Medical Treatment in Pediatric Glaucoma

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Medical Treatment in Pediatric Glaucoma

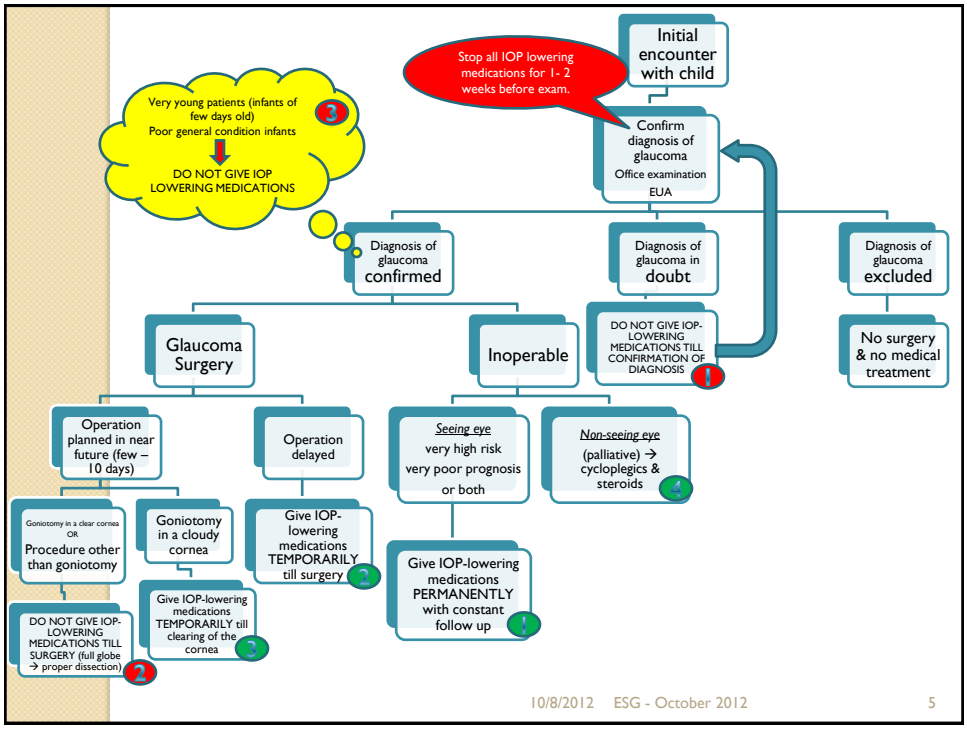
- Pediatric glaucoma is a surgical disease
- Several options are available for surgery
- Yet, medical therapy still has a role

Medical Treatment in Pediatric Glaucoma

- "When **should we use** medical therapy in pediatric glaucoma?"

Medical Treatment in Pediatric Glaucoma

- "When **should we NOT use** medical therapy in pediatric glaucoma?"



Medical Treatment in Pediatric Glaucoma

- "When should we use medical therapy in pediatric glaucoma?"
  - Preoperative
    - In ***preparation*** for surgery → to clear the cornea to allow goniotomy if this is the procedure planned
    - To manage an ***accidental delay*** of surgery (e.g. patient's bad general condition or acute illness, operating room or surgeon availability issues)

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- "When should we use medical therapy in pediatric glaucoma?"
  - Postoperative
    - In the ***interim between two procedures*** if the initial surgery fails & the patient is scheduled for another surgery
    - After glaucoma drainage device (GDD) surgery (i.e. in the ***hypertensive phase of GDDs***)
    - ***Permanently after failure*** of all surgical procedures to adequately control the IOP

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- "When should we use medical therapy in pediatric glaucoma?"
  - Permanently if surgical intervention is ***not applicable*** in a seeing eye, due to →
    - very high risk (e.g Sturge-Weber glaucoma with choroidal hemangioma & a mild elevation of IOP)
    - very poor prognosis (e.g. aphakic/pseudophakic glaucoma with a scarred conjunctiva)
    - both (e.g. aphakic/pseudophakic glaucoma in a vitrectomised eye with advanced optic nerve damage & poor vision)

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- "When should we use medical therapy in pediatric glaucoma?"
  - Permanently if surgical intervention is not applicable in a non-seeing eye (palliative) → therapy may include ***cycloplegics*** & ***steroids*** mainly, with IOP lowering medications secondarily, specially with time

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- "When should we NOT use medical therapy in pediatric glaucoma?"
  - General → relative
    - ***Before confirmation of the diagnosis*** of elevated IOP, by an office examination or by examination under general anaesthesia (EUA), in order not to mask the diagnosis & to allow a proper differential diagnosis
    - ***Before near term surgery*** (few days up to 1 week), in order to facilitate lamellar dissection and/or other surgical procedures on a full –non hypotonous – globe

Medical Treatment in Pediatric Glaucoma

- "When should we NOT use medical therapy in pediatric glaucoma?"
  - General → relative
    - ***Very young patients (infants of few days old)*** due to the small body surface area & body mass with resultant mismatch between dose administered & patient tolerance
    - ***Poor general condition***, e.g. preterm infants, infants with very low birth weight, infants with severe congenital cardiac, renal or otherwise metabolic anomalies

