Optic Nerve Examination

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Examination

* **Structure (optic disc)**
* **Function**

Examination of the optic disc

* The only cranial nerve (brain tract) which could be directly seen
* The optic disc can be examined clinically with:
  - direct ophthalmoscope,
  - indirect ophthalmoscope,
  - slit-lamp biomicroscope using a lens.

The *direct ophthalmoscope*

Provides a view of the optic disc through a **small pupil** , may be used in **bed ridden** patient

When used with a red-free filter, it enhances detection of the nerve fiber layer of the retina

It does not provide sufficient stereoscopic detail to detect subtle changes in optic disc topography**(Magnification is high but uniocular)**

The *indirect ophthalmoscope*

* is used for examination of the optic disc in young **children, uncooperative patients**, individuals with high **myopia**, and individuals with substantial **opacities** of the media.
* Cupping of the optic nerve can be detected, but cupping and pallor appear less pronounced than with slit-lamp methods, and the magnification is often inadequate for detecting subtle or localized details important in the evaluation of glaucoma.

Fundus Biomicroscopy

The *slit lamp* combined with a lens; a 60, 78, or 90 D lens.

The slit beam, is useful for determining subtle changes in the **contour** of the nerve head.

SL Provides high magnification, excellent illumination, and a stereoscopic view of the disc & allows for quantitative measurement of the diameter of the optic disc.

The disc diameter can then be calculated by taking into account the lens used. With a 60 D lens, the height of the slit equals the **disc diameter in millimeters** read directly from the scale., and with a 90 D lens multiplication by 1.3 results in the disc diameter in mm.

Slit-lamp techniques require some patient cooperation and moderate pupil size for adequate visibility of the disc.

$Power_{patient's\ eye} \div Power_{fundus\ lens} = magnification.$

* With respect to biomicroscopy,

60D. lens: 60 ÷ 60 = 1X magnification; a 90D lens, 60 ÷ 90 = .67X enlargement. Applying the same reason to B.I.O. funduscopes, the 20D lends 3X magnification, and the 30D gives 2X.

It seems counterintuitive, however, upon one's clinical experiences, that the 60D produces a smaller image than the 20D but Slit lamp magnification explains the differnce

Examination of Optic Nerve

* Examination of the optic nerve demonstrates both interobserver and intraobserver variability.
* Variabilty in size , cup , contour & other parameters are large
* No substitute for practice & systematic approach

7 Steps

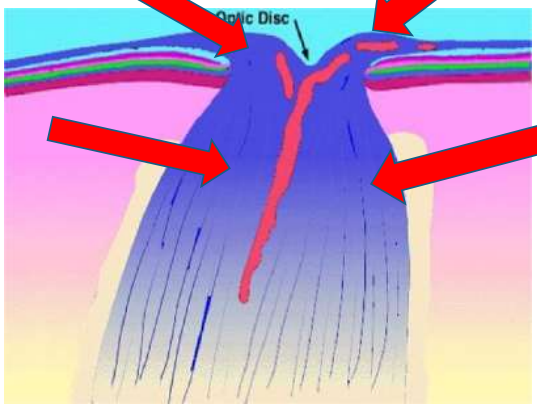
* Cup
* Color
* Contour
* ISNT role
* Disc size
* Vessel caliber
* Peripapillary atrophy

Disc Swelling

Low IOP

PGs Uveitis

Inflammation



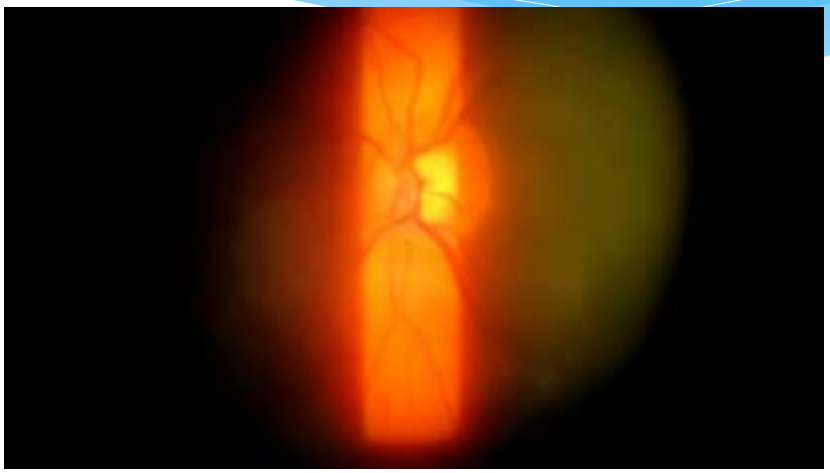
Intra axonal Oedema

Increased ICT

The swollen optic disc

- No Signs or symptoms
- Retinal Pathology
- Signs & symptoms of ++ICT
- Signs & symptoms of Visual function

