ESTIMATION OF EFFICIENCY OF MICROINVASIVE DRAINAGE INTERVENTION IN PRIMARY GLAUCOMA SURGERY

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Despite considerable achievements of ophthalmology for the last decades the glaucoma problem continues to remain at a high level as is causes the blindness from 5,2 million to 10,05 million people in the world. According to foreign authors the number of patients suffering from glaucoma in the world will have increased up to 80 million by 2020, and natives of Asia will make 47 %, furthermore the form called as angle-closure glaucoma (ACG) will make 87 % of them. According to the WHO data, open-angle glaucoma (OAG) as the cause of bilaterial blindness will have been noted at 5,9 million people by 2020, while angle –closure glaucoma being at 5,3 million, i.e. the ratio of blindness caused by ACG as well as OAG will be equal in the world [10, 12].

In the Russian Federation 1,025 million patients with glaucoma have been registered, the level of blindness owing to glaucoma has risen in 3 times for the last 10 years: from 8 to 22 per one thousand population [3, 4].

In the Republic Sakha (Yakutia) for the 10-year-old period (2001-2010) the steady prevalence of primary glaucoma (PG) increased up to 35 and in 2010 it was noted at 133,5 per 10 000. The prevalence of glaucoma among the natives (Sakha) reaches up to 171 per 10 000, surpassing considerably the data all over the republic. For the indigenous population a narrow ‘beak – shaped’ profile of iridal - corneal angle is prevailing (57 %) as well as short eyes (with frontback axis of 23 mm and less) and small anterior chamber (less than 2.3 mm). In age category of senior patients older than 60 years, the increase of cataract crystalline lens causes the formation of ACG with relative pupil block [1, 2].

Trabeculectomy is considered to be gold standard of fistulas antiglaucoma operations, but it is interfaced to high risk of complications, their prevalence reaching 25 % [5, 9]. Not penetrating deep sclerectomy is shown basically only in case of open - angle glaucoma and it is ineffective in narrow-angle form [5, 9].

Today drainages are of great importance in glaucoma treatment. There is a considerable number of drainage devices, including: Molteno, Baerveldt, Ahmed and Ex-PRESS implants which form the artificial channel for draining superfluous moisture from the forward chamber into the subconjunctival space. The basic problem associated with such standard drainages as the valve Molteno and the valve Ahmed consists in superfluous scarring of postoperative wound, so the frequency of unsuccessful outcomes is estimated at 10 % a year. For the last years the draining operations with drainage of liquid into the subarachnoid space are performed more fluently. The device intended for them is Gold Shunt (the USA, «the Gold shunt») which unlike the majority of other drainages improves natural ways of outflow and does not create a filtration pillow [5, 11, 13].

A new way of microinvasive treatment of glaucoma has been elaborated by us, which can be used at out-patients with ACG and complicated OAG (The Way of Surgical Treatment of Primary Glaucoma. The priority inquiry № 2011116957 from 28.04.11).

The aim of this research is to estimate remote results in performing the modified deep sclerectomy (MDSE) with eye microshunting at patients with ACG and OAG.

Material and methods. 52 patients (63 eyes) are referred for the study aged from 40 till 72 years, including 41,5 % women and 58,5 % men.

According to the glaucoma form the investigated patients were grouped as follows: 52,4 % with OAG; 47,6 % with ACG. The distribution of the operated eyes on stages and form of PG is presented in Table 1.

Among the operated eyes with OAG the prevalence was observed among eyes of stage II (33,3 %); visual acuity (VA) from 0,5 to 1,0 in 22,2 %, moderately high IOP (46 %). Among ACG the majority was referred to the eyes of stage II (27 %); VA from 0,5 to 1,0 in 23,8 %; moderately high IOP (42,8 %).

The accompanying eye pathology is revealed in 93 % (41 eyes), including 56,8 % with cataract, 20,4 % with earlier laser iridectomy.

Results of the treatment were estimated on the 7th day and in 12 months after the operation. All patients underwent MDSE with microshunting on the upper segment. Visual acuity and IOP (Pt) before MDSE at patients with PG are presented on Table 2.

All operations were performed at in-patients. The technical intervention is as follows. Firstly deep scleral rag was formed for not-penetrating deep sclerectomy. To carry out

cyclodialysis the sclera was cut through at the top of scleral rag. The anterior chamber paracentesis was performed in trabecular area. In cases of ACG the iridectomy was performed. The drainage "Repegel" manufactured by "Reper-NN" (Nizhni Novgorod) was used as an implant. The drainage is made of the elastic transparent material "Digel", i.e. spatially sewed polyoxypropilen block copolymer represented as a rectangular plasty 6,0 mm of length, 4,0 mm of width, 0,1 mm of thickness. The material possesses with hydrophil as well as hydrophobic properties, water content is 10-15 %. Due to the hydrophil property the intraocular liquid is easily delivered from the anterior chamber into the venous system, while the hydrophobic property prevents the formation of sclero - scleral unions [6, 7, 8]. The drainage was shaped like a sand-glass and implanted through the paracentesis into the anterior chamber by one end, and into the cyclodialysis slit by one (fig. 1, 2). As the final stage the superficial scleral rag was sewed to the edges by two knots, and the continuous seam was applied on the conjunctiva.

Results. No intraoperative complications were noted. The rate of early postoperative complications was rather low (5 cases - 8 %). Hyphema as a suspension of uniform elements was observed in 3 eyes (4,8 %) the day after at patients with ACG III who had had the laser-assisted operation before. In two days the siliochorioidal exfoliation (SCE) has developed in 2 (3,2 %) eyes ACG II and III with laser iridectomy carried out before and had a typical clinical picture: hypotonia (IOP < 10 mm hg), a small anterior chamber, reflex weakening on the eye bottom. The ophthalmoscopy detected that SCE looked like one or two grey bubbles of average height. All patients had the diagnosis confirmed by echography. In all cases the back sclera trepanation was carried out.

