

## “TRABECULECTOMY: TECHNIQUE AND RESULTS”

By

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Among all the operations for glaucoma, we think “trabeculectomy” is one of the safest and most effective.

Two elements in particular allow us to say that: the facility of restoration of the anterior chamber (which often happens during the intervention) and the frequent absence of a filtering bleb; the latter, which in classical fistulizing operations represents a very important goal, in the case of trabeculectomy may be considered almost a complication.

In fact we know that the mechanism of action of such an intervention, would be, according to the purpose of its proposer (CAIRNS), to re-establish a normal outflow of the aqueous humor through the Schlemm canal externally opened at the level of the removed scleral block. According to us, that may happen, but not necessarily.

Apart from these reasons, we have been led to use the technique of “trabeculectomy” after having heard from other authors about so many successful cases without serious complications.

Previously, we assumed that trabeculotomy would represent a more physiological re-establishment of the aqueous outflow, that is a more “causal” intervention.

Therefore we have operated on some glaucomatous eyes by means of such a technique, obtaining good but not completely satisfactory results.

Thus we thought it advisable to associate a more limited (in comparison with CAIRNS’ intervention) trabeculectomy to the trabeculotomy.

*TECHNIQUE*

When the general conditions and the age of the patient allow it, we use topical anaesthesia after a marked hypotonisation of the eyeball by means of myotics and osmotic durgs (Glycerol, Mannitol) (Fig. 1).

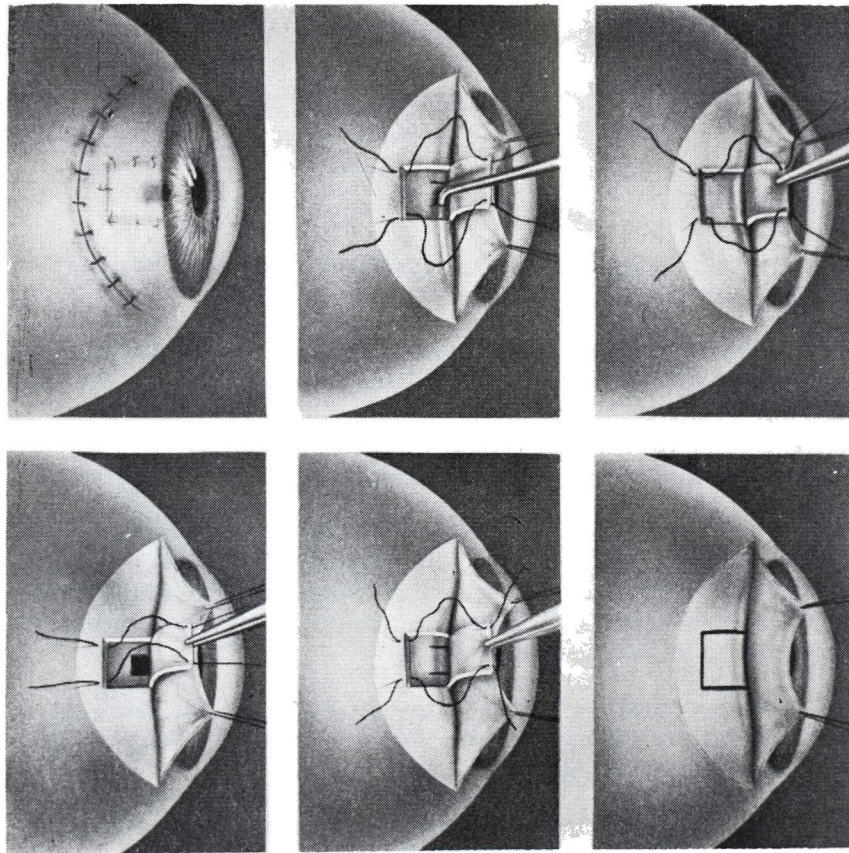


FIGURE 1

- A wide conjunctival flap at limbar basis is dissected, so that the sclera is completely revealed.
- By means of a normal cauter at middle intensity, a quadrangular area (side = 5 mm.) is limited.

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- The cauterized scleral tissue is cut by means of a special knife (blade), to obtain a flap 1/3 of the thickness of the entire sclera.
- Two silk stitches are performed and the scleral flap folded over to the cornea.
- By means of the same knife, two deep incision (2,5 mm.) perpendicularly to the limbus are made.
- Using a trabeculotom (Mackensen) we penetrate into the canal of Schlemm first on the right and then on the left: trabeculotomy is so performed.
- Afterwards, the incision on the deep scleral block is finished; then it is removed.
- After the basal iridectomy, the scleral flap is replaced.
- Finally the conjunctival flap is sutured.
- The eye is then medicated with mydriatics, antibiotics and corticosteroids.