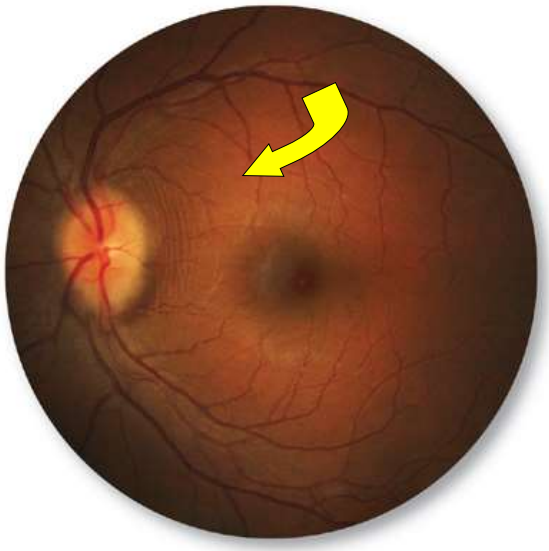
Spontaneous Venous Pulsations



Spontaneous Venous Pulse

- is always normal and signifies no IICP over 200 mmH2O.
- If absent may or may not be normal.
- A spontaneous arterial pulse is always abnormal.
- It means that either the IOP is too high for the arterial pressure or the arterial pressure is too low such as in severe carotid occlusive disease.

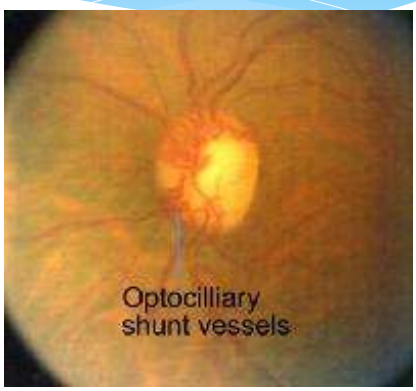
Paton's Lines



Optociliary Shunt Vessels

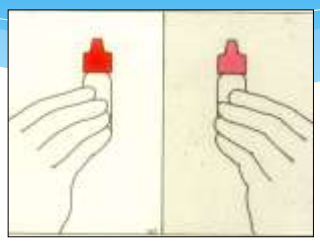
These are an infrequent finding on the disc and classically suggest optic nerve meningioma. However, the more recent association has been due to chronic ischemic blood flow to the disc.

Maybe only sign in retinal vein occlusion after IV injection



Function of Optic Nerve

Visual Acuity (Aided)
Visual Field
Colour Vision (red cap desaturation ,Ishihara or Farnsworth D15 Congenital from acquired
Pupillary reactions & Brightness sensitivity



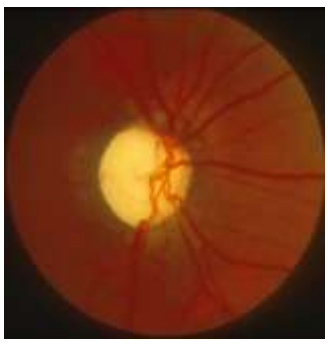
Macula Vs Optic nerve(Exam)

Feature	Optic nerve	Macula
VA	Variably reduced	Reduced ++
APD	Present	Absent
Brightness sense	Reduced ++	Slightly Reduced
Colour Vision	Reduced ++	Slightly Reduced
VF	Variable(-ve)	Normal or central scotoma (+ve)

Macula Vs Optic nerve(Tests)

Feature	Optic nerve	Macula
Amsler Chart	Scotoma	Metamorphopsia
VEP	Large latency delay	Small latency delay
Photostress test	Normal	Abnormal
Contrast sensitivity function	Greatest losses between 6-12 C/degree	Greatest losses around 18 C/degree

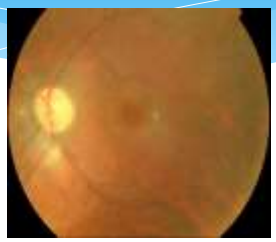
Cupping & Pallor



Cupped disc

The pale optic disc

- Congenital or myopia
- Secondary to
  - raised ICP Ildefined borders
  - vascular retinal disease vessel changes &shunt vessels
  - optic neuritis & optic nerve compression
  - trauma
- Glaucoma Cupping Vs Pallor



Five Causes to Obtain Neurologic Radiograph from glaucoma Patients

- **Pallor greater than cupping**
- **VF defects that respect the vertical midline**
- **Young age less than 50**
- **Poor visual acuity**
- **Patient progressing after normalization of IOPnn**

The Relative Afferent Pupillary Defect

Significant and highly **objective** clinical finding in the examination of the visual system.

