revealing a normal retina.

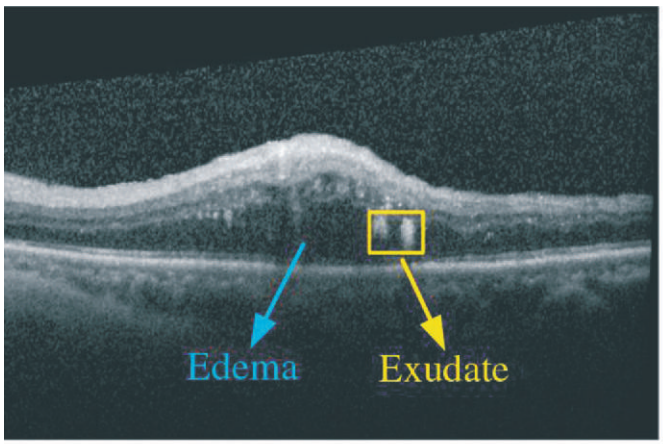

Figure 2 (b):
Wide field OCT revealing marked edema and exudates

Furthermore, OCT can detect subclinical macular edema, that may otherwise be missed on traditional methods, such as slit lamp biomicroscopy, indirect ophthalmoscopy and fundus photography. OCT captures structural information within the retina, and it does not provide angiographic information. In the diagnosis and management of diabetic macular edema, OCT is unable to diagnose macular ischemia.

Optical coherence tomography angiography (octa) :

OCTA is capable of providing depth-resolved images of the microvasculature in the retina and choroid at a depth and clarity, coming close to that of histology.[5] OCTA can display the capillary beds at distinct depths, separating the superficial and deep capillary plexuses as well as the choriocapillaris layer, which has increased our understanding of the microvascular changes in DR.

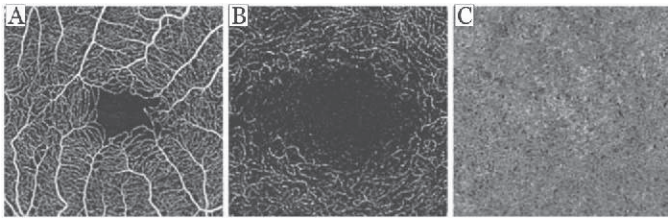

Figure 2 : Optical coherence tomography angiography images (A–C). (A) OCT angiogram of a superficial vascular plexus centered on the macula. The image of the superficial plexus was segmented from the internal limiting membrane (ILM) to the inner plexiform layer (IPL) (B) The OCT angiogram of a deep capillary plexus centered on the macula. The image of the deep plexus was segmented from the IPL to the outer plexiform layer (OPL) (C) An OCT angiogram of a choriocapillaris vascular layer centered on the macular. The image of the choriocapillaris layer was segmented below the retinal pigmented epithelium. The foveal avascular zone (FAZ) is visibly larger in the deep plexus (B) than superficial plexus (A).

(A) Comparison of Optical Coherence Tomography Angiography and Fluorescein Angiography :

Fluorescein Angiography	Optical Coherence Tomography
1. It requires intravenous dye injection and can lead to adverse reactions 2. Since 2-D, is not able to provide - Details of the distinct layers of blood vessels - Depth resolution 3. It can evaluate the breakdown of the blood retinal barrier.	1. It is based on flow motion detection and there is no need for any contrast dye injections 2. Capable of visualizing the distinct retinal vascular layers with high axial resolution. 3. Unable to evaluate the breakdown of the blood-retinal barrier

Lesions that have slow flow (microaneurysms subtypes and fibrotic neovascularization) would not be detected by OCTA. Since OCTA relies on contrast between consecutive B-scans, it will detect flow only above a minimum threshold, which is affected by the time between the two sequential OCT B-scans.[6,8]

(B) Optical Coherence Tomography Angiography Visualization of Diabetic Retinopathy Features :

Many of the common vascular features of DR, as seen on fluorescein angiography, including microaneurysms, neovascularization, and retinal nonperfusion regions, have been comprehensively studied and described using OCTA.[9]

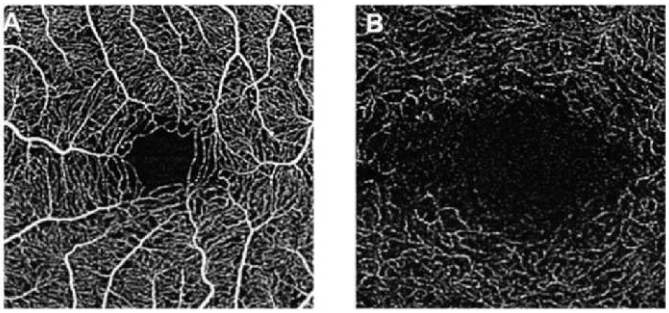

Figure 4 : Optical coherence tomography angiography (A: superficial capillary plexus, B: Deep capillary plexus)- showing network of capillaries of the superficial vascular plexus and a foveal avascular zone is surrounded by the foveal capillary network.

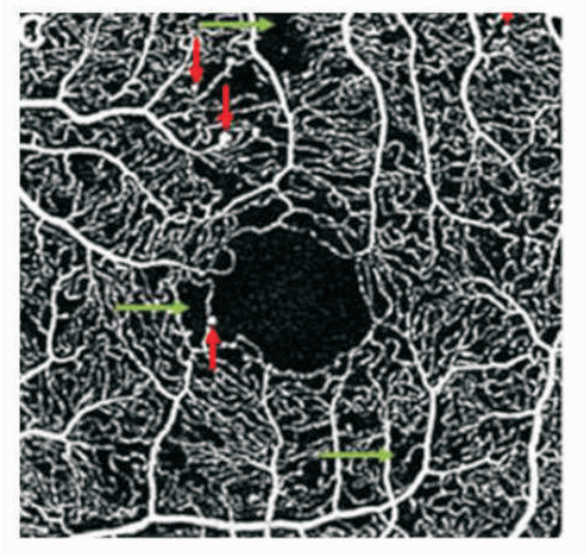

Figure 5 : OCTA (C) showing vascular abnormalities in superficial plexus layers- microaneurysms (red arrows), capillary nonperfusion (green arrows).

Microaneurysms :

Microaneurysms are seen as homogeneous hyperfluorescent punctate spots in fluorescein angiography. In OCTA, microaneurysms can appear as focally dilated saccular or fusiform capillaries, and are found in the superficial and deep vascular plexuses. The detection rate of microaneurysms may be lower in OCTA, due to the relative insensitivity of OCTA to the slow blood flow within certain subtypes of microaneurysms.

Neovascularization :

On fluorescein angiography, retinal neovascularization is identified as characteristic vessels with excessive leakage in the later phase. However, excessive dye leakage can obscure the vascular details of these abnormal vessels. In OCTA, the contrast depends on erythrocyte movement and the images are acquired over a short time, hence, dye leakages have no impact on the quality of images. As such, the vascular characteristic of neovascularization is displayed with greater clarity in OCTA compared to fluorescein angiography.

Since OCTA can provide information on the various retinal layers, it can help to distinguish between retinal neovascularization, which develops anterior to the retinal vessels and above the inner limiting membrane, and intraretinal microvascular abnormalities, which occur in the same plane as the retinal blood vessels. Therefore, OCTA may help to detect subtle neovascularization, which is difficult to differentiate from intraretinal microvascular abnormalities on clinical examination.[10-12]

While OCTA is unable to provide information on vascular leakage, morphologic evaluation of neovascularization using OCTA may be able to estimate the activity status of the neovascularization. Ishibazawa and co-workers reported that exuberant vascular proliferation (irregular proliferation of fine new vessels) in OCTA should be considered as a sign of active neovascularization. Hence, quantitative investigation of the extent of retinal neovascularization with OCTA can be used to guide effective therapeutic strategies.[13]

Peripheral Retinal Nonperfusion :

With fluorescein angiography, nonperfusion regions are seen as dark areas, with loss of capillaries surrounded by larger retinal vessels. OCTA can visualize these corresponding areas of nonperfusion within the superficial vascular plexus and the deep vascular plexus . Previous qualitative studies in DR have shown that OCTA is capable of delineating retinal capillary nonperfusion with better resolution than fluorescein angiography, providing an improved visualization of capillary dropout and changes in the foveal avascular zone (FAZ) . However, the nonperfusion areas, as seen on OCTA, may either represent capillary occlusion, capillary dropout (complete loss of capillaries) or perfusion deficits (presence of extremely slow flow or absence of flow within the existing retinal capillary) and cannot be differentiated.[81] Changes in vessels visualized on OCTA images do not necessarily indicate structural changes to the blood vessel angioarchitecture and capillary dropout, because the OCTA angiograms depict perfused vessels only. When the blood flow is very slow in diseased eyes, the decorrelation values may be below background noise floor, and therefore remain undetected .

Widefield fluorescein angiography revealed that peripheral retinal nonperfusion is a common finding in eyes with DR . These peripheral nonperfusion lesions have been associated with higher risks of DR progression and support the hypothesis that peripheral nonperfusion may be a useful surrogate for and potential predictor of proliferative DR . Therefore, numerous researchers have explored the use of widefield OCTA to identify peripheral capillary nonperfusion. They reported that widefield OCTA shows comparable diagnostic performance to that of widefield fluorescein angiography for retinal nonperfusion areas. Tan and co-workers further improved the diagnostic performance of widefield OCTA in detecting nonperfusion areas, by removing the influence of larger retinal vessels from capillaries in OCTA scans.[15] Furthermore, widefield OCTA

resulted in the higher detection of retinal neovascularization than on clinical examination, which suggests that widefield OCTA could be considered for the purpose of early detection of neovascularization.[16-17] Of note, the widefield fluorescein angiography remains a vital clinical tool in its ability to detect both peripheral retinal nonperfusion and eventual peripheral active neovascularization, which remains difficult to visualize clinically and is less accurately identified with widefield OCTA.

(C) Quantification of microvascular alterations from OCTA images :

Several methods to quantify OCTA vascular density outcomes have included perfusion density (or vessel area; calculated as the percentage of the area occupied by vessels), vessel density (or vessel length; calculated as the total length of skeletonized vessels in an area; in mm / mm2). These two parameters are widely used in DR studies. Other vascular parameters have also been described, including vessel diameter index (the average vessel caliber), fractal dimension (an index of the branching complexity of the capillary network), intercapillary area, vessel length fraction (total length of vessels), vascular architecture (such as branching angles, tortuosity and fractal dimension), and nonperfusion index.[18-21] Apart from static vascular biomarkers, another promising OCTA biomarker is vascular reactivity (the dynamic response of the vessels) .[22]

Foveal avascular zone (FAZ) measurements :

The human foveola, a rod-free region of the central retina, is responsible for central vision, as it has the maximum cone photoreceptor packing density. The absence of vasculature and the overlaying inner retinal tissue are believed to maximize the optical quality by reducing light scattering. This central avascular region is known as the foveal avascular zone (FAZ). In DR, enlargement of FAZ occurs due to the loss of capillaries in the adjacent vessels.[23] Therefore, the most common approach is to measure the area of the FAZ. FAZ area is believed to be a measurement that can indicate diabetic microvascular changes. In addition, other metrics have also been adopted to measure the FAZ, such as the FAZ perimetry, FAZ radius and FAZ circularity. The FAZ becomes irregular in shape once the obstruction of the innermost capillaries surrounding the fovea occurs. Hence, FAZ circularity on OCTA also serves as an indicator of capillary dropout and macular ischaemia.

Vessel density (VD) :

It is defined as the proportion of blood vessel area over the total measured area.

Vascular length density (VLD)/skeleton density (SD):

Vessel length density (VLD) or skeleton density (SD) is proposed to serve as a counterpart of VD which quantifies the vessel density by only considering whether the vessel exists per unit area, regardless of the vessel diameters. Consequently, compared with VD, VLD is thought to more sensitive to the perfusion changes at the capillary level.[24]

Vessel diameter index (VDI) :

It is calculated as the area occupied by blood vessel from the binarized image over the total length of blood vessel from the skeletonized image, representing the average vessel calibre of blood vessels.[25]

Fractal dimension (FD)

Fractal dimension (FD) measures the complexity of a vasculature branching pattern. FD is calculated from a skeletonized line tracing using the box-counting method, which divides each image into a series of squares for various side lengths and the number of boxes is counted.

Vessel tortuosity :

Retinal vessel tortuosity is defined as the integral of the curvature square along the path of the vessel, normalized by the total path length. The vessel tortuosity may be an early indicator of vascular damage to the retina since patients with DM were found to have increased vessel tortuosity as compared to healthy controls.[26]

(D) Quantitative OCTA metrics in diabetic retinopathy

➢ Quantitative metrics are correlated with severity of DR

Several studies demonstrated quantitative OCTA metrics on SCP and DCP are correlated with severity of DR.

Enlarged FAZ, Decreased FAZ circularity, Lower VD, Increased VDI, Decreased FD, Increase vessel tortuosity, Decreased SD	Worsen DR[27,28]
FAZ- Foveal avascular zone, VD- Vessel density, VDI- Vessel diameter index, FD- Fractal dimension, SD- Skeleton density.	

➢ Quantitative metrics are associated with DR progression

Only metrics at the DCP (FAZ, VD, and FD) showed significant associations with the risk of DR progression. The DCP may be more susceptible to ischaemic damage because it may reside in a watershed zone, where the deep layer of the retinal circulation next to high oxygen requirements of the outer plexiform layer. Taken together, quantitative OCTA analysis, indicative of diabetic macular ischaemia likely, may identify DM individuals at risk of developing DR progression independently.[29]

(E) OCTA of the choroidal vascular changes in diabetic eyes :

The choroid is mainly composed of vessels and stroma. Most choroidal space is occupied by vessels differentiated in three vascular layers- the choriocapillaris (CC), the Sattler's layer and Haller's layer. Measuring the choroidal blood flow remains challenging by using traditional dye-based angiography. The advent of OCTA makes it possible to visualize and quantify the choroidal vasculature, particularly the CC. There has been concerns about the insufficient resolution of commercial OCTA systems to measure CC because the CC is extremely dense in the posterior pole with small intercapillary distances (5–20 μm) that are smaller than the OCT system's lateral resolution (15–20 μm).[30] Therefore, researchers have proposed to use the flow deficit to analyse CC perfusion.[31] The flow deficit

represents the area where there is a lack of CC flow or CC flow below the OCT system's detectable threshold.[32] Dai and associates have reported increase CC flow deficits in diabetic eyes without retinopathy compared to age-matched controls .

Limitations of Optical Coherence Tomography Angiography :

1.The field of view with OCTA is smaller as compared with available FFA platforms. Although this issue has been overcome with montage OCTA using 12 mm × 12 mm scan, issues such as increased acquisition time and misalignment of images are still a problem.

2.It is unable to assess the dynamic characteristics of flow velocity.

3.Motion and projection artifacts are commonly encountered while analyzing the images.

