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Effectiveness of trabeculectomy on glaucoma patients in Ibadan

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Summary
This study was designed to determine the effectiveness of trabeculectomy on African patients. All patients who underwent trabeculectomy over a 10-year period, January 1987 to December 1996 were included in the study. Information extracted from their case notes included age, sex, type of glaucoma, number of years of glaucoma before surgery, eye involved, and visual acuity pre-operatively and post-operatively. Intraocular pressures at presentation, pre-operatively and post operatively (2 days, 1 week, 3 months, 6 months, 12 months and last clinic visit) were also recorded. Other data collected included pre-operative antiglaucoma therapy, additional techniques at surgery, complications of surgery, presence of a filtering bleb and follow-up period post operatively. A success rate of 91.2% was obtained from 433 eyes operated upon. The most significant outcome was the presence of a filtering bleb which had a better success rate than the absence of a bleb. High success rates were recorded in the age groups ">60 years and 20-40 years", the lowest success rate was in the "less than 20 years of age". All the patients with developmental glaucoma had a successful outcome (100%) while only 50% of the secondary glaucoma were successful. Patients with open angle glaucoma had 92% success rate. Complications of surgery were mostly transient.

It was concluded that the presence of a bleb was a good indication of the control of intraocular pressure and that early surgery gave a more successful outcome than late surgery.

Keywords: *Glaucoma, trabeculectomy, black patient, bleb*

Résumé
Cette étude avait été concu pour determiner efficacite de la Trabeculectomie chez les patients Africains. Tous les patients qui ont sure la Trabeculectomie pendant une periode de 10 ans, de Janvier 1987 an Decembre 1996 avaient été inclus dans cette etude. Les information extrais des register comprenaient, l'age, le sex, le type de glaucome, le numbre d'année de glaucome avant lachirugie oculaire vision preoperatoire et post operatoire. La tension intraoulaire pendant la presentation, preoperatoire et post operaoire avait été également enregestree. Les autres informations requises etaient la therapie anti glaucome les technique additionelles pendant la chivigie, les complications chrugicales, la presence des filtre de bleb et les suvies post operatoure. Un succes de 91,2% avait ete obenu des 433 cas operas. L'aboutissement le peus significatif etait la presence des litres de bleb qui avaient un success mieu que clabscence des blebs. Un plus grand success avait été observe dans la tranche d'age de peus 60 ans et entre 20 et 40 ans. Le succes minimum etait dans les classes de moins de 20 ans. Tous les patients avec les glaucoma en stage de development avaient elait neusi (100% de succés) pendant que juste 50% de glaucoma secondaire etait reussi. Les patients avec des glaucoma à angle ouvert ont reusse à 92%. Les complication de churigie etaient passagéres. Avait ete conclu que la pesence d'un etait une bonne indication de control de tension intraoculaire que la churigie à temps était micure reussi que celle après une longue durée de maladie.

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Introduction

Glaucoma is more common in Negroes than Caucasians and is a significant cause of blindness in Africa [1]. According to World Health Organization statistics, over 5 million people are blind as a result of glaucoma. Approximately 70% of these blind patients are found in developing countries [2]. In recent times, surgical treatment without initial trial of medical treatment has been found to give better results than postponing surgical treatment until medical treatment has been found inadequate [3,4]. In developing countries, medical treatment has been found more inadequate as compliance is almost always very poor. Also the standard drugs such as pilocarpine and timoptol are far too expensive, and these drugs are often out of stock or unavailable [5]. On the other hand, drainage operations are more prone to fail in Negroes, due to excessive fibrosis in the subconjunctival tissues [6]. In spite of this there have been more encouraging reports in recent years of successful glaucoma surgery in Africans [1,7].

The aim of this study was to consider factors which contributed to the success or failure of trabeculectomy in Nigerians and to compare the success rates with other studies in Africans.

Materials and methods

All patients who underwent trabeculectomy over a 10-year period, January 1987 to December 1996 were included in the study. Information extracted from their case notes included: age, sex, type of glaucoma, number of years of glaucoma before surgery, eye involved, visual acuity pre-operatively and post-operatively. Intraocular pressures at presentation, pre-operatively and post-operatively (2 days, 1 week, 3 months, 6 months, 12 months and last clinic visit) were also recorded. Other data collected included pre-operative antiglaucoma therapy, additional techniques at surgery, complications of surgery, presence of a filtering bleb and follow-up period post-operatively. The technique of trabeculectomy was generally Watson's[8] modification of the Cairn's[9] technique and the Luntz modification [10].

The conjunctival flap was either fornix-based or limbal-based. The superficial scleral flap was mainly rectangular (5 x 4mm) but an occasional triangular flap (5 x 5) was used. The deep block (3 x 3mm) was excised and a peripheral iridectomy was made. The superficial scleral flap was sutured with 8/0 virgin silk (2 for rectangular and 3 for triangular). The conjunctiva was also closed with 8/0 silk. Subconjunctival Gentamycin (20mg) and Depomedrol (0.3ml) were given into the inferior fornix followed by topical chloramphenicol and atropine drops and padding of the eye.Postoperative antibiotic, mydriatic and steroid drops were utilized.

