



# Initial Treatment of Glaucoma in a Rural Eye Clinic in Cameroon: Surgery or Medications

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## Authors' contributions

*This work was carried out in collaboration between all authors. Author KG designed the study, wrote the protocol. Authors KG and NTG analyzed the data. Authors KG and DC wrote the first draft of the manuscript. Authors KG, DC and NTG contributed to the writing of the manuscript. Authors KG, DC and PW agree with manuscript results and conclusions. All authors jointly developed the structure and arguments for the paper and made critical revisions and approved final version. All authors reviewed and approved of the final manuscript.*

## Article Information

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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

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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  $\leq 20$  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  $56 \pm 14$  years. The preoperative NCVA was  $\geq 0.2$  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  $34 \pm 3.30$ mmHg, given a target IOP of 19.44mmHg. The mean postoperative IOP was  $17.60 \pm 4.70$ 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.*

## 1. 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.

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

### 2.1 Ophthalmologic Examination

Pre operative evaluation included; non corrected visual acuity (NCVA) tested on decimal chart, intra-ocular pressure (IOP) taken by aplanation with Goldmann tonometer, papillary excavation evaluated by the indirect fundoscopy. The mean target IOP was obtained from the mean IOP using the Thierry Zeyen method [5]. The time frame between diagnosis and trabeculectomy was also analyzed. Postoperative data were collected at one week, 1 month,

3 months 6 months and 1 year. At each visit VA, IOP, current medications and complications were assessed. Follow-up was done in our clinic or by our outreach team in out stations. Worsening of VA was defined as a decrease of two lines of pre operative VA at one year follow-up. Global success of the filtering surgery was defined after one year as an IOP  $\leq 20$  mmHg with or without adjuvant glaucomatous medications. Absolute success was achieved when the IOP was  $\leq 20$  without adjuvant medication and relative success was defined as an IOP  $\leq 20$  with adjuvant glaucomatous medications. Failure was defined as an IOP higher than 20mmHg despite topical treatment with anti glaucomatous medication.

## 2.2 Surgical Procedure

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

## 2.3 Stastical 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.

## 3. 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 $\pm$ 14 years ranged 12 to 79 years. The pre operative NCVA on the operated eye was  $\geq 0.20$  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 $\pm$ 3.30mm Hg, given a target IOP of 19.44mmHg. The mean post operative IOP was 17.60 $\pm$ 4.70mmHg 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.

**Table 1. Data of the demographic, preoperative and postoperative and surgical complications**

<b>Patients included</b>	<b>63</b>
<b>Age (years, mean±SD)</b>	56±14
<b>Gender</b>	
Male (%)	36(57.14)
Female (%)	27(42.86)
Preoperative IOP (mmHg, mean±SD)	34±3.3
Target IOP (mmHg)	19.44
Postoperative IOP(mmHg, mean±SD)	17.60±4.70
Cup/disc ratio≥0.8 (%)	43(68.25%)
<b>Trabeculectomy success (%)</b>	
Global success	55(87.30)
Absolute success	46(73.01)
Relative success	9(14.29)
<b>Complications (%)</b>	
Intra ocular inflammation	7(11.11)
IOP elevation ( 3 early and 11 late elevation)	14(22.22)
Cataracts	12(19.04)
Endophthalmitis	1(1.58)
<b>Management cost</b>	
Annual cost of prostaglandin analog (US Dollars)	400
Trabeculectomy+MMC+accommodation (US Dollars)	100

#### 4. 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, Omgbwa 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 conservatively 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 lifelong single trabeculectomy with MMC (100US 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 et al. [18] 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 5mg/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<20mmHg) 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 filtration channel. Excessive conjunctiva fibrosis represented the main etiology for late IOP elevation. Cataracts accounted for 19.04% of complications in the current study. This finding is more than 8.5% reported by Bernadin P et al. [24]. Cataract formation after trabeculectomy depends on the surgical technique, the patient age, and the presence of other cataractogenous factors (diabetic, higher myopia) and the pre existing lens opacity. The worsening in VA secondary to cataract formation can constitute a barrier for glaucoma surgery.

## **5. CONCLUSION**

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

## **CONSENT**

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

## **ETHICAL APPROVAL**

The study was approved by the national ethics committee (N<sup>o</sup> 125/CNE/SE/20010).

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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