Summary and conclusion :

Recent advancements in imaging techniques have allowed a multimodal approach in diagnosis and management of various retinal diseases. OCTA being a non-invasive, dyeless procedure clearly delineates the abnormal retinal vasculature and non-perfusion areas. Introduction of wider scans helps detecting vascular abnormalities involving the peripheral retina. These imaging techniques may help in the detection of subclinical disease and retinal vascular changes, even before clinically detectable changes, or development of visual symptoms.

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Association of Public Health Measures During the COVID-19 Pandemic With the Incidence of Infectious Conjunctivitis

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JAMA Ophthalmol. Published online November 18, 2021. doi:10.1001/jamaophthalmol.2021.4852

COVID-19 Resource Center

Key Points

Question What were the associations of COVID-19–associated public health measures with the epidemiology of infectious conjunctivitis?

Findings A model involving publicly available smartphone mobility data was able to show the difference in actual behavior compared with expected trends based on data from previous years and included analysis of noninfectious eye conditions for comparison. The adoption of COVID-19–associated public health measures was associated with a 34% decrease in conjunctivitis-associated search activity and a 37% decrease in emergency department encounters for infectious conjunctivitis.

Meaning These findings show that search metrics in conjunction with mobility data may provide quantifiable metrics of the associations of public health interventions with transmissible diseases.

Oct in Glaucoma and its Fallacies

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Optical coherence tomography (OCT), first described in 1991, is a noncontact, noninvasive imaging technique that can reveal layers of the retina by looking at the interference patterns of reflected laser light.[1] OCT became widely popular in 2002 with the release of Stratus OCT, a time-domain technology (TD-OCT) that was well-studied and validated for use in glaucoma and retina.

Currently, the most common four commercially available SD-OCT devices in the US are: Cirrus HD-OCT (Carl Zeiss Meditec, Dublin, CA, USA), RTVue-100 (Optovue Inc., Fremont, CA, USA), Spectralis OCT (Heidelberg Engineering, Heidelberg, Germany), and Topcon 3D-OCT 2000 (Topcon Corporation, Tokyo, Japan).[2] Each machine has different glaucoma scan patterns, proprietary software segmentation algorithms, and display outputs, so their measurements are not easily interchangeable.

Use of SD-OCT in Glaucoma :

- Significant structural RNFL loss occurs prior to the development of functional visual field loss. In such pre-perimetric disease, OCT RNFL is especially useful in helping to diagnose glaucoma (nerve fibre thinning) prior to the onset of visual field loss.
- It also has a role in detecting RNFL thinning early disease
- Monitoring glaucoma progression.
- For documentation and as teaching tool for counselling of patient

SD-OCT Parameters :

There are three main parameters relevant to the detection of glaucomatous loss: retinal nerve fiber layer, optic nerve head, and the "ganglion cell complex." Currently the most followed parameter on OCT is parapapillary NFL.[3]

RNFL Thickness :

Retinal nerve fiber layer thickness represents the ganglion cell axons before they enter the optic nerve. The peripapillary RNFL thickness is by far the most popular OCT parameter used for glaucoma diagnosis and monitoring progression.

Various devices measure RNFL thickness in slightly different ways. In the Spectralis OCT, it is measured directly with a 3.46-mm diameter circular scan centered on the optic disc. In the case of the Cirrus OCT, the measurement of RNFL is generated from a 6 mm X 6mm datacube scan centered on the optic disc. The RTVue device scans the optic nerve head with multiple radial and circular scans and generates the RNFL thickness map along a 3.45-mm diameter circle centered on the optic disc.Each of the OCT devices provides the RNFL thickness curve on an age-adjusted normative database where green is considered normal, yellow is borderline and red is abnormal (RNFL values below the 99th percentile of normal database).

As glaucoma advances, RNFL measurement continues to decrease but it doesn't go to zero, which is known as the "floor effect." This is because the architectural support made up by Müller cells, astroglia, microglia and blood vessels doesn't degenerate completely with retinal ganglion cell axons. Once the RNFL thickness reaches the floor, progression can still occur, but it can't be detected by RNFL OCT. So in advanced glaucoma HFA (10-2) is a better device to monitor glaucoma progression.

Sources of Misinterpretation :

1. Signal Quality- When assessing the adequacy of a scan, the signal strength should always be noted. 1 unit of signal strength change can lead to approx. 2 micron decrease in RNFL thickness.[4]

Machine	Minimum acceptable scan quality level
Cirrus SD OCT (Carl Zeiss Meditec)	Signal strengh>6(max 10)
RTVue (Optovue)	Signal strength index≥30 (max 100)
3D OCT (Topcon Medical Systems)	Image quality> 45 (max 160)
Spectralis (Heidelberg Engineering)	Quality > 15 (max 40)

2. **Blink/Saccades :** With eye movement or blinking, the scans do not align correctly which can lead to an erroneous RNFL thickness measurement, which may be misinterpreted as progressive thinning.
3. **Centration** : If the scan is not centered on the optic nerve head, RNFL appears thinner in some sectors and thicker in

others. This may be more common in myopic eyes, which are elongated and often have peripapillary atrophy.

4. **Segmentation Errors :** The OCT machine fails to accurately delineate the layers of the retina. This results in false assessment of RNFL thickness.

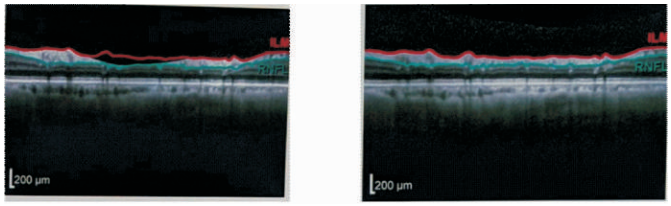

Figure 1 : Segmentation error

5. **Coexisting pathology** : Pathologic changes in the eye can affect RNFL measurements. Media opacities in the form of corneal haze, cataracts and vitreous debris may lead to a false decrease in RNFL thickness, while myelinated RNFL, epiretinal membrane, swelling of ONH and peripapillary retina can falsely increase RNFL measurements.

Macular scan :

Approximately 50% of the retinal ganglion cells reside in the macular region. Imaging the retinal thickness loss in the macula is a sensitive measure for detecting early glaucoma.[5]

Each of the OCT devices provides a different scan of the macula. Cirrus uses ganglion cell inner plexiform layer complex (GC-IPL complex). Optovue uses the GCC that includes the GC-IPL and the nerve fibre layer at the macula. Spectralis uses total macular thickness for macular analysis. The latest software of Spectralis can segment every layer at the macula.[6]

Macular parameters can also be affected by the floor effect, although this occurs later in the disease than is seen in the RNFL because of the high density of retinal ganglion cell in the macular area. So in advanced glaucoma, when RNFL reaches the floor, macular OCT may be more useful. This can also apply to patients with myopia, who have variability in disc morphology and peripapillary atrophy. In both situations, any other pathology affecting the macula should be ruled out before relying on it for monitoring progression.

Optic Nerve Head Scan :

Disc parameters measured by OCT haven't been widely accepted, probably due to variability of disc size, tilt, torsion, peripapillary atrophy and other potential artifacts.

Red disease :

Misinterpretation that occurs when normative database is applied to patients who should not be considered normal (eg. those with high myopia). OCT mistakenly indicates that something is abnormal.

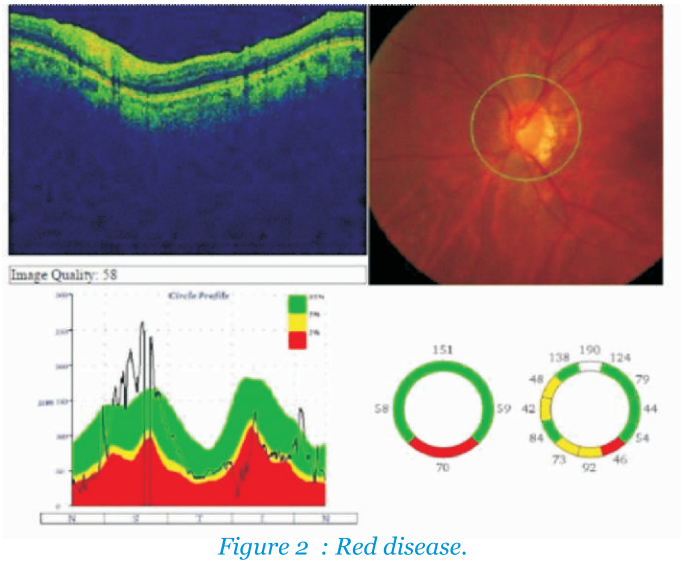

Figure 2 : Red disease.

Green disease : Occurs in patients who have normal global values such as an average RNFL thickness but have small focal defects that are missed. In

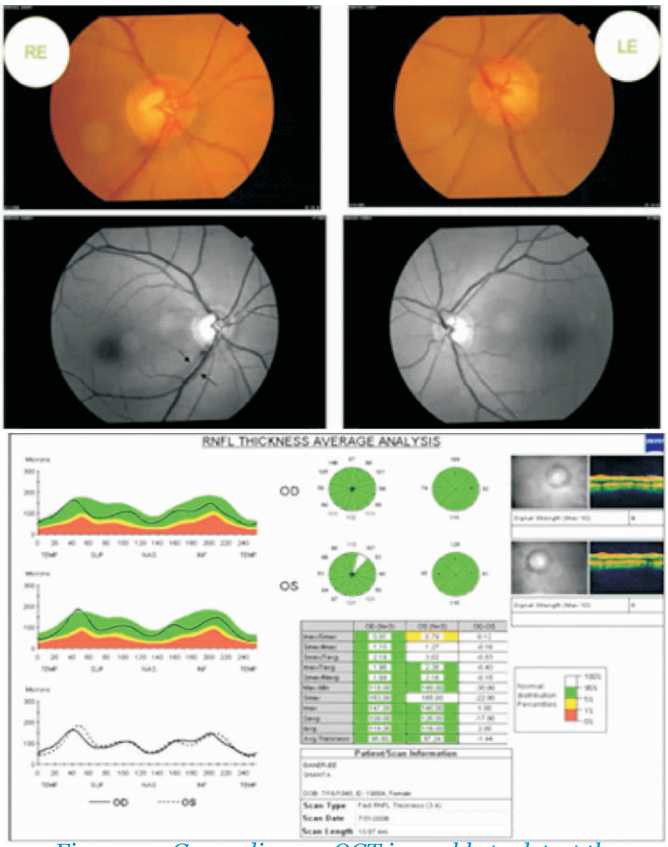

Figure 2 : Green disease. OCT is unable to detect the early inferior RNFL thinning in the right eye

there is inferior RNFL thinning and inferior disc haemorrhage in RE but the OCT RNFL is showing absolutely normal. This is

because unless there is 20-30% RNFL thinning, the OCT RNFL data is still within normative database.

Limitations of OCT :

- OCT machine changes before there is changes in the optic disc. Due to upgradation of software of OCT machine old reports cannot be compared with the recent reports.
- Data from different machines (generations) are not comparable.
- Artefacts are common (20-40%).
- Limited role in myopes, retinal pathology and gross media opacity.
- There is no universally accepted guidelines on OCT progression.

Conclusion :

OCT has proven to be a quantitative and reliable tool for diagnosing pre perimetric glaucoma and monitoring glaucoma progression. However, it should be used in conjunction with clinical evaluation and visual field testing. OCT findings should always be correlated with clinical findings. In early glaucoma, OCT of the RNFL and macula may be important for patients with normal or unreliable visual field tests. In moderate glaucoma, the correlation between OCT measurements and VF tests helps to confirm progression. In advanced glaucoma, one should be aware of the floor effect in RNFL OCT measurements and consider the use of macular OCT and 10-2 visual field tests to detect progression.

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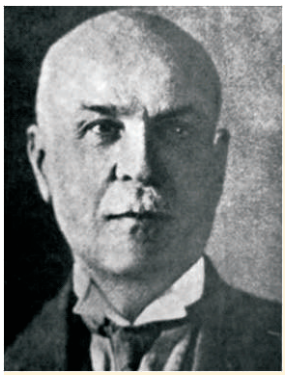

Invention of Gonioscopy by Alexios Trantas

The first person to observe the angle in vivo was the Greek ophthalmologist Alexios Trantas (Figure 1) in 1899 in an eye with kerato globus. He devised a method using direct ophthalmoscopy combined with digital pressure on the limbus. In 1900 he described the ophthalmoscopic appearance of the normal and the abnormal angle and was the first to use the term 'gonioscopy', noting instances of dense pigmentation of the trabecular mesh work, iris processes and cyclodialysis clefts.

Alexios Trantas was born in Epirus, Greece, in 1867 and studied medicine in Athens, where he received his doctorate in 1891, He was also founder and director of the first special pavilion for trachomatous patients in Constantinople, the so-called 'Skouloudeion ophthalmiatreion'. [20] His work covers a wide scope of eye disorders. He wrote mainly about eye symptoms in systemic diseases (leprosy, syphilis, tuberculosis etc.) and recognised the white dots in vernal kerato conjunctivitis as pathognomonic. These small, white-yellow chalky concretions of the conjunctiva around the limbus are known today as the Horner-Trantas spots or Trantas dots Trantas was recognised in 1948 by the Belgian Society of Ophthalmology as the 'Father of Gonioscopy',

Source:

histor J R Coll Physicians Edinb 2015; 45: 226–8http://dx.doi.org/10.4997/JRCPE.2015.311© 2015 Royal College of Physicians of Edinburgh

Mental Health in Ophthalmic Patients

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Among many aspects of mental health one is the patient's ability to cope with normal stresses of life. We as an ophthalmologist very often encounter patients with some mental illness. Mental illness can be due to some psychiatric disorder per se or it can be the psychological reaction of blindness. Signs like eye movement abnormalities may be associated with specific psychiatric disorders (e.g. schizophrenia) and could potentially aid in diagnosis to the psychiatrist. Also, there are several eye diseases with unknown causes in which psychological factors are implicated in causation.

Here we have discussed some of the possible psychiatric consequences of ophthalmic diseases like visual hallucinations, depression due to blindness, Psychosis due to steroid and eye patching, Phobias before and during surgery etc.

