

Initial treatment of glaucoma in a rural eye clinic in Cameroon: surgery or medications.

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Abstract

Objective : To report the outcome at one year after primary trabeculectomy with application of mitomycin-C in patient with primary open angle glaucoma in a rural Black West African population in Cameroon.

Patients and methods: Sixty three consecutive patients were enrolled in this retrospective study. Outcomes measured were post operative visual acuity, intra ocular pressure and complications at one year follow up. Absolute success was achieved when the IOP was ≤ 20 without adjuvant medication.

Results: Sixty three records (57.14 % (n=36) males and 42.86% (n=27) females) were included in this study. The mean age was 56 ± 14 years. The preoperative NCVA was ≥ 0.2 in 73.01% of eyes (n=46). At one year follow up visual acuity was stable in 79.36 % (n=50) eyes. The mean preoperative IOP was 34 ± 3.30 mm Hg, given a target IOP of 19.44 mmHg. The mean postoperative IOP was 17.60 ± 4.70 mmHg. This was significantly lower than the target pressure ($p= 0.001$). Trabeculectomy was indicated at the first consultation in 76.20% (n=48) patients. The absolute success rate was achieved in 73.01% of cases. Post operative complications included: 7 intraocular inflammations, 3 early IOP elevation, 11 late IOP elevation, 12 cataracts and 1 endophthalmitis.

Conclusion: Trabeculectomy with anti metabolites, can be an effective method of reducing the long-term risk of glaucomatous progression in Africa despite potential limitations in patient follow-up

Keywords: Primary open angle glaucoma, primary trabeculectomy, MMC, rural eye clinic

Introduction

Glaucoma is the second leading cause of blindness globally and the prevalence of open-angle glaucoma is highest in Africans. Cook C [1]. In a population-based, cross-sectional study Budenz DL et al [2] found a prevalence of primary open-angle glaucoma at 6.80% in an urban West African population in Ghana. Preussner PR et al [3] reported a prevalence of 8.20% in a rural Cameroonian region. Glaucoma is often undiagnosed and usually reveals itself mostly by its complications. The management of POAG lies essentially on the reduction of intraocular pressure by medical, physical or surgical means. Yorston et al [4] reported a high success with trabeculectomy associated with intra operative application of 5-fluorouracil (5-FU) Only early recognition and treatment of affected subjects can reduce glaucoma blindness. The aim of this study was to report the one year outcome of trabeculectomy with Mitomycin-C (MMC) at a rural eye clinic in Cameroon

Patients and Methods:

A total of 99 consecutive patients with POAG who underwent the first trabeculectomy with Mitomycin-C (MMC) at Manna eye clinic Nkongsamba between 2007 and 2010 were eligible for this retrospective study. Thirty six patients were excluded from analysis because they did

61 not complete at least a follow-up period of one year. Sixty six patients were enrolled in this
62 study.

63 **Ophthalmologic Examination**

64 Pre operative evaluation included; non corrected visual acuity (NCVA) tested on decimal
65 chart, intra-ocular pressure (IOP) taken by aplanation with Goldmann tonometer, papillary
66 excavation evaluated by the indirect fundoscopy. The mean target IOP was obtained from the
67 mean IOP using the Thierry Zeyen method [5]. The time frame between diagnosis and
68 trabeculectomy was also analyzed. Postoperative data were collected at one week, 1 month, 3
69 months 6 months and 1 year. At each visit VA, IOP, current medications and complications
70 were assessed. Follow-up was done in our clinic or by our outreach team in out stations.
71 Worsening of VA was defined as a decrease of two lines of pre operative VA at one year
72 follow-up. Global success of the filtering surgery was defined after one year as an $IOP \leq 20$
73 mmHg with or without adjuvant glaucomatous medications. Absolute success was achieved
74 when the IOP was ≤ 20 without adjuvant medication and **relative success was defined as an**
75 **$IOP \leq 20$ with adjuvant glaucomatous medications** . Failure was defined as an IOP higher
76 than 20 mmHg despite topical treatment with anti glaucomatous medication.

