

THE PROBLEM OF OPEN-ANGLE GLAUCOMA IN THE BANTU*

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Open-angle glaucoma (chronic simple glaucoma) is a disorder which leads to blindness due to optic atrophy. Ophthalmic surgeons are familiar with its effects, but in view of the serious nature and the extent of the disease, it is felt that practitioners and the lay public should once more be made aware of the problem that confronts us.

This was well accentuated in an editorial in the *South African Medical Journal* in 1963.¹ Among the causes of blindness in England and Wales, glaucoma accounted for 14%.² In South Africa the figures are inaccurate. A figure of 3% has been advanced, but among the other causes of blindness there is a total of 49% which is due to unknown causes³ which may include glaucoma cases that have not been diagnosed correctly. Mass surveys have been carried out in different countries and the conclusion is that 3-4% of the population of 45 years and over have a raised intra-ocular pressure, and approximately 2% of the population of over 45 years have unsuspected early open-angle glaucoma.⁴⁻⁶ In Liberia the incidence was found to be at least 3.25%.⁷

One suspects that the position in this country is equally

bad, and it may well be worse. It is the purpose of this paper to present the clinical findings in 90 patients with open-angle glaucoma in order to find out where the major problems in diagnosis and treatment arise. These findings will show that these patients seek treatment in an irreversible, final stage of the disease.

Due to unknown factors, a blockage occurs at the angle of the anterior chamber in or near the trabecular tissue in relationship to the canal of Schlemm. The aqueous humor, which is formed by the ciliary body posterior to the iris, circulates through the pupil opening into the anterior chamber, and then leaves the anterior chamber at its angle, to pass through the trabecular meshwork into the canal of Schlemm, where it joins the venous drainage channels.

The result of a slow blockage of aqueous fluid is to cause a chronic rise in intra-ocular pressure. Cupping of the optic disc, with visual field defects, optic atrophy and steady but slow loss of vision, results. This is the condition referred to as chronic simple glaucoma, or open-angle glaucoma. Other types of glaucoma occur which are better understood. These are the various types of secondary

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glaucoma, where there is an obstruction to the outflow of aqueous due to observable causes, e.g. haemorrhage, inflammatory products, etc., and a type of glaucoma called closed-angle glaucoma where the iris, at its periphery, blocks the anterior chamber angle. This may be acute or subacute, and gives rise to the acute congested glaucoma familiar to all practitioners. This type of glaucoma does not seem to occur in the Bantu and we are concerned here with the slow but progressive and extremely severe open-angle glaucoma.

METHODS OF INVESTIGATION

Over a period of 14 months, 2,240 eye outpatients were seen by me at Elim Hospital in the Northern Transvaal. Ninety patients were diagnosed as having open-angle glaucoma (4%). Approximately one-third of the total number of patients seen were children under the age of 15 years. If these are excluded, the percentage of glaucoma patients rises to 8%. These figures are, of course, related to a specific group of eye patients seeking treatment, and not to the general population over the age of 40 years.

The details of these 90 patients were analysed, and one can summarize these findings by saying that these glaucoma patients are receiving treatment when they are in an advanced and almost final end-stage of the disease.

The criteria for diagnosis in these cases were based on the appearance of the optic discs and on the demonstration of raised intra-ocular pressure by the Schiøtz tonometer. A reading of 20 mm.Hg (1957 Friedenwald scale)⁸ was taken as normal. Gonioscopy was not done as a routine, but at random, and these cases showed open angles which were pigmented. Peripheral and central field examinations were not attempted, as it was difficult to obtain an accurate result in these patients.

CLINICAL FINDINGS

Sex distribution was equal: out of the 90 patients studied, there were 44 males and 46 females. The patient usually waits until the visual acuity has deteriorated almost to extinction. Since the disease manifests itself mostly after 40 years of age, the older age-groups show a higher incidence. Table I shows that the highest age-group is 60 - 70

TABLE I. AGE INCIDENCE OF 90 PATIENTS WITH OPEN-ANGLE GLAUCOMA

Age (years)	No. of patients
Under 30	1
30 - 40	6
40 - 50	12
50 - 60	21
60 - 70	27
70 +	23

years. Only 12 patients were in the 40 - 50-year-old group, and it is in these younger age-groups where diagnosis and adequate treatment are essential.

