

Pediatric Glaucoma Suspect

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Suspect?


At Risk of Developing Glaucoma

WHY?

- Childhood Glaucoma → **6%** of Childhood **Blindness**
- **Suspects** → **1/3** Pediatric glaucoma clinic
- **½ Suspects** → initial **Normal IOP** → **Unnoticed**

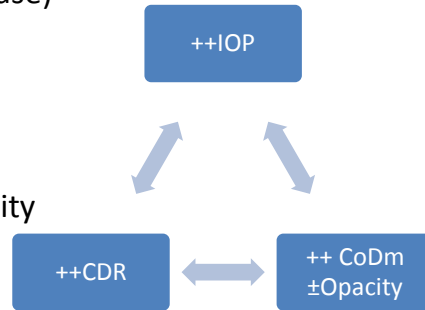
Fung et al., *Clin Ophthalmol* 2013; 7:1739-46.
Kooner et al., *Clin Ophthalmol* 2014;8 1139-1145.

What are the Challenges?

- Glaucoma is **Multi-factorial**
 - Suspects → **Asymptomatic**
 - **No clear Definition**
- 
- **No clear diagnosis-/management- Guidelines**

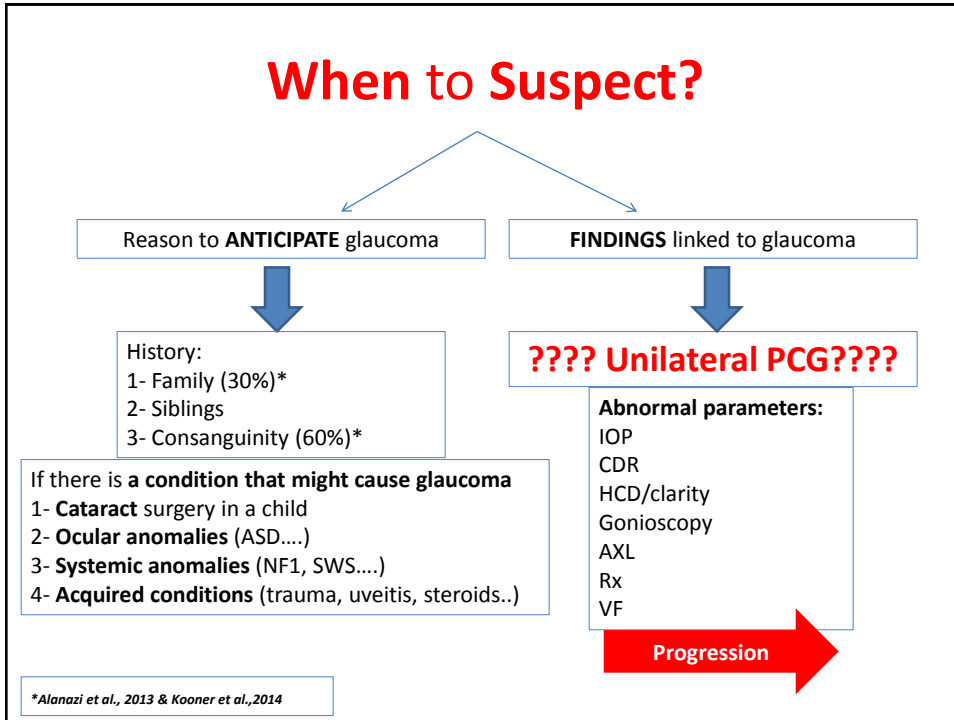
How do we diagnose glaucoma? (Parameters)

- **++ IOP**
- **Optic nerve cupping**
 - ++ CDR (evidence of increase)
 - Asymmetry ≥ 0.2
 - Focal thinning
- **Cornea:**
 - Diameter
 - Haab's striae/edema/ Clarity
- **Myopic shift/ ++ AXL**
- **Gonioscopy**
- **Field defects (>6Y)**



When to Suspect?

- **Anticipate:**
 - History:
 - Family/ Siblings
 - Consanguinity
 - Factors predisposing to secondary glaucoma
- **Findings:**
 - ?? Unilateral PCG??
 - Abnormal parameters

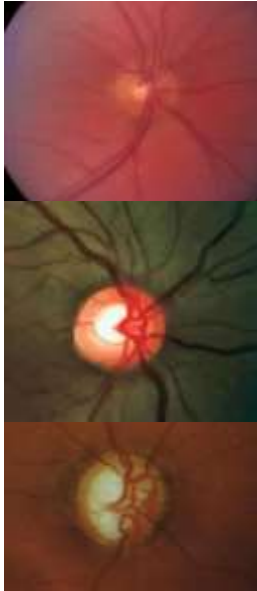


Normal parameters at a glance

- C/D
 <0.3 (racial factors)
 Asymmetry <0.2
 No Focal thinning (initial decrease)

Studies, year	V.C/D	H.C/D
Photographic studies		
Mansour ¹⁴ , 1992		
Hellmich ¹⁵ , 1998		
Samraiwidjana ¹⁶ , 2012	0.40	
HRT studies		
Ike ¹⁷ , 2008		
Pang ¹⁸ , 2008		
Larsen ¹⁹ , 2011		
TD-OCT studies (Stratus OCT)		
El-Doss ²⁰ , 2009	0.37	0.43
Haynes ²¹ , 2006	0.42 ± 0.15	0.46 ± 0.16
Haynes ²² , 2003	0.38 ± 0.14	0.44 ± 0.16
SD-OCT studies		
Ehr ²³ , 2012, Cirrus		
Bueno-Gilmer ²⁴ , 2014, Cirrus		
Bhojwala ²⁵ , 2015, RTVue	0.32 ± 0.22	0.36 ± 0.24
Present study, 2013, Optovue	0.37 ± 0.17	0.45 ± 0.20

Other family members
 Myopes
 Large discs



4

OCT???