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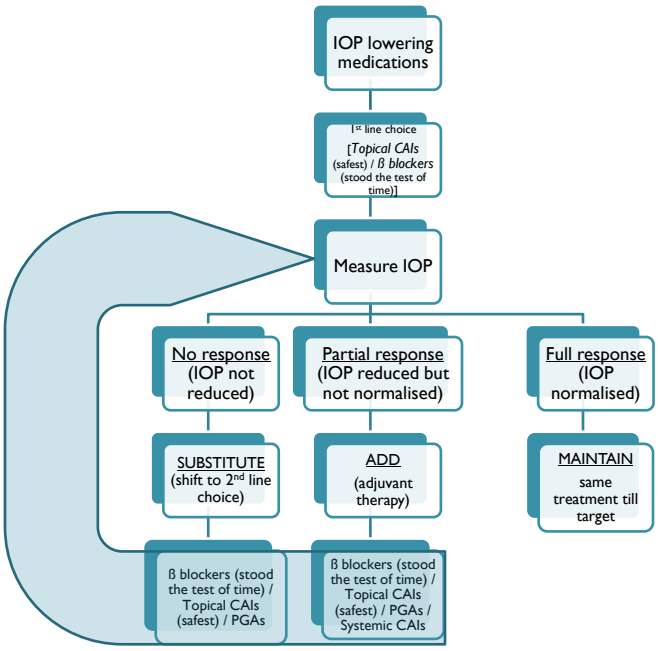
- "When should we NOT use medical therapy in pediatric glaucoma?"
  - Drug specific
    - ß blockers
    - α agonists
    - topical carbonic anhydrase inhibitors (CAIs)
    - systemic CAIs
    - prostaglandin analogues (PGAs)
    - Miotics
    - osmotic drugs

Medical Treatment in Pediatric Glaucoma

- "What is the **<u>treatment plan</u>** in pediatric glaucoma?"



Medical Treatment in Pediatric Glaucoma

- Precautions & comments
  - evaluate the risks & benefits of the individual medications
  - use the minimum dosage of the medication to achieve a therapeutic benefit
  - monitor children for ocular & systemic side effects
  - in general, the percentage of responders to glaucoma medical therapy ranges from 19 % to 29%, declining with time

Medical Treatment in Pediatric Glaucoma

- "What are the **drugs** used for medical therapy of pediatric glaucoma?"

Medical Treatment in Pediatric Glaucoma

- "What are the drugs used for medical therapy of pediatric glaucoma?"
  - ß blockers
  - α agonists
  - topical carbonic anhydrase inhibitors (CAIs)
  - systemic CAIs
  - prostaglandin analogues (PGAs)
  - Miotics
  - osmotic drugs

Medical Treatment in Pediatric Glaucoma

- ß blockers
  - prototype drug: timolol
  - has an IOP lowering effect in almost 30% of treated eyes
  - plasma timolol levels after topical timolol 0.25% in children (specially infants) exceed levels in adults after topical timolol 0.5% (due to volume distribution of the drug) → increased risk of systemic side effects, especially in infants

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- ß blockers
  - reported *side effects*:
    - reduction in resting pulse rates
    - apnea (in smaller children)
    - provocation of asthma (?betaxolol)
  - *contraindications & precautions*:
    - bronchial asthma
    - cardiac disease
    - neonates (use with extreme caution)
  - *recommendation*:
    - once daily dosing, of timolol 0.25%, in gel form

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- Topical carbonic anhydrase inhibitors (CAIs)
  - prototype: dorzolamide
  - are currently the recommended medical treatment for pediatric glaucoma
  - *recommendation*:
    - twice daily

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- Systemic CAIs
  - prototype: oral acetazolamide
  - are safe & well tolerated by children
  - reported *side effects*:
    - same side effects as in adults
    - growth suppression
    - severe metabolic acidosis in infants
  - *recommendation*:
    - oral acetazolamide, in a dose of 5 – 15 mg/kg (average 10 mg/kg), given in 3 divided doses

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- Prostaglandin analogues (PGAs)
  - prototype: latanoprost
  - more effective in older juvenile onset open angle glaucoma & Sturge-Weber syndrome glaucoma
  - reported *side effects*:
    - iris pigmentation change
    - eyelash growth
    - hyperemia

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- α-2 agonists
  - prototype: brimonidine
  - IOP lowering range of 7%
  - *side effects*:
    - ***central nervous depression*** (lipophilic [brimonidine] → cross the blood brain barrier) ➔ extreme fatigue, episodes of coma
  - brimonidine should be used with caution in pediatric patients & only used in older children

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- Miotics
  - prototype: pilocarpine
  - ***not effective*** due to goniodysgenesis & abnormal (anterior) insertion of the ciliary muscle into the trabecular meshwork
  - may be used in aphakic/pseudophakic pediatric glaucoma patients (?debatable)
  - long acting anticholinesterase drugs may induce systemic cholinergic crisis

Medical Treatment in Pediatric Glaucoma

- Osmotic drugs
  - prototype: glycerin, mannitol
  - dose:
    - glycerin 0.75 – 1.5 g/kg body weight, orally, in 50 % solution
    - mannitol (20 % solution) 0.5 – 1.5 g/kg body weight, intravenously, at approximately 60 drops /minute
  - may be administered ***preoperatively*** if IOP remains high even with standard medical therapy

Thank you