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.

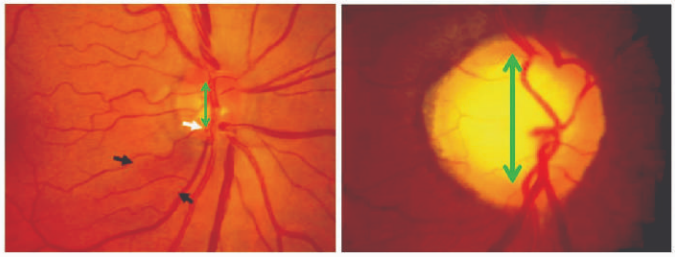

Figure 2 : Cup Disc Ratio in Relation to Optic Disc Size Right side disc is having larger Vertical CDR; however despite having smaller vertical CDR, left side disc is glaucomatous

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.

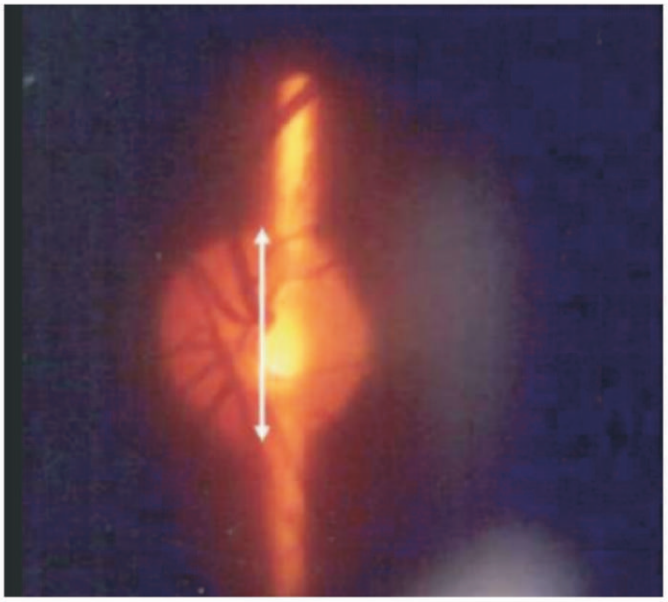

Figure 3 : Measurement of Disc Diameter with Slit-lamp biomicroscopy with use of Non Contact Lenses

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)

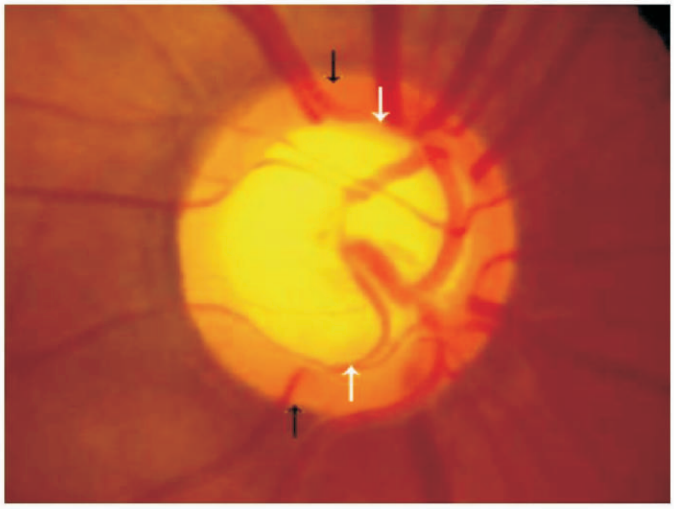

Figure 4 : Disc Margin (Black Arrow) and Cup Margin (White Arrow)

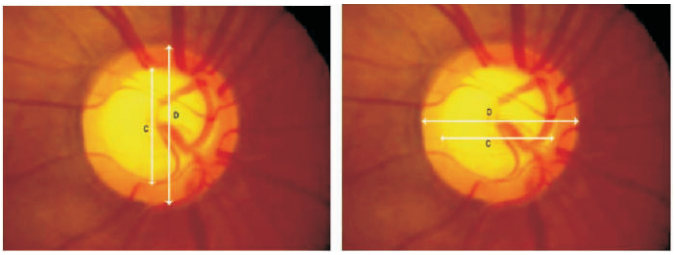

Figure 5 : Vertical Disc Diameter and Horizontal Disc Diameter

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.