77 **Surgical Procedure**

78 All procedures were performed by the same surgeon **(KG)**. After a peri bulbar bloc with 2%
79 Xylocaine, a fornix based temporal conjunctiva flap was made. The sclera was slightly
80 cauterized. A piece of cotton saturated with 0.40mg/ml MMC was placed over the sclera for
81 5 minutes, and then irrigated with 40 ml saline. A 4x4 rectangular sclera flap, one half of the
82 sclera thickness, was performed. Paracentesis was made temporally. After the trabecular
83 meshwork excision and peripheral iridectomy, the sclera flap was sutured with 10.0 nylon (2
84 to 4 sutures). The anterior chamber was reformed with the saline through the paracentesis and
85 at this moment, the filtration was tested and adjusted. Conjunctiva was sutured continuously
86 with 8.0Vicryl suture. Sub conjunctival depot of Triamcinolone was given and the eye was
87 patched under antibiotic- steroid ointment until following morning. Postoperatively, patients
88 received a topical antibiotic-steroid combination at **one drop six times a day** for 3 days, then 3
89 times daily for one week. **Tropicamide was dropped** twice daily for 3 days. Thereafter,
90 topical AINS was given 3 times daily for 3 to 4 months. Anti glaucomatous drugs was given
91 according to the level of the IOP.

92 **Statistical analysis**

Data were analyzed using Epi-Info 3.5.1. Qualitative variables were presented as percentages (%) while quantitative ones as mean $\pm$ standard deviation (SD). The Student T test was used to compare mean of quantitative variables. *P*-values less than 0.05 were considered statistically significant.

Results.

In the study period, a total of 2381 eye surgery were carried out in Manna eye clinic, among which 4.16%. (n=99) trabeculectomies for POAG. Data from 63 patients who completed a follow-up of at least one year were analyzed. Table 1 summarizes the baseline characteristics of our patients. There were 57.14 % (n=36) males and 42.86% (n=27) females. The mean age at presentation was 56 ± 14 years ranged 12 to 79 years. The pre operative NCVA on the operated eye was ≥ 0.20 in 73.01% of eyes (n=46) while in the non operated eye, NCVA was >0.20 in 15.87% (n=10). At one year follow up operated eye showed a stabilized visual acuity in 79.36 % (n=50) of cases and decreased in 20.64 % (n=13) of cases. The mean pre operative IOP was 34 ± 3.30 mm Hg, given a target IOP of 19.44 mmHg. The mean post operative IOP was 17.60 ± 4.70 mmHg at one year follow up. This was significantly lower than the target pressure ($p= 0.001$). The cup/disc ration was > 0.8 in 68.25% (n= 43). Trabeculectomy was indicated at the first consultation in 76.20% (n=48) patients presenting with newly diagnosed (previously untreated) glaucoma in advanced stage. In 23.80% (n=15) surgery was indicated because of poor compliance to medical therapy. 63.49 % (n=40) underwent trabeculectomy within 3 months after the diagnosis. Trabeculectomy success included: absolute success 73.01% (n=46), relative success 14.29% (n=9), global success 87.30 % (n=55). Failure accounted for 12.69% (n=8). Post operative complications included: 11.11% (n= 7) intraocular inflammation, 22.22% (n=14) IOP elevation (3 early and 11 late elevations), 19.04% (n=12) cataracts and 1.58 % (n=1) endophthalmitis.

Discussion

Trabeculectomy associated with MMC resulted in a significant long-term reduction of IOP in a group of rural Cameroonians. Trabeculectomy represents 5.70% of all surgical procedures in our clinic. This does not represent the total number of patients presenting an indication for surgery but only those who consented. Adekova BJ et al [6] reported a significant proportion

