GLAUCOMA AND GLAUCOSAN DROPS*

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THE medical treatment of the chronic forms of glaucoma ought to be encouraged, for the results of operations are not always satisfactory: in many cases operations have to be repeated; sometimes they do harm instead of doing good.

Throughout the whole of medical science the curing of chronic diseases (glaucoma simplex, *i.e.*, "Chronic Glaucoma," the main subject of this article) is very difficult and protracted, nor can it easily be done at one stroke by means of operations. Therefore the iridectomy of Albrecht von Graefe has held its ground only with regard to acute glaucoma; it would never have won its triumphant way all over the world if it had first been recommended for *chronic* forms of glaucoma. With regard to these the number of operative methods is exceedingly great and every year adds new ones. This by itself proves their unreliability.

Here are a few examples:

1. A minister, a gentleman who can afford the best doctors, was on the way back to Europe from the Far East. In Lisbon he called upon a prominent oculist who diagnosed glaucoma in one eye: "they will operate on you in your country, my advice is the contrary." The patient came home, underwent an operation; the operated eye became blind. In this case two authorities contradicted each other, and the cautious man was right.

2. A Russian surgeon underwent most successfully an operation on one eye for glaucoma. After a few years the other eye also became affected. The first eye having been operated upon with the best success, much was to be said in favour of operating upon the second. Nevertheless, immediately after the operation a considerable diminution of vision of the second eye took place, not down to the point of blindness, but to loss of binocular vision.

3. A woman was affected by glaucoma in one eye. Visual field very much reduced, but visual acuity still 1/3; thus very useful. The iris prolapsed into the wound; severe, slow inflammation with sympathetic ophthalmitis followed; this eye had to be enucleated; the second, up to that time perfectly well, healed after

* See the papers: "Treatment of Glaucoma," by W. S. Duke-Elder and Frank W. Law (*Brit. Med. Jl.*, March 30, 1929, pp. 590-592). Wright and Nayar: "The adrenaline pack in the treatment of glaucoma," *Brit. Med. Jl.*, September, 1929, pp. 456-457. Gifford: "Some modern preparations used in the treatment of Glaucoma," *Arch. of Ophthal.*, November, 1928, pp. 612-627. Pischel: "Glaucosan in glaucoma," *Amer. Jl. of Ophthal.*, September, 1928, pp. 705-709. N. E. Israel: "Observations on the use of glaucosan," *Texas State Jl. of Med.*, September, 1927.

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six months (!) leaving acuity of vision severely damaged. (*Klin. Monatsbl. f. Augenheilk.*, Bd. LXXVI, p. 604).

These three patients were operated on by famous oculists, so that technical mistakes cannot be assumed. It is, therefore, a great error to tell students and doctors, that with regard to operations for chronic forms of glaucoma "good technique guarantees good success."

The non-operative methods, up to now limited to the application of eserine and pilocarpine, have been increased by glaucosan,* *chiefly by its convenient administration in form of drops* (*glaucosan drops, laevo-glaucosan*); they are not effective in all, but in the majority of cases. It is highly important to state that *after their application the miotics become effective again,* not always, but very often. This is admitted also by Duke-Elder and Frank W. Law:—"It appears, however, that in conjunction with eserine a good effect can be produced in a case where eserine alone has remained ineffective."

Hence *my indication* for glaucoma simplex: First of all miotics; in case they suffice, nothing else. If, in spite of miotics, the tension remains high, only then glaucosan drops. As a rule I do not suggest operation unless and until all these conservative means fail.

Many novels end with the words: "and they entered the haven of matrimony." Many reports of clinical cases end with the word "operation." As though this would settle the matter, as though violent storms might not follow even after a short time! So Duke-Elder and Frank W. Law in their important and interesting work report among other cases: "Case 5. Male, aged 47 years; chronic primary glaucoma of right eye; six months' history. Tension full, pupil half dilated. Laevo-glaucosan four times in one hour. Marked reaction with some pain; tension down to normal; pupil widely dilated. Tension remained down three days, then rose slightly. Eserine; *tension fell. Trephine.*"

"Case 6. Male aged 53 years, chronic primary glaucoma of the left eye, three months' history. Had been on eserine, which had kept tension down until present subacute attack, when it was without effect. Laevo-glaucosan four times in one hour, marked reaction, pupil dilated, tension lowered to normal; began to rise in three to four hours; eserine instilled hourly. *Next day tension normal. Trephine.*"

The authors evidently have a wide experience and their work is very valuable, but since it is expressly stated: "Tension down to normal" I do not understand why they operated. Very likely it is often assumed that glaucosan drops help only temporarily. This has in fact to be tried from case to case. For with the same reason

* Manufacturer: Chemische Fabrik Woelm, Spangenberg b. Kassel, Germany.

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one might say: operation, too, helps only temporarily—every busy oculist knows eyes which, for glaucoma simplex, were operated on three, even four or more times (for examples see below).

