
(1) Huston Bell has used this operation in 40 cases of glaucoma with the following results.

<table>
<thead>
<tr>
<th>Type</th>
<th>Good</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute inflammatory</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Chronic</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Absolute</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Secondary</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

He has not used it in buphthalmos. In his opinion the operation of choice for acute glaucoma is iridectomy, but in the chronic types iridotasis is to be preferred because there is so little trauma to the eye. He has had no late infections and attributes his immunity to the continued use of boric and zinc lotion (gr. 2 to the ounce) after operation. The technique is to dissect up a flap of conjunctiva as for trephining and to pass a narrow keratome into the anterior chamber from a point 1—2 mm. behind the limbus. The incision should not be more than 4 mm. long. Fine forceps is then introduced, made to grasp the iris near the pupillary margin and draw it out into the wound so that the posterior surface is in contact with the anterior lip of the wound. The conjunctival flap is kept in place with three sutures and gentle daily massage is instituted from 24—48 hours after operation.

F. A. W-N.


(2) Gifford’s article consists in a critical survey of present theories of the pathogenesis of glaucoma. Seidel and his school consider that most cases are due to a blocking of the drainage channels for the aqueous, chiefly at the angle of the chamber. They are of opinion that this fluid is formed by secretory activity of the ciliary epithelium because; (i) Granules and vacuoles characteristic of secretory activity can be demonstrated in the cells. (ii) Pilocarpine stimulates the activity of the epithelium; this can be shown by dropping 2% fluorescein on the conjunctival bleb left after trephining, when it is found to clear more quickly after instillation of pilocarpine and less quickly after atropine. (iii) There are characteristic appearances after vital staining; (iv) Injection of toxic substances such as potassium cyanide into the vitreous lowers the intra-ocular pressure, apparently by reducing...
ciliary secretion. (v) The pressure in the intra-ocular capillaries, according to their findings, is 30 mm. Hg which, allowing for the intra-ocular pressure of 25 mm. Hg and the osmotic pressure of the blood, is insufficient to allow fluid to enter the eye without the intervention of a true secretory process.

With regard to drainage, Seidel found, in patients with a shallow anterior chamber, a marked increase in tension after a stay in a dark room. In one case the rise was from 20 to 80 mm. Hg. Also the weight of the tonometer caused five times as great a fall of tension in patients with small pupils as it did in those having large ones. Finally if coloured fluid be injected into the anterior chamber, and the pressure be raised slightly above the intra-ocular pressure, the anterior ciliary veins can be seen to fill with fluid. These observations led Seidel to conclude that glaucoma is due either to hypersecretion of aqueous or insufficient drainage at the chamber angle. Hamburger believes that the disease is due essentially to a relaxation of the vaso-constrictor mechanism of the eye, affecting principally the choroid. His opinion is based on the curative effect of adrenalin and the association of glaucoma with vascular naevi and with emotional stress. Magitot and Bailliat think that the cause is obstruction in the choroidal veins because (1) Experimental obstruction of the vortex and anterior ciliary veins produces hypertony. (2) Compression of the carotid artery produces hypotony. (3) Pathological examination of early cases of glaucoma shows in almost all cases periphlebitis or sclerosis of the choroidal vessels, and this is so even in the eyes of buphthalmic infants. (4) Certain pathological conditions such as orbital cellulitis and pulsating exophthalmos interfere with the venous return from the eye and have been reported as causing secondary glaucoma. Duke-Elder's views are not so dogmatic. He considers that the aqueous is a dialysate because he found sufficient difference in pressure between the blood in the retinal arteries and the general contents of the eye to allow of fluid leaving the former against the osmotic attraction of the blood colloids. On the other hand the venous pressure in the eye is 39 mm. Hg so that the only way in which circulation of aqueous can take place, is by intermittent increases in intra-ocular pressure forcing fluid out of the canal of Schlemm. Since physostigmine causes increased formation of aqueous even after removal of the ciliary ganglion, the increase of fluid cannot be due to secretory activity but is caused by the vaso-dilatation brought about by use of the drug. Duke-Elder does not, therefore, believe that obstruction of the chamber angle is the only cause of glaucoma and thinks that it may be secondary to other changes in the vitreous, vasomotor system, etc.