A significant number of patients with severe (bilateral) visual loss experience visual hallucinations. It is believed that these hallucinations are generated in the visual cortex days or weeks after development of visual loss. It can be temporary or permanent. Visual hallucinations also occur in psychiatric disorders like dementia(where they are usually accompanied by auditory hallucinations), drugs history, alcohol withdrawal. This condition is termed as Charles Bonnet Syndrome.[1] Counseling of the patient regarding the benign nature of the disease is the mainstay of treatment.[2]

An ophthalmologist's responsibility is to establish the cause for visual hallucination as it can also be observed in neurological disorders like occipital lobe lesions, migraine etc. Neurological symptoms, signs and neuro imaging of brain aid in the diagnosis of these neurological diseases. In such patients, ophthalmic examination is usually completely within normal limits except sometimes migraine attack may simulate subacute angle closure glaucoma.[3] Among ocular causes of visual hallucination, patient of posterior vitreous detachment (PVD) ,[4] optic neuritis or papilloedema experiencing flashes of lights can also simulate visual hallucination. However proper history & ocular examination can easily rule out the diagnosis. In psychiatric diseases like schizophrenia or functional psychosis, visual and auditory hallucination are treated by psychiatrist doctor. Depression is a common mental disorder. According to a review study prevalence of depressive symptoms seen in ocular diseases was 25%. Among different ocular diseases, dry eye disease patients(DED) observed to have highest prevalence(29%) of depression. Glaucoma is the second highest cause(25%) followed by Age related macular degeneration(24%) and cataract(23%).[5] Another study on older patients observed that age-related macular degeneration (AMD), glaucoma, or Fuchs corneal dystrophy are more likely to show signs of depression compared to a control group with good vision.[6]The sole factor for this depression is increasing dependency on people around them due to vision loss. Apart from depression, anxiety, personality changes, communication problems and emotional distress are the other consequences of vision loss on patient's mind[7]

Often loss of vision occurs as a side effect of psychiatric medication. Once a visually-impaired and mentally ill patient gets dependent into psychiatric medication which in turn can worsen their eyesight further resulting in further detoriation of mental health, thus forming a vicious cycle, especially without a support network, for them to make the necessary lifestyle changes. As an ophthalmologist, we should be able to recognize the mental status of a visually impaired patient refer them to a psychiatrist for proper counseling to adapt to the life style changes to overcome barriers in the daily routine and also to assist in overcoming negative thinking and enhance social supports.

Usage of systemic steroids (as in cases of panuveitis etc) in some patients can induce mental state changes which are termed as steroid induced psychosis. Females and younger patients are more prone to develop this type of psychosis [8]. Features include changes in mood such as depressive or manic disorder. It is usually acute in onset and symptoms generally presents in the first few days of therapy. Phenothiazines and cessation of systemic steroid therapy (or substituting systemic steroids with periocular steroids in purely ocular problems) is the mainstay treatment with resolution of symptoms within six weeks. Psychosis can also develop in some patients who have both eyes patched after traumata or after intraocular surgery. Psychiatric features include restlessness,

hyperactivity, anxiety, irritability, disorientation in time and space. Less frequently mania, delusions, auditory and visual hallucinations may occur. Patients who have impaired other senses like hearing problem etc are more prone to develop this condition. An ophthalmologist should be aware of this condition and can get appropriate consult from psychiatry colleagues when the need arise. Passing through various stages of eye operations can cause a lot of distress, anxiety and fear among patients. Reasons for fear and anxiety can be diverse. As far as local anaesthesia is concerned, the knowledge of needle pricks around the eyes is quite frightening for some people,

while some people with low threshold for pain may be troubled by the prick of needles.[9] The commonest fear of general anaesthesia is 'not waking up'. Another common cause of apprehension during surgery is the fear of becoming blind by some complication. However, patients who had uneventful and smooth surgeries in one eye earlier are calm generally when being operated upon the second eye.

Most of the studies showed a significant relation between psychiatry and ophthalmology, such as mental problems accompanying eye diseases and significant adverse side effects of psychotropics on the eye. As an ophthalmologists, we should be skilled enough to recognize symptoms of psychiatric disorders in patients. An early recognition of symptoms can help to start an adequate counseling or therapy in these patients to decrease the progression of disease and increase the quality of life of the patients.

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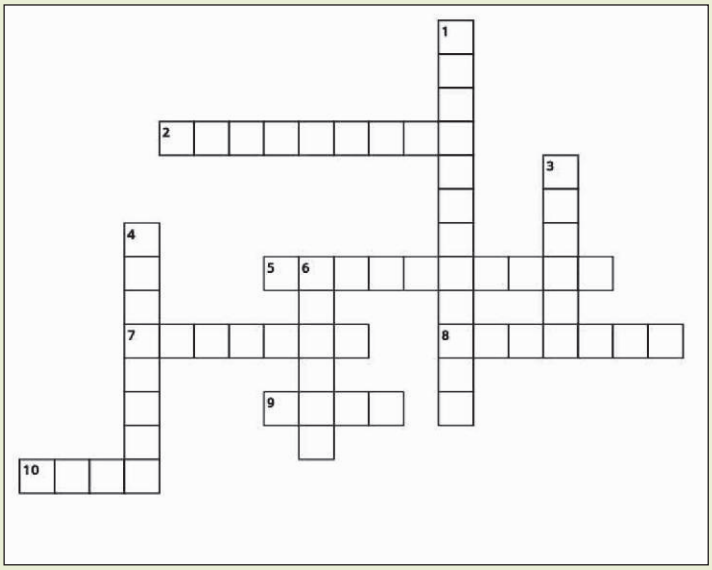
*by : **Dr. Anchal Tripathi***



Across

2. Pattern formed by folds in ILM overlying microcyst within NFL in foveal schisis
5. Cytokine receptor inhibitor
7. Verteporfin PDT vs Ranibizumab study
8. Pupil expander ring
9. Surgery done for senile entropion
10. Central Retinal artery also known as _ artery

Down

1. A 26kDA anti-VEGF approved recently for AMD
3. Suprachoroidal based MIGS
4. Rule that states when naevus flammus involves the upper lid, there is ipsilateral intraocular involvement
6. Hemorrhage in AC in Fuch's

The correct answers can be mailed to editorupsos 2018@gmail.com

Pthiriasis Palpebrum Manifestation in Eye: A Case Report

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Abstract:

Background : Phthiriasispalpebrarum is a rare infestation of eyelid and eyelashes. It occurs due to phthiriasis pubis often named as crab lice.

Case report : An 8-year-old child presented to our institution with itching, burning sensation and lacrimation in the left eyelid near lid margins. Diffuse torch light examination revealed multiple white dots on the left upper eyelashes. On slit-lamp examination multiple nits attached to the base and shaft of the cilia were seen. The right eyelid and eye was absolutelynormal. The patient was treated by mechanical removal of nits as possible followed by moxifloxacin eye ointment application. Patient was completely cured in 2 weeks.

Conclusion : Clinical findings similar to anterior seborrheic blepharitis should be carefully examined with a slit lamp to diagnose the etiology as Phthiriasispalpebrarum is frequently misdiagnosed as anterior blepharitis.

Key words : Phthiriasispalpebrarum, infestation, blebharitis

Introduction :

Phthiriasispalpebrarum is a rare infestation of eyelid and eyelashes. It occurs due to phthirias is pubis often named as crab lice. These lice primarily found in pubic hairs. Although, occasionally they can also infest skin and hairs of other body part but unilateral involvement of eyelid and eyelashes is very uncommon.[1] Sexual contact is the most typical mode of transmission however transmission can also occur through shared towels, sheets or clothes.[2] these iinfestati on generally affects people of low socioeconomic strata, associated with poor hygiene and overcrowding.[3] Thediagnosis can be made easily by the slit lamp examination, although misdiagnosis or delayed treatment can leadto blepharoconjuctivitis.

Case report :

Clinical presentation: An 8-year-old child came to our institution presented with itching, burning sensation and lacrimation in the left eyelid near lid margins for one week.On external examination of left eye multiple white dots were seen at lid margin and upper eyelashes along with mild hyperemia and excoriation. On slit-lamp examination multiple translucent oval nits firmly clinging to the base and shaft of the cilia were seen. No adult lice were observed at the time of examination(Figure 1).

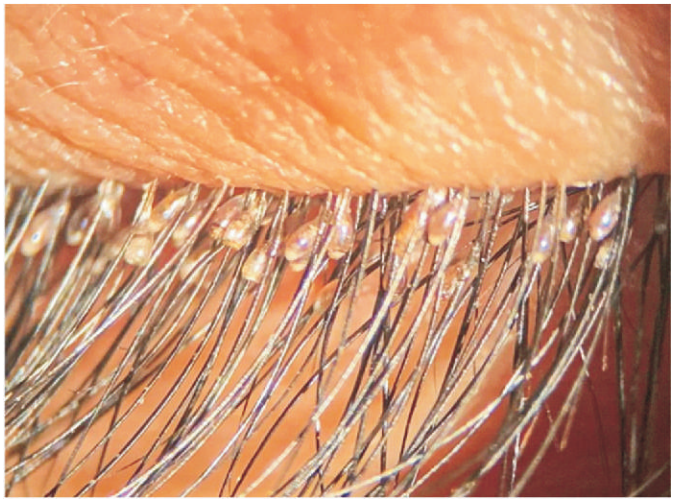

Figure 3 : The PhthiriasisPalpebrarum nits adhered to the eyelid

No discharge or congestionwas noticed in the conjunctiva and anterior and posterior segments were normal. The right eye was absolutely normal. The visual acuity of the patient in both eye (BE) was 20/20. Intraocular pressure was 17 mm Hg in both eyes. The patient was also send for the dermatologist opinion and infestation was not found anywhere else. No history of any chronic systemic illness was present. Diagnosis of phthiriasispalpebrabum without secondary infection was confirmed. The family members of the patient were also examined but no one had the disease.

Management :

Mechanical removalof as many nits as possiblewas done with

the help of forceps under topical anaesthesia. This was followed by moxifloxacin eye ointment application to the lid margin in ample amount three times per day. During the period of treatment and afterwards the patient was advised to avoid close body contact and not to share clothing and towels. Follow up was done on day 2 and then weekly. Patient was completely cured in 2 weeks.

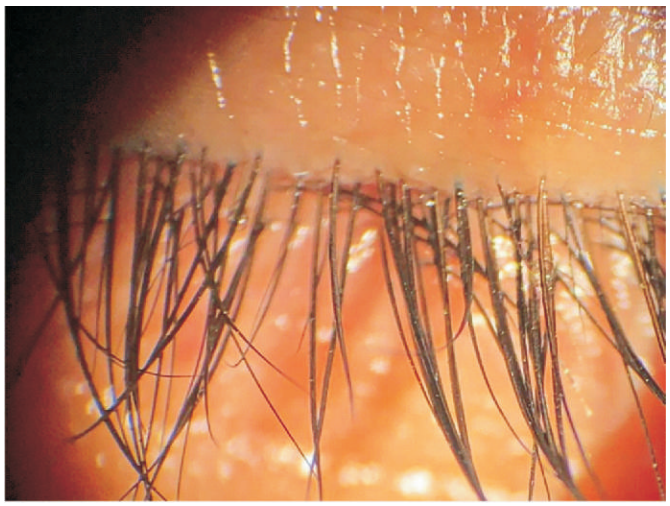

Figure 3 : treated eyelid of the same patient

Discussion :

Phthiriasispalpebrarum a rare infestation of the eyelashes with Pthirus pubis or crab louse commonly found in pubic hairs.[4] Phthiriasispubis is an arthropod of the family Pedialidae and the genus Phthirus.[5] It is an obligate ectoparasite similar to Pediculushumanus capitis (head louse) and Pediculushumanus corporis (body louse). Morphologically it is different from other louse as second and third pair of legs and claws are stouter and powerful due to which they grasp hair shafts tightly.[5] The adult female louse lays 7–10 eggs/day. The nits hatched after 7-8 days and nymphs matures in 8-10 days.[6]

Patients infested with phthiriasispalpebrarum usually present with intensepruritus, lacrimation conjunctival inflammation, and sometimes preauricular lymphadenopathy because of secondary infection. The transmission of parasite from the pubic area to eyelashes probably takes place via hands, but reported eyelashes infestation can occur with out pubic involvement as in our case.

Treatment include mechanical removal with forceps, eyelashes trimming, 20% fluorescein eye drops , physostigmine 25%, yellow mercuric oxide ointment 1%, pilocarpine gel, oral ivermectin and argon laser therapy or cryotherapy. Mechanical removal is the treatment of choice but complete removal in one sitting is not possible therefore we prescribed antibiotic eye ointment aswell. Cloths, towels and bedding used by the patient should be washed at with hot water and dried up in the sun.[9]

Conclusion :

Unilateral phthiriasispalpebrarum is a rare disease and easily misdiagnosed as blepharitis careful examination with slit lamp should be done to prevent secondary infection such as blepharoconjunctivitis . In multiple treatment modalities ,mechanical removal of nits along with antibiotic eye ointment application is the very effective option.

Acknowledgment :

The figures have been provided by Dr Mohit Khattri, MS, Senior Consultant, Regency Hospital Private limited, Kanpur.

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Severe Anterior Capsular Contraction Syndrome Presenting with Hypotony and Hyperopic Shift in A High Myope with History of Scleral Buckling

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Abstract :

Anterior capsular contraction syndrome (ACCS) is a known complication of cataract surgery caused by fibroblastic metaplasia of residual lens epithelial cells. The disease may take an aggressive form in eyes with zonulopathy because of an imbalance of centripetal and centrifugal forces acting on the capsular bag. Hypotony is an uncommon complication of this syndrome which can be associated with ciliary body detachment. Presence of hypotony with severe ACCS in a patient of high myopia and previous scleral buckling is a therapeutic challenge which if not treated in time can lead to major vision threatening complications.

Key words : Anterior capsular contraction syndrome, Hypotony, Hyperopia, Scleral buckling, Myopia

Anterior capsular contraction syndrome (ACCS) is a known complication of cataract surgery characterized by extreme fibrosis and contracture of the capsular bag with phimosis and even complete occlusion of the capsulotomy opening. Fibroblastic metaplasia of residual lens epithelial cells (LEC)in response to surgical trauma is the most widely accepted explanation for this disorder.[1] A small sized capsulorhexiscan induce capsular phimosis because of greater area of contact between LEC and anterior surface of alloplastic intraocular lens implant.[1] Eyes with zonular weakness, whether pre-existing or acquired intraoperatively are more prone to get extreme degrees of capsular shrinkage because of an imbalance between centripetal and centrifugal forces acting on the capsular bag.[1] Myopia, uveitis, post vitreoretinal surgery status, pseudoexfoliation, myotonic dystrophy are known risk factors.[2] Hypotony and ciliary body detachment are uncommon complications of ACCS by excessive centripetal tractional forces.[3-8] But presence of capsular contracture with hypotony in a high myopic patient with previous scleral buckling can complicate the picture. An early intervention in these cases can prevent vision loss. We report a case of a high myope with past history of scleral buckling (SB) who developed hypotony and a hyperopic shift with severe anterior capsular contraction syndrome after phacoemulsification surgery with a single piece hydrophobic acrylic to ricintraocular lens (IOL).

Case presentation :

A 38-year-old man with no systemic illness, visited us for a sudden diminution of vision in his left eye. He was a high myope and had lost vision in right eyein childhood secondary to an untreated retinal detachment. He also had a history of scleral buckling and cryopexy done in left eye 14 years ago for detached retina. Recently he had a phacoemulsification surgery done in left eye with a toric IOL at another hospital. His postoperative uncorrected distance visual acuity (UDVA)was 6/6. But at six weeks he started having blurring of vision in left eye and visited our centre. On examination we found his left eye UDVA was 6/24 and corrected distance visual acuity (CDVA), 6/9 with +2.00 DS. There was ciliary tenderness and intraocular pressure (IOP) with applanation tonometry was 03 mm. Siedel's test was negative,cornea clear, pupil round and reacting to light. Anterior chamber was deep and a mild cellular reaction (1+) was present. A severe capsular shrinkage with fibrosis was seen with the capsulorhexis opening phimosed to 1.5 – 2 mm size and both the haptics of the IOL flexed anteriorly, folded over the optic.

