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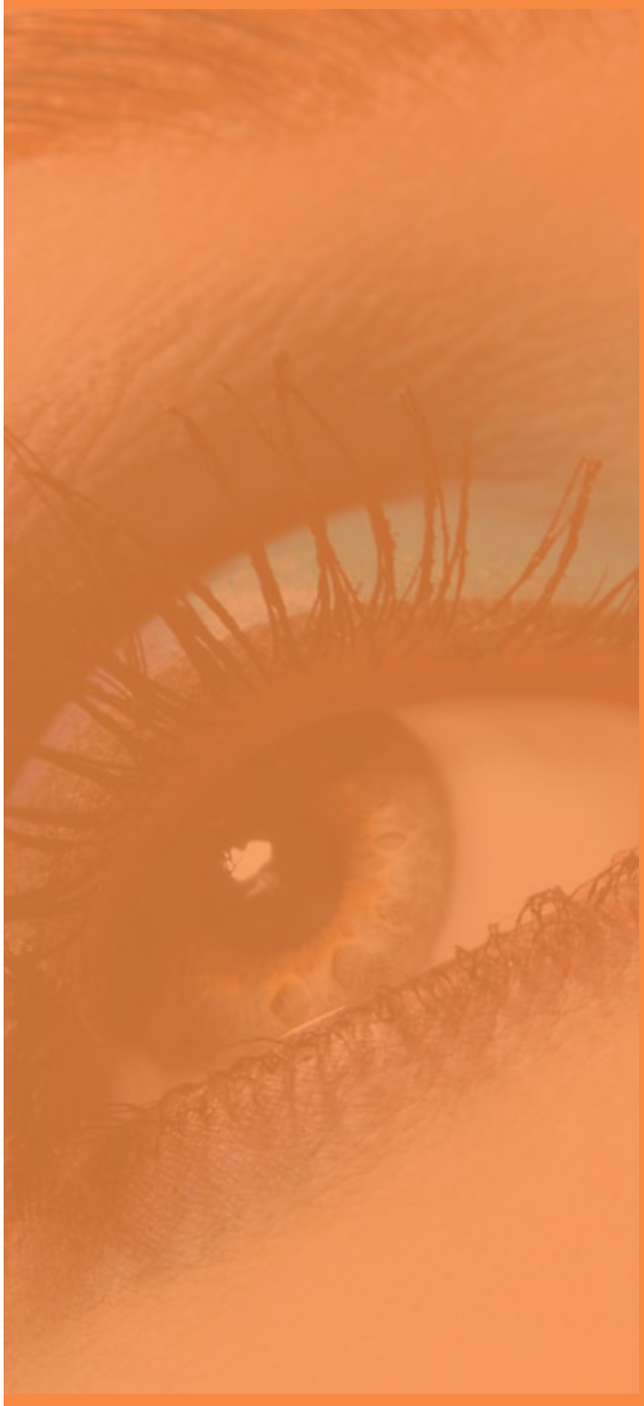

1 **Editorial: Conference scientific committees-what do they do?**
Nyawira M, Mukuria M, Bitok M

3 **National guidelines for screening and management of retinopathy of prematurity in Kenya: an overview of the recommendations**
Sitati S, Mwangi N, Njambi L, Onyango O, Gachago M, Mundia D, Murila F

6 **Review of outcome of horizontal childhood strabismus surgery at Kenyatta National Hospital and Kikuyu Eye Unit**
Fazal AF, Kimani K, Nyamori J, Mundia D

11 **Psychological experiences of adult patients with blindness secondary to glaucoma at Lions Sight First Eye Hospital in Blantyre, Malawi**
Chilonga FS, Kayange PC, Manda CS, Zungu TL, Masulani-Mwale C

15 **Indications for destructive eye surgery at Sekuru Kaguvi Eye Hospital, Zimbabwe**
Mangombe S, Masanganise R

19 **Central corneal thickness and its relationship with IOP, visual fields and optic disc parameters among glaucoma patients attending Eye Hospital at University Teaching Hospital in Lusaka Zambia**
Muma MKI, Nyalazi JIM, Mumba T, Zulu G, Syakantu G, Chinama – Musonda LM, Bailey R, Simulundu E, Michelo C

27 **Conjunctival malignant melanoma mimicking scleromalcia perforans: a case report**
Mulatu DG, Adamu Y, Ayalew M

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Editorial: Conference scientific committees-what do they do?

For the majority of us who attend scientific conferences regularly, there are only three points at which we consciously engage with the scientific committee: when we send our abstracts before the conference, share our slides and posters at the conference and when the committee is formally introduced to the conference audience. Beyond that, the role of the committee, and how it is navigated, is a mysterious 'black-box'. Despite the large number of international, national and local scientific meetings, there is paucity of literature on scientific committees[1]. Conferences are learning opportunities, but this is a frequently missed learning opportunity[2,3]. What can we learn from the experience of a scientific committee for a national professional conference?

The first annual conference of the Ophthalmological Society of Kenya (OSK)[4] provides a timely snap shot. This one-day conference was held on 30th November 2018 in Nairobi. The organizing committee appointed a core scientific committee of three (two thirds female), with the possibility to co-opt additional members. There is no standard guidance on the size of committees, and this number worked very well. Suitable criteria for membership advanced in the literature include; reputation among the scientific community; evidence of previous research engagement, such as research publications; ability to review scientific papers and previous participation in a scientific committee[1]. We found the following attributes to be invaluable: willingness to dedicate a significant amount of time to the work; access to communication media, being well-networked with the professional community, experience with oral and visual conference presentation; competency in information technology skill and an eye for diversity.

The main functions of the scientific committee were to: (i) assess abstracts submitted for the conference (ii) prepare a scientific program (iii) monitor the progress of the scientific program at the conference (iv) administer the best abstract awards. These functions are embodied within the broader context of organizing the entire conference hence the ability of a scientific committee to meet its tasks is critical to the achievement of the objectives of the conference. While the committee worked independently, accountability and feedback to the organizing committee was maintained. Close links were maintained with other committees of the congress as well. The budget committee for example facilitated the printing costs, hiring poster boards and purchasing awards. The conference organizer was on hand for logistics, such as organizing the congress space, sourcing for the required resources and updating the conference website. Regular joint meetings, group email, telephone conversations, WhatsApp group, Google sheets, and Skype communication strategies were valuable for ensuring smooth coordination.

The main responsibility of a scientific committee is to guarantee the scientific merit of the congress[5]. The quality and scope of the scientific content for both oral and poster presentations is a starting point. An all-inclusive approach with dedicated sessions for clinical, policy, public health, research and professional experiences was important for balance. As there were more than enough abstracts for oral presentation and very few poster presentations, flexibility was required - some presenters needed to change to poster presentations. Fortunately, this did not result in overt conflict.

The literature has identified expert engagement as an enabler for quality[5]. We found it necessary to consult with experts in the different thematic areas of the conference as we prepared the program. In selecting moderators and chairpersons for each session, we considered expertise, availability and inclusivity. Further, we ensured that persons with these roles did not double up as speakers within their session, as is best practice.

We had print copies of the conference program, but the abstract booklet and the feedback survey form were published on the OSK website. We argued three benefits for electronic distribution: to enable future reference by attendees, contribute to reducing the environmental impact of scientific conferences[2] and reduce the printing costs. On the other hand, print copies were of immediate use to the attendees who did not have constant access to internet facilities. We hope that we can progressively embrace a paperless conference in the future.

We learnt the need for inclusiveness of interests in all aspects of the congress, including the participants, the speakers, the session chair and moderators. We made effort to encourage diversity in terms of seniority, expertise, affiliation or background. We did not publish or share speaker slides on the OSK website, which reflects a level of exclusivity. It is envisaged that in future the slides will be available on the website in order to maximize access to the scientific content and influence practice.

The conference program ran smoothly and we did not experience profound challenges such as speaker cancellations. Although we had envisaged clear role

distinction[7], we noted an overlap in the roles of the session chair and moderator. Time constraints and the need for spontaneity may have contributed to this, but it did not result in any identifiable adverse consequences.

To help with time management, at the start of each session the speakers were reminded to keep to time limits. We had a digital stopwatch on a large screen prominently displayed for the presenters. A volunteer sitting directly opposite the podium carried a visible placard to alert the speaker when time remaining was only 3 minutes and 1 minute. A bell was rung upon expiry of the time. Despite these measures, many speakers had difficulty keeping to the allocated time limits. As this automatically affects subsequent sessions, session chairs need to be constantly vigilant to ensure that sessions end at just the right time[7].

We encountered a few technical problems with the audiovisual equipment, especially in the transition between platform speakers. Occasionally the computer would hang or the pointer would not work. These constraints are largely expected, therefore we would recommend arranging for a dedicated technician to be on stand-by.

We developed a criteria for the selection of best abstracts from the entire pool of abstracts submitted. The four criteria that we used were quality, relevance, importance and innovativeness, all considered in relation to the themes of the conference. A similar mix of criteria have been used in other scientific meetings of medical associations[8]. We recommend that committees carefully select the criteria for this task and these need not be the same at each conference.

We had three categories for best abstract awards, namely oral presentation, poster presentation and abstracts by residents. Awardees were announced during the closing dinner of the congress, and received physical tokens as awards. After the congress we received suggestions from participants - that documentary evidence of the awards, such as certificates or letters of commendation, would also be desirable. This can be considered in future meetings.

What is the punchline? The role of a scientific committee is more than gatekeeping to select the right abstracts. The committee can increase the value obtained from the conference. Scientific committees must be forward-looking and innovative to meet the needs of the scientific community. This will require momentum from all of us as we engage with conferences and conference committees.

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National guidelines for screening and management of retinopathy of prematurity in Kenya: an overview of the recommendations

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ABSTRACT

Retinopathy of Prematurity (ROP) is a challenge to neonatology and ophthalmology, as it causes blindness before the age of six months of age. In low and middle income countries, it is an upcoming epidemic and important cause of childhood blindness. Guidelines in many developing countries are lacking. The objective of the national guidelines for screening and management of ROP in Kenya is to improve the access, quality and coverage of prevention, screening, treatment and follow-up in ROP services. In this article, we provide an overview of the guidelines to facilitate their implementation by those providing care in new born units and eye care services.

Key words: Retinopathy of Prematurity, Prematures, Screaning Guidelines, Retina, Kenya

INTRODUCTION

Retinopathy of Prematurity (ROP) is a progressive, sight threatening, vaso-proliferative retinal disorder unique to premature infants[1]. It is the leading cause of childhood blindness in the developed world. Advances in neonatology in Low and Middle Income Countries (LMICs) have improved the survival rates for preemies, and consequently the rising prevalence of ROP[2]. In Kenya, prevalence of up to 40% has been reported in hospitals with well-established neonatal units[3-6]. Early detection through screening for all newborns at risk and prompt treatment can prevent blindness. However, clinical guidelines for screening and management of ROP (herein referred to as guidelines) are paradoxically lacking in LMICs. The Kenya ROP working group developed guidelines that were published in 2018[7]. These guidelines were adapted from existing guidelines with incorporation of local experience and local context[8]. In this article, we provide an overview of the guidelines for the benefit of those providing care in new born units and eye care services.

