

<https://doi.org/10.35630/2199-885X/2019/9/3.19>

# SURGICAL TREATMENT OF GLAUCOMA BY AUTOSCLERAL DRAINING OF THE ANTERIOR CHAMBER AND SUPRACHOROIDAL SPACE

**Andrey Ryabey, Mikhail Frolov, Alexander Frolov, Jonas Atulebire Akambase**✉

Department of Ophthalmology  
People's Friendship University of Russia (RUDN), Moscow

✉ [atulebire2006@gmail.com](mailto:atulebire2006@gmail.com)

**ABSTRACT** — **BACKGROUND.** It is known from numerous studies that one of the reasons for reducing the duration of the hypotensive effect in the postoperative period in patients with glaucoma is an intensive scarring process. This was the reason for the development of a technique, which will result in persistent IOP and prolonged hypotensive effect in primary open-angle glaucoma in the postoperative period. Consequently, at the Department of Ophthalmology, RUDN a new method — a modified sinus trabeculectomy with the drainage of the sclera of the patient's anterior chamber and suprachoroidal space has been elaborated.

**THE AIM** of the work was to develop a surgical procedure for patients with sub-compensated and uncompensated open-angle glaucoma by modifying sinus trabeculectomy including basal iridectomy, deep sclerectomy and autoscleral drainage of the anterior chamber and suprachoroidal space.

**MATERIAL AND METHODS.** 31 patients (31 eyes) with primary open-angle glaucoma were operated by modified sinus-trabeculectomy with basal iridectomy in combination with deep sclerectomy and autoscleral drainage of the anterior chamber and suprachoroidal space.

**FINDINGS.** In the first day after surgery, the level of IOP was from 12.5 mm Hg. up to 17.5 mm Hg. In a long-term postoperative period (after 16 months.) normalization and stabilization of ophthalmo-tonus was observed in 30 patients (IOP P (0) averaged  $14.6 \pm 1.7$  mm Hg. In one case, there was a moderate increase in the level of IOP, for which hypotensive therapy (beta-blockers) was prescribed.

**CONCLUSION.** Modified sinus-trabeculectomy with autoscleral drainage allows the achievement of a stable hypotensive effect and does not require the use of artificial drains and donor material.

**KEYWORDS** — glaucoma, sinus-trabeculectomy, deep sclerectomy, basal iridectomy, suprachoroidal space, drainage surgery.

## INTRODUCTION

Sinus-trabeculectomy is the most popular technique and often used by surgeons for surgical treatment of glaucoma, the results of which prove high efficiency due to persistent hypotensive effect [1, 2].

On the basis of many studies, it was determined that 10–25% of operated patients in the long-term postoperative period have scarring, which turn to block the outflow pathway of intraocular fluid via fibro-plastic process [3, 4, 5]. Such patients need additional postoperative administration, the use of various antimetabolites, control and lysis of sutures, needling, etc. In 2017, at the Department of Ophthalmology of the Peoples' Friendship University of Russia, in order to achieve a stable hypotensive effect with the help of traditional sinus-trabeculectomy and its prolongation, it was decided to include basal iridectomy, deep sclerectomy, autoscleral drainage of the anterior chamber and suprachoroidal space in the scope of the operation. Positive properties of auto-drainage are maximum biocompatibility, minimal postoperative inflammatory response and achievement of prolonged hypotensive effect. As an auto-drainage, surgeons used the lens capsule, iris, descemet shell, sclera. In our development, we used scraps of the patient's own sclera performing a drainage function in the future. The basis and the beginning for this technique were surgical methods aimed at combating glaucoma developed at the Russian University of Peoples' Friendship by Professor Mikhail Frolov with co-authors (A.M. Frolov 2016) and others since 2008 to the present day [6, 7].

## AIMS AND OBJECTIVES

The aim is to develop a surgical method for the treatment of patients with sub-compensated and uncompensated open-angle glaucoma by modifying sinus-trabeculectomy including basal iridectomy, deep sclerectomy and autoscleral drainage of the anterior chamber and suprachoroidal space.

## MATERIALS AND METHODS

The study was carried out at the main base of the Department of eye diseases of the Peoples' Friendship University of Russia. V. M. Buyanova, Moscow, from September 2017 to January 2019. the Protocol of the study was approved by the local ethics Committee (No. 24 of 21.09.2017). Written informed consent was obtained from each patient. According to our method, 31 patients (31 eyes) were operated on. The selection criteria were: patients with uncompensated B-C II-III-IV stages of primary open-angle glaucoma

