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★ RESUME ★

Monika UDZIELA received her MD degree from the Medical University of Warsaw (Poland).

Since 2004 she has been working in the Department of Ophthalmology Medical University of Warsaw, Public Clinical Ophthalmology Hospital. Present position - Senior Assistant.

Areas of Interest: Ocular surface and anterior segment of the eye disorders diagnostics and pharmacologic and surgical therapy, especially diseases of the cornea, genetic investigations of corneal dystrophies, keratoplasty, imaging examinations. She is a specialist of the in vivo confocal microscopy.

Author or co-author of 24 publications in Polish and foreign scientific journals. Author of 60 presentations during International Conferences and Congresses Clinical research experience. Education activities.



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EVALUATION OF THE INFLUENCE OF ANTIGLAUCOMA MEDICATIONS ON CORNEA TISSUE IN CONFOCAL MICROSCOPY- CASE SERIES

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★ INTRODUCTION ★

Glaucoma is the second leading cause of global blindness and the leading cause of irreversible visual loss in adults worldwide (1). This chronic degenerative disease has affected 60.5 million people in 2010 and projected to affect 79.6 million by 2020 (1, 2). All these patients require lifelong treatment- mostly pharmacological- to preserve vision.

Essence of medical treatment is to control intraocular pressure (IOP) by decrease aqueous humor production or increase outflow.

Topical ophthalmic antiglaucomatous medications have the influence not only on IOP reduction, but also on various components of the ocular surface, and lead to ocular surface disease (OSD). OSD has been reported to occur in 48%-59% of medically treated glaucoma patients (3)

High-magnification imaging of corneal layers by in vivo confocal microscopy (IVCM) has been used to visualize microstructural alterations in several pathologic conditions.

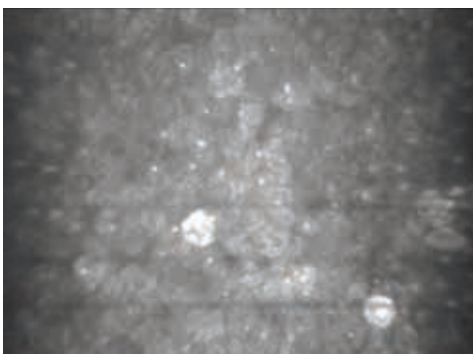
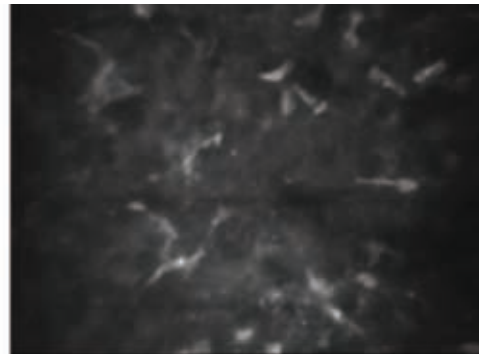
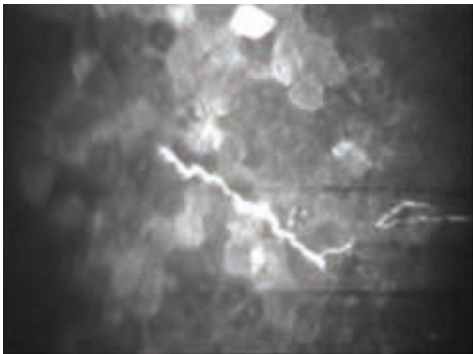
The aim of this study was the assessment of the influence of pharmacologic therapy on cornea tissue in glaucomatous patients using different topical medications.

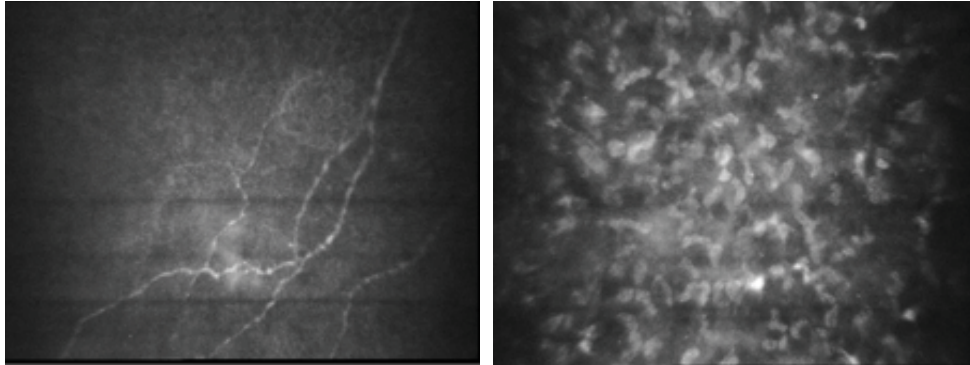
★ CASE REPORT ★

To report the case series of five patients suffering from bilateral primary open-angle glaucoma (POAG) and treated for more than 5 years with two or more medications.

All included individuals are of the same gender –females, in average age 56.2 years (age range 47 to 61 years) with no history of anterior segment eye diseases, intraocular surgery, Sjogren's syndrome, contact lens wear, and general diseases like diabetes and thyroid gland dysfunctions.

Corneas of each patients were examined with a confocal microscope using white-light system CS3/CS4 (Nidek Technologies) by the same investigator. Corresponding scans of corneal layer of each patients were analyzed manually and automatically.





Imaging exams of glaucomatous-treated eyes revealed: reduced density of superficial epithelial cells and different reflectivity of the cells (Fig.1a-b), abnormalities of subbasal nerve fibers (Fig.2a-b), changes in number and morphology of keratocytes within anterior and mid-stroma with significant keratocytes activation (Fig.3a-b), compared to normal condition cornea of healthy age-matched subjects' images.

The number of sub-basal nerves was lower (mean 3.06) with higher tortuosity.

In patients using two or more medications images of anterior stroma revealed decreased numbers of keratocytes (mean value 55.23 vs 60.90 in healthy subjects, mean density 755.52 vs 810.22 cells/mm²) and images of mid-stroma layer showed significant increased numbers of keratocytes (mean value 44.59 vs 39.00 in healthy subjects; mean density 580.93 vs 528.54 cells/mm²).

IVCM of the corneas of these case series glaucoma patients presented no abnormalities within posterior stroma and endothelium

★ DISCUSSION ★

The results of IVCM examination, especially epithelium and sub-basal nerve fibers condition in antiglaucomatous treated-patients are similar to the previous studies (4,5).

The functional implications of reported decreased number of nerve fiber bundles are not obvious. The question is how extensive could be the nerve fibers damage inducing topical antiglaucoma treatment and cause neurotrophic keratopathy. The few published articles reports NK after beta-adrenergic antagonist therapy (6,7).

Another question is the influence of preservatives in antiglaucoma eye drops. The most commonly used preservative agent – benzalkonium chloride (BAK) - may induce changes in corneal and conjunctival cell membranes and manifest as symptomatic OSD in medically treated glaucoma patients (8).

★ CONCLUSION ★

Glaucomatous patients with chronic treatment show ocular surface alterations including corneal tissue.

Based on IVCM data, chronic use of topical ophthalmic antiglaucoma medications in polytherapy may induce changes of nerve fibers and keratocyte within anterior stroma of the cornea.

Pathogenesis of these abnormalities requires further studies.

Disadvantage influence of antiglaucoma eye drops on ocular surface are known, and usage of less medications but enough effective in IOP reduction, preservative-free always should be consider in chronic therapy.

IVCM is very usefully tool to asses iatrogenic effect of antiglaucoma therapy on corneal tissue.

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