of patient who refused glaucoma surgery in Nigeria. The mean age at presentation of 56 ± 14 year is higher than 42.62 year reported by Ellong A et al [7] in the urban milieu in Douala. This suggests that patients with glaucoma in rural areas present very late to eye services. Appropriate programs for early detection and treatment of glaucoma in this area are therefore necessary. In their study, Kyari F et al [8] showed that POAG may start earlier and progress more rapidly in African patients than in Caucasians. Therefore, screening for glaucoma should be started early between 20 to 30 years in African populations. The male predominance observed in our study was also reported by other authors [2], this corroborates the fact that POAG is more frequent and has a faster evolution in men than in women. However, Ombwa Eballe A et al [9] reported females predominance in their study carried out in the gynecologic and pediatric hospital in Yaounde. In the current study the decrease in visual acuity was attributed to lens opacity secondary to trabeculectomy. The work of Karlen ME et al [10] and Mermoud A et al [11] showed that visual acuity generally returned to its preoperative value after trabeculectomy. The primary goal in treatment of glaucoma is the lowering IOP to prevent further progression of the disease. This can be achieved either conservative by medical or physical means or by surgery. According to many authors [12,13] medical therapy is currently the first line of glaucoma treatment and trabeculectomy must be considered only after failure of medical and physical treatment. This can be explained in developed countries by the availability and accessibility of more efficient new drugs such as prostaglandins. In our study, surgery was indicated at the first consultation in 76.20% (n=48) patients presenting with advanced glaucoma with a CD of more than 0.8. Balo KP et al [14] Gessesse GW [15] also advised trabeculectomy as the primary therapy in sub Sahara countries for advanced glaucoma. Sherwood MB [16] advocated that filtration surgery provides better intraocular pressure control than medical treatment. Moreover, long-term side effects of topical administration of eye drop may affect the quality of life of the patient. Also the annual cost of the medical therapy with prostaglandin analog (400 US Dollars) is 4 times higher than the life long single trabeculectomy with MMC (100 US Dollars). In 33.02%, surgery was indicated because of poor compliance to medical therapy. Glaucoma is an asymptomatic disease. In the absence of clinical signs such as severe pain and decreased visual acuity, it is difficult to convince patients in rural areas to administer eye drops for life. Socio economical factors, lack of awareness, poor education and inadequacy of trained eye care personnel contributed to the late presentation. Similar findings were reported in Ethiopia by Giorgis AT [17]. In developed countries, the first screening for glaucoma is done by the age of 40 when

the patient needs the first reading glasses. In our milieu, cheaper reading glasses are available on the road side and everybody can get it without eye examination.

In the current study, MMC was used in all cases. Indeed, it was demonstrated that melanoderma and young age were risk factors for trabeculectomy failure. Mwanza JC [18] et al in Congo reported a high success rate of trabeculectomy with MMC. In our study, 0,4mg/ml of MMC was applied on the sclera for 5 minutes. Klos-Rola J et al [19] suggested that topical application of topical bevacizumab 5 mg/ml five times a day for 20 days might favor functional bleb formation after trabeculectomy in eyes with a high risk of failure. In a recent study on trabeculectomy, Hogewind et al [20] found that the bleb failure rates for MMC and for sub-tenon injection of purified triamcinolone acetonide were comparable at five years. Corticosteroids thus seem to be appropriate alternative for anti fibrotic agents. MMC may be the likely cause of endophthalmitis in the cases reported in this series. It appeared 12 weeks after the surgery. This rare late complication has also been reported by Wallin O et al [21] who found 8 (0.7%) late infections with the use MMC in 1171 surgeries.

This suggests that operated patients should be educated about the long term follow-up as many complications can appear later .Thirty six patients were lost to follow up before one year. Several sociocultural reasons may explain the high dropout recorded in this study; access to health centers is challenging during the rainy season, while most of the patients who are essentially farmers will prefer to go to their farms in such periods. The absence of immediate improvement in visual acuity may be dissuasive for some. The mean preoperative overall IOP was significantly lower than the target pressure ($p= 0.001$).

In our series the global success rate (IOP<20 mmHg) at one year follow-up was 87.30% with 14.28% of them dependent on anti glaucomatous drugs. Our results are similar to 81.10% reported by Komolafe OO et al [22] in Nigeria who performed trabeculectomy with 5-fluorouracil using releasable suture technique. However, our success rate is lower than 93.75% and reported by Ellong A et al [23]. This difference could be due to their success criteria (IOP less than 21mmHg).