Since the normal intra-ocular pressure is 20 mm.Hg or lower, a pressure of 35 mm.Hg is already considered to be excessively raised. From Table II, it can be seen that 23% of eyes showed a pressure of up to 35 mm.Hg, but that the majority of eyes showed a very much higher

pressure, with 29% of patients having a pressure of 55 mm.Hg. An eye can feel almost stony hard, and yet the patient feels little discomfort. A slow rise of pressure is tolerated indefinitely. This is the problem with these patients. If pain were present, they would seek and demand treatment earlier. Only 12 patients out of 90 complained of sore eyes and headaches. One patient complained of itching eyes.

TABLE II. INTRA-OCULAR PRESSURE IN 180 EYES

Intra-ocular pressure (mm.Hg)	No. of eyes	%
20 - 35	42	23.5
35 - 45	42	23.5
45 - 55	43	24
55 +	53	29

Out of 180 eyes showing increased intra-ocular pressure, 120 showed obvious advanced cupping of the discs. Thirty-six eyes had cataracts which obscured the fundal details; 20 eyes showed corneal oedema with secondary keratitis, and these probably also had cupping since the oedema of the cornea was due to the increased intra-ocular pressure. Only 4 discs showed normal appearances. Cupping of the discs is a late sign in chronic simple glaucoma and indicates optic atrophy with field defects.

All patients had bilateral glaucoma, but in most cases there was no obvious discrepancy in the severity between the two eyes. Thus some patients would have one blind eye, with only early involvement of the other. For instance, Mrs N. M., aged 38 years, complained of poor vision in the left eye. The vision in her right eye was 6/6. She was totally blind in her left eye, there being no light perception. Both discs showed cupping and the intra-ocular pressure was 45 mm.Hg in each eye. Another patient, D. M., aged 75 years, presented with 6/18 vision in the right eye and only ability to count fingers with the left eye. Cupping was present only in the left eye, but the intra-ocular pressure was 35 mm.Hg in the right eye and 45 mm.Hg in the left eye. M. N., aged 54 years, had a visual acuity of 6/36 in the right eye and 6/6 in the left. There was no cupping present and the intra-ocular pressure was 40 mm.Hg in the right eye and 50 mm.Hg in the left eye.

Visual acuity and duration of symptoms were such that out of 90 patients, 76 presented with a main complaint of lack of vision. Patients had difficulty in assessing the duration of this loss. Thus, 34 patients could date their symptoms to more than 1 year previously; 30 patients said that symptoms had been present for 1 year only; 14 said 6 months; and 12 said 3 months.

Table III shows just how bad their visual acuity was. Out of 180 eyes of 90 patients, 140 eyes were in the terminal group of being totally blind or having ability to

TABLE III. VISUAL ACUITY

Visual acuity	No. of eyes (180)	No. of patients (90) with this vision in better eye
6/6 - 6/12	11	9
6/18 - 6/36	14	6
6/60	15	15
Counts fingers	70	25
Blind	70	35

count fingers at 1 metre only. Only 11 eyes had vision of 6/6 - 6/12.

Since treatment only halts the progress of the disease at the very best, and since at no stage is improvement of vision possible, it naturally follows that glaucoma patients must be diagnosed at the stage where minimal loss of visual acuity has occurred. Goldman⁹ states that visual deterioration can occur 15 - 20 years after the initial rise in intra-ocular pressure. Therefore, the early diagnosis rests on tonometry readings and patients must be persuaded to have glaucoma checks. From the table it can be seen that these patients have a hopelessly inadequate assessment of their visual loss. They seem to have the idea that they can wait till they are blind and can then have their vision restored. They know that this happens to friends and relatives who have had cataracts extracted, and there is no more pathetic sight than a patient led into hospital and told that his glaucoma is untreatable, while his friend is admitted for routine cataract extraction.

RESULTS

Group I

From the 90 patients, 15 only had a visual acuity of 6/36 or better in the good eye. The details of these patients are presented in Table IV, since this was the exceptional method of presentation and the only group who had a good or reasonable prognosis. These patients must be considered as a relatively sophisticated group, since they have sought treatment at an earlier stage. Patients may have been seen at other institutions or even have been examined in field surveys. This paper does not suggest that there have been misdiagnoses, but this is a factor that also has to be considered. Of these 15 patients, 7 received medical treatment and 8 underwent surgery.