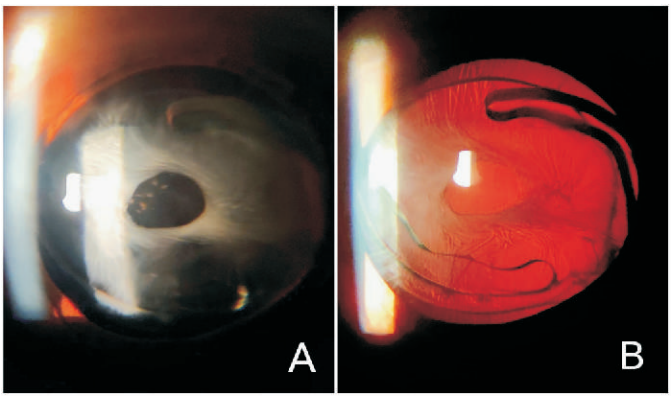

Figure 1 a : Severe anterior capsular phimosis at first visit.

Figure 1 b : Retroillumination picture showing anteriorly flexed IOL haptics

The IOL however, did not appear decentred. On dilated examination a posterior vitreous detachment was seen with no evidence of vitritis .Retina was attached with a healthy disc and fine epiretinal membrane (ERM) at macula.

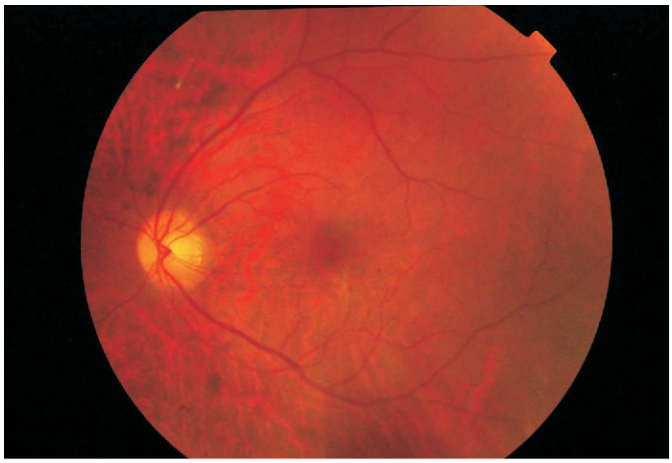

Figure 2 : Fundus picture showing healthy optic nerve and attached retina.

Few chorioretinal folds were present along inferotemporal arcade. Superior peripheral cryoscars and a 3600 buckle effect was seen, but nochoroidal effusion, buckle exposure, intrusion or scleral perforation was evident.

Few chorioretinal folds were present along inferotemporal arcade. Superior peripheral cryoscars and a 3600 buckle effect was seen, but nochoroidal effusion, buckle exposure, intrusion or scleral perforation was evident.

Investigations :

B-scan ultrasonography showed mild retino-choroidal thickening. Ultrasound biomicroscopy (UBM) showed mild thickening of ciliary body without any detachmentor effusion. A thick membrane corresponding to fibrosed capsule was seen over the IOL with stretched zonules .

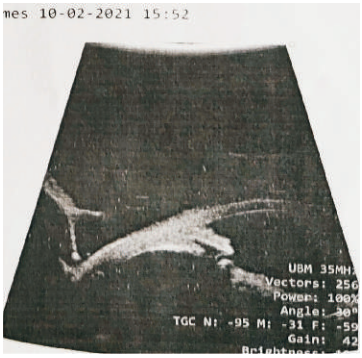

Figure 3 : Left eye UBMshows attached ciliary body and no effusion.

OCT scan showed maintained foveal contour and ERM.

Treatment :

Patient was started on oral and topical steroids with Atropine eyedrop 6 hourly. The IOP was still 5 mmHg after a week when we decided to do Nd:YAG laser anterior capsulotomy. Laser procedure was done in a stepwise fashion in three sittings (in 10 days) to avoid using too much energy at a time. Multiple radial cuts were given along the fibrosed rim,enlarging it to approximately 5 mm size by the third visit .

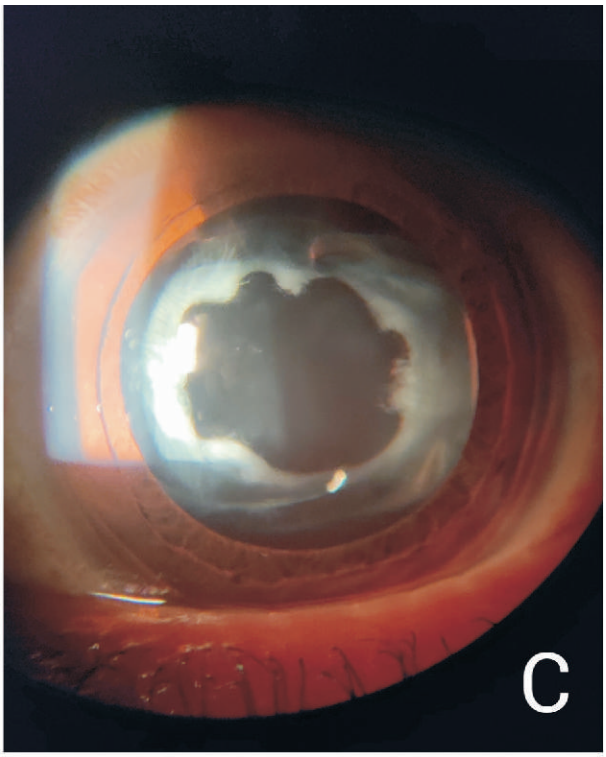

Figure 1 a : After completion of Nd:YAG laser treatment with enlarged capsular opening.

There was gradual improvement in vision to 6/6 and IOP was raised to 11 mmHg. A reduction in contact area of haptics with the IOL optic was seen. A total of 102 laser shots and 138mJof energy was used. Retina examination was carried out on each sitting before and after the laser treatment. A slow tapering of topical steroid was done over 6 weeks. At 3 months follow up visit, with topical steroids stopped for more than 6 weeks, the eye was quiet and patient asymptomatic.

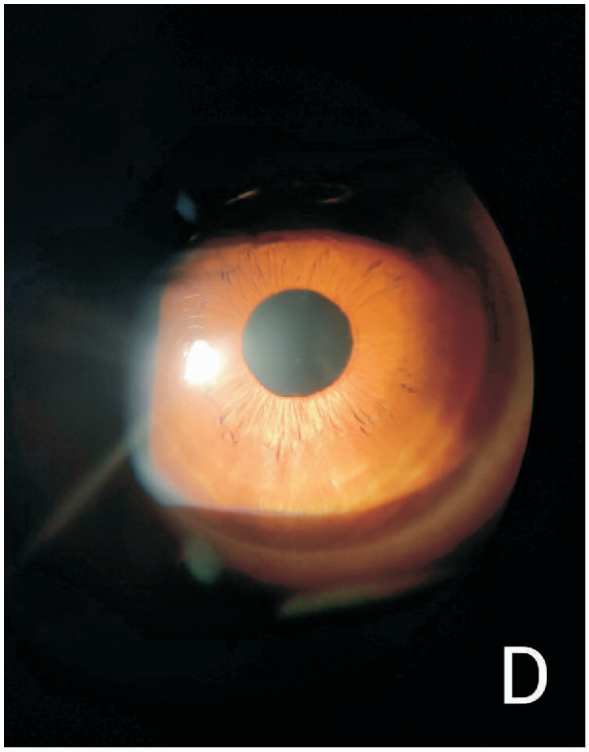

Figure 1 a : Left eye at 3 months follow-up

UDVA was 6/6, and near vision n6 with +2.00 D addition. The retina is attached and IOP in normal range now. Patient is under close follow up.

Discussion :

The differential diagnosisfor hypotony in this case was.[1] Traction on ciliary body by stretched zonules and inflammation .[2] Progressive scleral thinning with secondary complications of SB surgery. However, the patient had been doing well for 14 years post SB and no hypotony was noted before this episode. A meticulous retina examination, and investigations helped in ruling out scleral perforation, infection and buckle intrusion and only then we proceeded with laser treatment. A rapid development of capsular fibrosis in our patient can be attributed to high myopia. High circulating level of transforming growth factor-β 2 in aqueous humor of myopes has been implicated for ACCS.[9] Extreme contracture can induce a hyperopic shift by anterior flexion of haptics, shifting the IOL optic posteriorly.There are only 6 case reports of 7 patients of ACCS with hypotony.[3-8] We found that out of 7 patients, 5 were known cases of glaucoma and 4 had previously operated trabeculectomy.[4-7] The only case with no other ocular pathology was reported byLanzl et al where choroidal detachment accompaniedACCS after 18 months of cataract surgery and responded to laser treatment.[3] Williams et al reported a case of pars planitis with augmented trabeculectomy done who had high IOP after uncomplicated cataract surgery and Tablet Acetazolamide was giventwice daily following which the patient developed hypotony and uveitis on 6th dayand capsular contraction with ciliary body detachment was noted at 5 weeks.[7] Wang et al reported a patient who developed bilateral ACCS with ciliary body detachment which resolved post laser.[8] Unlike previous reports, our patient had hypotony and choroidal folds but no cilio-choroidal detachment. The possible reasons could be an early visit to the clinic as soon as he experienced visual deterioration. Inflammation and edema of CB induced by zonular stretching may have caused reduced aqueous secretion in this case. This was confirmed with the prompt resolution of hypotony after YAG laser treatment.

Hypotony secondary to globe perforation, intrusion or extrusion of buckle has been reported even many years after surgery in high myopes.[10] The management priority would have changed in such a condition.

Conclusion :

To conclude, anterior capsular contraction syndrome can cause hypotony after cataract surgery in patients with high myopia and the role of UBM is important to rule out ciliary body detachment. YAG laser capsulotomy is an effective method for treatment and avoids the risks of infection and other complications of surgery. However, extra care and close monitoring is needed in patients with scleral buckling who are prone to get vision threatening complications.

Declaration of Consent : A written informed consent has been obtained from the patient for publication of case report and de-identified images.

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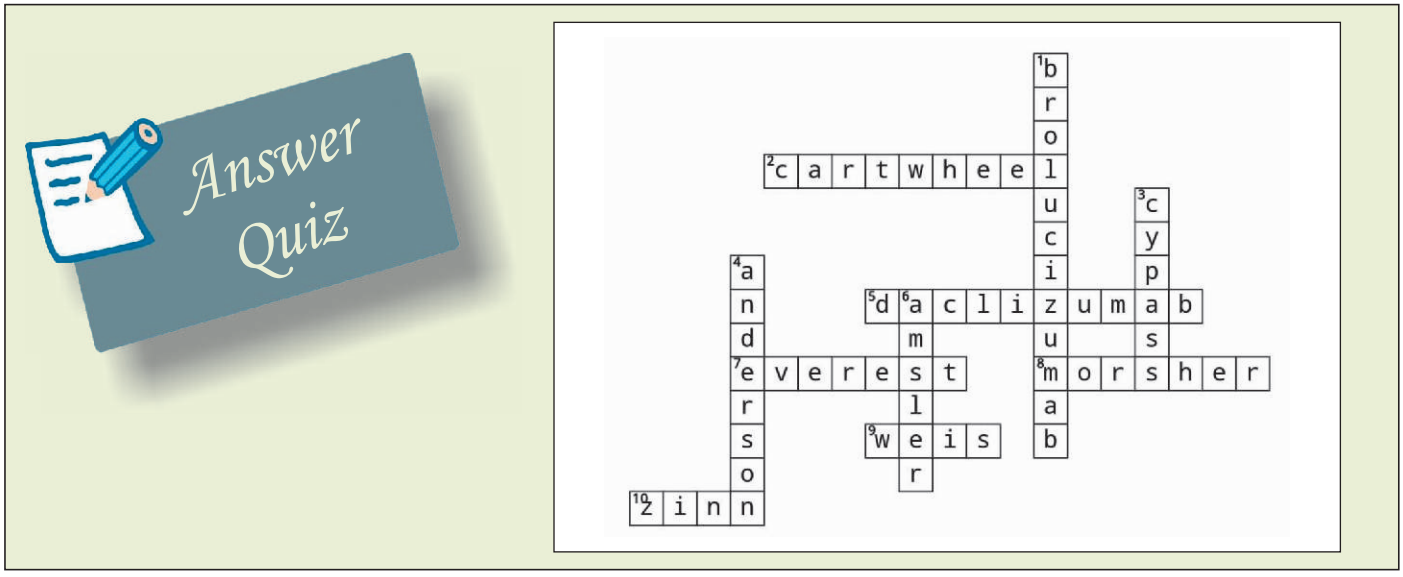

Optic Disc Evaluation in Glaucoma

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Glaucoma is a chronic progressive optic neuropathy with characteristic optic disc and RNFL changes correlating with visual field defect where IOP is a major risk factor. Several studies have shown that abnormalities in the appearance of the optic disc may precede visual field defects.[1,2] Conventional stereoscopic clinical evaluation and imaging of the optic disc with fund us photographs is still the most frequently used and sensitive means of diagnosing glaucoma. With some training, it is possible to clinically evaluate optic nerve head and retinal nerve fiber layer stereoscopically and detect early glaucomatous damage. The aim of this article is to describe the morphological changes of the optic nerve in glaucoma and highlight the techniques of clinical evaluation of the optic disc.

METHODS OF OPTIC DISC EXAMINATION

Traditionally, the direct ophthalmoscope has been used for the evaluation of the optic nerve head. Though it has the advantage of providing a magnified view, of being faster and easy to use, the lack of stereopsis can result in missing of subtle changes. Therefore, the use of the direct ophthalmoscope should be strongly discouraged.

A variety of contact and non contact lenses are available which allow stereoscopic viewing of the fundus through the slit lamp. Contact lenses such as Goldmann lenses are relatively uncomfortable for the patient, take longer time and the coupling fluid can cause transient blurring and difficulty in obtaining good quality fund us photographs. Non contact lenses include +60D, +78D, +90D and Volk superfield lenses (figure 1). These provide excellent stereoscopic and magnified view of the optic disc.

Figure 1 : Non Contact Lenses (Includes +60D, +78D and Volk Superfiel Lenses)

To determine the optic disc size on slit-lamp, reduce the size of the beam to coincide with the disc margi an dit can be measured on the reticule on the slit-lamp. The disc size needs to be multiplied by the magnification factor of the lens being used. The magnification factor of commonly used lens in clinical practice is provided in table 1. For all practical purpose, we divide the optic disc size into : "small", "average" and "large" disc. Usually less than 1.5mm is considered as a small size disc and greater than 3mm is large disc size.