The objective of these guidelines is to improve the access, quality and coverage of prevention, screening, treatment and follow-up in ROP services. Close collaboration between neonatology/child health and ophthalmology, as well as obstetrics is encouraged. The guideline document is a comprehensive 30-page document with detailed recommendations for screening and management of ROP[7]. This article however, provides an overview that may be used as a quick reference by all clinical cadres and administrators involved in the care of premature infants.

PREVENTION OF RISK FACTORS OF ROP

This can be summarized by the POINTS of care for new-born infants, which addresses common risk factors for ROP[9]. These are summarized in Table 1, and they highlight the important roles of caregivers and a multidisciplinary team of health care providers.

Table 1: POINTS of care for new born infants[9]

Pain control	Reduce unnecessary painful procedures, prevent pain by swaddling, use of oral sucrose/glucose, pacifier, use of systemic analgesics during procedures
Oxygen management	Judicious use of ventilation and supplemental oxygen, oxygen saturation %SpO_2 monitoring (should be between 91-95%), equipment to safely deliver and monitor oxygen therapy
Infection control	Hand washing by all persons entering new born unit (NBU), before and after handling baby, avoid sharing equipment between babies to avoid cross contamination
Nutrition	Exclusive breastfeeding is recommended
Temperature control	Keep preterm babies warm by wrapping, putting in an incubator or under a warmer
Supportive care	Kangaroo care, good positioning in the incubator or cot, minimize blood transfusions

RECOMMENDATIONS FOR SCREENING

The key parameters that determine who should be screened are: Gestational age ≤ 32 weeks and/or birth weight ≤1500grams[7]. Neonates with co-morbidities or an unstable clinical course who fall outside these criteria should also be screened. A decision algorithm (also available as a poster) can assist those working in neonatal units to make quick decisions on the selection of babies to be screened, as illustrated in Figure 1.

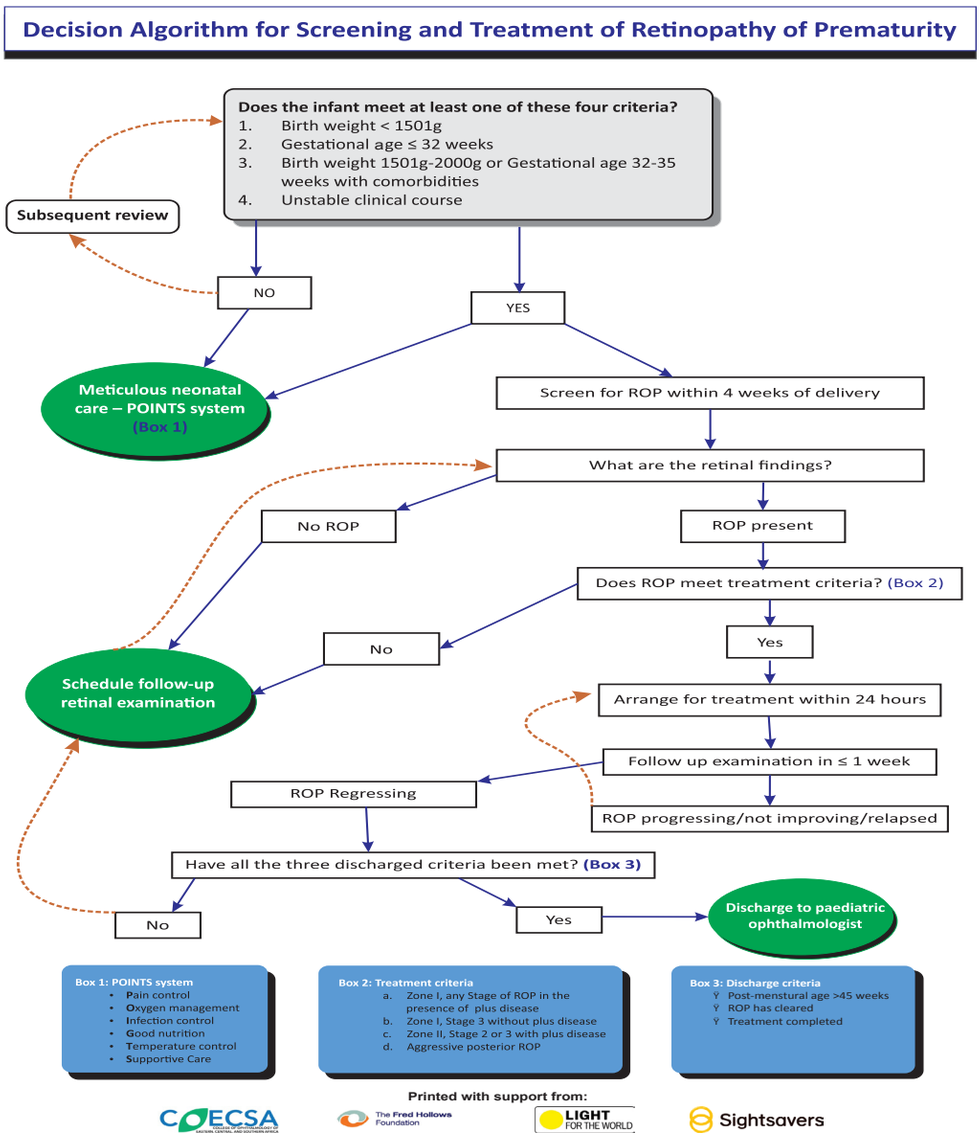

Figure 1: Decision algorithm

Eye examinations are carried out in the neonatal unit by an ophthalmologist, following dilatation of the infant's eyes (using a mydriatic cocktail drop of tropicamide 1% and phenylephrine), then by using an indirect ophthalmoscope and a 20D/28D/30D lens[7]. An eyelid speculum and indenter may be used to help visualize the periphery. Infection control practices must be put in place to prevent cross-infection between babies. Serial exams are done at least fortnightly, starting at one month post-birth. This means that identification of infants for screening begins on admission, and those not examined in the unit must be examined as out-patients in the clinic.

Infants may be discharged from ROP screening when they achieve vascularisation to zone III, achieve 45 weeks gestational age or when ROP completely regresses[7]. Thereafter, follow up is done by the paediatric ophthalmologist for refractive errors, strabismus and other conditions which may develop as a result of prematurity or ROP treatment.

RECOMMENDATIONS FOR TREATMENT OF ROP

Not all infants who develop ROP require treatment. Type 1 ROP necessitates treatment, that is any Zone I disease with plus disease, Zone I stage 3 disease or Zone 2/3 with plus disease. Aggressive Posterior ROP (APROP) also requires prompt treatment. Treatment for ROP is urgent and should be given within 24-48 hours of diagnosis[7]. Treatment modalities and recommendations are indicated in Table 2. Choice of treatment modality is made by the treating ophthalmologist, based on availability of equipment and monitoring facilities available for infants in the neonatal unit.

Table 2: Recommendations for choice of treatment for ROP

Modality	Recommendation
Anti-vascular endothelial growth factor (anti-VEGF), bevacizumab or ranibizumab	Zone I disease
Laser (indirect laser photocoagulation)	Zone II or III disease Stage 4 disease (in combination with surgery)
Pars plana vitrectomy(PPV)+ air fluid exchange (AFE)	Stage 4 and 5 disease

OUTCOMES OF ROP

Majority of ROP regresses spontaneously with close follow up and without treatment. Treatment of severe ROP is also associated with better long-term visual and structural outcomes. If untreated, severe ROP leads to blindness before the age of six months. A small proportion of preterm infants may also progress despite treatment. Close monitoring after treatment is required for early detection and re-treatment if necessary[7].

CONCLUSION

The elimination of childhood blindness is an important agenda for both ophthalmologists and paediatricians. Blindness due to ROP is emerging as an important cause of childhood blindness in Kenya. This is a condition that is both preventable and treatable. A multi-disciplinary approach involving parents/caregivers, obstetricians, ophthalmologists, paediatricians, nurses and administrators is important in stemming the second wave of ROP that is presenting in low and middle income countries.

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Review of outcome of horizontal childhood strabismus surgery at Kenyatta National Hospital and Kikuyu Eye Unit

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ABSTRACT

Background: With early management of strabismus, improved visual acuity and better cosmetic outcomes can be achieved. Strabismus surgery aims to improve the cosmetic appearance of the eyes and eventually reduce the negative psycho-social impact, possibly restore Binocular Single Vision (BSV) and centralize or expand the field of BSV hence this study is of importance to determine whether we are achieving the aims of surgery.
Objectives: The aim of this study was to determine the outcome of horizontal childhood strabismus surgery at Kenyatta National Hospital (KNH) and Kikuyu Eye Unit (KEU).
Methods: A retrospective case series was carried out targeting children who underwent strabismus surgery.
Results: A total of 199 children (0 – 15 years) who had corrective strabismus surgery from June 2008 to June 2013, of whom 122/199 (61.3%) completed the 2-3 month follow-up. Forty one out of ninety (45.6%) cases of esotropia and 19/32 (59.4%) cases of exotropia had a good outcome, while the poor outcome was 15/90 (16.7%) and 2/32 (6.3%), respectively. Bilateral medial rectus recession for esotropia had 12/34 (35.3%) good outcome and 6/34 (17.6%) poor outcome, while recess-resect procedure for esotropia had 27/53 (50.9%) good and 9/53 (17%) poor outcome. Bilateral lateral rectus recession for exotropia had 4/9 (44.4%) good and 1/9 (11.1%) poor outcome, while for recess-resect procedure for exotropia had 15/23 (65.2%) good and 1/23 (4.3%) poor outcome.
Conclusions: The most common type of paediatric strabismus was esotropia. Most common surgery performed was a recess-resect procedure for all types of tropia. Surgical success rate was generally good.

Key words: Amblyopia, Binocular single vision, Strabismus, Surgical outcome, Refraction

INTRODUCTION

Ocular alignment is the mechanism that ensures the fovea of the eye fixates on an object of interest in order to achieve normal Binocular Single Vision (BSV). BSV is characterized by sensory and motor fusion. Sensory fusion is the cortical integration of slightly dissimilar images perceived by the two eyes into a single image[1]. Motor fusion is the process by which bifoveal fixation is sustained by motor alignment. It is evident from previous studies that strabismus occurs when there is a misalignment of visual axis, this is where the image in the fixating eye lies on the fovea and in the non-fixating eye lies on an extra-foveal region. Factors contributing to ocular alignment include arousal, good vision in both eyes, normal neuromuscular co-ordination of extraocular muscles to move the eye, functional cranial nerves III, IV, VI, and brainstem supranuclear pathways. Any abnormality in these factors subsequently results in strabismus and consequently loss of BSV, depth perception and amblyopia in children[2].

Strabismus consists of any deviation of binocular alignment and is present in 2 to 4% of the world's child population[3]. It can be both the cause and the effect of poor binocularity. If strabismus arises after binocular vision development, diplopia and image confusion appears, which persists indefinitely or until motor alteration is corrected[4]. Childhood blindness is defined as a corrected visual acuity of less than 6/60 in the better eye in an individual aged 0-15 years[5]. Strabismus is a common cause of amblyopia and its identification at an earlier age may prevent the development of amblyopia and improve the chance of restoring binocularity as well as effectively treating strabismus -associated amblyopia[6]. Moreover, visual loss in childhood may have negative impact on their development and education[7].

Management of strabismus involves both non-surgical and surgical methods. The management of strabismus dates back to several centuries ago when the condition was thought to be as a result of visitation of an evil spirit and was considered incurable.