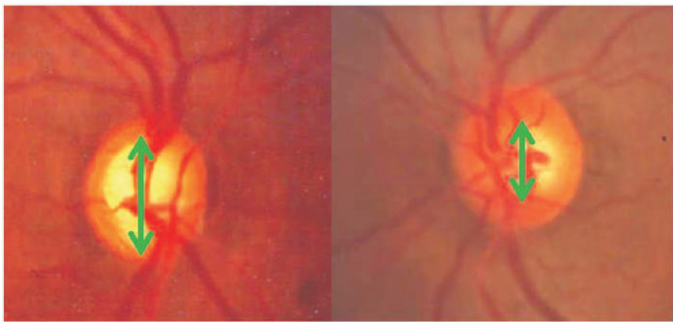

Figure 6 : Asymmetry in vertical CDR

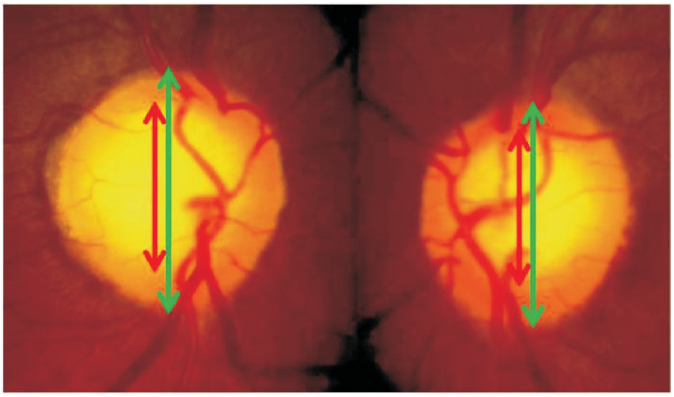

Figure 7 : Asymmetry of Cupping in Relation to Asymmetry of Disc Size

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.

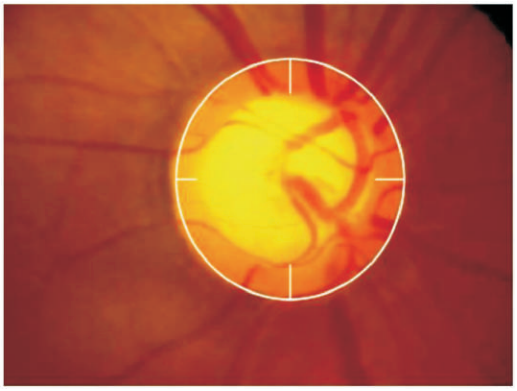

Figure 8 : Shows ISNT Rule

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

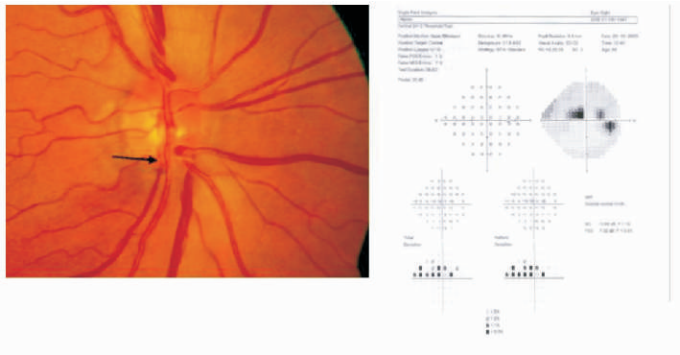

Figure 9 : Relation Between neuro-retinal Rim Notch and Visual Field Defect

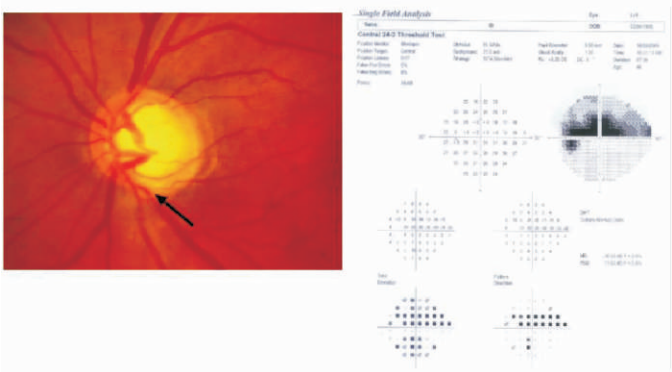

Figure 10 : Relation between Inferior (Here Inferior Notch is wider than the one in Fig 9) Notch and Visual Field Defect

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.