Intraocular inflammation appears frequently after the trabeculectomy and continues until one month after the operation. It is mostly due to the opening of the anterior chamber and peripheral iridectomy which induce the rupture of hemato aqueous barrier, causing the release of various inflammatory mediators, as well as the recruitment and stimulation of many cells of inflammation. This can lead to a transient early increase in IOP. The postoperative intraocular hypertension is the result of decreased filtration through the newly formed

189 filtration channel. Excessive conjunctiva fibrosis represented the main etiology for late IOP
190 elevation. Cataracts accounted for 19.04% of complications in the current study. This finding
191 is more than 8.5% reported by Bernadin P et al [24]. Cataract formation after trabeculectomy
192 depends on the surgical technique, the patient age, and the presence of other cataractogenous
193 factors (diabetic, higher myopia) and the pre existing lens opacity. The worsening in VA
194 secondary to cataract formation can constitute a barrier for glaucoma surgery.

196 **Conclusion:**

197 This study suggest that trabeculectomy with MMC is effective in reducing the risk of
198 glaucomatous progression over long-term follow-up in Africa. Surgery must be thus
199 considered as the initial glaucoma treatment in Africa. Appropriate strategies must be
200 developed to facilitate early detection early surgery. However, the lack of Visual field and
201 pachymetry data were the main limits of our study. We could not prove that the achieved post
202 operative IOP was sufficient to stabilize the glaucoma.

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220 **CONSENT**

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222 Written informed consent was obtained after explaining the nature of the procedure from all
223 patients (or legal relatives) before surgery.

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225 **ETHICAL APPROVAL**

226 The study was approved by the national ethics committee (N^o 125/CNE/SE/20010)

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231 **References**

232 1- Cook C, Foster P. Epidemiology of glaucoma: what's new? Can J Ophthalmol.2012 Jun

233 47(3):223-6

234 2- Budenz DL, Barton K, Whiteside-de Vos J, Schiffman J, Bandi J, Nolan W, Herndon L,

235 kim H, Hay-Smith G, Tielsch JM, Tema Eye Surgery Group. Prevalence of glaucoma in

236 an urban West African population: the Tema Eye Survey. JAMA Ophthalmol. 2013 May;

237 131(5): 651-8

238 3- Preussner PR, Grossmann A, Ngounou F, Kouogan G, Tamon J. Glaucoma screening in

239 Western Cameroon. Graefes Arch Clin Exp Ophthalmol. 2009 Dec; 247(12):1671-5

240 4- Yorston D, Khaw P. A randomised trial of the effect of intraoperative 5-FU on the

241 outcome of trabeculectomy in east Africa Br J Ophthalmol. Sep 2001; 85(9): 1028–1030

242 5- Zeyen T. Target pressures in glaucoma. Bull Soc Belge Ophtalmol 1999;274:61-5.