With early management of strabismus, improved visual acuity and better cosmetic outcomes can be achieved[6,7]. Strabismus surgery aims to improve the cosmetic appearance of the eyes and eventually reduce the negative psycho-social impact, possibly restore BSV and centralize or expand the field of BSV hence this study is of importance to determine whether we are achieving the aims of surgery. There is also no data on the strabismus surgery outcomes at KNH or KEU and the findings will act as a baseline and elucidate the type of surgeries performed at the unit. The aim of this study was to determine outcome of horizontal childhood strabismus surgery at KNH and KEU.

MATERIALS AND METHODS

Area of study: This study was carried out in Kenyatta National Hospital (KNH) and Kikuyu Eye Unit (KEU). KNH is the national referral and teaching hospital with a bed capacity of 1800 patients. It has an active paediatric ophthalmology and strabismus clinic every Wednesday and Thursday morning that reviews an average of 17 patients every week. Strabismus surgery has been done by three paediatric ophthalmology and strabismus surgeons with theatre availability on Monday and Thursday every week. Surgeries done are bilateral recession and recession-resection with the average dosage ratio for exotropia being 1:1-1:1.5 and for esotropia 1:1.5. KEU has an active paediatric ophthalmology and strabismus clinic with consultants trained in this sub-specialty. The hospital manages around 70,000-80,000 patients annually. Surgeries done are bilateral recession and recession-resection with the average dosage ratio for exotropia being 1:1-1:2.5 and for esotropia is 1.5:1-2:1. Same surgery may be optimum for one patient and grossly under- or over-corrected the deviation in another[8]. Dosage patterns may vary from one hospital to another.

Study population: The study population consisted of patients aged 0 – 15 years who underwent strabismus surgery at KNH and KEU from June 2008 to June 2013.

Study design: The study was a retrospective descriptive study among children aged 0 – 15 years at KNH and KEU in Kenya.

Inclusion criteria: These included patients aged 0 – 15 years who had corrective strabismus surgery at KNH and KEU from June 2008 till June 2013.

Ethical considerations: Approval to perform the study was granted from the ethics, research and standards committee of KNH/University of Nairobi. Permission was granted by KEU.

Data collection: Data was collected retrospectively beginning from June 2008 to June 2013. Data was collected from the patients' files; through liaison with records officers working at records office who provided a list of patients who have undergone strabismus surgery.

Data analysis: The data collected was analyzed by means of SPSS and presented in tables. The accepted level of significance was 95% confidence intervals and exact P value for effects.

RESULTS

One hundred and ninety nine children underwent surgery for strabismus from June 2008 to June 2013. A total of 41 (20.6%) patients were operated at KNH while 158/199 (79.4%) were operated at KEU. At KNH mean age at diagnosis was 5.8 years (SD=3.813); mean age at surgery was 8.9 years (SD=4.192) and at KEU mean age at diagnosis was 4.8 years (SD=3.388); mean age at surgery was 6.2 years (SD=3.514). It was found that most patients (32.7%) were found to have hypermetropia with astigmatism, followed by hypermetropia (25.1%), Myopia with astigmatism (14.0%), myopia (5.0%), and emmetropia (2.0%). Some patients did not have any refraction assessed (10.6%) and the reason for not refracting was not recorded.

Table 1: Demographic characteristics (n = 199)

Variables	Number of patients	(%)	P value
Study center			
KNH	41	20.6	N/A
KEU	158	79.4	
Sex			
Male	94	47.2	0.978
Female	105	52.8	
Age at diagnosis (years)			
<5	112	56.3	0.076
5 – 15	87	43.7	
Age at surgery (years)			
<5	59	29.6	0.00
5 – 15	140	70.4	

Esotropia was seen in 138/199 (69.3%) and exotropia in 61/199 (30.7%). Twenty seven patients (13.6%) had a small angles, 100/199 (50.3%) had moderate angles and 72/199 (36.2%) had large angles with most of the

patients having moderate pre-operative angles. Table 2 shows that amongst the esotropes surgeries undergone were 80/138 (58.0%) medial rectus recession and lateral rectus resection procedure. The most common surgery was a recession-resection.

Table 2: Types of surgery for esotropia

Type of pre-op angle	Type of surgery	No. of patients (%)
Small	MR recession/ LR resection	9 (6.5)
	Bilateral MR recession	3 (2.2)
	Unilateral MR recession	3 (2.2)
Moderate	MR Recess/ LR resection	46 (33.3)
	Bilateral MR recession	19 (13.8)
	BMR splitting operation	3 (2.2)
	Unilateral MR recession	1 (0.7)
	Bilateral lever arm reducing	1 (0.7)
Large	MR recession/ LR resection	25 (18.1)
	Bilateral MR recession	28 (20.3)
Total		138 (100)

Data are frequencies (percentages)

Table 3 shows that amongst the exotropes surgeries undergone were 36/61 (59.0%) lateral rectus recession and medial rectus recession, 24/61 (39.3%) bilateral lateral rectus recession while 1/61 (1.6%) had unilateral lateral rectus recession. Other surgeries were also performed on 18 patients in addition to the horizontal muscle surgeries for A and V pattern and inferior and superior oblique over-action (IOOA/ SOOA).

Table 3: Types of surgery for exotropia

Type of pre-op angle	Type of surgery	No. of patients (%)
Small	Bilateral LR recession	8 (13.1)
	LR recession/ MR resection	3 (4.9)
	Unilateral LR recession	1 (1.6)
Moderate	LR recession/ MR resection	18 (29.5)
	Bilateral LR recession	12 (19.7)
Large	LR recession/ MR resection	15 (24.6)
	Bilateral LR recession	4 (6.6)
Total		61 (100)

Data are frequencies (percentages)

Table 4 and 5 shows good outcome (post-operative deviation ≤ 10PD) was seen in 41/90 (45.6%) patients with esotropia and 19/32 (59.4%) patients with exotropia, and poor outcome (residual deviation > 20PD) in 15/90 (16.7%) patients with esotropia and 2/32 (6.3%) patients with exotropia.

Table 4: Outcomes for esotropia

Outcome	Surgery							Total
Residual deviation in PD	MR recess/ LR resect			BMR recess			BMR splitting op	
	S	M	L	S	M	L	M	n (%)
Good (≤10)	5	18	4	0	6	6	2	41 (45.6%)
Borderline (>10-≤20)	0	14	3	2	6	8	1	34 (37.8%)
Poor (>20)	0	4	5	0	2	4		15 (16.7%)
Total	5	36	12	2	14	18	3	90 (100.0%)

PD= Prism Diopter; LR= Lateral Rectus; MR= Medial Rectus; BMR= Bilateral Medial Rectus; S= Small; M=Moderate; L= Large

Patients who underwent esotropia surgery, 48/138 patients were lost to follow-up at the 2-3 month post-operative visit. Most patients had moderate angle strabismus of which most had good and borderline outcomes. Patients who underwent exotropia surgery, 29/61 patients were lost to follow-up. Most patients had moderate angle strabismus in both surgical procedures. Majority had good outcomes.

Table 5: Outcomes for exotropia

Residual deviation in PD	Outcome of surgery					Total
	LR recess/ MR resect			BLR recess		
	S	M	L	S	M	
Good	1	10	4	1	3	19 (59.4%)
Borderline	0	7	0	2	2	11 (34.4%)
Poor	0	0	1	0	1	2 (6.3%)
Total	1	17	5	3	6	32 (100.0%)

PD= Prism Diopter; LR= Lateral Rectus; MR= Medial Rectus; BLR= Bilateral Lateral Rectus; S= Small; M=Moderate; L= Large

DISCUSSION

The purpose of this study was to review the outcomes of childhood strabismus surgery in patients operated at KNH and KEU. It was seen in our study that majority of the patients in the study were from KEU (79.4%). Most patients operated were female (52.8%) than male, with a ratio of 1:1. The study established that most of the patients operated were above 5 years of age with most of them being operated between 4-6 years after presentation. The mean age of surgery, 9.6 years was similar to that found in a study conducted in India by Gogate *et al*[9] where average age was 9 years 8 months. The age at surgery has been a topic of debate and the advantage to be considered of early surgery is in preventing sensory changes and establishing better post-operative outcomes. The advantage of later surgery is that it allows for better measurements and hence less residual deviations and need for second surgeries.

The refractive status of the patients showed majority of children having hypermetropia with astigmatism (32.7%) followed by hypermetropia (25.1%). Studies in India, Egypt and Ethiopia[10-12] have shown astigmatism is the most common type of refractive error. This is an expected finding in children, however the study may have overestimated the number of children having a refractive error since all patients refractions were analyzed without considering the amount of refraction that would cause visual impairment for particular age groups. In a study done by Mahmudi *et al*[13] in Macedonia, hypermetropia was the most common refractive error. Use of different inclusion criteria can be one reason for such difference. But in this study the population comprised of children starting from 3 years of age. This may explain the higher incidence of hypermetropia.

Majority of the patients undergoing surgery had esotropia 138/199 (69.3%). This finding was expected since esotropia is the most common childhood strabismus and has been demonstrated in case report and review of literature on esotropia in East Africa by Mtanda *et al*[14]. The more common surgery being performed for both esotropia and exotropia was the recess-resect procedure followed by the bilateral recessions. For esotropia it was seen that there were more good outcomes in the recess-resect (50.9%) procedure compared to bilateral recessions (35.3%). Similarly in exotropia the recess-resect (65.2%) procedure had better outcomes than the bilateral recession (44.4%) procedures. Other studies[15-17] have reported almost similar success rates of 32.8–83.3% for unilateral R&R procedure in intermittent exotropia. However, the direct comparison between these studies is limited because of differences in the definition of successful surgery, size of each study, and duration of follow-up.

In this study, surgery for exotropia had better outcomes than esotropia. Similar findings were seen in other studies. In India, a study by Gogate *et al*[9] evaluating outcome of horizontal strabismus surgery in children had success rates of 44.6% in bilateral recessions and 61.7% in recess-resect procedures for esotropia and 53% in bilateral recessions for exotropia when deviation was within 10 prism diopters. A similar success was seen in Keenan *et al*[18,19] while looking at outcomes of childhood tropia where he saw 85.7% good outcomes in recess-resect procedure for exotropia and 57.5% good outcomes in bilateral recess procedures for esotropia. In Cameroon, Mvogo *et al*[20] found good outcomes in 61% of recess-resect procedures for exotropia.

No major complications were seen in this study like scleral perforation, slipped or lost muscle. The most common complication was subconjuctival haemorrhage (7%) followed by dellen (2%) which was higher than a study conducted in Korea by Jeong *et al*[21] on complications of strabismus surgery where he found dellen in 0.5%. Chronic suture granuloma (1.5%) was also seen however this was less than that found by Jeong *et al*[21] (2.8%) and Espinoza *et al* (2.1%)[22] who did a study on conjuctival suture granulomas after strabismus surgery. Ptosis (1%) was the least common complication seen and this was most likely not a direct result of the horizontal muscle surgery but a complication of an adjunct surgery being done.

Our study had limitations that included: variability in results due to many different surgeons; patients lost to follow-up; and confounders on surgical dosages

mm: variable refraction, variable angle, and variable age. We concluded that the most common surgery performed was a recess-resect procedure (58.3%) for all types of tropia with exotropia having better outcomes than esotropia as in other studies. Moderate angle was found to have a better outcome for all types of tropia. No major complication was seen (e.g. scleral perforation, lost or slipped muscle), however, most frequent complication was subconjuctival haemorrhage (7%). study recommends that it is important to document all refractions and further conduct a prospective study on surgical dosages with control of confounding factors.

