Beta Blockers

Topical beta-adrenergic antagonists (beta blockers) work by reducing aqueous production. Topical beta blockers are often chosen as first-line medical therapy, but have well-documented systemic side effects that limit their use in infants, in children with reactive airways, and in some with cardiac disease. Several drugs and formulations are available, as are many combination therapies. The most widely used nonselective beta blocker in children is timolol, whereas betaxolol is the most widely used relatively beta‑1 selective beta blocker; both of these are most often available as 0.25% and 0.5% solutions, with viscous gel-forming versions also sold. These drugs are dosed twice daily, but can often be used once every morning with similar IOP control.

As monotherapy, topical timolol (0.25% and 0.5%) lowers IOP about 5 mm Hg,[2,10] whereas betaxolol 0.25% and levobetaxolol suspension 0.5% each has a less robust effect at about 3 mm Hg.[11, 12] IOP control was achieved with timolol monotherapy in about 75% of children through a 3‑month prospective trial, with 0.25% concentration prescribed to those younger than 2 years and 0.5% prescribed to older children.[13] Gel-forming formulations of timolol used once daily lower IOP similarly to solution formulations of the same strength dosed twice daily and can confer better adherence and decrease systemic absorption[14] while being relatively contraindicated with contact lens use.

The plasma timolol concentration in adults rises rapidly after topical administration and can be diminished with punctal occlusion. Random plasma timolol concentrations in children are in general higher than those of adults and can be greater than 30 times higher in infants, reaching levels above those desired for clinical (systemic) beta blockade.[15] Ocular side effects of topical beta blockers include ocular hyperemia and discomfort, which is present in about 5%–7% of patients regardless of agent, formulation or strength.[2, 11, 12] Systemic side effects such as bradycardia, fatigue, and hypotension are seen in 3%–6% of children.[11, 12] In a retrospective series, 2 of the 10 adverse events in 106 patients were reported as "wheezing," underscoring the beta‑2 mediated bronchopulmonary side effects in susceptible children.[2]

In summary, topical timolol lowers IOP about 5 mm Hg, with betaxolol and levobetaxolol slightly less effective. Topical beta blockers can be used once or twice daily and in combination with most other drug classes and can be good first- or second-line drugs in most pediatric glaucomas. About 75% of patients can achieve short-term IOP control with topical beta blocker therapy alone. Gel-forming formulations might be preferred in young patients due to easier dosing schedule and theoretically lower systemic absorption. Plasma concentration of topical timolol in children can be much higher than that of adults, and the medication must be used with caution in infants and in children with a history of respiratory (especially reactive airways/asthma) and cardiac problems. Topical beta blockers are generally well tolerated, with 3%–6% of children at risk of developing systemic side effects.

Beta-1-selective agents might be appropriate, but not entirely without risk for side effects, for those at high risk of bronchopulmonary events.

Source: https://www.aao.org/disease-review/glaucoma-medications