Even in an **unconscious** patient

US ------anatomy

ERG-----outer retinal layers

VEP-----ON &Visual cortex

General Points about RAPD

* An RAPD occurs with significant **optic nerve or retinal disease**, when there is a difference in the disease process between the two eyes.
* If each eye has severe but equal disease, there will be no RAPD.
* Severe disease in one eye leading to an RAPD will **not** lead to **anisocoria**. The diseased eye's pupil will appear to be of equal size to the other eye due to the consensual light reaction

The pupillary light reflex

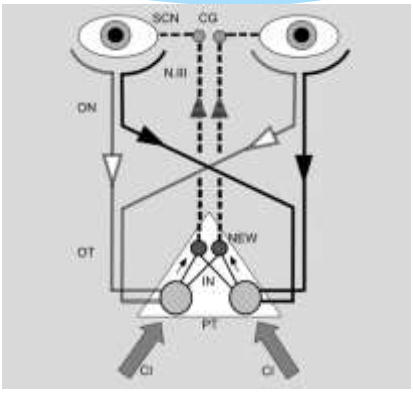
Light hits retina, sends (sensory afferents) to **both sides** of brain that go to the pretectum.

Pretectal neurons project to **both EWN** (in midbrain).

Edinger-Westphal projects to the ciliary ganglion (PNS)

Ciliary ganglion projects to the constrictor muscle .

Shining light leads to constriction of **both** muscles. (motor efferent – cranial nerve 3 – occulomotor).



General Points about RAPD

* Because of the consensual light reaction, only **one functioning pupil** is needed to determine the presence of an RAPD.
* The **VA** does not necessarily correlate with an RAPD. Some conditions will lead to a marked reduction of VA with an RAPD, while others spare the central vision. Often an extensive loss of **peripheral vision** correlates with an RAPD.

Conditions which will NOT cause a RAPD

- Refractive Error (even if extreme), Strabismus
- Media Opacity (a bright enough light will indicate **NO** RAPD)
- Previous eye surgery (unless there is a complication)
- Conditions with an **Efferent** Pupillary Defect
  - Third Cranial Nerve Palsy
  - Adie's Pupil
  - Horner's Syndrome
- Mild retinal problems, including:
  - Mild background diabetic retinopathy ,Central serous choroidopathy ,Non-ischemic CRVO s ,ARMD
- Conditions which are typically bilaterally symmetrical will not show an RAPD:
  - Bilateral retinitis pigmentosa
  - Bilateral nutritional or metabolic optic neuropathies
- Cerebral infarct usually will not cause an RAPD

Pupil Testing

Procedure consists of four steps

1. **Observation (screen for anisocoria)**
2. **Direct and consensual response**
3. **Swinging flashlight test**
4. **Near reflex test**

Evaluation of the Pupils

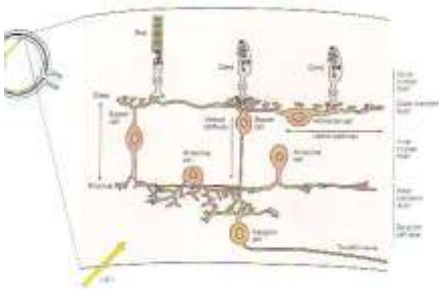
- The test is best performed in a dimly illuminated room. This allows for some pupillary dilation,
- Pt looks @ distance to isolates near response
- Test the individual reaction of each pupil initially. In some cases one pupil may not be reactive due to a variety of conditions. In cases where neither pupil reacts to light, no further testing can be done, except for testing the . response to accommodation.

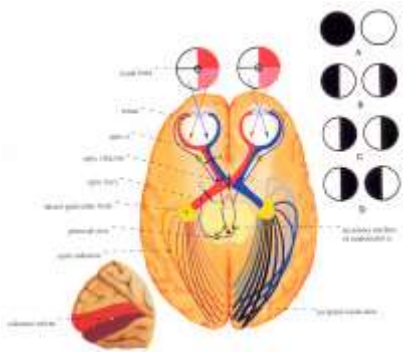
How to Check RAPD

Rt.RAPD

Visual Field

Retinotopic Organization





Visual Field

Methods:

- Confrontation
- Amsler
- Automated

Defects (unilateral)

NF bundle defect
Central
Cecocentral
Altitudinal
Total