Various authors have reported diminution in the osmotic pressure of the blood in glaucoma but this is due only to diminished
content of crystalloids, and so could have no effect on the formation of aqueous. Others have found abnormalities in the vasomotor control of patients suffering from glaucoma, especially in the regulation of the capillaries, and there are frequently other signs of vaso-neurosis, such as asthma, urticaria and teichopsis. According to these observers glaucoma is due to increased permeability of the capillaries. Against this theory, however, is the observation that choline reduces the intra-ocular tension although it brings about vasodilatation. The observation of decreased tension after cocainisation or alcohol injection of the sphenopalatine ganglion shows that there is a nervous element in the production of this disease. Malling is of the opinion that quiet iridocyclitis may be the primary cause of all cases of glaucoma, because out of 71 patients with this disease, there were only nine who showed no evidence of iridocyclitis when examined with the slit-lamp. The present position with regard to the vitreous would seem to be as follows:—Its iso-electric point is pH 4.2, a reaction much more acid than ever occurs in the body fluids. The vitreous, therefore, is never at its minimum volume though in the extreme acidosis accompanying diabetic coma, it shrinks considerably, so that the eye becomes soft. Redslab and Reiss have found that by increasing the alkalinity of the vitreous from the normal pH 7.7, to pH 8.2, a definite amount of swelling followed each change of 0.1 pH. Since the addition of 0.22 c.c. of fluid to the human eye at normal tension raised it to 60 mm. Hg, it is quite possible that changes in tissue alkalinity occurring during life may cause enough swelling of the vitreous to result in glaucoma.

F. A. W-N.


(3) Krause reports two cases of his own and reviews the twenty-seven cases recorded in the literature on the subject of the association of naevi with glaucoma. Of the twenty-seven cases recorded, eleven were cases of glaucoma supervening in late life in people with naevi, and in the remaining sixteen cases buphthalmos was present from birth in patients suffering from this vascular disfigurement.

Of Krause’s cases one was a glaucoma which began to develop at the age of fifteen in the right eye of a patient who had an extensive port-wine stain affecting mainly the right side of the face. The other was a case of a boy aged two years suffering from unilateral congenital buphthalmos and a port-wine naevus on the corresponding side of the face. In the first case there were also seen teleangiectatic changes in the conjunctiva, iris and choroid.
GLAUCOMA

In this case compression of the jugular veins led to a slight increase in the tension of the eye, and to a dilatation of the vessels of the iris and choroid; on the other hand compression of the carotid artery on the side of the affected eye together with massage of the globe led to some lowering of the tension. In the second case, that of the baby with buphthalmos, there were present painful spasmodic contractions of the limbs on the side of the affected eye, probably due to cerebral haemangioma and the presence of an enlarged liver led to the possible diagnosis of haemangioma of the liver.

The author associates himself with the view expressed by earlier observers that these cases of glaucoma are the result of telangiectasis of the choroid. But it must be added that Safar, who had the opportunity of examining microscopically a buphthalmic eye which had the association discussed here, could find no abnormality other than an imperfectly formed canal of Schlemm, and even this abnormality was not found by Clausen who reported on the second examination on record.

ARNOLD SORSBY.


(4) In the course of a severe outbreak of epidemic dropsy or beri-beri in Calcutta, Mukerjee saw 253 cases of glaucoma complicating the disease. In most cases the glaucoma came on during the convalescent stage or during the course of the milder but prolonged attacks. Most of the patients were constipated, those with looseness of the bowels generally escaping the ocular complication. Not only hypermetropic or small eyes were involved but normal and myopic eyes also. An analysis showed 90% to have occurred among rice-eaters and the commonest age period to be 20 to 40 years. The attacks appeared to conform to the classical type of subacute glaucoma with the following departures from type:—(i) the anterior chamber was normal or deep; (ii) the pupil was normal or only moderately dilated; (iii) the cupping of the optic disc was little more than physiological but was progressive. In three cases arterial pulsation on the optic disc was seen. No definite signs of iridocyclitis were present.