Table 1 : magnification factor of commonly used lens

Lens	Magnification factor
60D	0.94X
78D	1.13X
90D	1.33X
SUPERFIELD LENS	1.5X

It is important to draw the appearance of the optic nerve head in each visit. It helps in temporal follow up of the patient. We must draw the contour of the blood vessels as we see along with cup and rim status. Though drawing of the optic disc suffers from the disadvantage of being subjective in nature, they offer a quick and inexpensive method of following the optic nerve head in patients of glaucoma. In addition, photographs may not be possible in all cases e.g. patients with rigid miotic pupils and those with significant media opacities. However, wherever possible, photographs are an indispensable adjunct to clinical evaluation.

It is important to know the basic anatomy and the wide variation in optic disc in a population and the variation between different ethnic groups. The Normal optic disc is highly variable. The size, shape and angle of insertion of optic nerve can vary a lot in normal subjects. These can vary with refractive error as well as with ethnicity. The optic disc has a slightly vertically oval form with the vertical diameter being about 7 to 10% larger than the horizontal diameter. In highly myopic eyes, the optic disc configuration is significantly more oval and more elongated, and more obliquely oriented than in any other group and hence difficult to evaluate. Since eyes with a tilted optic disc can exhibit visual field defects due to a regional hypopigmentation of the fundus or a refractive

scotoma, eyes with ocular hypertension and tilted discs should not automatically be regarded to be glaucomatous unless the reason for the perimetric defect has clearly been shown to be the glaucomatous process.

FEATURES OF GLAUCOMATOUS DISC DAMAGE

We will discuss basic anatomy, its variation and the changes, which takes place in glaucomatous eyes in various optic disc parameters.

Table 2 shows optic disc changes seen in glaucoma

Parameter
• Loss of ISNT pattern
• Localized notch in the rim
• Acquired Pit
• Disc Hemorrhage
• Wedge / diffuse loss of retinal nerve fibers
• Progressive increase in vertical CDR
• Over pass phenomenon
• CDR of > 0.7
• Baring of the circumlinear vessel
• Laminar dot sign
• Asymmetry in CDR of > 0.2
• Thinned retinal arterioles
• Parapapillary atrophy

1. Optic Disc Size: Optic disc size has large inter-individual variation. It varies from 0.80 mm^2 to almost 6.00 mm^2, or about 1:7 in a normal Caucasian population. Within a range of -5 to +5 diopters of refractive error, optic disc size is almost independent of the refractive error of the eye. Beyond +5 diopters of refractive error, the optic disc is significantly smaller, and beyond -8 diopters, the optic disc is significantly larger than in emme tropic eyes.

Size of the optic disc depends on race. Caucasians have relatively small optic discs, followed by Mexicans, Asians, and Afro-Americans. The importance of the size of the optic disc in the diagnosis and pathogenesis of glaucomatous optic neuropathy is that larger the optic disc, the larger are the optic cup and neuro retinal rim. A large cup in a large optic disc can, therefore, be normal, while a small optic cup in a very small optic disc may suggests glaucomatous optic nerve damage.

2. CUP DISC RATIO:

Disc margin is defined by inner edge of white scleral ring. Optic cup is the level at which neuro-retinal rim (NRR) steepens.

Due to the vertically oval optic disc and the horizontally oval optic cup, the cup/disc ratios in normal eyes are significantly larger horizontally than vertically. 93 % of normals have larger horizontal cup to disc area ratio.

As a ratio of cup diameter to disc diameter, the cup/disc ratios depend on the size of the optic disc and cup. The optic disc and cup diameters has a high inter-individual variability and that explains that the cup/disc ratio range between 0.0 to 0.9 in a normal population. More than 0.65 cup to disc area ratio is seen in less than 5 % normals.

1.2 million axons pass through each optic disc. Optic disc size varies considerably. These axons fills up the outer part of optic disc and it is called neuro-retinal rim and the space that is not filled ("left over" space) is optic cup. This "Left over" space has to vary with size of the disc. So, the larger optic disc usually have larger cup to disc area ratio.

Early studies by Armaly et al have reported that the vertical and horizontal cup-disc diameter ratios are useful for the quantification of glaucomatous optic neuropathy and for early detection of glaucoma.[3] However, the ratio has limited value in the identification of glaucomatous damage, because of the wide variability in the size of the optic cup in the normal population. A high cup-disc ratio can be normal if the optic disc is large[4] and a low cup-disc ratio may be glaucomatous if the optic disc is small.[5] (figure 2) The problem with estimating cup-disc ratio as a measure of glaucomatous damage is that it is difficult to decide if the cup is physiological in a large disc or pathological in a small or normal sized disc. In a recent study by Garway-Heath et al, vertical cup-disc diameter ratio corrected for the optic disc size was the best variable to separate between normal subjects and patients of ocular hypertension with retinal nerve fiber layer defect.[6] The high vertical CDR compared to horizontal CDR is highly suggestive. However progressive increase in vertical CDR is pathognomic of glaucoma.

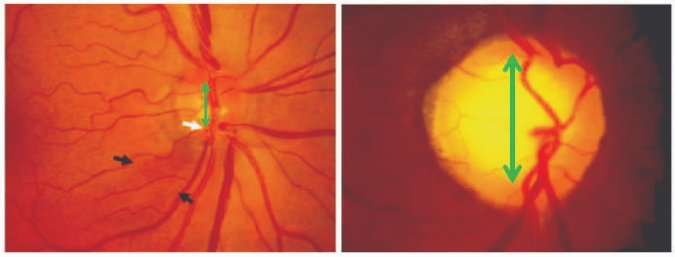

Figure 2 : Cup Disc Ratio in Relation to Optic Disc Size Right side disc is having larger Vertical CDR; however despite having smaller vertical CDR, left side disc is glaucomatous

So in the clinical description of the optic nerve head, it is important to state the vertical cup-disc diameter ratio in combination with the estimated disc size. The disc diameter can be easily measured by adjusting the slit lamp beam height to the edges of the disc while viewing the disc through a 60D lens.[7] (figure 3) Based on these direct measurements of the horizontal and vertical disc diameters, we can also calculate the optic disc area using following modified formula of an ellipse (area = p/4* horizontal diameter * vertical diameter). The measurement by this method is roughly equal to the measurement obtained by the planimetry of disc photos by Litmann's correction.

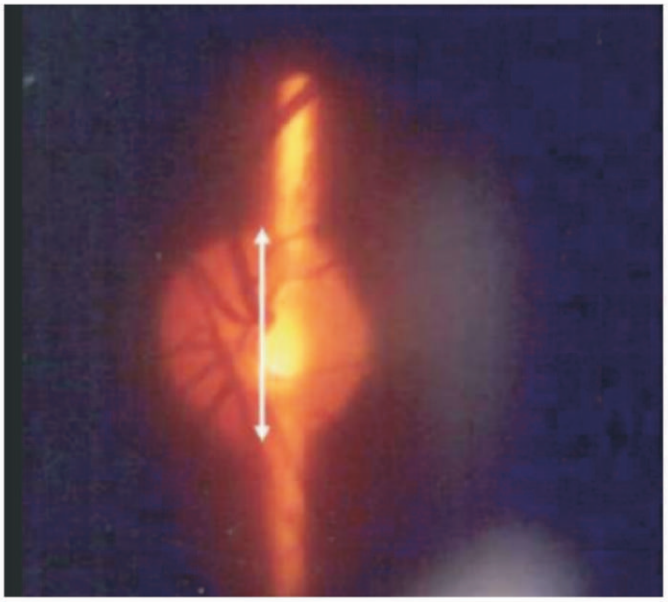

Figure 3 : Measurement of Disc Diameter with Slit-lamp biomicroscopy with use of Non Contact Lenses

Measurements can also be made with other lenses by multiplying the measured value with the appropriate magnification factor – Goldmann contact lens (1.26) and Volk superfield lens (1.5)[7]

It is important to differentiate contour cupping from color cupping. The margin of the cup should be determined by the bend of the small vessels across the disc rim and not by the central area of disc pallor. (figure 4, figure 5)

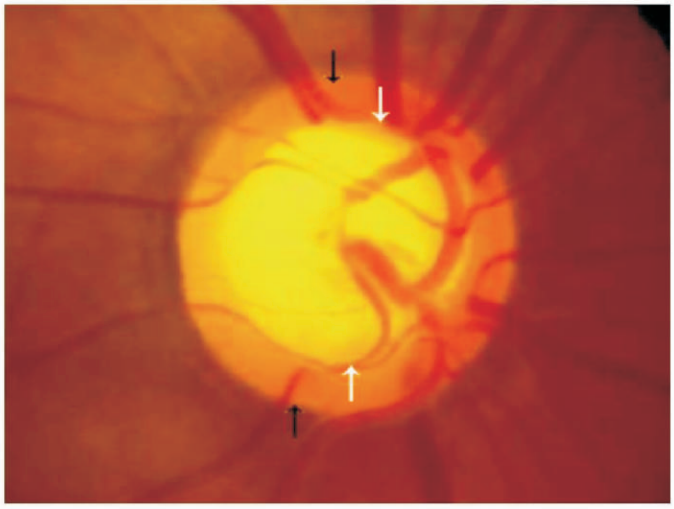

Figure 4 : Disc Margin (Black Arrow) and Cup Margin (White Arrow)

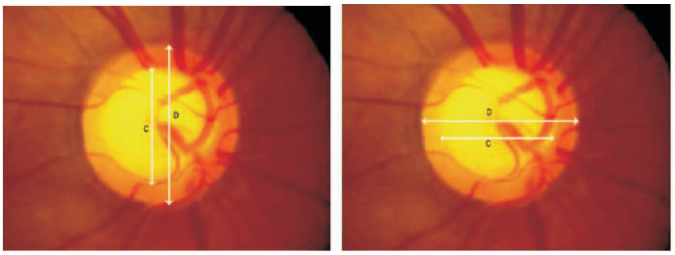

Figure 5 : Vertical Disc Diameter and Horizontal Disc Diameter

3. ASYMMETRY OF OPTC DISC CUPPING:

Cup to disc area ratio asymmetry between two eyes of more than 0.2 is seen in less than 5% of normal population. So, until proven otherwise, it must be taken as an indication of early glaucomatous damage. (Figure 6) However, while assessing asymmetry, it is important to rule out asymmetry of the disc size, which may be due to anisometropia. (Figure 7) This can result in difference in the cup –disc ratio between the eyes.

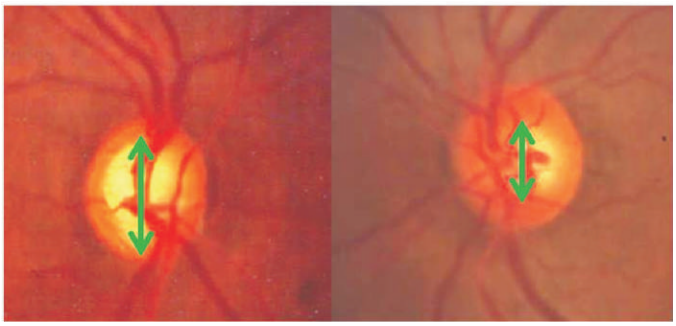

Figure 6 : Asymmetry in vertical CDR

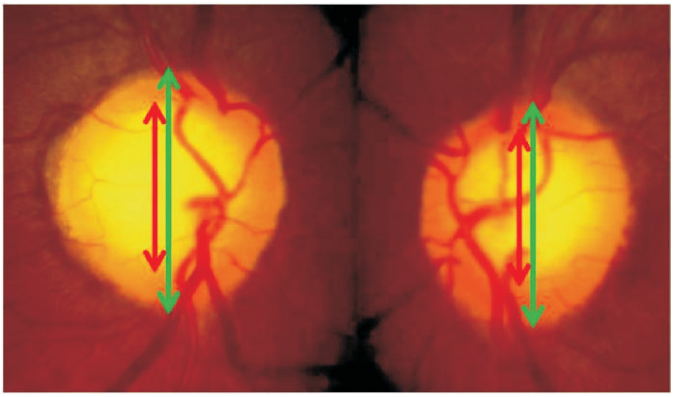

Figure 7 : Asymmetry of Cupping in Relation to Asymmetry of Disc Size

Left sided Optic disc is having larger Disc size and so larger vertical CDR in comparison to right sided Optic Disc

4. NEURORETINAL RIM EVALUATION:

The neuroretinal rim is the intrapapillary equivalent of the retinal nerve fibres and optic nerve fibres. It is, therefore, one of the main targets in the morphologic glaucoma diagnosis.[8] The neuroretinal rim size is correlated with the optic disc area: the larger the disc, the larger the rim. The correlation between rim area and disc area corresponds with the positive correlation between optic disc size, optic nerve fibre count and number and total area of the lamina cribrosa pores.

The neuroretinal rim exhibits a characteristic configuration in normal eyes (Figure 8). It is based on the vertically oval shape of the optic disc and the horizontally oval shape of the optic cup. The neuroretinal rim is usually broadest in the Inferior disc region, followed by the Superior disc region, the Nasal disc area, and finally the Temporal disc region (ISN'T rule, as termed by Elliot Werner/Philadelphia). The characteristic shape of the rim is of utmost importance in the diagnosis of early glaucomatous optic nerve damage. 83% of normal eyes follow ISNT rule.

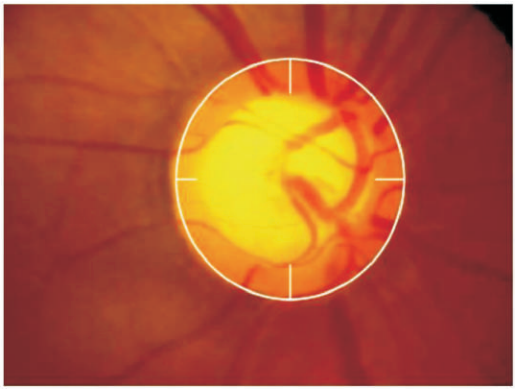

Figure 8 : Shows ISNT Rule

Inferior rim to temporal rim ratio: 2 : 1

Superior to temporal ratio: 1.5 : 1

Neuro retinal rim is less marked in large discs. In large disc, rim is more evenly distributed and does not follow ISNT rule. It also has punched out well-defined cup. In small and medium size disc, the NRR is usually sloping. In normal eyes NRR may be tilted supero nasally. In eyes with oblique insertion of optic disc, shape of NRR is steep or over hanging.

In glaucoma, neuro retinal rim is lost in all sectors of the optic disc with regional preferences depending on the stage of the disease. Glaucomatous damage can be diffuse, focal or a combination of both. Diffuse damage results in symmetrical enlargement of the cup. Focal damage usually involves a particular area of the rim.