All data were double entered using Epi-Info. Statistical analyses were done with the Epi - Info analysis package. Chi squared test and t-test were used for the analysis of categorical and continuous data respectively.

Results

Out of 3,412 ophthalmic surgeries performed over the 10-year period, 493 were trabeculectomies in 317 patients, some were bilateral. Out of the 493, case notes for 433 eyes were available for review, a recovery rate of 87.8%. The age range was 1 week to 81 years old (Table 1), with a mean of 48.1 years. Forty-four eyes were in patients 16 years old and below. There were 292 males and 141 females a M:F ratio of 2:1.

Table 1: Age range of trabeculectomy patients

Age (years)	Number	% of total
0 – 10	30	6.9
11 – 20	26	6.0
21 – 30	33	7.6
31 – 40	32	7.4
41 – 50	77	17.8
51 – 60	100	23.1
61 – 70	92	21.2
71 – 80	42	9.7
81 – 90	1	0.2
Total	433	100%

Table 2: Type of glaucoma

	Number	Percent	No. of Complications
Congenital	37	8.5	17
Developmental	50	11.5	25
Chronic Open Angle	264	61	135
Acute Closed Angle	8	1.8	2
Chronic Closed Angle	70	16.2	40
Secondary	4	1.0	2
Total	433	100%	221*

* 24 eyes had more than one complication.

Table 3: Complications of trabeculectomy

	Number	% of total
Transient increase in intraocular pressure	198	45.7
Shallow anterior chamber	18	4.2
Uveitis	10	2.3
Endophthalmitis	7	1.6
Choroidal detachment	6	1.4
Cataract	2	0.5
Vascularization of bleb	1	0.2
Central retinal vein occlusion	1	0.2
Keratitis	1	0.2
Phthisis bulbi	1	0.2
Total	245	56.5%

The type of glaucoma in all patients in seen in Table 2, the commonest being chronic open angle glaucoma, 61% of all patients. The number of years of diagnosed glaucoma pre-operatively ranged from 0 – 17 years with mean of 1.9 years ± 3.0 (standard deviation). There were 225 right eyes (52%) and 208 left eyes (48%). Cup-disc ratios ranged from 0.3 to 1.0, with an average of 0.8 . Twelve eyes had cataract extractions at the time of trabeculectomy, 8 were extracapsular and 4 were intracapsular cataract extractions. Two hundred and ninety eyes had fornix-based conjunctival flaps and 143 were limbal-based.

The procedure was performed under general anaesthesia in 289 eyes and local anaesthesia in 144 eyes. Post-operatively, blebs were present in 404 eyes but absent in 29 eyes. Complications in the 433 eyes are listed on Table 3, the commonest being transient increase in intraocular pressure occurring in 198 eyes (45.7% of 433 eyes).Follow up ranged from 3 months to 12-years, the longest follow up following trabeculectomy being 12-years, with an average of 3.7 years in the 433 eyes. Three hundred and seventy three eyes were followed up for more than a year and 305 out of these were followed up for over 2 years.

Pre-operative intraocular pressure (IOP) ranged from 9 – 65mmHg with an average of 23.7 mmHg, while immediate post operative IOP ranged from 0-44 mmHg, with an average of 9.7mmHg. 92.2% of patients had IOP of less than 21mmHg immediately post-operatively.

No additional medical therapy was required for 245 eyes and complete success, denoted by a post-operative IOP of 21mmHg or less without medical therapy occurred in 238 eyes (55%). Seven eyes had IOPs between 22 – 30 mmHg but did not require additional medical therapy as the eyes were blind. They were included in the failures. One drug was required in 115 eyes, 2 drugs in 53 eyes and 3 drugs in 20 eyes. The drugs were Timoptol drops, Pilocarpine drops and Diamox tablets.

Qualified success in which IOP was 21mmHg or

less with additional medical therapy occurred in 157 eyes (36.2%) and failure in which IOP was greater than 21mmHg inspite of medical treatment occurred in 38 eyes (8.8%). Success was achieved in 91.2% of the patients, attaining an IOP of 21mmHg or less, with or without additional medical therapy.

Visual status was the same pre- and post-operatively in 233 eyes, worse post-operatively in 80 eyes and better post-operatively compared to pre-operatively in 120 eyes. Statistical analysis performed revealed the highest success rate in the age groups 21– 40 years old (93.8%) and > 60 years old (93.2%). The least success rate was found in patients less than 20 years of age (87.3%). The age group 41-60 years had a success rate of 89.7%. The difference in success rate across the age groups was not statistically significant ($x^2 = 2.81$, $P = 0.42$).