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Psychological experiences of adult patients with blindness secondary to glaucoma at Lions Sight First Eye Hospital in Blantyre, Malawi

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ABSTRACT

Background: Glaucoma is the second leading cause of blindness in the world. Blindness secondary to glaucoma is irreversible, and thus people experience lifelong blindness once they develop blindness from glaucoma. Currently, there is lack of literature regarding psychological experiences of patients living with blindness secondary to glaucoma in Africa.
Objective: To explore psychological experiences of adult patients with blindness secondary to glaucoma.
Method: A hospital based qualitative study at a tertiary government eye hospital was done among adult patients who presented with blindness secondary to glaucoma. Selection of participants was done by purposive sampling and individual in-depth interviews were used to collect data among study participants until data saturation. Data was analyzed using content analysis.
Results: Eight adult patients (7 men and 1 woman) with blindness secondary to glaucoma were interviewed. Patients with glaucoma experienced psychological distress and depression due to unemployment, lack of basic needs and worries related to unaccomplished family obligations. The patients felt restricted in performing activities of daily living which consequently overburden their caregivers.
Conclusion: This study has shown that adult patients who are blind from glaucoma experience challenging mental health problems. There is a need for integration of psychosocial care into the management of patients with blindness secondary to glaucoma.

Key words: Glaucoma, Blindness, Psychological experiences, Mental health

INTRODUCTION

Glaucoma is the second leading cause of blindness in Malawi[1]. Blindness from glaucoma can be prevented if diagnosis and treatment is done in good time[2]. However, many patients with glaucoma presents to eye hospital in Malawi at an advanced stage with blindness[3].

Visual impairment from glaucoma is slowly progressive. Individuals do not notice any problem in the early stages while those with advanced stage experience behavior restriction due to inability to see properly[4]. The limitation from blindness results in a decline in the patients' quality of life[5].

When the glaucoma patients are informed about their diagnosis and that nothing can be done to restore the vision, they became shocked, worried and feel hopeless[6]. Ultimately, depression and psychological distress set in and this affect their overall quality of life.

The World Health Organization recognizes the importance of psychological wellbeing and defines health as a 'state of complete physical, mental, and social wellbeing and not merely the absence of diseases and infirmities[7]. Therefore providing psychological support to individuals with psychological issues secondary to glaucoma can hence improve their health status and overall quality life.

There is scanty literature on psychological experiences and challenges faced by adult patients with blindness due to glaucoma in sub Saharan Africa. This study was conducted at a tertiary eye hospital in Malawi with the following four specific objectives; to explore psychological experiences of adult patients with blindness secondary to glaucoma, to identify psychological challenges of patients with blindness secondary to glaucoma, to explore coping mechanisms of patients with blindness secondary to glaucoma and to identify psychosocial support which the health workers can offer the family members and the community provide to the patients with blindness secondary to glaucoma.

MATERIALS AND METHODS

This qualitative study was done at Lions Sight First Eye Unit, Queen Elizabeth Central Hospital in Blantyre, Malawi between July and August 2015. Lions Sight First Eye Unit is the largest eye hospital in Malawi and it is the main teaching eye hospital for College of Medicine, University of Malawi.

Adult patients (aged 18 years or more) that presented to the eye hospital with blindness secondary to glaucoma were invited to participate in the study. The study participants were purposively selected and underwent in-depth interviews that were administered by the principal investigator (FC) in a local language (Chichewa).

Data was collected through use of semi-structured questionnaire with open-ended questions. The questionnaire was designed to capture information on experiences, challenges and psychosocial support the participants encountered in their daily lives. The questionnaire was pretested on a different sample from those participants in the study. All errors noted during the pilot phase were corrected to ensure that the questionnaire guide was clear and appropriate for the participants.

Interviews were recorded with participants' written consent. Non-verbal observations were also recorded. The audio tapes of interviews were transcribed verbatim and subjected to qualitative content analysis. Transcribed data was translated into English and analyzed manually using content analysis.

The principal investigator reviewed the interview 'notes' since this contained non-verbal responses or reactions in order to deeply understand the data. The interpretation process consisted of reading each transcript a couple of times to get a brief understanding of psychological experiences described by participants. A standardized procedure for data analysis was developed by coding the narrative materials into entire meaningful text aimed at identifying the parts and patterns of the explanations. This involved careful verification of the responses that had emerged from each interview session. For quality purposes, the transcripts were compared to the taped interviews by another investigator (CMM) who had more experience and training in mental health. After familiarization with the transcripts, a code book for the interview data was concurrently but independently developed by the principal investigator (FC) and another investigator (CMM). Similar responses were noted and grouped into appropriate categories of themes and these themes become major findings. Estimated sample size was twelve. However, the number was reduced to eight during data collection when the saturation of data was attained.

Ethical clearance to conduct the study was sought. A formal permission to conduct the study at Lions Sight First eye unit was granted by the Director of Queen Elizabeth Central Hospital and the Head of Lions Sight First eye unit. Informed consent was obtained from the study participants.

RESULTS

A total of eight study participants (7 men and 1 woman) were interviewed. This number was decided upon reaching data saturation. Three themes emerged from the data that was gathered. The themes were psychological experiences, challenges and general lack of support.

Theme one: Psychological experiences

Patients with blindness secondary to glaucoma encountered psychological experiences. Our study patients were stressed up as they had no hope for their future. They explained that they got worried and felt hopeless when they were told that they were not going to see again. Some persons who had residual sight were anxious about the possibility of becoming blind completely.

One participant said *"I feel so much pain and I am stressful. The problem is in my body, what else can I do?"*

Theme two: Challenges

The data also showed that participants face a lot of challenges in their daily living. Participants expressed challenges including that: they were unable to walk alone, could not perform house hold chores such as washing clothes, could no longer be employed because they were blind, and they had unaccomplished family obligations because they have no source of income generating activities. Additionally, they also lacked basic needs such as food and sourcing these basic needs had become a problem. This brought them a lot of worries and stresses.

One participant said "*I get worried because we lack food. My family and I take only porridge for supper, and sometimes we sleep without eating food. When I see a child crying because of hunger, I become worried and ask myself what I should do*"

Another participant said *"I have been unemployed for six months. Things are not well for me"*

Another participant said *"I used to make and sell chairs. I am no longer able to make chairs as I am now not able to see.*

Theme three: Support

The study findings showed that the patients require the provision of psychosocial support to meet challenges in

their daily living. Some of the support that was required includes counseling, financial help, treatment for their condition, spiritual support and support on house hold chores.

(i) *Counseling*: Counseling was one of the supports required by the blind patients. One of the participants said *"I should be advised on how to protect myself from risks such as falling and accidents*".
Another participant said "*I will accept any type of counseling which is appropriate"*

(ii) *Treatment for the loss of vision:* All participants knew little about glaucoma prior to diagnosis. Upon diagnosis, they were so anxious about getting effective treatment for the lost vision. They kept on going to hospital with the hope of getting treatment that would restore the vision.

One participant said *"What is needed is that I should see. I would be very happy if my sight is restored. I need to be given medicine"*.

Another participant said that *"Since this is the hospital, I will be assisted with medicine which I should instill in the eye in order to recover my vision. I am failing to watch Television and use my mobile phone. I really want to have my sight restored"*.

The participants were also encouraged by family members to seek hospital support.

(iii) *Financial needs:* Data showed that participants needed financial support from family and well-wishers to meet their daily needs in order to reduce poverty related stress. Others wanted to be assisted in skilled work, or to be trained in any type of business. They wanted to be trained at a high level so that they merely work or run businesses by giving instructions to other people to carry the work or business tasks on their behalf. One participant for example said that "I can run business by delegating someone to do it.".

(iv) *Spiritual support.* Our participants prayed to God for spiritual intervention. They believed that God heard their prayers. This made them comfortable in facing their challenges. Others believed that God will heal them in future.

(v) *Support on house hold chores:* Our participants explained that they could no longer perform many house hold chores such as washing. They depended on their relatives and friends in carrying out some chores.

DISCUSSION

This study provides an insight into the lived psychological experiences and challenges faced by patients with blindness secondary to glaucoma. The study finding revealed that patients with blindness secondary to glaucoma experiences psychological distress. The patients who were completely blind felt hopeless since they could not independently perform physical activities such as walking. The patients who had some residual vision were also distressed due to the possibility of permanent complete loss of their sight. This is in line with findings by Uzima *et al*[8] who found that patients with physical disorders including glaucoma suffer hidden psychiatric disorders that are often undetected.

The study was not designed to identify and grade psychiatric disorders. However, a previous study done in Nigeria by Dawodu *et al*[9] found that glaucoma patients suffer psychological disorders such as stress, anxiety and depression which lead to poor mental health. The fear of losing vision was amongst the sources of anxiety or depression among such patients. It is therefore essential to provide mental health care to patients with blinding diseases such as glaucoma.

The study findings demonstrated that our study patients encountered different challenges in their lives as a result of blindness. They had challenges in performing their roles such as engaging in business or activities at their place of work while others have stopped performing their roles. In line with this, Filipe[10] stated that impact of glaucoma affects the ability to perform daily life activities leading to psychological and social issues, and this affects quality of life of patients.

The study patients had to cope with their hardships due to blindness in different ways. A Previous study by Wu *et al*[4] showed that one of the ways how family members assist glaucoma patients in coping with blindness is by re-arranging household furniture in order to limit obstacles during walking and protect them against accidents such as falling or hitting objects. This helps the patients in adapting to their situation and avoiding unnecessary stressors. In addition, Glen and Crabb[11] found that patients used social support by making their peers aware of their condition, asking for help and having someone by their side to assist. In this study, family members and the community gave the patients psychological support by encouraging them to seek hospital treatment and also by assisting them in activities of daily living such as escorting them when they want to walk and wash their clothes. Coleman *et al*[12] emphasized that visual impairment will increase causing poor quality of life if the blind individuals do not seek treatment. This is because patients become less productive, hopeless and helpless leading to social exclusion.

Spiritual faith was also found to be another coping strategy. Religion also played a role in making our study patients to live comfortably in these difficult situations as they believed that God heard their prayers and one day he will heal them. Wu *et al*[4] found that religion

was described by most participants as a useful strategy to cope with their problem because they believed that their spiritual foundations and religious beliefs could assist them in dealing with adversity.

The study had a limitation in that it was a hospital based study and as such, we cannot generalize the findings to the general population. Additionally, our study was not designed to score psychological disorders. Therefore, the results need to be interpreted carefully. In spite of this limitation, we provide an insight into psychological experiences and challenges faced by adults with blindness secondary to glaucoma in sub Saharan Africa.

CONCLUSION

The study has shown that patients who are blind from glaucoma are encountering challenges that needed to be addressed in order to promote their mental health. The patients resorted to coping mechanisms such seeking spiritual intervention and relying on family support. There is also need for integration of psychosocial care into the current medical and surgical treatment of patients with vision loss secondary to glaucoma.