A disadvantage of glaucosan treatment is the occasionally ensuing rise of tension. As a rule the latter goes down completely, later on the tension is usually so much the lower. The best way of treating this rise of tension is by eserine, 0·5 per cent., further by injection of 10 c.cm. 10 per cent. salt solution (NaCl) in the vein of the arm, and if need be, by subcutaneous injection of morphine. Also a bleeding might prove very effective.* Among the many cases of chronic glaucoma which I have seen, I only had to operate once because of an acute attack after glaucosan; in this case the operation did not bring the tension down to normal either, for the case was a particularly difficult one.—It is as a matter of course better to prevent these attacks according to the suggestion of the well-known American ophthalmologist Gifford of Omaha. Gifford expressly says that the occasional attacks following glaucosan drops (laevo-glaucosan) should not be deemed discouraging, for the value of this treatment is considerable and definite. He instils eserine twice with a lapse of 5 minutes; *then* glaucosan drops several times every 15 minutes; then again in the course of 2 hours eserine every 15 to 20 minutes.—I only treat *one* eye at each consultation, *never* both eyes on one day, particularly when I do not know the patient. One proceeds particularly cautiously, *e.g.*, if it is the only eye left, and if it is the first consultation, giving glaucosan drops only once in order to see how the patient reacts. I do the first instillation at the clinic or else I insist upon the patient remaining under supervision for several hours until the pupil has become narrowed again.†

As to the objection that glaucosan drops help only temporarily: this is right, their effect lasts only for days or weeks, but the effect produced by miotics is even limited to *hours*. The administration has only to be repeated. The following case illustrates that this can be done for years with the best success (see Curve) :

* The antagonist of glaucosan drops is histamine (aminoglaucosan); it is the most powerful miotic. Duke-Elder and Frank Law are quite right in saying (page 592 with regard to *acute* glaucoma): " Aminoglaucosan is an extremely potent miotic. It cannot be depended upon to contract the pupil and lower the tension in every case of acute glaucoma, but it would appear on occasion to be a very useful adjunct to eserine. *In cases where the pupil remains dilated and the tension raised after the administration of aminoglaucosan, this preliminary treatment has undoubtedly made eserine effective subsequently in bringing about a contraction of the pupil and a lowering of the tension.*" I believe the occurrence of a hypopyon without other obvious cause after the use of aminoglaucosan is not the consequence of this drug, but of the tonometer. I saw some accidents of this kind.

† As a rule the application is done by means of drop-ampoules; every ampoule contains the amount needed for one administration. For clinics the comparatively cheaper packing in 5 c.cm. bottles is preferable though these have to be kept cold and well closed and should be used up within a fortnight.

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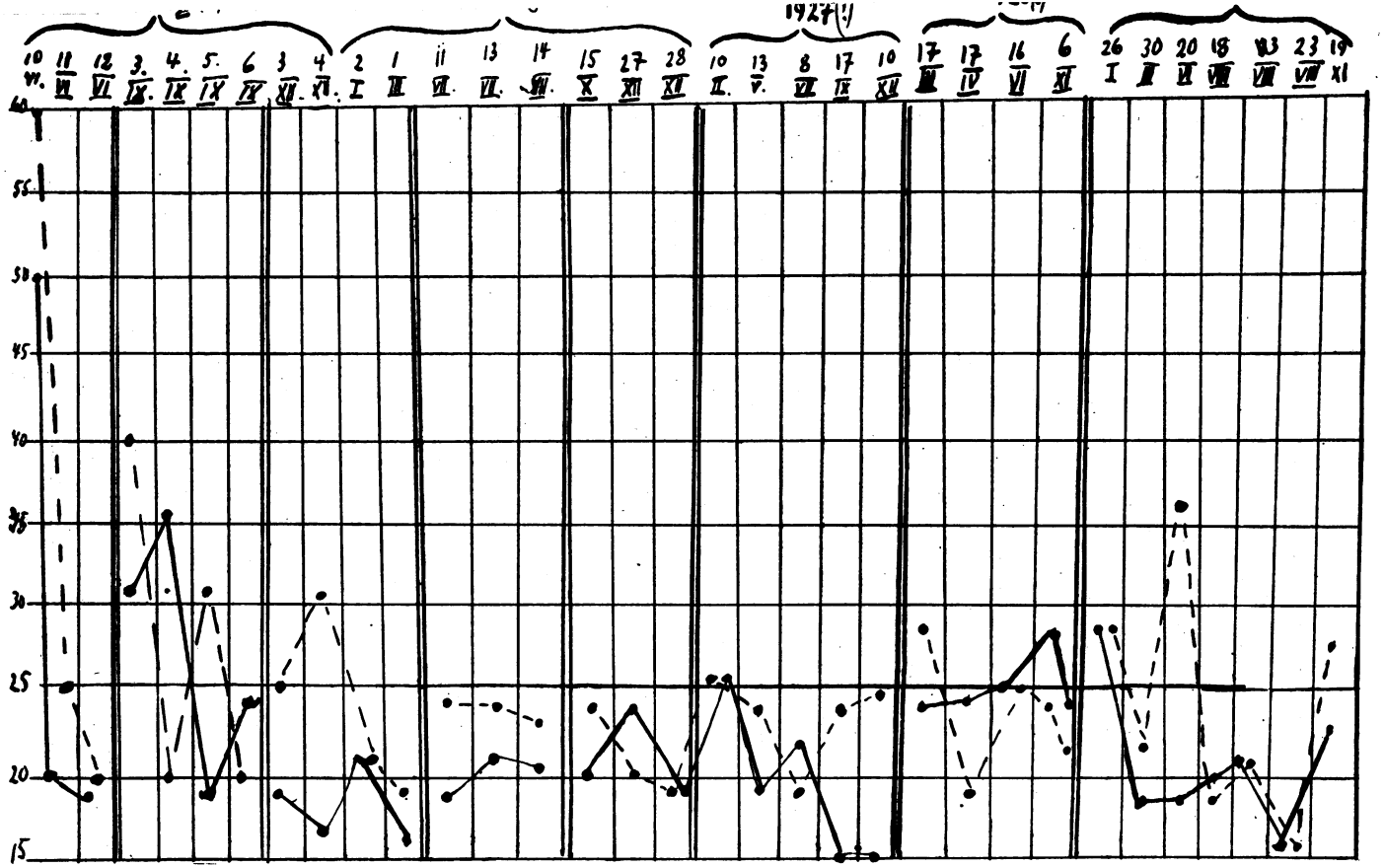