OCT in Children

- No normative data
- Data not available < 5y*.
- Variable with age, race and AXL** →
- Diagnostic capacity (under study)†

- **Not a diagnostic tool**

- ?? Documentation, follow up for progression

*Kiziloglu et al, 2018 **El Dairi et al., 2009 † Morales Fernandez et al., 2018

Normal parameters at a glance

- Corneal diameter

>1 year → 9mm
1-2 years → 10mm
>2years → 11mm



CCT

Normal parameters at a glance

• CCT

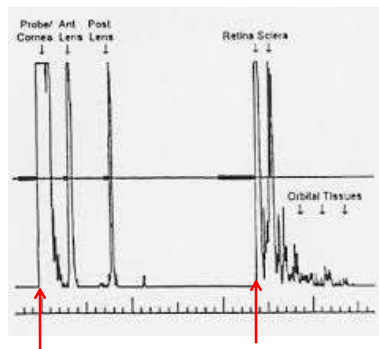
- Varies with specific diagnosis¹/ **not alone**²
- Varies with ethnicity³
- May poorly correlate with GAT³
- **Do not use correction factors**⁴

1. Lopes et al., **Central corneal thickness in pediatric glaucoma**. JPOS. 2007 ; **44**(2):112-7.
2. Freedman, **Central corneal thickness in children—does it help or hinder our evaluation of eyes at risk for glaucoma?** <https://doi.org/10.1016/j.jaapos.2007.12.004>
3. Najabat et al., **Correlation Between Intraocular Pressure and Central Corneal Thickness in Persian Children**. Ophthalmol Ther (2016) 5:235–243
4. Strouthidis et al., **Clinical Evaluation of Glaucoma in Children**. Current Ophthalmology Reports June 2013, Volume 1, Issue 2, pp 106–112

Normal parameters at a glance

• AXL

>1 year → 17mm
 1-2 years → 17-21mm
 2-10 years → +1-2mm



Normal parameters at a glance

- IOP
 - Literature (≥ 21 mmHg \rightarrow glaucoma)
 - Practice:
in a child $\leq 2y \rightarrow$ **15 mmHg** (highly suspicious)
 - Bresson-Dumont, 2009 \rightarrow

< 8 mmHg (<3 months)
< 12 mmHg (6-9 months.)
Approach adult levels by 12 years of age

ORA??

- ORA
 - CH markedly reduce in PCG
 - ORA IOPs are significantly higher than GAT
 - GAT and ORA \rightarrow Not interchangeable

Zareei et al., Intraocular Pressure Measurement by Three Different Tonometers in Primary Congenital Glaucoma . *J Ophthalmic Vis Res* 2015; 10 (1): 43-48.

Normal parameters at a glance

- Refraction:
 - <3months → 2 D of hyperopia (SD± 2 D).
 - 3-12months → fast **emmetropization** (applies to myopes)
 - slow change till **2 years** in hyperopes.
 - Little change between 3-6 years
 - **Monitor these levels of refractive errors for a rapid MYOPIC SHIFT**



Normal parameters at a glance

- Gonioscopy (UGA)



Courtesy Prof Ghada Gawdat

Clinical management outcomes of childhood glaucoma suspects. Greenberg 2017 (retrospective-USA)

- How many converted to frank GLAUCOMA
- When did they convert
- How were they managed

Clinical management outcomes of childhood glaucoma suspects. Greenberg 2017 (retrospective-USA)

- **Conversion criteria:**
 1. A **progressive increase in CDR/focal rim thinning** (documented on serial disc Photos)
 2. A **progressive thinning of cpRNFL** \geq of 10 microns
 3. **Progressive myopic shift** with
 - an increase in ocular dimensions
 - elevated IOP > 21 mmHg on two or more occasions
 4. An **acquired visual field defect**, or a reproducible deepening and/or expansion of a preexisting

Clinical management outcomes of childhood glaucoma suspects. Greenberg 2017 (retrospective-USA)

- **How many converted to frank GLAUCOMA**
 - 22/214 subjects (**10.2%**)
- **When did they convert**
 - 32.8±33.5 months
- **What was the commonest risk factor for conversion**
 - IOP (av., min., max.) **not base line IOP**
- **How were they managed**

IOP on initial evaluation was included. The decision to initiate treatment was at the discretion of the attending pediatric glaucoma specialist; no criteria or protocol were used in this decision-making.

Take home message

- **IOP can be misleading (الضغط وحده لا يكفي)**
- **Monitor closely** and for a **LONG** time
- Look for **signs of progression** rather than specific figures
- **Document** objectively (fundus pictures)
- **Examine the family** (the apple doesn't fall far from the tree)

Remember!!!

- Controversies:
 - CCT (varies with specific diagnosis¹/ not alone²)
 - OCT (No normative data)
 - ORA



Auxillary Tests

1. Lopes et al., **Central corneal thickness in pediatric glaucoma**. JPOS. 2007 ; **44**(2):112-7.
2. Freedman, **Central corneal thickness in children—does it help or hinder our evaluation of eyes at risk for glaucoma?**
<https://doi.org/10.1016/j.jaapos.2007.12.004>

Thank you for your Kind Attention

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 - Prof Nader Bayoumi

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