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Indications for destructive eye surgery at Sekuru Kaguvi Eye Hospital, Zimbabwe

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ABSTRACT

Background: Destructive Eye Surgery (DES) is a management option that is offered as a final resort where keeping the globe risks jeopardizing life or the general health of an individual. The three destructive eye operations are: evisceration, enucleation and exenteration in order of increasing aggressive nature of the operation.
Objective: To find out the common indications for destructive eye surgeries (DES) at Sekuru Kaguvi Hospital (SKH).
Methods: Patients who presented to Sekuru Kaguvi Hospital in the period January to March 2017 who ended up having some form of DES were enrolled into the study. Data was collected on participant demography, occupation, the affected eye, diagnosis and the subsequent DES done.
Results: A total of 37 eyes of 37 patients had DES done during the period January to March 2017. Generally more males had DES done on them compared to females (73%). Percentages of the DES done were: eviscerations 51.4%, enucleations 29.7% and exenterations 18.9%. The main indication for DES was trauma in 32.4%, followed by retinoblastoma in 21.6%, panophthalmitis in 21.6%, ocular surface squamous neoplasia in 18.9%, staphyloma and painful blind eye in 5.4%. The commonest indication for the eviscerations was a ruptured globe in 57.9%, the remainder being panophthalmitis. There was a total of 11 ruptured globes requiring an evisceration and 10 (90.9%) were males. Globe ruptures attributed to assault were 71.2%. The mean age for eviscerations was 39.21 years. Of the total enucleations done, 72.7% were children under 5 years (average age 2 years), the commonest indications being retinoblastoma in this group (87.5%). A total of 7 exenterations were performed, the commonest indication being ocular surface squamous neoplasia in 85.7%. Males were at a higher chance of being exenterated than females (5:2). Most of the removed eyes had no vision (no light perception in 73%, light perception in 18.9%, hand movement in 5.4% and 3/60 in 2.7%).
Conclusion: The main indication for DES was trauma followed by panophthalmitis and retinoblastoma. The commonest indication for exenteration was OSSN which can be treated earlier before warranting eye removal. There is thus need to address these preventable conditions and risks that can lead to eye removal.

Key words: Sekuru Kaguvi Hospital (SKH), Destructive Eye Surgery (DES), Evisceration, Enucleation, Exenteration

INTRODUCTION

Destructive Eye Surgery (DES) consists of evisceration, enucleation or exenteration in ascending order of their destructive extent[1]. It is a management option offered to patients when further retention of the globe is likely to affect ocular and general health or jeopardize survival. The eyes contribute immensely to an individual's overall appearance and self-image. The decision to remove an eye is often difficult for both the doctor and the patient because of the enormous psychological sequelae[2]. The loss of an eye often occurs suddenly due to trauma and infection in our environment and patients are often poorly prepared to deal with the decision. It is more grievous when the second eye is already blind. Indeed, depression has been reported after DES[3].

Evisceration is the removal of all intraocular contents but leaving the sclera. Important indications include a ruptured globe and a blind eye with an intractable infection (endophthalmitis or panophthalmitis) preventing the spread of infection to the cerebro-spinal fluid[4]. Enucleation is the removal of the eyeball. Indications include a ruptured globe, painful blind eye, an unsightly blind eye and intraocular malignancy such as retinoblastoma[1]. The enucleation of a severely traumatized eye also serves as a prophylaxis against the development of sympathetic ophthalmia[5]. The latter is an autoimmune, lymphocytic attack on the uveal tract of both eyes following sensitization of lymphocytes to uveal tissue after penetrating trauma in one eye[5]. Enucleation of the injured eye prior to the development of sympathetic ophthalmia is very effective in preventing its occurrence[1,5].

Exenteration, either radical or modified, involves removal of the eyeball and all contents of the orbit. These include the orbital fat, lacrimal gland, extraocular

muscles, periorbita, eyelids and a varying amount of surrounding skin and bone. It is a disfiguring procedure with devastating functional, aesthetic and psychological consequences[3]. In Zimbabwe the commonest indication is advanced OSSN[3,6].

MATERIALS AND METHODS

This was a cross sectional study. Patients who presented to Sekuru Kaguvi Hospital in the period January to March 2017 who ended up having some form of DES were enrolled into the study. A data collecting tool was used to capture the required fields for the study. Verbal informed consent was administered. Inclusion criteria were patients who presented to SKH who ended up having any form of DES. Exclusion criteria were patients/care-givers who were unable to give informed consent at the time of the study. Data was processed using Statistical Package for Social Sciences (SPSS).

RESULTS

A total of 37 eyes of 37 patients were removed during the period January to March 2017. Generally more males had DES done on them compared to females (73%). Percentages of the DES done were: eviscerations 51.4%, enucleations 29.7% and exenterations 18.9%. (Figure 1).

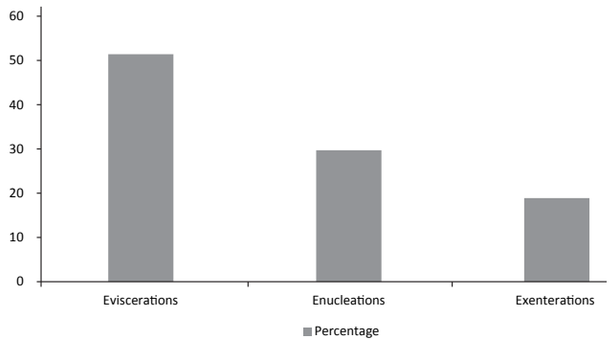

Figure 1: Percentages of DES done

Table 1: Summary of the DES done and their indications

Type of surgical procedure	Invasive squamous cell neoplasia	Globe rupture	Panophthalmitis	Staphyloma	Retinoblastoma
Evisceration	0	11	8	0	0
Enucleation	0	1	0	2	8
Exenteration	6	0	0	0	1
Total	6	12	8	2	9

The main indication for DES was trauma in 32.4%, followed by retinoblastoma in 21.6%, panophthalmitis in 21.6%, ocular surface squamous neoplasia in 18.9%, staphyloma and painful blind eye in 5.4% (Figure 2).

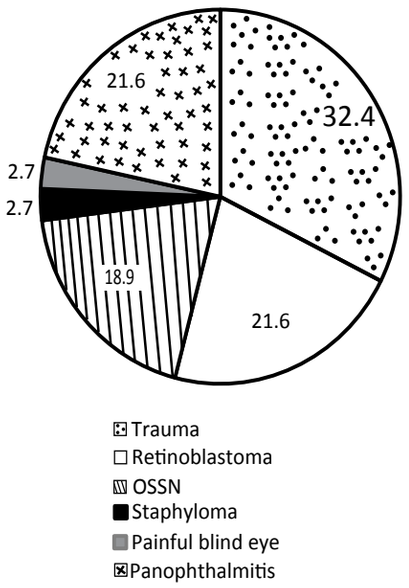

Figure 2: Indications for DES

The commonest indication for the eviscerations was a ruptured globe in 57.9%, the remainder being panophthalmitis and the mean age for this DES was 39.21 years. Age distribution is also given in Table 2.

Table 2: Age distribution in years by frequency of DES

Age group (years)	Frequency
0-10	13 (35.1%)
11-20	3 (8.1%)
21-30	6 (16.2%)
31-40	2 (5.4)
41-50	4 (10.8)
51-60	4 (10.8%)
61-70	2 (5.4%)
>70	3 (8.1%)

Globe ruptures attributed to assault were 71.2%. There was a total of 11 ruptured globes requiring an evisceration and 10 (90.9%) were males. Of the total

enucleations done, 72.7% were children under 5 years (average age 2 years), the commonest indications being retinoblastoma in this group (87.5%). A total of 7 exenterations were performed, the commonest indication being ocular surface squamous neoplasia in 85.7%. Males were at a higher chance of being exenterated than females (5:2). Most of the removed eyes had no vision (no light perception in 73%, light perception in 18.9%, hand movement in 5.4% and 3/60 in 2.7%). Over half of the total DES done, 22 (59.5%), were performed under general anaesthesia and these were all the enucleations and exenterations and 4 evisceration (10.8%).

DISCUSSION

The average age of patients who had DES at SKH during the period of the study was 31.2 years and 43.1 years after excluding those below 5 years. This finding is comparable to 30.1 years recorded by Musa *et al*[7] but lower than the 40.8 years, 43.78 years and 45.6 years documented by Nwosu,[8] Eballé *et al*.[9] and Ajibode *et al*[10] respectively. The observation that the first decade of life was most affected is similar to the experience in previous studies by Eballe *et al*[9] in Cameroun, and Gyasi *et al*[11] in Ghana. This is worrisome because of the "blind years" ahead of these children as well as the potential facial asymmetry with attendant psychosocial implication and social outcast effect that could occur if prosthesis is poorly fitted or not fitted at all[7]. There is also reported depression associated with DES in a study done in Zimbabwe by Kawome[3].

The commonest indication for DES at SKH was due to trauma (32.4%) and being a male was a risk factor. This finding was consistent with similar observation by Musa *et al*[7] and the affected age was mainly in the economically active group of 21-40 years. This has a bearing on the socioeconomic function of the affected individual and families. The majority of the causes of the trauma were assault, domestic disputes and road traffic accidents which can be prevented.

Retinoblastoma was the commonest indication for enucleation and the commonest indication for eye removal in the under 5 years age group. One child who had late presentation had an exenteration due to orbital spread. This finding is comparable to similar findings by Musa *et al*[7] where retinoblastoma was the most common indication for eye removal in the first decade of life[7-9]. This finding may be due to the fact that retinoblastoma is the commonest intraocular tumour in childhood. Most patients present late when the globe can no longer be salvaged[7]. There is thus need to intensify screening for retinoblastoma in children.

Ocular infection (panophthalmitis) contributed to 21.6% of the removed eyes. The average affected age was 61 years and is comparable to similar findings in literature[7-9]. There is generally immunosuppression in advanced age and increased risk factors for ocular infections in this age group e.g blepharitis, dry eyes and poor hygiene[12]. Early treatment of these ocular conditions predisposing to ocular infection can be the main approach to prevent loss of an eye.

Evisceration was the most commonly performed destructive eye surgery in this study (51.4%). This is in agreement with previous documentations in the literature[7-9]. Most of the performed eviscerations were done under local anaesthesia meaning that the technicalities in doing an evisceration are better than enucleation and thus, all things being equal most surgeons would perform an evisceration[7]. Furthermore, badly damaged eyes, either due to trauma or infection, being the most common indication for evisceration, were responsible for more than half of the eyes removed. The notion that evisceration has the advantages of relative tissue preservation, better mobility of prosthesis, less operation time, lower risk of orbital implant extrusion or transmission of infective materials into cavernous sinus causing intracranial infection in endophthalmitis/ panophthalmitis, relative to enucleation could make it a natural preference[7, 9].

The commonest indication for an exenteration in this study was advanced squamous cell carcinoma and this is in keeping with previous study done at SKH by Masanganise and Magava[6]. Ocular surface neoplasia is common in HIV positive patients and also after chronic ultraviolet light exposure[12]. Early changes of OSSN can be detected on routine ophthalmological assessment and treatment instituted before warranting exenteration. Public health measures also need to continue to combat new HIV infection and spread.

CONCLUSION

Most of the common indications for DES at SKH namely, trauma, ocular tumours (retinoblastoma and OSSN) and infections are preventable. The affected

age groups are either children or the economically active age group. Therefore, improvement in eye health education, genetic counselling and provision of free health care to facilitate better access to quality eye care services can be recommended.