In eyes with modest glaucomatous damage, rim loss is found predominantly at the infero temporal and supero temporal disc regions. In eyes with moderately advanced glaucomatous atrophy, the temporal horizontal disc region is the location with relatively the most marked rim loss. In very advanced glaucoma, the rim remnants are located mainly in the nasal disc sector, with a larger rim portion in the upper nasal region than in the lower nasal region. This sequence of disc sectors (infero-temporal – supero-temporal – temporal-horizontal – nasal-inferior – nasal-superior) correlates with the progression of visual field defects with early perimetrical changes in the nasal upper quadrant of the visual field, and a last island of vision in the temporal inferior part of the visual field in eyes with almost absolute glaucoma. Papillo macular bundle forms temporal rim. It is usually the last to get damaged in glaucoma. In POAG with Myopia and NTG, temporal rim preferentially gets cupped earlier with field loss near fixation

During optic nerve head evaluation, one must look carefully for any areas of thinning of the neuro retinal rim or for notching (especially the temporal inferior and the temporal superior disc sectors) or in other words extension of the cup into the rim tissue. If the cup is especially deep in the notch, it is known as a pseudo-pit. Notching and pseudo-pits are usually seen at the superior or inferior poles. The width of the notch tends to correspond to the extent of the visual field defect (Figs.9A and 9B, 10A and 10B). Optic rim pallor is another important indicator of glaucomatous disc damage.

The contour of NRR in glaucoma:

May cause a backward bowing of the rim tissue

May cause deep extension of the cup in one meridian

May cause gentler sloping of rim in backward direction

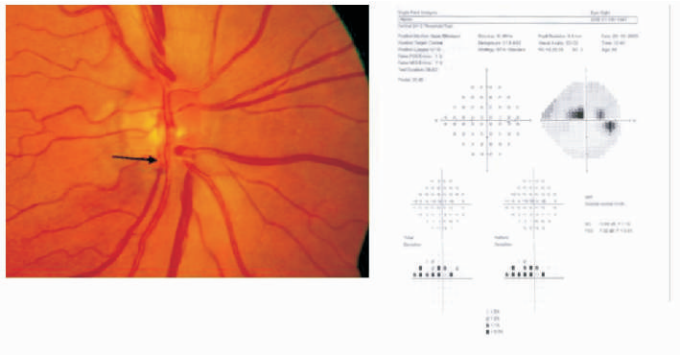

Figure 9 : Relation Between neuro-retinal Rim Notch and Visual Field Defect

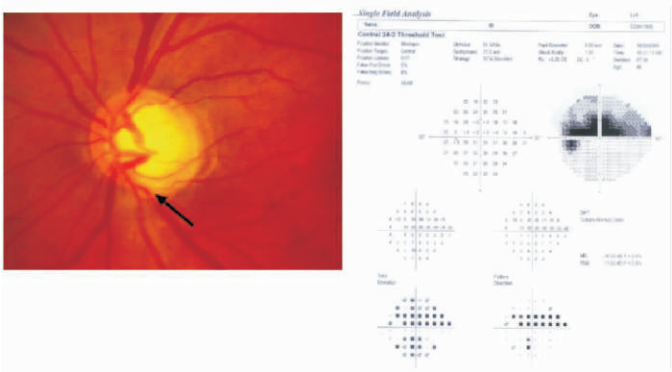

Figure 10 : Relation between Inferior (Here Inferior Notch is wider than the one in Fig 9) Notch and Visual Field Defect

In early glaucoma, there is a backward bowing of the NRR (red arrow). On a cross section, it appears as a saucer. It can start in periphery of NRR or a portion of a rim. Usually it is a first glaucomatous change. In more advanced glaucomatous damage, NRR gets more thinner. On cross sectional view, rim loss may appear as shelved out (red arrow). Here, visual field may be normal or may have early field defect. With further damage, NRR gets thinner and it may be excavated in one or both direction. Usually this change first occurs at the superior or the inferior pole. On cross sectional view, rim loss may appear as shelved out (red arrow). Here, on optic disc, we can see that NRR is lost and blood vessels come out at optic disc margin (white arrow).

5. VASCULAR CHANGES

Splinter-shaped or flame-shaped hemorrhages at the border of the optic disc (figure 11) are a hallmark of glaucomatous optic nerve atrophy, found only extremely rarely in normal eyes (1%).[9] Disc hemorrhages are detected in about 4 to 7% of eyes with glaucoma. Their frequency increases from an early stage of glaucoma to a medium advanced stage and decreases again in advanced stage. In early glaucoma, they are usually located in the inferotemporal or superotemporal disc regions. They are associated with localized retinal nerve fibre layer defects, neuroretinal rim notches and circumscribed perimetric loss. They indicate the presence of glaucomatous optic nerve damage even if the visual field is normal.

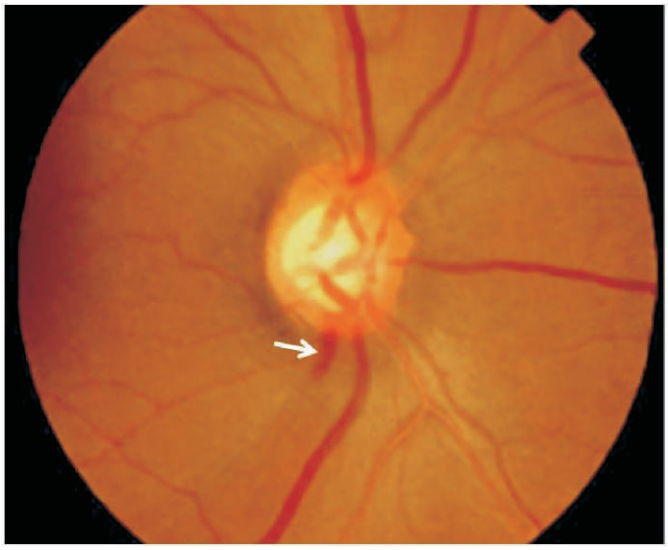

Figure 11 : Disc Hemorrhage

Various studies have shown that disc hemorrhages in association with localized nerve fiber layer defects and notches of the neuroretinal rim are more common among patients of normal tension glaucoma. [9,10] A possible explanation for the difference in frequency has been suggested by Jonas et al according to whom the amount of blood leaking out of a vessel into the surrounding tissue depends on the intraocular pressure when the bleeding occurs.[10] The higher transmural pressure gradient in normal pressure glaucoma leads to larger disc hemorrhages. Also, since the absorption rate of disc hemorrhages depends on the size of the disc bleed, the hemorrhages in patients of normal pressure glaucoma may take a longer time to disappear and thus have a higher chance to be detected than the disc hemorrhages in patients of high pressure glaucoma.[11-13]

Usually after disc hemorrhage, often a localized defect of the retinal nerve fiber layer or a broadening of a localized retinal nerve fiber layer defect can be detected correlating with a circumscribed scotoma in the visual field. They usually precede neuro-retinal changes and visual field defects corresponding to the location of the hemorrhage may be expected to appear weeks to years later. Hence occurrence of these is considered an indication for the enhancement of glaucoma treatment.

6. CONFIGURATION OF VESSELS

The retinal vessels on the optic nerve head can provide clues about the topography of the disc. Nasalization of the vessels can be seen in glaucoma as well as in other diseases of the optic nerve. Bayoneting of the vessels can be seen if the rim is absent or very thin. This causes the vessels to pass under the overhanging edge of the cup and then make a sharp bend as they cross the disc surface. This convoluted appearance of the vessels is called 'bayoneting'.

Circum Linear Vessels cross the optic disc temporally toward macula hugging the NRR. (white arrow) It is present in 50 % eyes. In early glaucoma as NRR is lost, the vessels does not hug the rim but there is a separation between the blood vessels and the rim which is called "bearing of vessels". It implies the rim loss. It is very specific of glaucoma.

7. PERIPAPILLARY ATROPHY

The parapapillary chorioretinal atrophy can be divided into a central beta zone and a peripheral alpha zone (Figure 12)

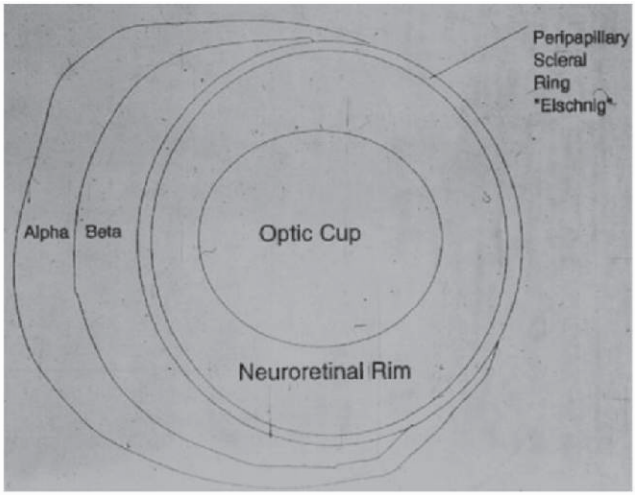

Figure 12 : Peripapillary Atrophy

The peripheral zone (alpha zone) is characterized by an irregular hypopigmentation and hyperpigmentation and intimated thinning of the chorioretinal tissue layer. On its outer side it is adjacent to the retina, and on its inner side it is in touch with a zone characterized by visible sclera and visible large choroidal vessels (beta zone), or with the peripapillary scleral ring, respectively. It produces relative scotoma on visual field.

The inner zone (beta zone) are marked atrophy of the retinal pigment epithelium and of the choriocapillaris, good visibility of the large choroidal vessels and the sclera, thinning of the chorioretinal tissues and round bounds to the adjacent alpha zone on its peripheral side and to the peripapillary scleral ring on its central side. If both zones are present, beta zone is always closer to the optic disc than alpha zone. Beta zone correlates with a complete loss of retinal pigment epithelium cells and a markedly diminished count of retinal photo-receptors. It produces absolute scotoma.

Alpha and beta zones are present in normal subjects also. Nearly 95 % of normal subjects may have alpha zone while only 20 % of normal subjects may have beta zone. PPA is most frequently located in the temporal horizontal sector, followed by the inferior temporal area and the superior temporal region.

The size of both the zones and the frequency of beta zone are significantly correlated with variables that indicate the severity of the glaucomatous optic nerve damage such as neuroretinal rim loss, decrease of retinal vessel diameter, reduced visibility of the retinal nerve fibre bundles, and perimetric defects. The location of parapapillary chorioretinal atrophy is also spatially correlated with the neuroretinal rim loss in the intrapapillary region. It is larger in that sector with the more marked loss of neuroretinal rim.

A highly significant correlation has been reported between the location of peripapillary atrophy and visual field defects 14 Since these changes may represent a congenital anomaly, especially in myopic eyes, appearance of these changes de novo or their presence in small, non-myopic discs should be viewed with suspicion. Perpapillary atrophy may be focal or circumferential. (Figure 13 and figure 14)

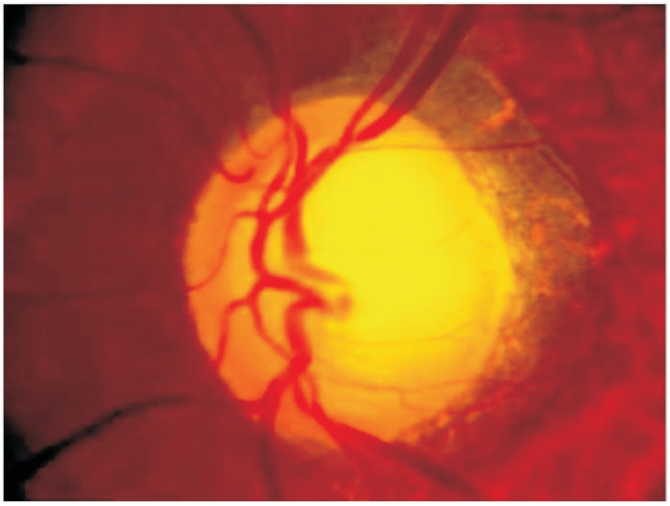

Figure 13 : Localized peripapillary Atrophy in the Temporal Area of the Disc

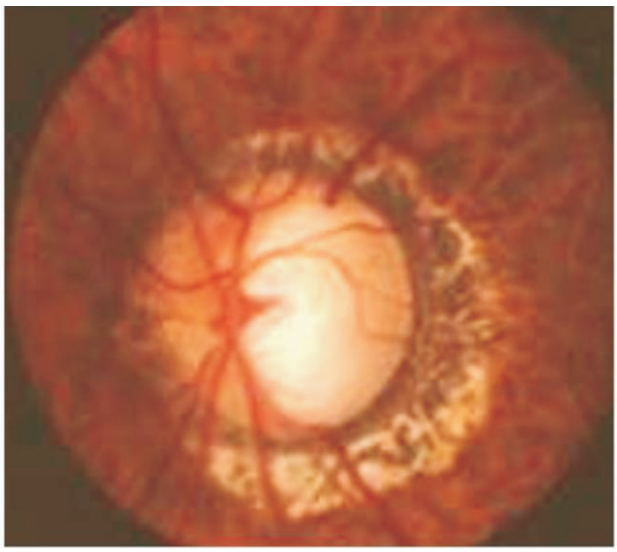

Figure 14 : Peripapillary Atrophy : Generalized

8. RETINAL NERVE FIBER LAYER ABNORMALITIES

The retinal nerve fiber layer (RNFL) contains the retinal ganglion cell axons covered by astrocytes and bundled by processes of Muèller cells.

In normal eyes, visibility of the RNFL is regionally unevenly distributed. Dividing the fundus into eight regions, the nerve fiber bundles are most visible in the temporal inferior sector, followed by the temporal superior area, the nasal superior region and finally the nasal inferior sector.

It is least visible in the superior, inferior, temporal horizontal and nasal horizontal regions. Correspondingly, the diameters of the retinal arterioles are significantly widest at the temporal inferior disc border, followed by the temporal superior disc region, the nasal superior area and finally the nasal inferior disc region.

Visibility of the RNFL decreases with age. This correlates with an age-related reduction of the optic nerve fibre count with an annual loss of about 4000 to 5000 fibres/year out of an original population of approximately 1.2 million optic nerve fibres. These features of the normal RNFL are important for diagnosis of RNFL changes secondary to optic nerve damage in the diseased eye.

Localized defects of the RNFL are defined as wedge-shaped and not spindle-like defects, running towards or touching the optic disc border. (figure 15) If they are pronounced, they can have a broad basis at the temporal raphe of the fundus. This is important for subjects with ocular hypertension in which a localized RNFL defect points to optic nerve damage even in the absence of perimetric abnormalities. In glaucomatous eyes, the frequency of localized RNFL defects increases significantly from an "early" glaucoma stage to a stage with medium advanced glaucomatous damage and decreases again to a stage with very marked glaucomatous changes.

