SURGICAL NEUROPROTECTION BY CHANGING
THE BIOMECHANICAL PROPERTIES OF SCLERA
IN THE PERINEURAL AREA IN GLAUCOMA

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BACKGROUND

The method of surgical neuroprotection — perineural scleroplastic with xenoplast material in cases of far advanced glaucoma was developed in our clinic. This method is based on the mathematical model calculation of mechanical stretches in the optic disk area, which leads to significant decreasing of mechanical forces excess directly on optic disk.

METHODS

Material Xenoplast for perineural scleroplastic consists of insoluble pore xenocollagen, extracted from bone tissue of agricultural animals. It has high biocompatibility with eye tissues, good integration with sclera and deformation stability.

The clinical material was tested on 189 patients with far advanced glaucoma (204 eyes). The observation period was 1-3 years after operation. The first group consisted of patients after antiglaucoma operation (AGO) — 20 patients (24 eyes), the second — after perineural scleroplastic (PS) — 45 patients (47 eyes), the third — after combined antiglaucoma operation with perineural scleroplastic (AGO+PS) — 124 patients (132 eyes). Besides standard examination all the patients underwent optical coherent tomography (OCT) of the optic nerve and analysis of biomechanical properties of corneoscleral shell on ORA.

RESULTS

Parameters of retinal nerve layer thickness were stable during all period of observation in second and third groups. After antiglaucoma operation in the first and the third groups the corneal hysteresis increased which can be explained by IOP decreasing after operation. In the second group corneal hysteresis decreased compared with the initial data, thus the result we got was caused by redistribution of mechanical forces in the eye after the surgery.

CONCLUSIONS

Perineural scleroplastic as a method of surgical neuroprotection provides visual function stability in cases of far advanced glaucoma. Optimal stable results during all observation period were received in patients after combined antiglaucoma operation with perineural scleroplastic.
Biological Drainage – Xenoplast in Glaucoma Surgery (experimental and 10-years of clinical follow-up)

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Drainage collagen non-absorbable antiglaucomatous (DCA Xenoplast).
Material Xenoplast on the basis of bone collagen
Patent RF №2161473 2001
Registration from 31.05.2005 r.
Ukrain Registration №5737/2006 21.11.2006

Drainage production in the clean room GMP with 200x air circulation

Experimental investigations (4 months of follow-up) - Xenoplast in congenital glaucoma
Type I collagen is non-toxic material and is well stand by animals either in applications or when it is inserted under the skin, in sclera, corneal stroma or anterior chamber.

The investigation of Xenoplast material effectiveness on tissue reparation in rabbit eye filter zone
- Drainage histological view
- In 4 months after implantation in scleral layers near filter zone.
- No inflammation
- No capsular formation
- Kreiberg Colouring X 100.

The purpose of the work was to evaluate the effectiveness of Drainage – Xenoplast (ACD Xenoplast) usage according to the data received during international research study performed in different clinics of Russia, Ukraine and Syria.

Variants of Drainage location in surgical treatment zone

Gonioscopic picture 6 month after surgery – Implantation of Xenoplast into the anterior chamber – close angle glaucoma
ADC Xenoplast in congenital glaucoma

Early and far post-op after antiglaucomatous procedures + Xenoplast Moscow Eye Center “East Sight Recover” (1815 procedures, 2-10 years of follow-up)
- NPDS+Xenoplast – 1185
- 477 eyes-26% IAG-laser gonipuncture
- Angular-veal drainage with Xenoplast– 45 eye (Hyphema 4.5%, Choroid detachment -11%)
- Combined NPDS+Xenoplast + phakic– 456 eyes
- Repeated procedures 59 (failure) – 3.5%

Ophthalmological department of Medical Academy of postgraduate education, Ukraine, Zaporozhje
- 250 procedures of supraveal space drainage were performed ab interno (2-3 years of follow-up) (non-bleb surgery).
  - There were no cases of the reaction on the material and ACD Xenoplast removal.
  - Pre-op baseline IOP 28.0±8.4, No of AG med 3.35±0.70
  - IOP 17.6±5.6
  - Reduction 36.0±15.0
  - % IOP Reduction 36.0±15.0
  - No of AG med post op 1.44±0.8
  - IAG-laser gonipuncture after NPDS

CONCLUSIONS
1. ACD Xenoplast is a drainage with exceptional high qualities of biocompatibility
2. The data received during international investigation, performed in different clinics of Russia, Ukraine and Syria has shown that ACD Xenoplast usage effectively decreases IOP to tolerant level and maintains new developed paths of intraocular fluid flow after antiglaucomatous surgery of penetrating and non-penetrating types of glaucoma surgery.

The results of 3379 antiglaucomatous operations with Drainage Xenoplast in different stages and clinical types of glaucoma performed in 12 clinics of Russia, Ukraine and ophthalmological clinic in Khaleb (Syria) were analyzed
- 542 penetrating procedures with Xenoplast
- 2837 NPDS with Xenoplast into the scleral space

Xenoplast in anterior chamber of the eye with advanced refractory 2-times operated glaucoma (first day after surgery)

Photo by prof. Alekseen I.B., 2010, 1-st day after surgery

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