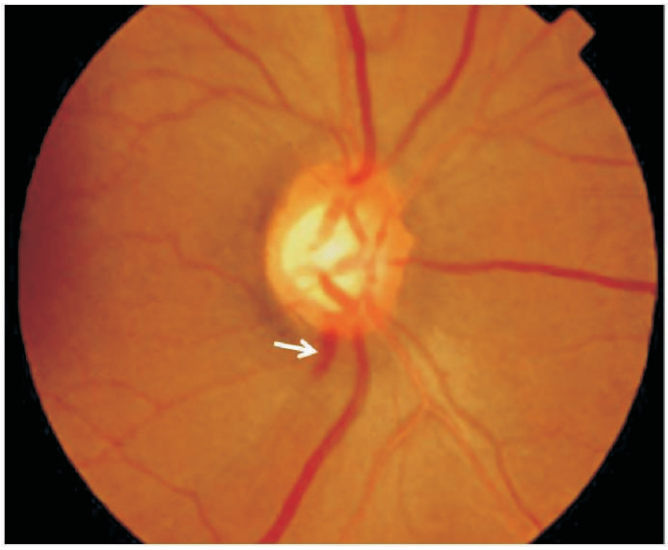

Figure 11 : Disc Hemorrhage

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)

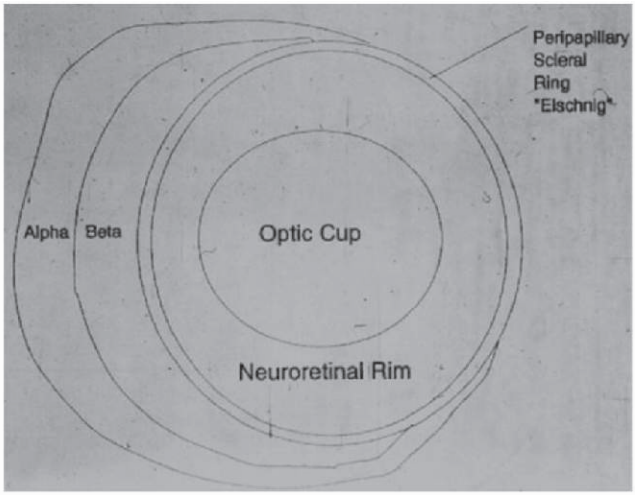

Figure 12 : Peripapillary Atrophy

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)