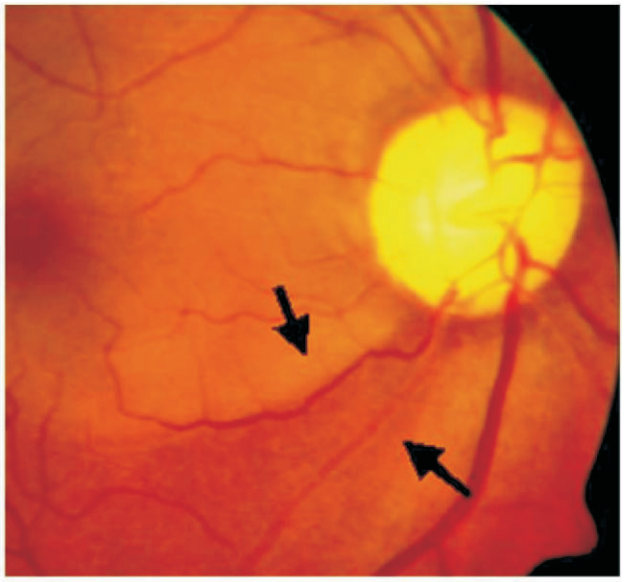

Figure 15 : Retinal Nerve Fiber Layer Defect. Wedge Shaped RNFL Defect can be seen between Two Arrows

Typically occurring in about 20% or more of all glaucoma eyes, they can also be found in eyes with an atrophy of the optic nerve due to other reasons such as optic disc drusen, toxoplasmotic retinochoroidal scars, ischemic retinopathies with cotton-wool spots of the retina, after long-standing papilledema or optic neuritis due to multiple sclerosis, to mention some examples. Since the localized RNFL defects are not present in normal eyes, they almost always signify a pathological abnormality.

Localized RNFL defects are detected more often in eyes with the focal type of normal-pressure glaucoma than in eyes with the age-related atrophic type of open-angle glaucoma and the highly myopic type of open-angle glaucoma.

In advanced glaucoma there may be diffuse loss of RNFL and it may be not visible as a wedge defect. This NFL loss may be seen as

1.Inferior retina less visible than Superior

2.Bright, Dark, Bright pattern of NFL is lost

3.Macula as bright as Superior and Inferior area

4. “Naked” vessels. Usually NFL is over blood vessels and give shiny appearance.

Localized RNFL defects are often found six to eight weeks after an optic disc bleeding. They point towards a localized type of optic nerve damage. With respect to different sectors of the fundus, localized RNFL defects are most often found in the

temporal inferior sector followed by the temporal superior sector.

Experimental studies have shown that localized RNFL defects can ophthalmoscopically be detected if more than 50% of the thickness of the retinal nerve fibre layer is lost.

It can be assessed ophthalmoscopically, wide-angle red-free photographs, by photogrammetric measurements of the retinal nerve fibre layer thickness or by using other sophisticated techniques such as confocal scanner laser tomography (HRT), and optical coherence tomography (OCT). For its ophthalmoscopic evaluation it is helpful to use green light.

9. MYOPIC CHANGES v/s GLAUCOMA

It is difficult to assess the glaucomatous changes in the presence of high myopia. It is difficult to find localized defects of the retinal nerve fiber layer in highly myopic eyes with glaucoma. These patients usually have significantly shallower disc cupping, which may be due to low intraocular pressure. Large parapapillary atrophy in highly myopic eyes with glaucoma is mainly due to myopic stretching of the globe. We should have a high index of suspicion and should carefully examine the disc to look for changes in the contour of the blood vessels, as well a carefully delineate the disc margin from the peripapillary changes (Fig.16).

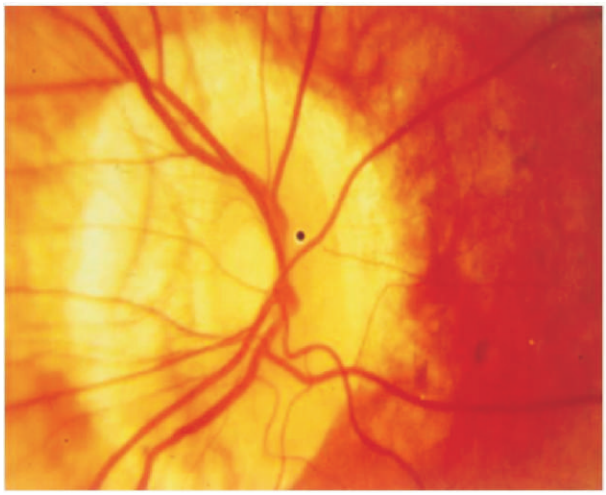

Figure 16 : Myopic Disc with Primary Open Angle Glaucoma

DIFFERENTIAL DIAGNOSIS

In addition to glaucoma, other abnormalities can cause excavation and or pallor of the optic disc and it is very important to rule these possibilities before making the diagnosis of glaucoma.

1. PHYSIOLOGICAL CUPPING

Assessment of the size of the optic disc, careful examination of the neuroretinal rim and the retinal nerve fiber layer can help distinguish physiological cupping from glaucomatous damage in most cases.

2.OPTIC NERVE COLOBOMA

Optic nerve colobomas typically demonstrate enlargement of the papillary region, partial or complete excavation, and blood vessels entering and exiting from the border of the defect and a glistening white surface. The visual field defects can be in the form of generalized constriction, centrocecal scotomas, altitudinal defects, arcuate scotomas, enlargement of the blind spot and ring scotomas that can mimic those found in glaucomatous eyes.[15]

Morning glory syndrome is a variant of optic disc coloboma and is characterized by large excavated disc, central core of white or gray glial tissue surrounded by an elevated annulus of variably pigmented sub-retinal tissue. The retinal vessels appear to enter and exit from the margins of the disc, are straightened and often sheathed.

3.CONGENITAL OPTIC DISC PIT

Congenital optic disc pits appear gray or yellowish white, round or oval, localized depression within the optic nerve. They are located within the temporal aspect of the disc in over half of the cases and centrally in about one third. Involvement is usually unilateral in about 80% cases and the optic disc is larger on the involved side. Approximately 55-60% of the eyes have a field defect in the form of arcuate scotomas, paracentral scotoma, altitudinal defect, generalized constriction and nasal or temporal steps.

4.ANTERIOR ISCHAEMIC OPTIC NEUROPATHY

A history of acute visual loss, initial swelling of the optic disc, absence of marked cupping, rise in ESR, presence of centrocecal scotoma or altitudinal defects and loss of colour vision can help differentiate it from glaucoma.

5.NEUROLOGICAL CAUSES

Pallor disproportionate to cupping, normal intraocular pressure or unusual history of onset, progression and age should arouse suspicion of a neurological cause for disc changes (Fig17).

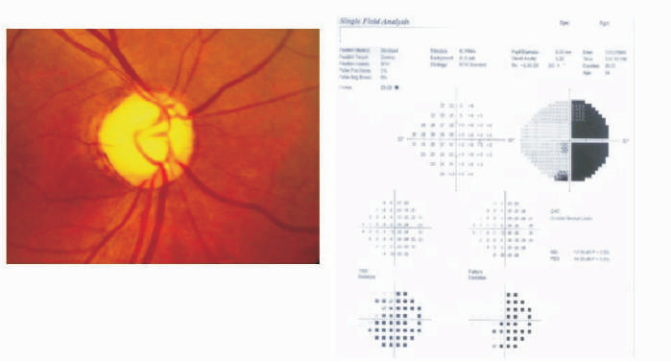

Figure 17 : Optic Disc Showing Cupping with out of Proportion Pallor and Visual Field Defect Showing a Temporal hemianopia

In summary, the optic disc evaluation in glaucoma is best done stereoscopically at the slit lamp with a dilated pupil using one of the (60D, 78D or 90 D) lenses. Changes in the neuroretinal rim, optic disc hemorrhages, peri papillary atrophy and nerve fiber layer defects are more important than the cup-disc ratio. The cup-disc ratio is to be documented and interpreted along with the disc size and not in isolation. The diagnosis of glaucoma will depend on the presence of a visual field defect that correlates with the anatomic changes on the optic nerve head and the peri papillary retina.

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Ophthalmic News

Oxymetazoline hydrochloride ophthalmic solution 0.1% (UpNeeq, RVL Pharmaceuticals) has been recognized by Alluremagazine as one of the 2021 winners of its Best of Beauty Breakthrough Awards.

Oxymetazoline hydrochloride is useful for more than just treating acquired blepharoptosis and the drug can be used for ocular pathologies that cause blepharoptosis. It is a topical ophthalmic medication approved to treat acquired blepharoptosis as an alternative to surgical intervention.

The formulation also is effective for treating patients with etiologies that can result in blepharoptosis, ie, blepharoptosis associated with ocular surgery, myotonic muscular dystrophy, and Bell’s palsy.

Source: David Hutton, Ophthalmology Times 2021

To Study Ocular Surface Morbidities among Glaucoma Patients on Anti-Glaucoma Drops

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Abstract:

Title : To study ocular surface morbidities among glaucoma patients on anti-glaucoma drops

Background : Glaucoma is a chronic, lifelong disease and it requires lifelong therapy as well. Topical anti-glaucoma drugs are often associated with symptoms and sign of toxicity.

Objective : We aimed to study the incidence, symptoms and signs of ocular surface disease among patients on different anti-glaucoma drops and control group and to compare effects of mono and combination therapy.

Materials and methods : In this case control study 105 patients of glaucoma on anti-glaucoma drops for at least 3 months who presented to us were examined and compared to 102 patients of glaucoma not on anti-glaucoma drops.

Observation/result : Mean age was 56.2 years with male to female ratio 1.25:1. 83.09% of the patients had primary glaucoma with PNAG being the most common diagnosis. DOV, redness and pain being the most common presenting complaint in study group. In both groups on application of different dry eye test, there was increased incidence of abnormal OSDI, corneal assessment, TBUT and schirmer's test in study group. Difference in incidence of abnormal OSDI, corneal assessment, TBUT and schirmer's test was not significant in mono therapy and combination therapy group.

Conclusion : there is higher incidence of ocular surface disease among patients on anti-glaucoma drops and the most commonly encountered problem is reduced tear film stability. Preservative free and combination drops along with use of lubricant is found to reduce the ocular surface toxicity.

Key words : anti-glaucoma, drops, glaucoma, ocular surface, tear film

Introduction :

Glaucoma is a chronic, lifelong disease which requires lifelong therapy in a regular and continuous manner. Topical anti-glaucomatous therapy is often associated with symptoms and signs of toxicity, inflammatory changes of the ocular surface and decrease of tear film break up time (TBUT).[1,2] The main causative factor for the toxicity and ocular surface disorders can be preservative or an active compound of the drug.[3,4] There are two main groups of preservatives, detergent and oxidative. Detergent preservatives like BAK can cause cell membrane lysis and accumulate in ocular tissue. They have dose dependent effect. They also interfere with the integrity of superficial lipid layer of the tear film, reduce the TBUT and may contribute to the ocular surface disease .[5,6] Second group are oxidative preservatives with Stabilized Oxochloro Complex (SOC) as the main representative. Their key component is sodium chloride and it has mild cytotoxic effect and excellent safety record.

Ocular surface disease (OSD) represents one of the major causes for ophthalmological consultation worldwide.[7] It involves all sorts of pathological alterations of conjunctiva and cornea from the minor such as punctate keratitis to the extreme such as symblepharon, or loss of limbal stem cells with corneal conjunctivalisation. Within this group, dry eye syndrome (DES) constitutes a well-defined, yet not completely explained entity, with multifactorial etiology but clearly defined symptoms like redness, itching, foreign-body sensation, tearing and pain. Ocular lubricants constitute the main treatment, but recently, advances in the understanding of the DES as an inflammatory condition have modified our view on the correct way to approach this problem. The clinical diagnosis of objective tests for DES includes: 1) the Schirmer test (ST), with or without anesthesia, which determines tear production; 2) tear break-up time (TBUT) that reflects tear film stability; and 3) dye staining tests for evaluating the tissue integrity .[8-10]

The purpose of this study is to evaluate the incidence of ocular surface disease and need for preservative free or combination drops among glaucoma patients under topical treatment, and to identify risk factors associated with it.

Material and methods :

Ocular surface morbidities are essentially a clinical diagnosis, assisted by information obtained from both the history and the examination and performing one or more tests to lend some objectivity to the diagnosis. No one test is sufficiently specific to permit an absolute diagnosis of dry eye.

We did a prospective observational study for a duration of 1 year on patients presenting to our OPD with symptoms of

discomfort and ocular irritation such as redness, pain, discharge, blurred vision itching, watering or tearing. All the selected patients were subjected to detailed history taking, clinical examination and investigation like Schirmer's test, Rose Bengal test and Tear-film Breakup Time. Patients were divided in to 2 groups.

Study Group : diagnosed Patients of glaucoma and on anti-glaucoma drops for at least 3 months.

Control : glaucoma patients (based on signs, symptoms and investigation) not on anti-glaucoma drops

Inclusion criteria :

1. Patients 40 years and above whom have been diagnosed as glaucoma and on anti-glaucoma drops for at least 3 months and age matched control group.
2. Patients of either sex and any age suffering from ocular surface disorder.

Exclusion criteria :

1. Patients suffering from any medical disorders that can cause ocular surface disease (like DM, arthritis, thyroid diseases etc.)
2. Recent history of surgeries and history of chemo or radiotherapy.
3. Patient having conjunctivitis of various etiology including allergic or other ocular diseases that can cause ocular surface disorders.

The demographic and clinical characteristics were represented by frequencies and percentage. Chi square test and Fischer exact test were used to calculate P-value. Significant p value was taken as <0.05.

Observation :

Out of total 207 patients in our study 115 (55.56%) were male and 92 (44.44%) female with sex ratio of 1.25:1. Maximum number of patients i.e. 41.55% (86) presented to us with primary narrow angle glaucoma (PNAG) closely followed by primary open angle glaucoma (PAOG) with 36.71% (76) patients whereas 15.94% (33) had secondary glaucoma, 0.97% (2) had ocular hypertension, 1.45% (3) patient presented with normal tension glaucoma. 7 patients in our study did not have glaucoma. POAG was diagnosed in a higher age group with mean age of POAG, PNAG and secondary glaucoma group were 59.68, 53.72 and 52.28 respectively.

Out of 207 patients in our study, 105 belonged to the study group whereas 102 belonged to control group. In the study group, out of total 105, 54 and 51 were male and female respectively where POAG was found to be more common in males (44.44%) and PNAG in females (58.82%). Similarly, out of 102 patients in control group, 61 and 41 were male and female respectively where POAG was found to be more common in females (60.97%) and PNAG in males (55.73%).

Diminution of vision was the most common presenting complaint (68%) followed by pain (47.5%) and redness (17.5%). Watering (4.5%) and other complaints (5%) were some of the less common presenting symptoms. 2 patients did not present with any symptom.

Both the groups when given OSDI questionnaire comprising 12 questions, 61% and 68.6% were normal in study and control group respectively with p value of 0.604. similarly, 16.2% and 18.6% showed mild symptoms, 10.5% and 5.9% showed moderate and 12.4% and 6.9% showed severe symptoms in study and control group respectively. More patients (41) showed symptoms in study group than control group (32) but the difference was not statistically significant.

SCHIRMER test showed higher incidence of abnormal result in study group (39%) than control group (24.5%) with p value of 0.049 which was statistically significant. Similarly, corneal assessment showed higher incidence of abnormal result (SPK) in study group (62.9%) than control group (37.3%) with statistically significant p value of 0.006.