Medical treatment was not successful. In Table IV, patients 1 - 7 had medical treatment and patients 8 - 15 had surgery. None of the medically treated patients returned for regular check-ups. Three of the 7 did not return for a

TABLE IV. DETAILS OF PATIENTS IN GROUP I

Case No.	Age (years)	Visual acuity		Cupping		Intra-ocular pressure (mm.Hg)		Symptoms
		RE	LE	RE	LE	RE	LE	
1	48	6/18	6/18	+	-	28	28	Poor vision. Miotics. Failed to return
2	63	6/6	6/6	+	-	25	25	Poor vision. Miotics. Failed to return
3	55	6/6	Blind	+	+	25	40	Poor vision. Miotics 1 year
4	70	6/18	6/18	+	+	35	35	Miotics 7 days. Failed to return
5	38	6/18	6/12	+	+	35	35	Eyes itch, 2 years. Miotics. Failed to return
6	54	6/18	6/12	+	-	25	25	Poor vision 3 months. Miotics. Failed to return
7	65	6/36	6/36	+	+	35	35	Poor vision. Refuses operation
8	38	6/6	Blind	+	+	45	45	LE poor vision for years. Surgery
9	75	6/18	Counts fingers	-	+	35	45	LE poor vision for years. Surgery
10	54	6/36	6/6	-	-	40	50	Sore eyes 3 months. R pterygium removed previously. Surgery
11	70	6/18	P.L.	+	+	68	50	Poor vision LE 1 year. Surgery
12	40	Blind	6/12	+	-	25	35	Smoky vision years. Surgery
13	49	6/12	6/12	+	+	50	40	Eyes sore 6 months. Surgery
14	56	6/6	6/60	+	+	35	45	LE poor vision. Surgery
15	65	6/6	6/18	+	+	70	45	Old traumatic iris prolapse I.E. Surgery

RE = right eye, LE = left eye.

second visit. One returned 4 times before retiring. The remaining 3 averaged 3 visits each before disappearing.

Table V shows the reduction in intra-ocular pressure following surgery. A scleral cautery was used to obtain a

TABLE V. RESULTS OF SURGERY IN 8 PATIENTS, GROUP I

Case No.	Age (years)	Pre-op. tension (mm.Hg)		Operation	Post-op. tension (mm.Hg)	
		RE	LE		RE	LE
8	38	45	45	Bil. ant. sclerectomy	20	20
9	75	35	45	L trephine. Refuses R	35	25
10	54	40	50	R sclerectomy, L trephine	25	25
11	70	68	50	Bil. ant. sclerectomy	18	18
12	40	25	35	L trephine	25	25
13	49	50	40	Bil. ant. sclerectomy	20	20
14	56	35	45	Bil. trephine	23	35
15	65	47	70	Bil. trephine	25	25

Anterior sclerectomy—normal intra-ocular pressure 6 out of 7 eyes.
Trephine —normal intra-ocular pressure 0 out of 7 eyes.

bloodless field, but was not used as in the Scheie operation. Anterior sclerectomy showed a far better result than the trephine operation. The failure of the trephine is exemplified by case 14. This patient was a schoolmaster and most cooperative. He was receiving Diamox 250 mg. *t.d.s.* and pilocarpine drops 2% with eserine 1/4% *q.i.d.* His pressure in the right eye varied from 30 to 25 mm.Hg over a period of 1 year, and in the left eye from 40 to 25 mm.Hg. Following bilateral trephine operations, his lowest pressures were 23 mm.Hg in the right eye and 35 mm.Hg in the left eye. With Diamox and pilocarpine drops and eserine his pressure was maintained at 23 mm.Hg in the right eye and 20 mm.Hg in the left eye.

The treatment of choice in this group of patients was therefore surgical. Luntz¹⁰ suggests that filtering operations should include cauterization of the scleral wound. The surgical results are then comparable to those in White patients whose glaucoma is at a similar stage.

Group II

Of the remaining 75 patients whose best visual acuity was less than 6/36 in the better eye (Table III), 35 patients were totally blind, 25 patients could count fingers, and 15 patients had 6/60 vision in the better eye.

It was decided to reduce the intra-ocular pressure surgically in 40 out of these 75 patients. These were the patients who had some vision present. It was considered that reduction of pressure might retain their vision for a longer period than if they were left without treatment. It has already been shown that there is no place for medical treatment in these patients.

Table VI shows how these eyes responded. Again, anterior sclerectomy was the most successful operation. One must remember that one is dealing with an abnormally

TABLE VI. RESULTS OF SURGERY IN GROUP II PATIENTS

No. of eyes	Type of operation	Intra-ocular pressure (mm.Hg)		
		<20	20-25	>25
41	Trephine	14	16	11
31	Anterior sclerectomy	15	9	7
4	Cyclodialysis	1	3	
4	Iridencleisis		4	

Anterior sclerectomy—normal intra-ocular pressure 15 out of 31 eyes.
Trephine —normal intra-ocular pressure 14 out of 41 eyes.

high intra-ocular pressure in this group. If the initial pressure was high, e.g. over 45 mm.Hg, the postoperative pressure represented an average drop of 20 - 30 mm.Hg. Those eyes with a pressure of 30 - 35 mm.Hg had a reduction of only 5 mm.Hg.