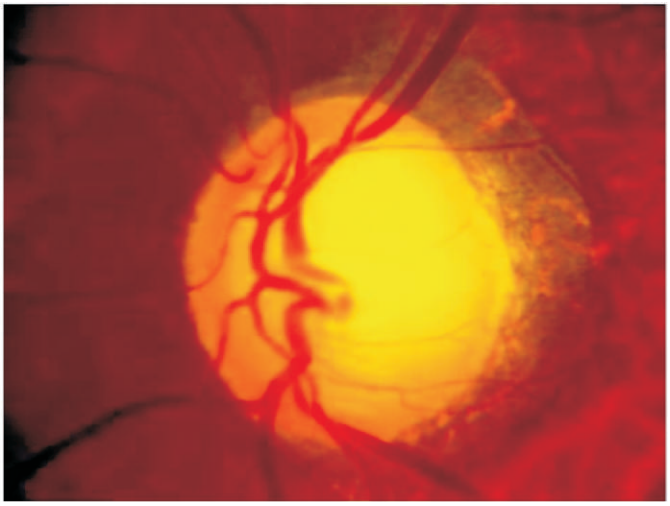

Figure 13 : Localized peripapillary Atrophy in the Temporal Area of the Disc

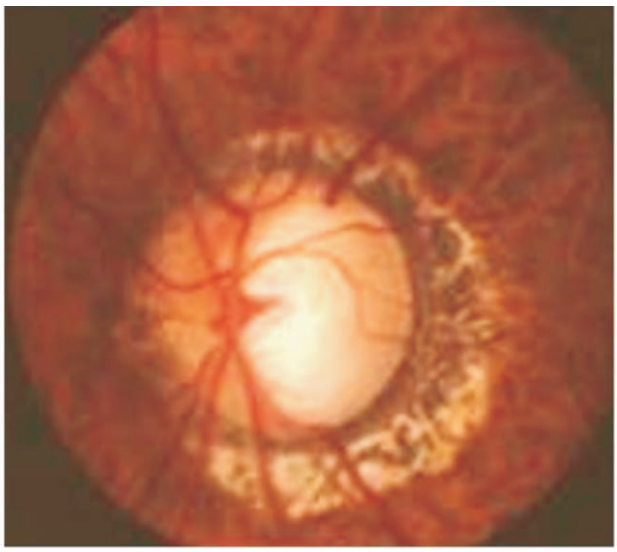

Figure 14 : Peripapillary Atrophy : Generalized

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.

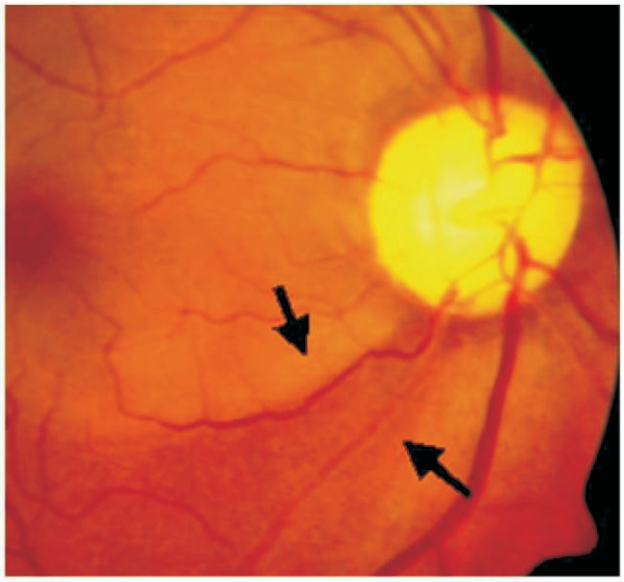

Figure 15 : Retinal Nerve Fiber Layer Defect. Wedge Shaped RNFL Defect can be seen between Two Arrows

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).

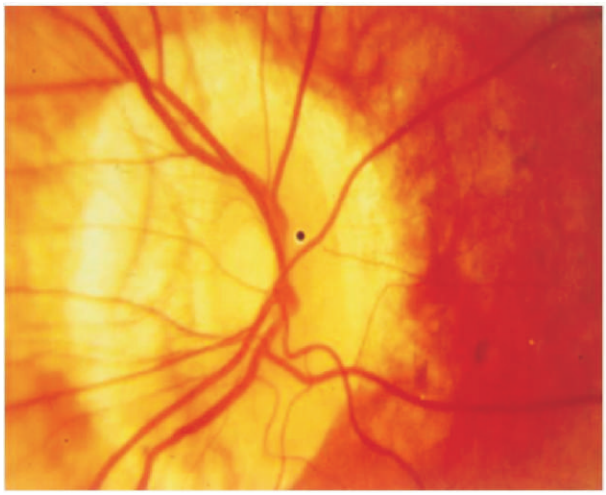

Figure 16 : Myopic Disc with Primary Open Angle Glaucoma

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).

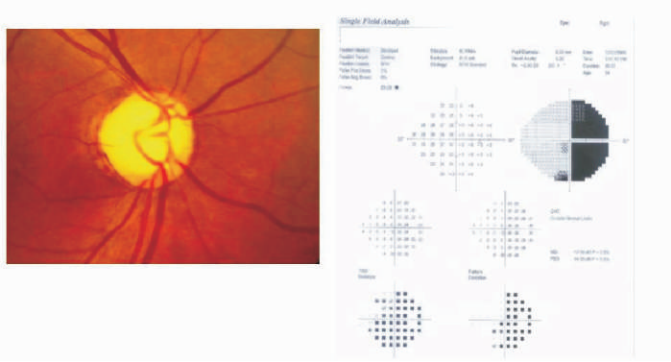

Figure 17 : Optic Disc Showing Cupping with out of Proportion Pallor and Visual Field Defect Showing a Temporal hemianopia

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