The fields of vision showed nasal contraction as a constant feature with the loss of some part of the central field in many cases. The tension was found to average 70—100 mm. of Hg by McLean's tonometer, often varying during a day, even to the extent of becoming normal.

Blood and urine examinations helped little in elucidating the cases and the suggested cause was a hyper-secretion by the ciliary body as a result of passive congestion induced by the causative factor in epidemic dropsy. If this be a toxin which might damage
the vessel walls, thus increasing transudation from ciliary capillaries, it would seem that the diarrhoeic cases escape glaucoma because the toxins are profusely eliminated through the intestinal canal.

Treatment was directed against the general condition, especially with a view to the elimination of any toxins, and locally to the eyes. In the majority, the glaucoma was cured by the free use of miotics but where raised tension persisted or the field of vision steadily decreased operation was undertaken. Trephining was done in 57 cases, simple iridectomy in two. The results were very satisfactory, only five or six failing as the result of very high tension or almost complete loss of vision. Cataract developed after operation in two cases but for this type of glaucoma the operation of trephining is strongly supported.

R. C. Davenport.


(5) As a result of careful tonometric studies in 74 glaucomatous eyes in which puncture of the anterior chamber was performed—as a sequel to an earlier study of the effect of the same procedure on normal eyes—Kronfeld comes to the following conclusions:

1. In glaucoma with increased tension, intra-ocular pressure becomes re-established more quickly than in normal eyes. Once the original pressure is reached, a phase of reaction with still further increase of tension sets in, followed by a slight decline in tension for a short period. This is also true for glaucoma with normal tension, i.e., glaucoma in which optic atrophy of the glaucomatous type rather than increase in tension is the dominant feature.

2. The rapid restoration of tension after puncture of the anterior chamber may be taken as a characteristic and diagnostic feature of glaucoma.

3. The rapidity with which intra-ocular pressure rises from 0 to 15 mm. mercury may be considered as an indication of the sum of the active factors concerned in the restoration of tension (such as vasomotor reaction, changes in the production and in the albumen content of the aqueous. These factors are therefore in a state of heightened activity in glaucoma.

4. From a study of cases of buphthalmos and of secondary glaucoma due to cyclitis the author concludes that the first of these conditions is a "pure retention-glaucoma," and the second is due to retention with inflammatory hyperaemia of the uvea.

Arnold Sorsby.

(6) **Vogt** finds that out of 150 cases of chronic glaucoma 8.6 per cent. were of a type hitherto undescribed, apparently being due to an exfoliation of the anterior capsule of the lens. This exfoliation appears to be a senile phenomenon, when a fine membrane, which is probably detached by the movements of the pupil, is seen lying over the pupillary border. Out of all the cases of an exfoliation of the capsule of this nature which were observed, chronic glaucoma followed in 75 per cent., because, in Vogt’s opinion, there was a mechanical blockage of the filtration channels by detritus. The prognosis after operation in this type of chronic glaucoma is less good than in other types.

**W. S. Duke-Elder.**

(7) **Farina.**—Increased intra-ocular pressure and true glaucoma. (Ipertonie endoculari e glaucoma vero e proprio. Studio eziopatogenetico e clinico-terapeutico in base alla dottrina neuro-endocrinologica.) *Arch. di Ottal.*, November, 1929.

(7) **Farina** recalls the well-known fact that women are much more frequently the subjects of glaucoma than men, and concludes that in the production of high intra-ocular pressure there are concerned the genital glands and the thyroid, with the other endocrine glands as adjuvants.

When certain degenerative changes are present in the eye, attacks of high pressure occasioned by these glands, become primary glaucoma; when such changes are not present, the manifestations subside. He has succeeded in some instances in his attempt to lower the intra-ocular pressure by re-establishing the normal functions of the glands, or supplementing the missing hormones by administering glandular extracts.