TYPE OF GLAUCOMA		CHRONIC SIMPLE	CLOSED ANGLE	CORTICOST.	TRAUMATIC	APHAKIC	CONGENITAL	TOTAL
NUMBER OF EYES		60	24	4	5	5	2	100
AGE		55 - 79	45 - 75				3	
SEX		23m. 21f.	13m. 10f.	1m. 1f.			1m.	
B E	OCULAR PRESSURE (mmHg)							
	Without therapy	35.17	59.6	40.7	41.8	44.6	42	
F O R E	With Therapy	26.05	30	34	30	35.5		
	NORMALIZED EYES WITH THERAPY	12 (20%)	2 (8%)	2 (50%)	1 (20%)	0	0	15
A F T E R	OCULAR PRESSURE WITHOUT THERAPY	20.32	19.3	12.2	19.4	17	14	
	NORMALIZED EYES Without therapy	57 (95%)	24 (100%)	4 (100%)	5 (100%)	5 (100%)	2 (100%)	97
R E S U L T S	With therapy	41 (68%)	19 (80%)	4 (100%)	4 (80%)	5 (100%)	2 (100%)	75
	UNCONTROLLED EYES	16 (26%)	5 (20%)	1 (20%)	1 (20%)	0	0	22
TIME CONTROL (Months)		4 - 20	2 - 22	9	8 - 12	7 - 14	12	
F I L T R A T I O N	FILTRATION WITH BLEB	17 (29%)	7 (29%)		1 (20%)	2 (40%)		27
	+	8 (13%)	3 (12%)					
	++	6 (10%)	3 (12%)			2 (40%)		
	+++	3 (5%)	1 (4%)		1 (20%)			
	SUBCONJUNCTIVAL FILTRATION	10 (16%)	4 (16%)					14
NO FILTRATION		33 (55%)	13 (54%)	4 (100%)	4 (80%)	3	2 (100%)	59
C O M P L I C A T I O N S	HYPHAEMA	12 (20%)	9 (37%)			1 (20%)		22
	IRIS-LENS SYNECHIAE	17 (28%)	8 (33%)			2 (40%)		27
	ATALAMY	2 (3%)	1 (4%)					4
	CATARACT	7 (11.6%)	4 (16%)					11

**TABLE 1**

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With such a technique we have operated 100 eyes affected respectively by simple open angle glaucoma (60), closed angle glaucoma (24), corticosteroid glaucoma (4), traumatic (5), aphakic (5) and congenital (2) glaucoma.

We have operated only those cases in which it was not possible to obtain a normal pressure by pharmacological means. The same applies to those cases which could no longer tolerate the administration of carbonic anhydrase inhibitors.

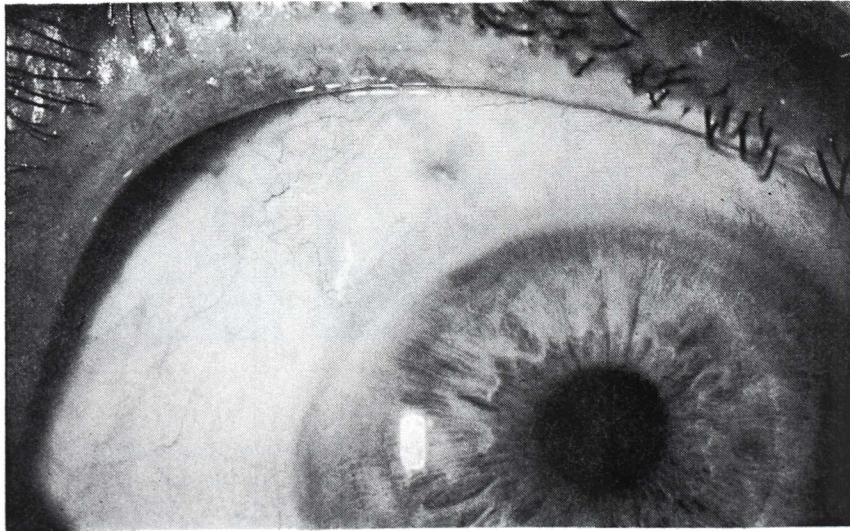
The eyes with closed angle glaucoma were operated after at least two acute attacks; in these cases a simple iridectomy should not be sufficient.

The two eyes with congenital glaucoma have been already operated by two goniotomies, but without success.

