PRELIMINARY COMMUNICATION

INFLUENCE OF β-ADRENERGIC ANTAGONISTS ON TEAR SECRETION IN CHILDREN

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The aim of the study was to compare the results of tear film volume, conjunctival and corneal state of children eyes both treated with β-blocker and healthy ones.

We have examined 40 eyes of 20 children at the age from 7 to 17 years. Group I – 20 glaucomatous eyes treated with 0.5% timolol twice daily during at least 12 months. Group II – 20 eyes of control age-matched group. Schirmer I test without anesthesia and lissamine green staining was performed to evaluate conjunctival and corneal surface.

The values of Schirmer I test were: group I from 12 to 24 mm, the mean 17.06 ± 1.78 mm and group II from 16 to 35 mm, the mean 29.3 ± 2.67, p = 0.000004. Keratoepitheliopathy was observed in 4 eyes (20%) of group I and was rated as 3rd and 6th degree of Franek classification. In the group II, there were only single staining points classified as 1st degree noticed in 2 eyes (10%), p = 0.37.

The long-term treatment with timolol causes a decrease in tear secretion in children, which can further generate keratoepitheliopathy. Therefore, we suggest application of the artificial tears in these patients.

Key words: tear film, β-blockers, cornea, glaucoma, children, dry eye

The surgery is the first line therapy in childhood glaucoma. The pharmacotherapy is performed just before operation and after it if decreasing of intraocular pressure is not satisfactory. In these patients, antiglaucoma drugs are applied, sometimes for a long time. Among them β-adrenergic antagonists are used most often to decrease aqueous humor production. The constant tear secretion depends on
sympathetic adrenergic system so β-blockers can influence it. The tear film consists of lipid, aqueous and mucous layers. The general and topical application of β-blockers can lead to alterations in aqueous part of a tear film, which is evaluated by Schirmer test [10]. The changes in volume and in consequence, in stability of a tear film affects the corneal condition and causes epitheliokeratopathy.

The aim of this paper is to compare the results of Schirmer I test and the corneal condition in children both treated with β-blocker and the healthy ones.

We have examined 40 eyes in 20 children at the age from 7 to 17 years. Among them there were 20 eyes of patients treated with 0.5% timolol (0.5% Oftensin, Polpharma, with benzalkonium chloride as a preservative) twice a day for at least 12 months. They were the patients with juvenile and congenital glaucoma. They did not take any other drugs.

The group II consisted of 20 eyes of children who did not show any ophthalmological or general diseases that could affect the tear secretion [6, 11]. The patients were interviewed on their possible subjective disorder and their parents on the evaluation of children eyelids closing while sleeping.

The Schirmer I test without local anesthesia [9] was performed three times to estimate the tear secretion. We observed the moistening of strip put into inferior conjunctival fornix for 5 min. Values below 5 mm allow to recognize definitively dry eye, good results are over 15 mm. The corneal state was examined with biomicroscope. The necrosed and degenerated cells of conjunctival and corneal surface were observed after the application of lissamine green.

The Franek classification was used to estimate the advancement of the alterations [3]. Degree 0 means no staining points, 1st degree: no more than 10, 2nd degree: over 10 to 50 points and 3rd degree: more than 50 points. We summarized the number of staining points in cornea and in nasal and temporal part of bulbar conjunctiva. Maximum one can get is the 9th degree.

The results were statistically analyzed by means of U Mann-Whitney and Fisher tests, α = 0.05.

The patients from both groups I and II did not claim any subjective complaints. In both groups, there was a proper structure and movability of eyelids – the blinking caused the covering of a whole cornea. The children closed their eyelids properly while sleeping. Mean age of group I was 14.6 years (ranged from 7 to 17 years) and of group II was 9.3 years (ranged from 7 to 17 years). The results of Schirmer I test were from 14–31 mm before treatment in group I and 16–35, mean 29.3 ± 2.67 mm in group II, p = 0.16. After treatment with β-blocker the values of Schirmer I test were 12–24, mean 17.06 ± 1.78 mm.

Figure 1 shows that tear secretion was statistically significantly lower in eyes treated with topical -blocker than in the control eyes, p = 0.000004.

Fig. 1. Schirmer I test results in the eyes treated with β-blocker (Group I) and in the healthy children eyes (Group II)

In the group I keratoepitheliopathy was noticed in 4 (20%) treated eyes. The advancement of alterations was 3rd degree in 2 eyes and 6th degree of Franck classification in 2 eyes.

In the group II, only single staining points were noticed (1st degree) in 2 eyes (10%).

The incidence of punctate corneal erosions was more frequent in Oftensin group than in healthy patients, but not statistically significant, p = 0.37.

There were no patients claiming any indisposition even among those with the 3rd or 6th degree of corneal and conjunctival changes examined by means of lissamine green staining. There were also no difficulties in the performance of Schirmer I test on our young patients. This test shows the significant decreasing of tear secretion in patients treated with timolol comparing to healthy children, p = 0.000004. The lowest result of Schirmer I test was 12 mm noticed in the group treated with β-blocker. In majority of children the achieved result was above 15 mm.
Many authors claimed a decrease in the tear secretion in adults treated with \( \beta \)-blockers, as evaluated by Schirmer I test [1, 5, 7, 8, 12, 14], though some did not notice such alterations [14]. Gobbels et al. [4] have used the fluorophotometry to evaluate tear flow and for only 14 days after the administration of timolol, he observed lower values of tear volume which returned to the value obtained before treatment. Keratoepitheliopathy can be the effect of a decrease in tear volume [5]. Among our patients treated with Ofteonsin, we have observed, with lissamine green, some changes in conjunctiva and cornea in 20% of them. Other authors claim similar results in adults [5, 8, 13], though some suggest the connection of these alterations with the role of preservatives and not the \( \beta \)-blockers as such [2, 7].

In conclusion, the long-term treatment with Ofteonsin causes a decrease in tear secretion in children, which can further generate keratoepitheliopathy. Therefore, we suggest application of the artificial tears in these patients.

**REFERENCES**


Received: November 24, 2004; in revised form: December 22, 2004.