**Harold Grimsdale.**

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**II.—CONJUNCTIVA**


**Tontscheff** reports extremely good results in the treatment of spring catarrh with lactic acid. This opinion is based on a series of 19 patients in which a perfect cure was obtained in 12—an
extremely high percentage in this recalcitrant disease. The technique which he uses is as follows:

The conjunctival sac is anaesthetized with a 5 per cent. solution of cocaine and epinephrine. The upper lid is everted, a horn plate is inserted below it to protect the eye, and a 10 per cent. solution of lactic acid is applied by means of a probe tipped with cotton wool. After one or two minutes the surface of the conjunctiva is neutralized with saline or mercury oxycyanide. The same process is then repeated on the lower lid and on the conjunctiva bulbi, great care being taken to protect the cornea, since the application of the acid here gives rise to an opacity. If there are gross proliferations these should first be curetted if they are on the conjunctiva of the lids, and if they are on the bulbar conjunctiva they should be excised. The application of the lactic acid may require to be repeated in some instances, and should always be repeated if a curetting or excision of proliferations has been necessary. Solutions up to 40 per cent. of acid may be used; it is stated that these cause pain equivalent to that experienced after painting with 2 per cent. silver nitrate. After treatment, no bandage is required, itching of the lids and discharge cease in about three days. Discoloration of the conjunctiva does not follow and in one case where a drop of the concentrated solution of the acid accidentally fell upon the cornea, the opacity which resulted disappeared after a short time.

W. S. Duke-Elder.

III.—BIOCHEMISTRY


Redslob and Reiss state that they have previously (Ann. d’Ocul., 1928, p. 641) shown the dependence of the swelling of the vitreous in the eye of the cow upon its pH, and particularly its diminution on the acid side. Injections of 0·1 c.c. of fluid were possible into the rabbit’s vitreous. With normal saline this caused a rise of tension (Schiotz) from 25 mm. Hg to 100 mm. or more, of short duration. In ten minutes, the tension dropped to 30 mm. Hg. Injections of isotonic solutions of HCl or H₃PO₄ resulted in a fall within thirty minutes to about 15 mm. Hg, and
in a few hours to 10 mm. Hg. In ten days, the tension started to rise and reached normal in about thirty days. Injection of alkaline solution (NaOH, n/6) into the rabbit's eye resulted in a persistent high tension for several hours instead of a fall as with normal saline. Experiments with injection of four different gelatine solutions gave similar results for the four solutions—a fall from the raised tension of injection to about normal in twenty-four hours and a subnormal tension up to the eighth day.

Conclusions.—The results of experiments on living rabbits agree with measurements of vitreous swelling in relation to pH obtained with the enucleated eye of the cow. Injections of acid lowered the tension for an average period of twenty days. Alkaline injections gave a temporary rise in tension followed by a fall. Injection of gelatine has a hypotensive action like acids.

A patient with absolute glaucoma in one eye—the other being healthy—in whom treatment by iridectomy and with the use of drops of pilocarpine, eserine, aminoglaucosan and finally anterior sclerotomy, was without effect, was given injections into the vitreous of the affected eye. Signs of acute glaucoma were present, with great pain, sleeplessness, tension 90 mm. Hg, and vision of light perception with bad projection. An injection of 0.2 c.c. of isotonic solution of H$_3$PO$_4$ was made under local anaesthesia. All treatment was stopped. The day after operation the patient said he had slept well, that all headache disappeared and that he felt much better. The eye was less red and the cornea now clear and bright. The vision was unaltered. The tension chart (reproduced) showed a marked improvement for several days.

Humphrey Neame.

IV.—CORNEA

Pillat, Arnold (Pekin, China).—Does keratomalacia exist in adults? Arch. of Ophthal., September-October, 1929.