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Central corneal thickness and its relationship with IOP, visual fields and optic disc parameters among glaucoma patients attending the Eye Hospital at University Teaching Hospitals in Lusaka, Zambia

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ABSTRACT

Background: Glaucoma is a heterogeneous group of optic neuropathies characterized by an acquired loss of retinal ganglion cells, optic nerve atrophy and Visual Field Defects (VFD). Raised Intraocular Pressure (IOP) is the only causal risk factor for glaucoma that can be therapeutically and surgically manipulated to change the course of the disease process. Though Goldman Applanation Tonometry (GAT) is the "gold standard" for IOP measurement, readings of IOP with GAT are believed to be influenced by Central Corneal Thickness (CCT). The study evaluated the correlation of CCT and IOP with VFD parameters like Mean Deviation (MD), Pattern Standard Deviation (PSD) and Cup-to-Disc Ratio (CDR) in Primary Open Angle Glaucoma (POAG) patients.
Objective: To determine the relationship of central corneal thickness, intraocular pressure, visual fields and optic disc parameters in Zambian primary open angle glaucoma patients.
Methods: A cross-sectional study was conducted in 2014 from January to September and all glaucoma patients visiting the University Teaching Hospitals – Eye Hospital during the study period were included if they consented to it and met the inclusion criteria. A total of 166 randomly selected newly diagnosed glaucoma patients aged 18 years and above were recruited. The CCT was measured using Kacon Ophthalmic Ultrasound system and IOP was measured by GAT. Analyses were carried out considering the level of significance at 5%.
Results: One hundred and sixty-six newly diagnosed glaucoma patients aged 18 to 88 years were included into the study. There were 85 (51.2%) males and 81 (48.8%) females with a mean age being 51.31 years. The mean IOP was 23.60 (±10.40) mmHg. The mean CCT was 531.9 (±40.59). All the participants had primary open angle glaucoma POAG. Thin CCT was significantly correlated with vertical CDR (r= - 0.023, and 0.011). Thin CCT was also significantly associated with worsened MD of visual field (r= - 0.033 and p=0.023) and PSD (r= - 0.027 and p=0.012).
Conclusions: The mean CCT of Zambian POAG patients is thinner as compared to other races. CCT was positively correlated with IOP. Patients who had thicker CCT were more likely to have low IOP compared to patients who had thinner CCT. In the POAG patients thinner CCT was associated with greater cup disc ratio and Visual Field (VF) damages than those with a thicker CCT.

Key words: Central Corneal Thickness (CCT), Cup Disc Ratio (CDR), Primary Open Angle Glaucoma (POAG), Visual Field (VF), Intraocular Pressure (IOP).

INTRODUCTION

Glaucoma is the second leading cause of global blindness and results in irreversible visual impairment[1] and the third leading cause of blindness in Zambia[2]. Primary open angle glaucoma is the most common type of glaucoma in Zambia with a prevalence of 19.0%[3]. Globally, it is predicted that by the year 2020, the number of people with open angle glaucoma and angle closure glaucoma in Africa would be over 10 million and the continent will have the highest ratio of glaucoma to adult population[1].

As IOP is the only known risk factor that can be pharmacologically manipulated in the treatment of glaucoma[3,4], accurate measurements of IOP are essential in the screening, diagnosis and management of glaucoma[5,6]. Intraocular pressure is known to be influenced by CCT measurements recorded with applanation tonometres[7,8]. Several studies[9-11] have reported that IOP is overestimated in corneas with the higher mean CCT measurement and underestimated in corneas with lower mean CCT reading. Goldmann Applanation Tonometry (GAT), the clinical gold standard for IOP measurement[12], is calibrated on a theoretical assumption of a 520 µm CCT measurement [7,13]. Thus, any variation in CCT will alter the balance between the corneal resistance to indentation and the surface tension of the tear film[14]. In an early study, Ehlers *et al*[15,16] concluded that any deviation of 70 µm on either side of 520 µm would alter the IOP by 5 mmHg. It was further noted that IOP may be incorrectly interpreted by as much as 7 mmHg for every 100 µm deviation in CCT[16]. More recently, Eballe *et al*[17] suggested that IOP would change by 2.8 mmHg per 100 µm change in mean CCT. Despite several researchers acknowledging the influence of CCT on IOP measurements, there is little agreement as to how the measured IOP should be adjusted to account for the CCT measurement[18]. This has resulted in several correction algorithms being posited[5,7] but none have been widely used or accepted[19,20].

Previous studies have highlighted the role of CCT as an independent risk factor for glaucoma[21,22]. Kaushik *et al*[23] suggested that thinner CCT measurements are related to greater susceptibility for glaucomatous changes. As a result, assessment of CCT has become an important part of an ocular examination since it provides information about the risk and clinical characterisation of the various glaucoma disorders[21].

The literature shows that considerable CCT data have been collected in several American, Asian and European populations[3,11]. Studies conducted in developed countries have shown that people of African descent had increased risk of developing glaucoma, and POAG is significantly more common, develops earlier, and is more severe in blacks than whites[21]. In contrast, only a few studies have investigated CCT in African populations living within the African continent. Considering the consequences of glaucoma and its prevalence in the African continent, it is important to understand the distribution of CCT measurements in African sub-populations.

The Ocular Hypertension Study (OHTS) significantly highlighted the importance of the measurement of CCT in overall diagnosis of glaucoma[21]. Other studies have highlighted the correlation of CCT with other diagnostic parameters of glaucoma [24]. The glaucomatous damage is assessed by detection of VFD, which shows the glaucomatous damage in functional terms. Humphrey Visual Field (HVF) is an automated perimetry widely used to detect VFD and monitor glaucoma progression [25]. The indices like Mean Deviation (MD) and Pattern Standard Deviation (PSD) show the damage of glaucoma in relation to normal population, and despite their limitations, are widely used in grading and staging of glaucoma[26]. Cup-to-Disc Ratio (CDR) is the clinical evaluation of optic disc using slit lamp microscope and fundus viewing lens. It indicates the diameter of the cup expressed as a fraction of the diameter of the disc and is an important clinical finding in glaucoma suspects and patients[27].

Information on CCT data on how it affects native Zambian glaucoma patients is lacking. The study endeavoured to look at the role of CCT and IOP in influencing the glaucoma disease by examining the relationship of CCT and IOP with VF and CDR with the aim of improving the management of glaucoma. This would also probably serve as a catalyst for ophthalmologists and other eye health care workers in Zambia and the region in mainstreaming the clinical decision making in glaucoma management in relation to CCT and IOP.

MATERIALS AND METHODS

Setting: The study was conducted at the University Teaching Hospitals Eye Hospital in 2014 from January to September.

Design and sampling: This was a cross-sectional hospital-based study among the 166 Zambian glaucoma patients. Newly diagnosed glaucoma patients who visited the Eye Hospital during the study period were included in the study as long as they were aged 18 years and above and consented to participation. Both eyes of each patient were examined. The diagnosis and classification of glaucoma patients were done based on IOP value, gonioscopy, optic disc evaluation and VF testing. A structured questionnaire was used to collect data from volunteering glaucoma patients with normal anterior segment. Patients not willing to participate, and those with major corneal pathology, previous intraocular and or corneal surgery were excluded from the study.

Central corneal thickness and intraocular pressure measurements: Five consecutive ultrasound pachymetry (using Kacon Ophthalmic Ultrasound System) measurements of CCT were obtained from both eyes and a mean value was then computed and recorded in micrometers (µm). The two IOP measurements were taken 15 minutes apart to rule out any tonometric effect on the pressure. The tonometer dial was set between 1 and 2 graduation marks of the prism and care was taken to avoid inaccurate readings from inappropriate fluorescein pattern resulting from excessive or insufficient fluorescein, and pressure on

the globe by the examiner or patient squeezing the eyelids. All measurements were performed under topical anaesthesia (amethocaine hydrochloride 2%). Then, two corresponding GAT measurements were obtained with the use of fluorescein staining and an average value was recorded in mmHg. The tonometer tip and the pachymeter probe tip were cleaned with dry cotton followed by swabbing the tips thoroughly with methylated spirit prep pad and allowing it to dry for 5 minutes to reduce the risk of cross-infection.

Visual field evaluation: Global indices (MD, PSD) of the VF were measured by the Humphrey field analyser (Humphrey-Zeiss, Munich, German) using the full threshold 24–2 programme. Reliable Humphrey automated perimetry was defined by having fewer than two of the following characteristics: fixation losses greater than 20%, false positive responses greater than 33%, or false negative responses greater than 33%. Glaucomatous VF loss was defined as a reliable abnormal VF with a pattern standard deviation outside 95% normal limit, or a glaucoma hemifield test outside 99% normal limit, or three or more adjacent points with P <5% on the pattern deviation probability plot of which one must have P <1% [28].

Data analysis: Data was evaluated and analyzed using Statistical Package for Social Sciences (SPSS) version 24. Mean and standard deviation was reported for continuous variables (Age, CCT, IOP, MD, PSD, CDR) while frequency and percentage for nominal/ordinal data. Shapiro Wilk's test was used to check normality of data. Post normality testing, Pearson correlation coefficient was calculated to evaluate relationship between CCT and IOP and VF parameters (MD, PSD) including CDR and thereafter correlation and regression analyses were performed. P-value of <0.05 for all the analyses was taken to be statistically significant for all the tests employed.

Ethical considerations: The University of Zambia Biomedical Research Ethics Committee (UNZABREC) approved the study (reference number 013-08-12) and was carried out in compliance with the Helsinki Declaration (2006). Further approval was obtained from Ministry of Health of Zambia through the UTH. Informed consent was obtained from each study participant and confidentiality was observed.

RESULTS

Participation and distribution: The mean age of the 166 participants was 51.31 years (SD ± 17.99 years). Among the study participants, 85 (51.2%) were males and 81 (48.8%) were females (Table 1). There was no statistical difference between the two sexes (p=0.919).

Table 1: Socio-demographic characteristics of the study participants (n = 166)

Variable	No.	(%)	Mean CCT (µm)	Mean IOP (mmHg)
Gender				
Male	85	51.2	530.47	23.35
Female	81	48.8	533.96	23.75
Age (years)				
<40	50	30.1	548.76	22.50
40-44	14	8.4	531.79	24.50
45-49	9	5.4	529.50	23.83
50-54	16	9.6	523.60	22.32
55-59	12	7.2	536.04	22.09
60-64	21	12.7	527.88	24.29
≥65	44	26.5	517.16	24.84
Ethnicity				
Tonga	22	13.3	515.34	23.21
Nyanja	36	21.7	535.64	22.99
Lozi	7	4.2	542.29	22.15
Kaonde	6	3.6	520.75	26.50
Luvale	8	4.8	535.63	26.13
Lunda	5	3	516.00	30.30
Bemba	77	46.4	535.60	22.79
Other	5	3	530.20	28.10
Total	166	100		

All the 166 (100%) patients had POAG who were all newly diagnosed. The mean duration of glaucoma disease was 41.87 months (SD ± 43.55 months). Thirty-nine (23.5%) of the patients had trabeculectomy done after being recruited in the study and the rest 127 (76.5%) did not undergo any surgical intervention. One hundred and twenty (78.4%) of the patients were commenced on timolol, 12 (7.8%) on timolol and xalatan and 21 (13.7%) of them were not on any medical treatment. Regarding other health problems 16 (9.6%) of the study subjects were diabetic, nine (5.9%) were diabetic and hypertensive while the rest did not have any other known medical illness.