- 243 6- Adekova BJ, Akinsola FB, Balogun BG, Balogun MM, Ibidapo OO. Patient refusal of
244 glaucoma surgery and associated factors in Lagos, Nigeria. Middle East Afr J Ophthalmol.
245 2013 Apr-Jun;20(2):168-73
- 246 7- Ellong A, Ebana Mvogo C, Bella-Hiag AL, Nyouma, Ngosso A, Njoh Litumbe. La
247 prévalence des glaucomes dans une population de noirs camerounais. Santé 2006;16:83-8.
- 248 8- Kyari F, Abdull MM, Bastawrous A, Gilbert CE, Faal H. Epidemiology of glaucoma in
249 sub-saharan Africa: prevalence, incidence and risk factors. Middle East Afr J
250 Ophthalmol. 2013 Apr-Jun;20(2):111-25
- 251 9- Ombgwa Eballe A, Owono D, Bella A, Ebana C, Din long, Aboutou R. Caractéristiques
252 cliniques et épidémiologiques du glaucome chronique à angle ouvert Etude hospitalière à
253 Yaoundé. Santé 2008;18:19-23.
- 254 10- . Karlen ME, Sanchez E, Schnyder CC, Sickenberg M, Mermoud A. Deep sclérectomy
255 with collagen implant : medium term results. Br J Ophtalmol 1999;83:6-11.
- 256 11- Mermoud A, Schnyder CC, Sickenberg M, Chiou AG, Hediguer SE, Faggioni R.
257 comparison of deep sclérectomie with collagen implant and trabeculectomy in open-angle
258 glaucoma. J Cataract Refract Surg 1999;25:323-3
- 259 12- Chae B, Cakiner –Egilmez T, Desai M. Glaucoma medications Insight. 2013
260 Winter;38(1):5-9
- 261 13- Baudouin C, Denover A, Rostène W. [Glaucoma today: detection and therapeutic
262 progress.]. Biol Aujourd'hui. 2013;207(2):87-95
- 263 14- Balo KP, Adjiovon K, Bechetiole A. Evolution tonométrique après la trabéculectomie : A
264 propos de 105 cas observés au CHU de Lomé. J Fr Ophtalmol 1997;20 (5):339-44.
- 265 15- Gessesse GW, Damji KF. Advanced glaucoma: management pearls. Middle East Afr J
266 Ophthalmol. 2013 Apr-Jun;20(2):131-41
- 267 16- Sherwood MB, Migdal CS, Hitchings RA, Sharir M, Zimmerman TJ, Schultz JS.
268 Initial treatment of glaucoma: surgery or medication. Surv Ophthalmol. 1993 Jan-
269 Feb;37(4):293-305
- 270 17- Giogis AT, Mulugeta A, Aga A, Deyassa N. The spectrum of glaucoma presentation at
271 Menelik II Hospital, Addis Ababa. 2012 Jul;50(3):259-64
- 272 18- Mwanza JC, Kabasele PM. Trabeculectomy with and without mitomycin-C in a black
273 African population. Euro J Ophthalmol. 2001 jul-Sep;11(3): 261-3
- 274 19- Klos Rosa J, Tulidowicz-Bielak M, Zarnowski T. Effects of topical bevacizumab
275 application on early bleb failure after trabeculectomy: observational case series. Clin
276 Ophthalmol. 2013;7: 1929-35

- 277 20- Hogewind B.F.T, Pijl B, Benedict C, Theelen T. Purified triamcinilone acetonide as
278 antifibrotic adjunct in glaucoma surgery. Graefes Arch clin Exp Ophthtalmol. 2013;
279 251:1213-1218
- 280 21- Wallin O, Al-Ahramy AM, Lundström M, Montan P. Endophthalmitis and severe blebitis
281 following trabeculectomy. Epidemiology and risk factors; a single-centre retrospective
282 study. Acta Ophthalmol 2013 Sep 11 [Epub ahead of print]
- 283 22- Komolafe OO, Ashave AO, Bekibele CO, Baiyeroju AM, Olawove OO. Outcome of
284 trabeculectomy with 5-fluorouracil using releasable suture technique in a Nigerian
285 Tertiary Hospital. West Afr J Med 2011 May-Jun; 30(3):173-7
- 286 23- Ellong A, Ebana Mvogo C, Bella-Hiag AL, Ngosso A. La trabéculéctomie : résultats
287 tonométriques à long terme chez le camerounais expérience de l'Hôpital Général de
288 Douala. Med Afr Noire 2001;48(1):21
- 289 24- Bernadin P, Abenanto Andro IC, Auzemery. La trabéculéctomie à Madagascar,
290 étude rétrospective sur 3 ans. Ocul Trop Subtrop Santé Publique 1994; 71:125-35.

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292 **Table 1 Data of the demographie, preoperative and postoperative and surgical complications**

Patients included	63
Age (years, mean $\pm$ SD)	56 $\pm$14
gender	36 (57.14)
-Male (%)	27 (42.86)
-Female (%)	
Preoperative IOP (mmHg, mean $\pm$SD)	34 $\pm$3.3
Target IOP (mmHg)	19.44
Postoperative IOP (mmHg, mean $\pm$SD)	17.60 $\pm$4.70
Cup/disc ratio $\geq$0.8 (%)	43 (68.25%)
Trabeculectomy success (%)	
- global success	55 (87. 30)
- absolute success	46 (73,01)
- relative success	9 (14,29)

Complications (%) - Intra ocular inflammation - IOP elevation (3 early and 11 late elevation) - Cataracts -Endophtalmitis.	7 (11,11) 14 (22.22) 12 (19.04) 1 (1.58)
Management cost -Annual cost of Prostaglandin analog (US Dollars) -Trabeculectomy + MMC+ Acommodation (US Dollars)	400 100

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