Pillat's paper gives an affirmative reply to the question he uses as a heading. All conditions from simple epithelial xerosis to complete necrosis of the cornea may be seen in adults; and the author considers keratomalacia to be only one symptom of a disease affecting all the structures derived from ectoderm. He reports seven cases of varying severity. The first one, in a man aged 19 years, had night blindness, slight pyrexia, a dry white conjunctiva and a dry xerotic patch in the centre of the cornea of each eye. He had been living on a few vegetables, some white Chinese cabbage and very little else, although he was doing heavy
manual labour. His face was covered with comedones, and the skin was dry, puffy and ashy. He recovered completely by having a diet of butter, milk, liver, cod-liver oil, and lemon juice. The fourth case was interesting, because the condition might easily have been mistaken for an hypopyon ulcer. The whole left cornea was dull and dry with a dense ring of opacity about 1·5 mm. from the limbus and a centrally placed circular ulcer with undermined edges. Deep to this was an abscess in the substance of the cornea which was continuous with an hypopyon. The diagnosis could be made, however, by examination of the conjunctiva which showed dirty grey folds like argyrosis, in the fornices, while in the bulbar portion the membrane had become like dried up leather and was lying in folds concentric with the corneal margin. In spite of its advanced condition, the ulcer healed completely, after 10 days of dietetic treatment. Although this patient was only 18 years old, an opacity like typical arcus senilis remained permanently in the cornea. Case 5 was more severe; when first seen the eyes were so covered with dry yellow crusts that nothing was to be seen, either of the conjunctiva or cornea. When the crusts were removed there were seen, projecting from the palpebral fissure, irregular, purplish grey, leathery folds of conjunctiva. The right cornea showed a severe, perforating ulcer while in the left the destruction had extended to the limbus and at one point into the sclera. There were also important general symptoms. The patient was mentally confused and though only 45 years, appeared like a man of 60 years. His colour was a dark greyish brown. The skin was dry, earthy and desquamating, lying in wrinkles and deep folds and showed numerous areas of secondary infection, though there was little inflammatory reaction as the whole organisation was in a state of such intense exhaustion. Case 6 was even more severe and was of special interest because the multiple abscesses without inflammatory symptoms, were diagnosed in another department as syphilitic. They all healed under correct dietetic treatment.

In the second part of his paper Pillat comments on his cases and draws some general inferences from them. Conjunctivitis is not an essential symptom of the disease but is commonly present as a secondary infection, due to the lowered vitality of the patient. Severe cases may at times resemble trachoma, particularly as the dry state of the conjunctiva may be scanty and easily overlooked. The curious colour of this membrane, however, helps in the diagnosis. The lower fornix is at first yellow, then changes from light grey to a deep brownish grey, exactly resembling argyrosis, while the bulbar conjunctiva becomes yellow but not dark brown. In the cornea there are first of all xerotic spots which may turn into ulcers. Changes in the lens are not easily seen, because of
the corneal opacity, but in cases where the lens was visible it seemed to undergo a decrease of lustre. Slit-lamp examination of the cornea shows thickening of its nerve fibres with resulting anaesthesia. With regard to aetiology, the author is convinced that dietetic errors are the cause of the condition. None of his patients had eaten meat, green vegetables or any food containing vitamin A for weeks and yet had been doing hard physical labour. In former descriptions of the disease great stress has been laid on diarrhoea as a cause of the condition but in the author's experience it is a symptom, due to degeneration of the intestinal mucous membrane, consequent on absence of vitamin A from the dietary. General symptoms comprise moderate pyrexia (98·6 to 100·2° F. in ordinary cases and up to 104° F. in severe cases), decrease of haemoglobin in the red cells and an increase of polymorphonuclears, and change of colour and texture of the skin, the colour ranging from a faded grey to greyish yellow and the surface being rough, dry and desquamating. Cracks and wrinkles appear in it which frequently become infected with organisms producing abscesses with very little inflammatory reaction. The hair becomes dry and falls out, while the nails are seamed with furrows. Mucous membranes other than the conjunctiva and internal mucosa may also be affected. Thus, the mouth becomes dry, hoarseness develops, bronchitis and even broncho-pneumonia may occur and in one case there was a non-gonococcal urethritis.

F. A. W-N.

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**BOOK NOTICES**

*Kurzes Handbuch der Ophthalmologie.* Edited by F. Schieck and A. Brückner. Berlin: Julius Springer. 7 Vols. 138.6 marks per volume.


It may seem somewhat strange that a series of seven portentous volumes should be presented under the title of a "Short Handbook," but the reason perhaps lies in a comparison with the immensely overgrown handbook of Graefe-Saemisch-Hess. But whatever surprise may be felt at seeing the book from afar, it can only give way to admiration when its contents are studied. So far as can be judged by the two volumes which are now to hand, this handbook