With regards to sex, the males had a higher success rate, 269 (92.1%) compared to the females, 126 (89.4%). The difference in the outcome of surgery by sex was not statistically significant ($x^2 = 0.91$, $p = 0.3$). Comparing the 2 types of conjunctival flaps, the success rate was over 90% for both fornix-based (91.7%) and limbal-based (90.2%) and there was no statistically significant difference between them. ($x^2 = 0.27$, $p = 0.6$). Patients with blebs, had a higher success rate (92.1%) rate than those without blebs (80%), ($x^2 = 5.07$, $p = 0.02$.), the difference between the two groups was statistically significant. According to the types of glaucoma, all the patients with developmental glaucoma had a successful outcome (100%), while only 50% of the secondary glaucoma were successful. Patients with open angle glaucoma had a 92% success rate, chronic closed angle glaucoma 90.1%, congenital glaucoma 83.8%, acute closed angle glaucoma 75%. This was statistically significant ($x^2 = 18.96$, $P = 0.00195$).

The difference between the success rates of developmental glaucoma versus secondary glaucoma was statistically significant, Fishers exact test = 0.004. The mean number of years preoperatively was 1.9 ± 3.0 years. Those with successful outcome were operated earlier 1.13 ± 0.45 years compared to those with unsuccessful outcome 1.26 ± 0.68 years ($t = 1.6$, $P = 0.01$). This was statistically significant where those operated on earlier had a better outcome than those operated on later.

Discussion

It is a well known fact that glaucoma is more common in Negroes than Caucasians and is a significant cause of blindness in Africa [1]. Surgical treatment without initial trial of medical treatment has been found to give better results than postponing surgical treatment until medical treatment has been found inadequate [3,4]. In developing countries, medical treatment has been found more inadequate as compliance is almost always very poor. This is due to unavailability of drugs as well as the expensive nature. On the other hand, drainage operations are more prone to fail in Negroes, due to excessive fibrosis in the subconjunctival tissues [1,6].

Various reports in the past have obtained success figures for trabeculectomy in blacks, ranging from 65% [1] – 95% [7] in Northern Nigeria. In our study, a success rate of 91.2% (395 eyes) was achieved. Follow up of patients is usually difficult in our community, as patients tend to default after surgery. In this study though, follow up was reasonably good, 90.3% of patients (391) were followed up for between 6 months and 12 years compared to 71% in another study in the northern part of Nigeria [7]. The most likely reason for the good follow up in this institution is the health education talks during the glaucoma clinics explaining issues about glaucoma, medical and surgical therapy as well as the need for good follow up in all our patients.

The reduction in IOP was significant. The average initial IOP was 35.8 mmHg (range 12-74 mmHg), while the average pre operative IOP on medical therapy was 23.7mmHg. The average initial post operative IOP was 9.7 mmHg, with 92.2% of eyes having less than 21 mmHg without any additional medical therapy.

The most statistically significant outcome was the presence of blebs, which had a higher success rate than those without blebs ($x^2 = 5.07$, P-value = 0.02) Table 3. This has also been noted in other studies in Africans where the presence of a bleb was always associated with a well controlled IOP [7].

Another statistically significant outcome was the success rates in the different types of glaucoma. The most significant difference was between developmental glaucoma with a success rate of 100% and secondary glaucoma with a success rate of 50% (Fishers exact test $P = 0.004$). In this series, 50 patients had developmental glaucoma while only 4 patients had secondary glaucoma, the small number of patients with secondary glaucoma makes it difficult to make any meaningful deductions. Developmental glaucoma in our environment are operated upon within the first year of presentation while secondary glaucoma take years before surgery as attempts are being made to treat the primary cause of the glaucoma.

Patients with successful outcome were operated earlier 1.13 ± 0.45 years after presentation compared with those that had unsuccessful outcome 1.26 ± 0.68 years after presentation. This had been shown in previous studies by Jay and Hitchings [3,4]where early trabeculectomy after presentation was found to have a better success rate than initial medical therapy followed by trabeculectomy when medical therapy failed.

Trabeculectomies have been previously shown to be least successful under the age of 20 [11,12] and this was confirmed by our study.

The study by Miller and Barber on black patients showed the most successful age group to be the over 60's [12] which was also confirmed by our study. This was in addition to the 20-40 year old age bracket, which was also found to be highly successful in our study, but has not been noted by previous authors.

Complications in this study were mostly transient. The most common was the post-operative increase in intraocular pressure (198 eyes) which resolved within the first few days after surgery. In 38 eyes (8.8%) the IOP could not be successfully reduced below 21mmHg in spite of additional medical therapy in most of them. All the complications noted on Table 3 are well-recognized complications of trabeculectomy [1,7,12].

From our study, it is of note that trabeculectomy in black patients has a high success rate even though additional medical therapy may be required to obtain a satisfactorily low IOP. This is to prevent the downward progression of glaucoma to blindness and to ensure a reasonably good perfusion of the optic nerve head.

The presence of a filtering bleb is highly desirable in spite of the risk of subconjunctival fibrosis noted in blacks. Studies are already underway with the use of antimetabolites like 5- Fluorouracil and Mitomycin-C in blacks patients to see if the success rate of trabeculectomy could be improved upon.

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