The Table shows all the results of our experiences. On the whole, we have obtained complete success (normalization without therapy) in 75% of the cases, a partial success (normalization with therapy) in 22% of the cases and no success in 3%.

In the eyes with partial success, the normalization was obtained only by means of myotics or topical adrenergic drugs.

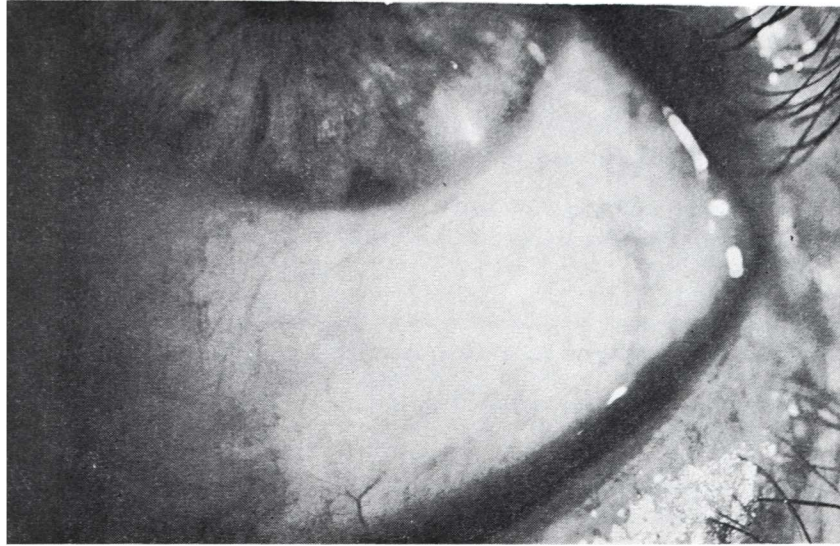
Regarding the presence of a conjunctival filtration, we may observe that a transconjunctival filtration was present in 27% of the cases (Fig. 2) and a subconjunctival filtration in 14% (Fig. 3).



**FIGURE 2**

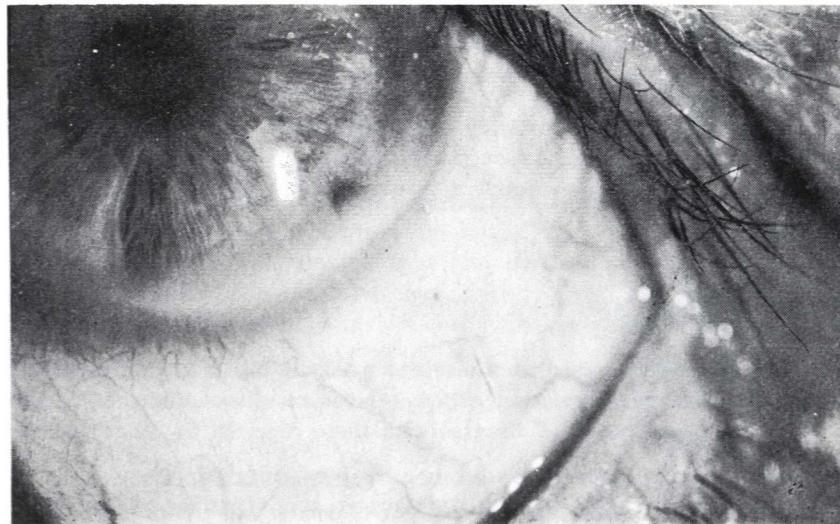


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**FIGURE 3**

A complete absence of filtration has been observed in the remaining 59% (Fig. 4).



**FIGURE 4**

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If we consider now the incidence of the not-filtration in comparison only with the normalized eyes (97%), we may say that 60,8% of them reached a normalization with (22,6%) or without (77,3%) topic therapy.

Concerning complications, during the intervention we have often observed small hemorrhages which were of course very easy to block.

During the postoperative period, the frequent incidence of iris-lens synechie has to be also ascribed to our infrequent use, at the beginning, of mydriatics.

The cataract must be considered as an increase of the initial lenticular opacities, already present before the operation.

No case of marked hypotony after the intervention and of intraocular flare was present.

From a *hydrodynamic* point of view, the tonography performed in some eyes before and after the operation, has generally pointed out a normalization of the pathological values of C (coefficient of the outflow facility) without significant modification of the aqueous production (F).

*Gonioscopy* always clearly showed the presence of the deep scleral opening and the correspondent iridectomy.

On the contrary, in no case we have observed a Schlemm canal opened by the trabeculotomy at the level of the trabecular meshwork.