Intraocular pressure and central corneal thickness: In this study it was found that the mean CCT and IOP among Zambian glaucoma patients were 532.20 µm and 23.55 mmHg respectively. The distribution of CCT observed in the study subjects resembled a Gaussian curve as shown in Figure 1.

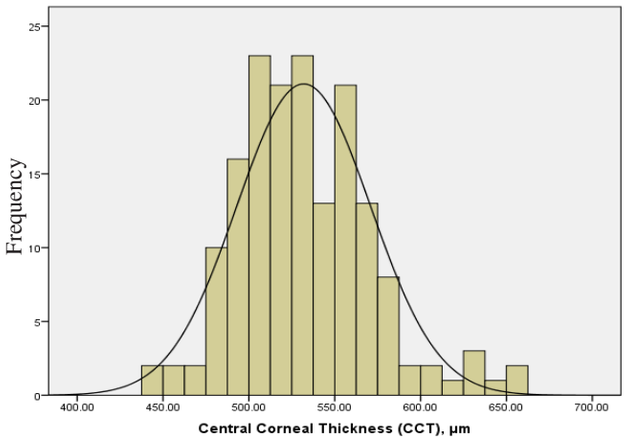

Figure 1: Distribution of CCT (µm) in the study participants

The mean IOP in males was 23.35 mmHg (SD±6.68 mmHg). In females it was 23.75 mmHg (SD±6.91 mmHg), and there was no statistically significant difference in mean IOPs between the males and females (p=0.930, and p = 0.593, 2-tailed, Independent Student T-test).

The mean CCT in females was 533.96 µm (SD±46.60 µm), which was slightly higher than the mean CCT in males where it was 530.47 µm (SD±34.05 µm) but this difference in mean CCTs was not statistically significant (p=0.563, 2-tailed, Independent Student T-test). The mean CCT was higher in the age group below 40 years of age (548.76±45.46 µm) and lower in the age group aged 65 years and above (517.16±37.86 µm) as shown in Table 1. This change in the mean CCTs was statistically significant (p=0.016, One-Way ANOVA).

Correlational analysis: There was a statistically significant decline in CCT with increase age (r=0.050, p=0.001); (Figure 2).

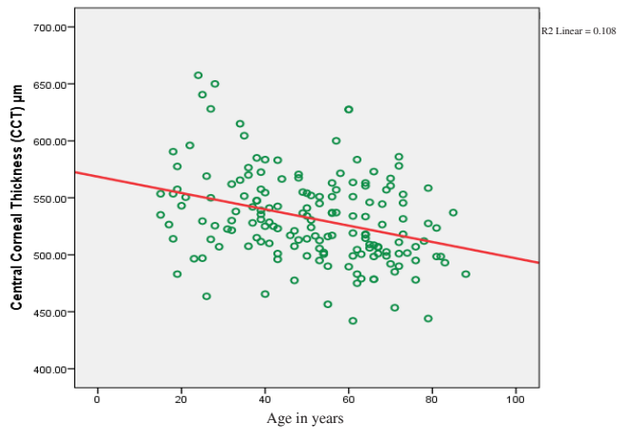

Figure 2: Relation between CCT (µm) and the age (in years) in the study participants

This study revealed a statistically significant linear relationship between CCT and IOP as per the linear regression analysis (r=0.014, p=0.010). Furthermore, in a Bivariate correlation analysis, it was found that the CCT was correlated linearly with IOP values (ρ =0.175, p<0.05) as shown in Figure 3.

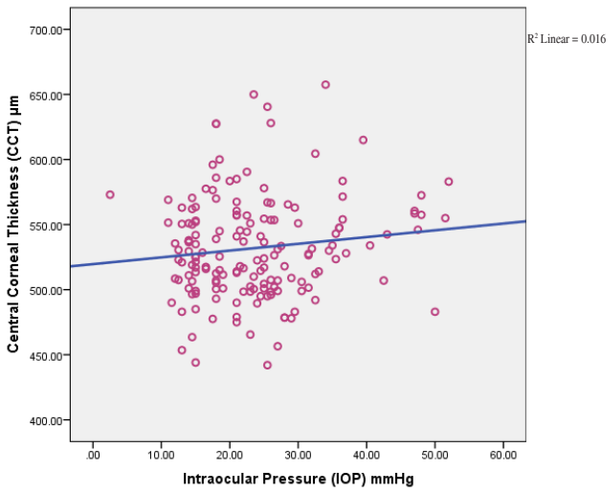

Figure 3: Relation between CCT (µm) and IOP (mmHg) in the study participants.

Ethnicity (p = 0.490) and duration of glaucoma (p = 0.666) showed no statistically significant relationship with CCT. Similarly, there was no statistically significant relationship between IOP and age, sex, and ethnicity within these study participants (p > 0.05). However, duration of glaucoma showed statistically significant relationship with IOP (p = 0.023). There was significant correlation of CCT with MD, PSD and CDR (r=-0.033, p=0.023; r=-0.027, p=0.012; r=-0.023, p=0.011 respectively), by multiple regression analysis. Correlation of CCT with MD, PSD and CDR is given in Table 2.

Table 2: Correlation of CCT with various parameters (n=166)

Parameter	Univariate regression analysis		Multivariate regression analysis	
	Pearson correlation co-efficient	p-value	Pearson correlation co-efficient	p-value
MD	-0.501	<0.001	-0.033	0.023
PSD	-0.533	<0.001	-0.027	0.012
CDR	-0.422	<0.001	-0.023	0.011

There was equally a significant correlation of IOP with MD, PSD and CDR (r=-0.201, p=0.010; r=-0.171, p=0.007; r=-0.144, p=0.030 respectively) (Table 3).

Table 3: Correlation of IOP with various parameters (n=166)

Parameter	Univariate regression analysis		Multivariate regression analysis	
	Pearson correlation co-efficient	p-value	Pearson correlation co-efficient	p-value
MD	-0.405	<0.001	-0.201	0.010
PSD	-0.520	<0.001	-0.171	0.007
CDR	-0.534	<0.001	-0.144	0.030

DISCUSSION

In this study it was found that the mean CCT and IOP among Zambian glaucoma patients were 532.20 µm and 23.55 mmHg respectively. This study also showed a statistically significant association between CCT and IOP.

Though the mean CCT of this study is significantly lower than the reported mean CCT of whites, it agrees with studies done among Africans and African-Americans [4,21,24-26] which equally reported thinner mean CCT. In most of the studies performed in Nigeria the mean CCT found was higher than the Zambian CCT while those found in Cameroon, Sudan and Ghana were comparable and those from Ethiopia and South Africa were lower than the Zambian CCT[17-19]. Studies that directly compared Caucasians and African Americans found a CCT of 555.7 µm in blacks compared to 573 µm in whites[21]. This finding is what was reported in other studies conducted in other parts of Africa[17,18].

According to a meta-analysis which included 300 studies conducted over a period of 31 years, Doughty and Zaman[29] reported an expected mean CCT measurement of 535 µm. This study reported 531.96 µm which was very close to the meta-analysis figure. However, when an ultrasound device is used, the expected mean CCT is higher averaging 544 µm[29]. When compared to the mean CCT measurements reported in African studies included in this review, only studies involving the Nigerian participants[20] are comparable to the suggested normal value (544 µm). All studies involving the other African sub-populations reported considerably lower mean CCT measurements[17-19]. This includes this study which reported 531.96 µm. However, this study and others done on the continent have shown that overall, there is a broad distribution (range: 519.00 µm – 550.00 µm) of mean CCT measurements in the various African sub-populations. The highest and lowest CCT measurements were reported in the Nigerian samples[30] (547.00 – 550.00 µm) and the Ethiopian and South African samples[4] (519 µm), respectively. This difference in mean CCT of 31 µm would be significant in terms of influencing IOP.

There was difference between the lowest and the highest CCTs found in the Zambian study population compared to studies conducted elsewhere in Africa all ranging from 31 µm to 34 µm. However, the study conducted on Caucasians in USA show a difference of 40 µm[21]. The younger patients (below 40 years) had the thicker corneas compared to the older (more than 65 years). However, there was no statistical difference between the two age groups. There was no statistical difference in mean CCT between the male and female participants. This was similar with what was reported in other studies. This study also showed a statistically significant association between CCT and IOP ($p < 0.003$), (Figure 3).

The mean CCT in Caucasians[31] and Asians (predominantly Chinese)[31], when using ultrasound pachymetry, ranges between 553 µm and 563 µm, and 566 µm and 570 µm, respectively[31]. This is therefore suggestive of the fact that, on average, the Zambian POAG patients have thinner mean CCT measurements (532.20 µm) than Caucasians and Asians and like the average CCT reported in African-Americans.

Numerous studies have elaborated the positive relation of CCT and measured IOP, and the quantitative relation between them in both adults and adolescents' population has also been revealed in many reports[7,19,32]. This study demonstrated significant correlations between the CCT and IOP values. Linear regression analysis revealed a positive correlation between CCT and IOP ($r = 0.0322$, $P < 0.003$). It is worth noting that r of 0.0322 demonstrates a moderate to strong positive relationship between CCT and IOP and this was confirmed with the statistical significance of $p < 0.003$.

Literature has highlighted CCT's impact on glaucoma related factors with controversies. Some literature shows that thin cornea is not associated with POAG or Primary Angle Closure Glaucoma (PACG)[32]. Other studies revealed population with thin CCT to be at increased risk of glaucoma development, and thicker corneas having less glaucoma[33]. This study established that there was a significant association between CCT and glaucoma disease progression with

the participants having thinner corneas presenting with severe disease as demonstrated by significant MD, PSD and CDR. This confirms the suggestion by Kaushik *et al*[24] that thinner CCT measurements are related to greater susceptibility for glaucomatous changes. CCT should therefore be an important part of an ocular examination since it provides information about the risk and clinical characterisation of the various glaucoma disorders[21].

However, some studies found out that patients with ocular hypertension had thicker corneas, and those with normal tension glaucoma had thin corneas[34]. Nevertheless, the widely acceptable results are from multicentre OHTS which revealed that the risk for development of glaucoma is greater in eyes with low CCT and lower in eyes with higher CCT[35]. This is probably attributed to under- and over-estimation of IOP due to variations in CCT.

MD and PSD give the estimation of VF defects, and are widely used to interpret, classify and document progression in glaucoma patients. This study found negative and significant correlation between CCT and VF parameters like MD and PSD. Studies utilizing multivariate regression models have found negative and significant relation between CCT and VF parameters like MD and PSD[37]. In another study to find correlation between CCT and severity of glaucoma using Advanced Glaucoma Intervention Study VF scoring criteria, it was found that score was significantly higher in the thinner CCT eyes, as compared to the thicker CCT eyes. This confirmed CCT as an independent risk factor for glaucomatous VF defects[37]. This study seems to agree with these findings by Mansouri *et al*[38] and Sullivan-Mee *et al*[39]. Other studies also highlighted significant negative correlation between CCT and VF parameters[38,39]. Whether CCT is an independent factor for glaucomatous damage or progression remains controversial.