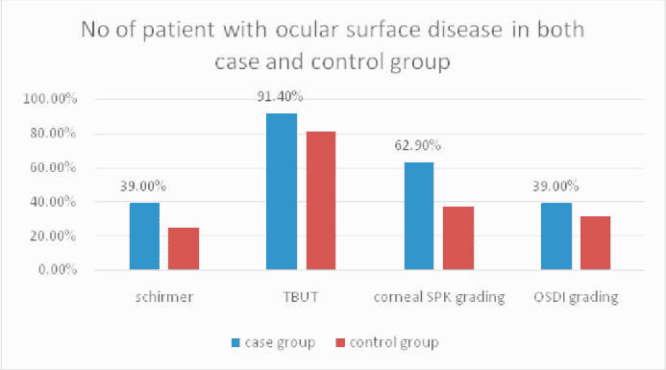

Figure 1 : No of patient with ocular surface disease in both case and control group

Out of 105 patients in study group on anti-glaucoma medication, 55 patients were on monotherapy while 60 were on combination therapy. Abnormal test for ocular surface disease was seen in both groups, more in combination therapy group.

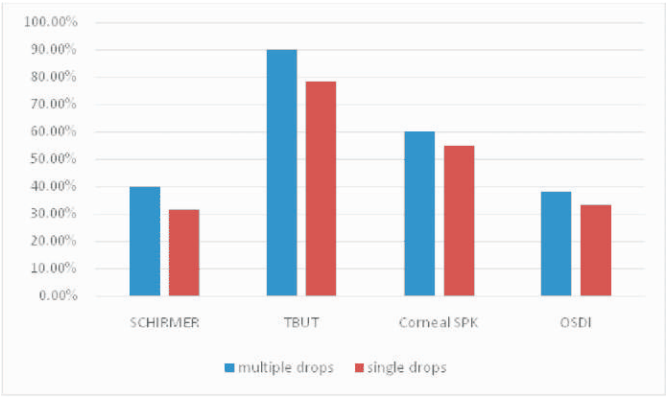

Figure 2 : Difference between ocular surface disease in single and multiple medication

but the difference was not statistically significant. In 55 patients on monotherapy, 18 were on preservative free drops

and 37 on BAK containing drops. All the test showed more no of patients with abnormal result in BAK group .

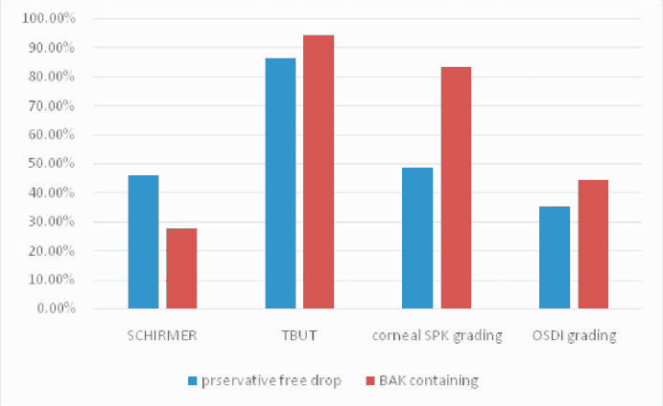

Figure 3 :Difference in ocular surface disease among patients using preservative free and BAK containing eye-drops

Discussion :

It is an established fact that OSD is more frequently observed in patients on anti-glaucomatous medication. During treatment it is necessary to consider not only the effect of medication on IOP but also the incidence and severity of drug-induced OSD as the most frequent side effect. Careful observation is particularly needed for the eyes that are treated with multiple eye drops and in the older age group.[3] Moderate or severe OSD affects 38% of patients who received a single topical therapy, 54% of those who received 2 topical therapies, and 71% of those who received 3 or more topical therapies.[11] It should however be emphasized that in daily practice the situation is probably even more difficult than which can be assessed using data available from clinical trials .[12,13]

In our study Patients on anti-glaucoma eye drops did not show presence of any significant lid abnormalities such as blepharitis or meibomitis. However, they suffered from reduced tear production (Schirmer test less than 10mm) as well as abnormal corneal punctate keratitis. In both groups, most of the patients had tear film instability which was reflected by the shortened tear break-up time. Based on the Ocular Surface Disease Index grading, in both groups less than 50% of patients experienced symptoms ranging from mild to severe.

In a national panel survey, dry eye was found to be more common among glaucoma respondents than non-glaucoma controls (16.5% vs 5.6%, P<0.0001), and there was a non-significant trend for glaucoma patients with dry eye to report higher rates of intraocular pressure-lowering medications than those without dry eye (44.2% vs 35.0%, P<0.076).[14] Interestingly, we found that the use of 2 or more anti-glaucoma medications (OR=1.92) and duration of treatment greater than 5 years (OR=2.92)

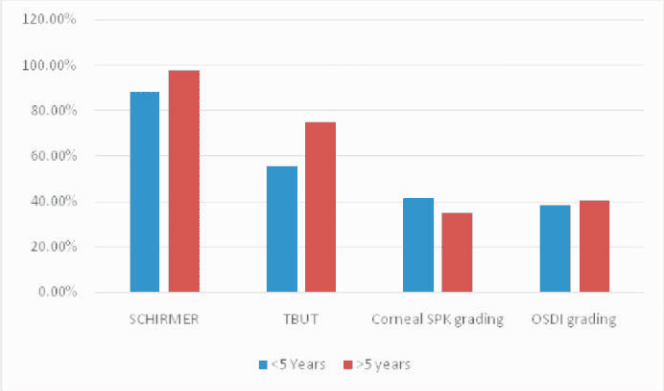

Figure 4 :comparison of ocular surface disease in duration more than or less than 5 years

were significantly associated with dry eye. We believe that this association is explained by the fact that longer treatments with more drops per day have a higher load of preservatives delivered to the ocular surface.

Martone et al,[15] in a comparative retrospective study using in vivo confocal microscopy,found lower density of superficial epithelial cells, higher density of basal epithelial cells, higher stromal keratocyte activation, less sub-basal nerves and higher tortuosity on glaucomatous patients with chronic treatment. Fechtner et al,[16] observed that the mean OSDI score significantly increased from 12.9 when one anti-glaucoma medication was used to 19.4 when three or more medications were used (p=0.0001). Rossi GC et al[17] investigated the occurrence of dry eye syndrome (defined as presence of punctuate keratitis or decreased tear break-up time) in 61 glaucoma patients divided according to the number of glaucoma drops instilled per day.[1,2, or 3] The prevalence of dry eye was 40% in patients using 3 drops/day, 39% in patients using 2 drops/day, and 11% in patients using one drop/day. Furthermore, OSDI questionnaires revealed that 15% of those using 3 drops/day and 8.7% of those using 2 drops/day showed severe OSD. Pisella et al,[18] observed that the prevalence of ocular symptoms and signs related to dry eye were dose dependent, increasing with the number of preserved anti-glaucoma drops. Although there is some evidence that glaucoma per se may be associated with decreased basal tear turnover, most of the studies blame the development of dry eye on the chronic use of anti-glaucoma medications, especially due to the presence of preservatives.

Conclusion :

In conclusion, there is higher incidence of ocular surface disease among patients on anti-glaucoma drops. The most commonly encountered problem is the tear film stability and this is most likely caused by deficiency of mucin production from conjunctival goblet cells. To curb this problem, the use of preservative containing drops should be minimized as much as possible. Preservative free or combination drops should be used to reduce the preservative load in the eye. In patients who

have to use multiple drops, eye drops with much gentler preservatives can be prescribed. All patients on anti-glaucoma drops should be screened for ocular surface disease during their follow up.

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Fluoxetine and AMD

An antidepressant best known as FLUOXETINE could offer the first treatment for the leading cause of blindness among people over 50, new research from the University of Virginia School of Medicine suggests.

UVA's Bradley D. Gelfand, PhD, and collaborators have found early evidence that the drug fluoxetine may be effective against atrophic (or "dry") age-related macular degeneration. The drug has shown promise in the scientists' lab tests and animal models, and the researchers bolstered by their results by examining two huge insurance databases encompassing more than 100 million Americans. That analysis concluded that patients taking fluoxetine were less likely to develop atrophic macular degeneration (AMD).

Based on their findings, the researchers are urging clinical trials to test the drug in patients with AMD. If successful, they believe the drug could be administered either orally or via a long-lasting implant in the eye.

The researchers believe fluoxetine works against AMD by binding with a particular agent of the immune system known as an inflammasome. This inflammasome, NLRP3-ASC, triggers the breakdown of the pigmented layer of the eye's retina.

Source : Journal reference :

Ambati, M., et al. (2021) Identification of fluoxetine as a direct NLRP3 inhibitor to treat atrophic macular degeneration. Proceedings of the National Academy of Sciences. doi.org/10.1073/pnas.2102975118.

Spontaneous Epithelisation in Exposed Implant following Enucleation- A Case Report and Review of Literature

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Introduction :

Retinoblastoma is the most common intraocular malignancy of childhood.[1] Enucleation in retinoblastoma is performed beyond group C of the disease when eye cannot be salvaged by othertreatment modalities.[2] The purpose of enucleation in the eye with retinoblastoma is to remove the diseased globe, prevent the extraocular spread of the disease and provide acceptable cosmesis.[3] Orbital implants are beneficial to orbital growth besides replacing the volume loss and also promote prosthesis motility.[4] Orbital implants can be of alloplastic or autogenous material within the socket and porous hydroxyapatite is one of the alloplastic orbital implants.[5] The hydroxyapatite material is filled with living fibrovascular tissue, hence it is possible to make a hole into it and support a motility peg which provides direct mechanical coupling to the prosthesis.[6] Earlier reported experience has been good in terms of cosmesis and motility with the use of this implant.[7] However few cases of conjunctival dehiscence over implant causing exposure of implant have been noted due to various reasons.[8,9,10] Herein we have discussed a case of exposed hydroxyapatite implant which further self-epithelizedwith due course of time.

Case :

A 1 year old male child presented to us with a chief complaint of white reflex in the right eye in 2018. The CT scan of the patient was done which showed an enlarged right eyeball with calcificationand normal left eyeball. The patient was diagnosed with group D retinoblastoma and underwent enucleation with 18 mm porous hydroxyapatite implantation using my oconjunctival technique with 14 mm optic nerve length retrieval in September 2018.The patient was kept on regular follow up every 3 monthly after that. Approximately 2 years after implantation, the patient developed conjunctival dehiscence with exposure of implant measuring about 4×5mm. (Figure : 1)

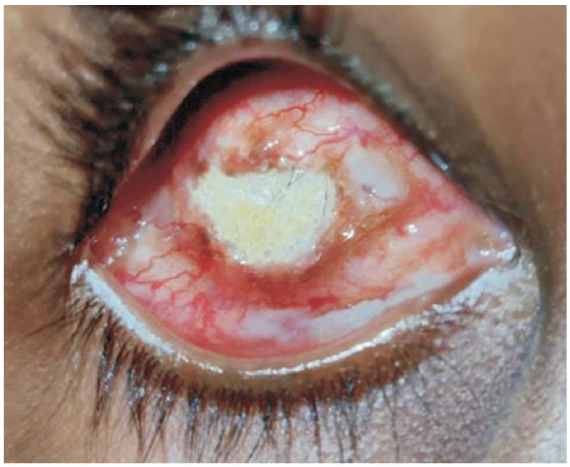

Figure 1 : Enucleated socket showing implant exposure along with few cilia present over it

He was managed on topical to bramycin 0.3% and dexamethasone 0.1% and was kept on close follow up. After 12 months the size of the defect remained the same. Some vascular tufts were seen in the hydroxyapatite pores but the spicules remained exposed. The patient was planned for the removal of the implant. The patient was lost to follow up for 1 year due to covid19 lockdown and travel restrictions. The patient visited us in September 2021. On examination, we found that there was conjunctival reepithelization over the exposed implant area (Figure : 2)

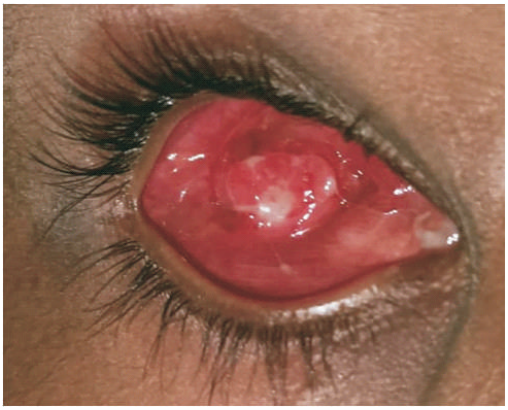

Figure 2 : Conjunctival re-epithelisation seen after a period of 1 year treated by topical tobramycin 0.3% and dexamethasone 0.1% ointment.

Discussion :

Porous hydroxyapatite has been used as a successful orbital implant in enucleation, evisceration and as secondary implants since 1985.[6,11] There may be various causes of implant extrusion which includes infection, haemorrhage, surgical technique, biocompatibility with implant material and inappropriate sizing.[12] These enumerated causes mostly cause extrusion of the implant in the early healing phase. In our case, there were no signs of infection, haemorrhage or oedema. The clinical course was uneventful for two years. So early causes of implant extrusion were excluded in our case scenario. Superficially placed hydroxyapatite orbital implant can be a cause of conjunctival wound dehiscence as shown in previous studies because it is thought that hydroxyapatite spicules can be irritative to the conjunctiva.[5] The ill-fitted prosthesis can be a cause of late extrusion of the implant which causes tissue erosion over the anterior surface of the implant. In our case scenario superficially placed implant or ill-fitted prosthesis can be a cause of implant exposure.

Although the implant was chronically exposed, the clinical outcome was uneventful. It is probably related to the excellent fibrovascular ingrowth inside the hydroxyapatite pores. This makes the hydroxyapatite implant superior as compared to other implants made of silicon or polymethacrylate which would have been probably extruded.[5]

Previous studies have shown the treatment of conjunctival dehiscence using vascular flaps or scleral patch graft to cover implant exposure.[5] In our case since the patient was not having any discharge or any change in the size of the exposed area of the implant, we had kept the patient for follow up without any intervention. As the patient lost to follow up for one year, we could not document the clinical course of the patient. After one year when the patient consulted us again, surprisingly we found the area of implant exposure was completely epithelized without any intervention. The patient is not having any clinical complaint, has been kept under our observation and has been advised for revaluation of prosthesis fitting.

The treatment for implant exposure has been speculative but we can always practice careful sterile techniques, placing the implant as deeply as possible, closing without tension and using vascularized tissue over the implant. The wrapping material can also be used like autogenous fascia, donor sclera or any other biocompatible layer to protect the anterior surface of orbital tissues from hydroxyapatite spicules.[5] Implant exposure is a potential problem with hydroxyapatite implants however with the advent of newer techniques and implant material these problems can be overcome.[13]

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