However, in an eye previously operated only by a trabeculotomy and then hystologically examined at the death of the patient 17 days later (Fig. 5) the result of the intervention clearly appears.

**CONSIDERATIONS AND CONCLUSION**

The technique we used in these interventions, might be more exactly called a trabeculo-trabeculectomy. However the results we obtained in the present investigation do not disagree with those reported by other authors.

From the data of CAIRNS (98% of successes), WELSH (63%), D'ERMO e BONOMI (92%), TAKAKU e SHIRAI (68%), KESSING (98%) and more recently of REHAC and co-workers (80%) and BRANDT and HEINICHEN

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FIGURE 5

(86%) and many others, we may conclude that undoubtedly trabeculectomy may be considered a successful intervention in many forms of glaucoma.

Regarding the mechanism of action, we must pay attention to the 60,8% of normalized eyes without the presence of a real conjunctival filtration.

For these cases, we can either suppose that the intervention created new ways of uveo-scleral outflow, or that a very small subconjunctival filtration is present or, finally, that the particular anatomic-functional conditions that CAIRNS suggested, have been realized. The latter condition seems to be in contrast with what has been experimentally proved (monkey).

In fact there is a marked tendency to scarring and then to obstruction of the too small terminal openings of the Schlemm canal (RICH and Mc-PHERSON).

In our opinion the combination with the trabeculotomy (not always easy to be performed) allows one to remove a deep scleral block of a much smaller size than is usually performed.

SUMMARY

Following Cairn's purpose of reestablishing the normal drainage of the acuccus humor, the authors present the results of a technique that might be called trabeculo-trabeculectomy. Using this technique, 100 patients who suffered from different types of glaucoma and in whom the usual pharmacological means had failed to control their tension, were treated.

*TECHNIQUE*

Under local anesthesia, whenever the patient's conditions allow it, and after reducing the ocular pressure with osmotic agents, a wide limbus-based conjunctival flap is cut. With a medium intensity cautery a 5 mm. quadrangular area is marked. Next, a scleral flap of 1/3 the thickness of the sclera is cut with a special knife, laying it over the cornea. The canal is openend using 2 incisions 2.5 mm. wide, and the trabeculectomy is performed using a Mackensen trabeculotome. Next, the sclerotomy is completed, the flap is replaced, and sutures are placed.

*RESULTS*

In 75% of cases control without therapeutical aid was achieved; in 22% it was achieved with the aid of miotics only, and in 3% of cases there was a failure. In 59% of cases filtration was not observed. The tonographic control performed in some patients before and after the operation showed the normalization of the drainage factor without modification of the acuous humor secretion. The gonioscopy showed clearly the presence of the scleral hole and the corresponding iridectomy; on the other hand, the opening of the Schlemm canal could not be detected in any of them.

The authors underline the success of the technique, even though it is not always easy to be performed, mostly because 60.8% of those cases in which the tension became normal did not present a conjunctival filtration, indicating thus the possibility of a new drainage route being created or, as Cairns noted, the normal drainage was restored.



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**BIBLIOGRAPHY**

- BAGOLINI, B., GIARELLI, L., CAMPOS, E.: **Observations hystologiques sur un oeil atteint de glaucome opéré par trabéculotomie ab externo.** Arch. Ophthal. 32, 721, 1972.
- BRANDT, H. P. and HEINICHEN, V.: **Trabekulotomie, ein Klinischer Erfahrungsbericht.** Klin. Mbl. Augenh. 165, 403, 1974.
- CAIRNS, J. E.: **Trabeculectomy: preliminary report of a new method.** Am. J. Ophth. 66, 673, 1968.
- D'ERMO, F. and BONOMI, L.: **Trabeculectomy. Results in the treatment of glaucoma.** Ophthalmologica (Basel), 166, 311, 1973.
- KESSING, S. V.: **Trabeculectomy "ab externo".** Acta Ophth. (Kbl.) suppl. 120, 20, 1973.
- REHAC, S., HROCHOVA, J. and FAJSTAUEROVA, V.: **Experience with trabeculectomy "ab externo".** Cs. Oftal. 30, 37, 1974.
- RICH, A. M. and Mc PHERSON, S. D.: **Trabeculectomy in the owl monkey.** Ann. Ophth. (Chic) 5, 1082, 1973.
- TAKAKU, I. and SHIRAI, A.: **Clinical evaluation of microsurgery of the outflow channels.** Folia Ophthal. Jap. 24, 421, 1973.
- WELSH, N. H.: **Trabeculectomy with fistula formation in the African.** Brit. J. Ophth. 56, 32, 1972.