After analyzing the quantity of previous postoperative complications the safety and advantage of MDSE with microshunting was indicated as compared with fistulous operations [5].

The drainage in the remote period was supervised by the ultrasonic echography (Fig. 3). No drainage displacement was defined.

The hypotensive effect in the operated eyes remained during all term of the survey (12 months). In the remote postoperative period hypotensive drops were additionally appointed in 6 eyes (9,5 %) (4 eyes with ACG III and 2 eyes with OAG III) in 12 months. As the result IOP was estimated at 14,3±3,1 (12-20) mm of mercury. Antiglaucoma operation can be considered successful if in the remote terms after operation (in 12 months) the level of intraocular pressure is on the lower border without hypotensive medical preparations and relatively successful with use of preparations [5, 8].

No cases of induced cataract were noted during this survey. Though it was progressing in 3 eyes (4,7 %) with earlier diagnosed cataract . In 2-3 months phacoemulsification with implanted elastic intraocular lenses was executed to the patients.

Preliminary results of the new operation concerning modified deep scleroectomy with microshunting testify to its efficiency in surgical treatment of OAG and ACG as well.

Table 1

Classification of operated eyes on PG stages and form (n=63)

Glaucoma form and quantity of eyes	Glaucoma stages		
	Stage I	Stage II	Stage III
OAG (n=33)	-	21 (33,3%)	12 (19%)
ACG (n=30)	4 (6,3%)	17 (27%)	9 (14,3%)
Total (n=63)	4 (6,3%)	38 (60,3%)	21 (33,3%)

Table 2

Visual acuity of intraocular pressure (Pt) before MDSE operation on eyes PG (n=63)

Форма глаукомы и кол-во глаз	Visual acuity			Maclakov's IOP (mm of mercury)	
	0,03-0,09	0,1-0,4	0,5-1,0	26-32	> 33
OAG (n=33)	7 (11,1%)	12 (19%)	14 (22,2%)	29 (46%)	4 (6,3%)
ACG (n=30)	6 (9,5%)	9 (14,4%)	15 (23,8%)	27 (42,8%)	3 (4,8%)
Total (n=63)	13 (20,6%)	21(33,4%)	29(46%)	56 (88,9%)	7 (11,1%)

The literature

1. Zakharova E.K., Poskachina T.P., Malysheva L.B. Ethnic features of glaucoma at indigenous population (Sakha) in Viljujsky area group of the Republic Sakha (Yakutia)./Zakharova E.K., Poskachina T.P. et al.// Ophthalmology of Yakutia - 85: stages and perspectives of blindness prevention. Collect. of scient. works. – Yakutsk, 2010. – P. 31-37.
2. Zakharova E.K., Poskachina T.R., Malysheva L.B. Prevalence of glaucoma in Yakutia./ Zakharova E.K., Poskachina T.P. et al. / / The Yakut medical journal. – 2010. – P. 69-72.
3. Libman E.S., Chumaeva E.A., Elkina Y.E. Epidemiological characteristic of glaucoma./ E.S. Libman, E.A. Chumaeva et al. // Ophthalmology News. - M, 2007.
4. Libman E.S. Epidemiological characteristic of glaucoma./ E.S. Libman // Glaucoma (Appendix). - 2009. – №1. – P. 2-3.
5. Neroev V.V., Bykov V.P., Kvasha O.I., Belyovtseva T.A. Microdrainage surgical treatment of glaucoma. The literature review./ V.V. Neroev, V.P. Bykov et al.// Clinical ophthalmology. – 2009. – № 3. - P. 113-115.
6. Pashtaev N.P., Gorbunova N.U. Efficiency of antiglaucomatous operations with use of a new collagen copolymer drainage in refractive glaucoma treatment./ N.P. Pashtaev, N.U. Gorbunova et al.// Modern technologies of glaucoma treatment. Fedorov's readings - 2003: Coll. scient. works. Ĕ M, 2003. Ĕ P. 325-328.
7. Pashtaev N.P., Gorbunova N.J., Treushnikov V.V., Pastukhova N.V. A new digel drainage form in refractive glaucoma surgery./N.P. Pashtaev, N.U. Gorbunova et al.// The 3rd All-Russia ophthalmologist's school: Coll. scient. works. Ĕ M, 2004. Ĕ P. 123-126.
8. Cheglakov V. U. Results of non-penetrating deep sclerectomy with implanted hydrogel drainage at patients with pseudoexfoliative glaucoma./ V. U. Cheglakov // Glaucoma. - 2010. – № 2. – P.25-29.
9. Ishida K., Netland P.A., Costa V.P. et al., Comparison of Polypropylene and Silicone Ahmed Glaucoma Valves./ K. Ishida, P.A. Netland et al.// Ophthalmology. – 2006. – Vol. 113. – № 8. – P.1320–1326.
10. Kocur I. Level and the reasons of deterioration of sight. Geneva.
11. Maris P.J., Ishida K., Netland P.A. Comparison of Trabeculectomy with Ex-PRESS Miniature Glaucoma Device Implanted Under Scleral Flap./ P.J. Maris, K. Ishida et al.// J. Glaucoma. – 2007.

– Vol. 16. – № 1. – P. 14-12.

5. Quigli H.A. Broman A.T. The number of people with glaucoma worldwide in 2010 and 2020./ H.A.

Quigli, A.T. Broman // Br. J. Ophthalmol. – 2006. – Vol. 90. – P. 262-270.

13. Simon G. A Suprachoroidal Gold Shunt for glaucoma./ G. Simon // European Ophthalmic Review. – 2009. – № 1. – P. 42-44.

The resume

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