DESCRIPTION OF THE CURVE

Numbers (at left) mean mm. Hg; Tonometer Schiötz; 25 — *or 28* — in general is the limit of the norm. The dotted line represents the right eye, the straight line the left one.

Architect L.—Glaucoma simp. of both eyes, since June, 1925, under my treatment. History—see the text of the paper. Since the patient does not live in Berlin, Mrs. L. learned tonometry (in my clinic): she administers glaucosan drops as soon as the tension, in spite of miotics, is more than 25 mm. For 1925 the curve shows only occasional tests (lack of space), from 1926 on all the tests I have taken. Mrs. L. is measuring twice a week.

Look at the beginning and the end of the curve (4½ years). At the end mounting of the tension is a great exception. Vision and visual field are the same as in beginning of the treatment. He is drawing all his works himself.

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Architect L. lives in a small place with no oculist in residence and has been under my treatment since June, 1925. Tension at that time 50 and 60 mm. Hg. (Schiötz Tonometer), *i.e.*, twice and three times as high as normal! *Scotomas extend almost to the centre.* Even the most willing operator might in such a case be very satisfied indeed to desist from an operation. Here the wife has not only done the instillation but learned also tonometry; I supervise from time to time. The patient is now 53 years of age, carries on his entire work; none of his chiefs knows that he has a disease. The glaucosan-eserine treatment is now being supplied for the fifth year. Similarly reports Dr. Haitz, Mainz (*Klin. Monatsbl. f. Augenheilk.*, 1929, Bd. LXXXII, S. 937): "A patient refuses operation. Under glaucosan his better eye keeps invariably well for two years and a quarter; whereas the other, operated on before, has been getting slowly worse (enlargement of scotomas)."

Of quite particular value are glaucosan drops in the case of secondary glaucoma (following iritis with synechiae), for they are the most powerful mydriatic known at the present; there is no other drug able at the same time to lower the tension and to dilate the pupil.* Duke-Elder and Law are quite right in writing: "In secondary glaucoma laevo-glaucosan will succeed in rupturing synechiae which with other mydriatics remain unaffected." Similarly Professor Stock (Ophthalmological Hospital, Tübingen): In the case of this form of glaucoma successes are not seldom simply brilliant: "pupil dilates, some synechiae rupture, glaucoma disappears." (*Klin. Monatsbl. f. Augenheilk.*, 1928, page 690.)

I do not aspire for a moment to render the glaucoma operations superfluous by means of glaucosan drops. Undoubtedly certain glaucoma eyes can only be preserved by operation, and sometimes operation is a real relief: but since the end is very hard to predict, the medical treatment—in my opinion—should be tried first of all if by any means possible.

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* See the paper: "Some clinical observations on laevo-glaucosan, etc.," by Ellet and Rythener, Memphis, U.S.A., *Amer. Jl. of Ophthal.*, 1929, p. 371: "We should like to call especial attention to the utility of glaucosan in this class of cases, namely iritis and iridocyclitis with increased tension. *It dilates the pupil more effectively than any other drug, and without any risk of further increasing the intra-ocular tension.*"

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