Two cases deserve mention. In the first a bilateral anterior sclerectomy was performed. The pressure in the right eye fell from 50 to 25 mm.Hg. The pressure in the left eye fell from 55 to 45 mm.Hg, and the postoperative remark was 'might as well have done nothing'. The patient refused further surgery.

The second case had a left trephine and the pressure was unaltered postoperatively at 35 mm.Hg. Re-operation showed that there were extensive adhesions between Tenon's capsule, conjunctiva and sclera. When these were released, aqueous flowed freely out of the trephine. The trephine was enlarged on either side and the postoperative tension fell to 25 mm.Hg. One cannot help feeling that episcleral fibrosis plays a part in failure of drainage.¹¹

This is not to say that drainage operations do not function well in the Bantu. J. M., a male aged 60 years, had had bilateral iris inclusions performed 4 years previously. He was blind, with extensive cupping of the discs, but his pressure was 20 mm.Hg in each eye. J. M., aged 50 years, had had bilateral trephines 1 year previously. Although he was blind, with extensive cupping, the pressure was 18 mm.Hg in each eye.

DISCUSSION

The problem of treating glaucoma successfully in the Bantu would appear to be based on the following:

Diagnostic Difficulties

Patient's assessment of symptoms. As the Bantu seems to be totally unaware of the serious nature of glaucoma, extensive education must be carried out in this direction. This could be a public health problem, and cooperation between these authorities and the ophthalmic surgeons is necessary.

Mobile clinics which are managed by the Bureau for the Prevention of Blindness must concentrate on mass surveys. Mass screening has been carried out successfully in different countries using tonometry, and potential glaucoma patients can be advised.

Tonometry. Luntz⁵ has already advocated the use of routine tonometry by general practitioners.

Inability of patient to obtain the necessary medical examination. Economically, patients may hesitate to obtain the correct advice. Geographically, there are excellent hospitals and clinics throughout the country. No patient need be more isolated than is necessary. Although the patients seen in this series were living in rural areas, facilities existed for them to reach the hospital for treatment through rural clinics, ambulance services, etc. The delay in receiving attention is largely due to ignorance and

to lack of facilities; specialist services are very inadequate in country areas.

*Establishment of glaucoma clinics.*² Glaucoma clinics should be established in all hospitals. This aspect is urgent. In the same way that special clinics have evolved for tuberculosis, venereal diseases and diabetes, glaucoma clinics can be simply developed. General practitioners and nurses can be taught to take tonometry readings. Ophthalmic surgeons must be given facilities in hospitals to treat the glaucoma patients that have thus been isolated and also to investigate the borderline cases.

Therapeutic Difficulties

Medical treatment with miotics and carbonic anhydrase inhibitors, e.g. Diamox, is not successful in the Bantu. They cannot attend regularly for follow-up examinations and they cannot be relied upon to treat themselves with eye-drops.

Early surgery is therefore desirable. The choice of drainage operation is difficult. In group I, anterior sclerectomy had a higher proportion of normal postoperative intra-ocular pressures (6 out of 7 eyes) than trephine (0 out of 7 eyes).

In group II, anterior sclerectomy had a higher proportion of normal postoperative intra-ocular pressures (15 out of 31) compared with trephines (14 out of 41). Luntz¹⁰ prefers a Scheie-type operation, as this prevents scleral closure. It is felt, from experience gained in operating on advanced glaucoma, that conjunctival fibrosis plays a part in preventing adequate drainage. In a few cases, gelfilm was placed between the drainage hole and the conjunctiva to prevent fibrosis. However, the results were inconclusive as there was no follow up.

SUMMARY

Ninety patients out of 2,240 seeking eye treatment in a rural hospital were found to have open-angle glaucoma (chronic simple glaucoma). Of these 90 patients, 75 were already in the final stages of the disease, with 35 completely blind. The reasons for this delay in treatment are discussed. The treatment of choice in glaucoma patients in the Bantu is surgical, and methods are discussed whereby glaucoma patients may be diagnosed and treated earlier. The routine use of tonometry by practitioners, as advocated by Luntz, is strongly endorsed and the establishment of glaucoma clinics is recommended.

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