(POAG) on the maximum hypotensive mode of instillation of drugs in the form of non-selective blockers-2-adrenoreceptors, analogues of prostaglandins F2a and carbonic anhydrase inhibitors, previously unoperated for glaucoma. The patients were between the ages of 59 to 86 years. these, 13 were males (41.9%) and 18 were females (58.1%). Duration of glaucoma — from 4 years to 12 years. Patients were examined according to generally accepted standards in the following scope: visometry, biomicroscopy, gonioscopy, ophthalmoscopy, perimetry. To calculate IOP, patients underwent electronic tonography with the glaustest 60 eye tonograph on the day before surgery and every 3 months thereafter, inclusive, and at the 16<sup>th</sup> month of follow-up. Prior to surgery, the intraocular tonographic pressure P0 averaged  $28.2 \pm 3.4$  mm Hg for example, the coefficient of ease of outflow on average  $C = 0.06 \pm 0.02 \text{ mm}^3$  (min. mm Hg). The method of sinus-trabeculectomy modified by us was carried out as follows (the patent of the Russian Federation for the invention No. 2674088 of 04.12.2018 was received). A conjunctival incision was made 8–10 mm posteriorly from the limb from 10 to 1 h. the Conjunctival flap was formed with the base to the limb. The conjunctiva and tenon sheath were separated from the sclera. With a scleral knife, a rectangular flap was cut out with the base to the limb at  $\frac{2}{3}$  thickness of the sclera,  $5 \times 5$  mm in size. Then the flap was mobilized anteriorly so as to open the corneo-scleral zone. On the remaining surface  $\frac{1}{3}$  sclera produced longitudinal, parallel incisions of which formed five strips, 5 mm long and 1 mm wide. The lateral strip was cut out to a flat part of the ciliary body where, later after performing sinus-trabeculectomy, it was placed to a depth of 4.5 mm in the anterior chamber. Next, the medial strip was cut out from the limb with the base to the vault to the flat part of the ciliary body. A tunnel is prepared into the suprachoroidal space by spatula with a width of 2 mm and a length of 5 mm, where the previously separated medial strip is set to a depth of 4.5 mm. Of the five scleral strips, the middle (third) was separated completely, exposing the surface of the ciliary body in the future, where additional filtration of intraocular fluid will also occur, forming a filtration zone. The next stage was performed basal iridectomy at 12 o'clock. The rectangular flap was sutured with two nodular sutures. A continuous suture was applied to the conjunctiva. The operation was completed by administration of dexamethasone solution under the conjunctiva.

## RESULT AND DISCUSSION

Intraoperative and early postoperative periods were without complications. In the first day after surgery, all patients were visualized filtration

pad and there was a mild inflammatory reaction of first degree, according to the classification of S.N. Fedorov–E.V. Egorova (1992). In the study group of patients after surgery, the level of intraocular pressure was from 12.5 mm Hg up to 17.5 mm Hg. in the postoperative period (16 months) after electron tonography, 30 (96.8%) patients had normalization of IOP, Po ( $14.6 \pm 1.7$  mm Hg), increased outflow of IOP C ( $0.38 \pm 0.07 \text{ mm}^3$  (min. mm Hg) and in one case (3.2%) there was an increase in IOP (P (0) 22 mm.Hg, C =  $0.12 \text{ mm}^3$  (min. mm Hg)), which required the addition of drug therapy (Beta 1,2-blockers).



*Fig. 1. Eye of the patient after completion of the steps of the operation with scleral drainage into the anterior chamber.*



*Fig. 2. Eye of the patient in the first day after surgery*

## CONCLUSION

The created modified method of sinus-trabeculectomy using the patient's own sclera as a drainage component confirms its effectiveness, stabilizes the level of intraocular pressure, and also affects the duration of the positive effect of surgery. The proposed method is quite safe, contributes to the normalization of IOP level, can be applied at any degree and stage of

primary open-angle glaucoma, activates several out-flow pathways of IOP, and does not require additional artificial drains, donor foreign material and various xenoplants.

## REFERENCES

1. **KHAW PT, CHIANG M, SHAH P.** Glaucoma filtration surgery: indications, techniques, and complications. In: Albert & Jakobiec's Principles & Practice of Ophthalmology. Eds: Albert DM, Miller J, Azar DT, Blodi BA: 3<sup>rd</sup> ed., 2821–2840 (Saunders, 2008).
2. **WATSON P.G., JAKEMAN C., OZTURK M.** The complication of trabeculectomy (a 20-year follow-up) . Eye. – 1990. – Vol. 4. – № 3. – P. 425–438.
3. **CHEN T.C., WILENSKY J.T., VIANA M.A.** Long-term follow-up of initially successful trabeculectomy . Ophthalmology. – 1997. Vol. 104. № 7. P.1120–1125.
4. **PETROV S.Y., SAFONOVA D.M.** The modern concept of wound healing in glaucoma surgery. Ophthalmology in Russia. 2015;12(4):9–17. (In Russ.) .
5. **STALMANS, I., GILLIS, A., LAFAUT, A. S. & ZEYEN, T.** Safe trabeculectomy technique: long term outcome. Br J Ophthalmol90, 44–47 (2006).
6. **FROLOV M.A., FEDOROV A.A., NAZAROVA V.S., GONCHAR P.A., KUMAR VINOD, FROLOV A.M.** Morphological condition of alodrenaige implanted in the case of refractory glaucoma in the long-term follow. Oftal'mologiya [Ophthalmology]. 2009; 6 (3): 11–14.
7. **FROLOV M.A., FROLOV A.M.,2, KAZAKOVA K.A.,** Comparative analysis of combined treatment of glaucoma with cataract. The Journal of scientific articles "Health and Education Millennium", 2017. Vol. 19. No 3 p.13–17.