CDR estimation remains an important clinical finding in glaucoma patients. OHTS shows increased risk of glaucomatous damage in patients having high CDR[36]. We found negative and statistically significant correlation between CCT and CDR, demonstrating thicker corneas to be having less CDR. This is consistent with findings by Kim *et al*[28]. Who found negative and significant correlation between CCT and CDR, though after multiple regression analysis the correlation appeared to be not statistically significant. Wangsupadilok *et al*[41] also found negative and significant relation between CCT and CDR[42]. In one study, a significant negative correlation was detected between CDR and CCT ($r = 0.102$, $P < 0.001$). However, there are studies showing no correlation between CCT and vertical CDR[43]. One study found significant correlation between CCT and CDR in one eye, and not significant relation in another eye[18]. Wu and co-workers[43] found negative correlation between these two variables, which was not statistically significant. Thus, it is implied from our study and literature that thinner corneas have high CDR, and vice-versa.

The IOP level correlates with topographic changes in the optic disc in eyes of patients suspected of having high-tension glaucoma[43]. The findings of this study agree with this postulation by Tanito *et al*[45], in the sense that IOP was found to have a significant association with severe disease manifestation. This effect IOP was noted to affect disease severity in all age groups. From this study it can be postulated that IOP as an important part of an ocular examination must be done in all adult patients for quick and early diagnosis of glaucoma. The same study has suggested that IOP of between 18 and 21 mmHg, and <18 mmHg is a safe target level in the treatment of patients suspected of having high-tension glaucoma to delay topographic optic disc changes[44]. This study agrees with this suggestion and further wishes to recommend that IOP of between 10 mmHg and 15 mmHg would even be a better target as determined in the study.

CONCLUSIONS

The findings in this study agree with previous reports that there are racial differences in CCT values. The mean CCT of Black Zambian participants were lower than those of Caucasians and other races. Also, in general, findings agree with previous studies that there is an association between CCT and IOP. Patients who had higher mean CCT were more likely to have high IOP compared to patients who had thinner CCT although this was not statistically significant. Thinner CCT and IOP were associated with greater cup disc ratio and Visual Field (VF) damages than those with a thicker CCT.

Competing interests: The authors declare that there is no competing interest.

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Conjunctival malignant melanoma mimicking scleromalcia perforans: a case report

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ABSTRACT

Malignant melanoma of the conjunctiva is a relatively infrequent neoplasm that can be associated with significant morbidity and cause diagnostic difficulty to both the ophthalmologist and pathologist. We herein describe a case of malignant conjunctival melanoma which clinically simulated scleromalcia perforance causing sclerouveal staphyloma or huge conjunctival cyst. Being rare but potentially lethal tumour, conjunctival melanoma should be included in the differential diagnosis of slowly growing conjunctival masses or sclerouveal staphylomas for early detection and management.

Key words: Malignant melanoma, Scleromalacia perforans, Staphyloma, Conjunctival cyst

INTRODUCTION

Conjunctival melanoma is a relatively rare condition, occurring only 1/40th as often as choroidal melanoma and approximately 500 times less often than cutaneous melanoma[1, 2]. Its incidence is 0.2 to 0.8 per million in white populations and it tends to present in adulthood with the median age at diagnosis being 60 years and with no sexual predilection[1- 4]. Conjunctival melanoma is a potentially lethal neoplasm, with an average 10 year mortality rate of 30%[1]. It can arise denovo (12%), from an existing nevus (20-30%), or more frequently from an area of primary acquired melanosis (75%)[5, 6]. The lesion is identified most frequently in the peri-limbal interpalpebral bulbar conjunctiva. Tumours located in the palpebral, forniceal and caruncular conjunctival regions are infrequent and are associated with poor prognosis[1,7].

Classically, conjunctival melanoma presents as a darkly pigmented mass of variable duration (often short) in the interpalpebral region of the bulbar surface that would cause little diagnostic difficulty for the ophthalmologist[7].

However, other several lesions may simulate conjunctival melanoma including extraocular extension of uveal malignant melanoma, metastatic malignant melanoma to the conjunctiva (usually from a cutaneous origin), melanosis oculi and oculodermal melanocytosis (nevus of Ota), scleraluveal staphyloma, foreign body, polymerized epinephrine, nerve loop axenfeld, pigmented epithelial tumours including papilloma, pigmented pinguecula and ocular surface squamous neoplasia[5,8].

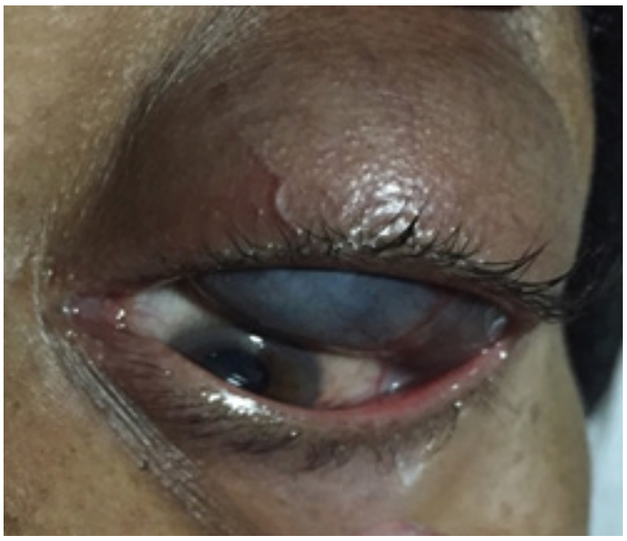
We describe a case of malignant conjunctival melanoma which simulated scleromalacia perforans with scleraluveal staphyloma.

CASE REPORT

A 50 year old female from the rural part of Arsi, Oromia region in Ethiopia, presented with a painless mass on the left eye of 5 years duration which progressively enlarged in size. She also complained of markedly reduced vision but denied any history of redness, ocular trauma or known systemic illnesses like diabetes, hypertension or rheumatoid arthritis.

On examination her vision on the left eye was reduced to counting fingers at 1meter. There was a bluish, cystic, fluctuant non-tender mass over the supero-temporal area of the orbit, filling the palpebral fissure and displacing the globe infero nasally. No pulsations or bruit were heard over the mass and its posterior limit was not visible (Figure 1). There was no significant lymphadenopathy.

A



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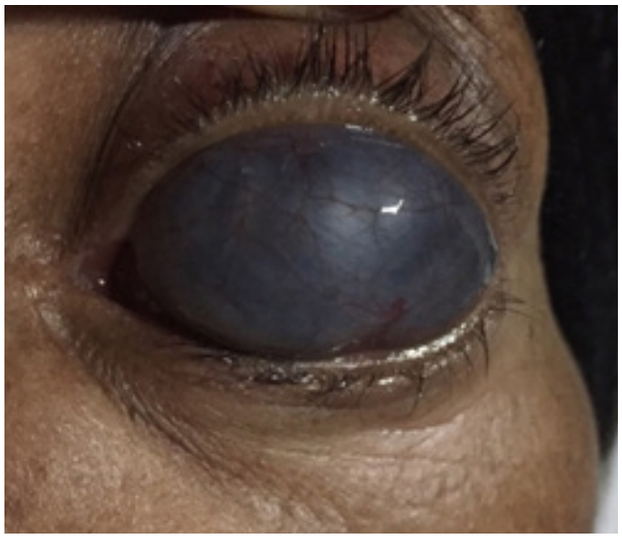


Figure 1: A & B – mass on the left eye

Slit lamp biomicroscope examination of the anterior segment was normal. Examination of the fundus using slit lamp biomicroscope and 90D Volk lens revealed diffuse chorioretinal scar involving the inferior half of the retina and macula (Figure 2).

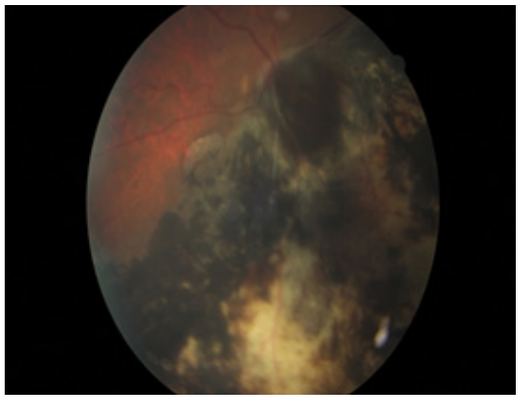
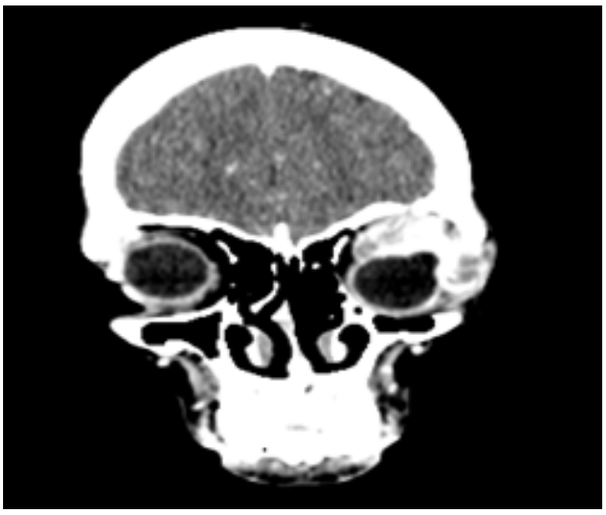


Figure 2: Fundus picture of the left eye

With a presumed diagnosis of scleromalacia perforans resulting in sclerouveal staphyloma, the patient was investigated with blood tests including Complete Blood Count (CBC); serologic tests including Rheumatoid Factor (RF), Venereal Disease Research Laboratory (VDRL), serology test for HIV 1 and HIV 2; organ function tests including liver and renal function tests all of which turned out to be normal. Chest X-ray and abdomino-pelvic ultrasound were also normal.

Ocular ultrasound showed a hypoechoic mass over the supero-temporal area of the left orbit compressing the globe but with questionable communication with the globe. Orbital CT scan showed heterogeneous orbital mass involving the supero-temporal orbit and had little enhancement with contrast.

A



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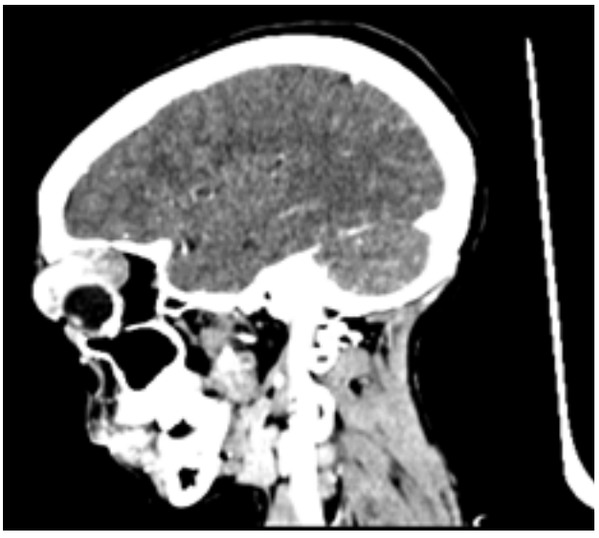

Figure 3: CT scan of the orbit and brain, coronal section (A) & sagittal section (B)

The case was presented to attending staff and residents at the Department of Ophthalmology, Addis Ababa University as scleromalacia perforans. Upon discussion, the diagnosis was challenged and agreed to be in need of further work-up including Cybersight® consultation. Doppler ultrasound was done and showed a highly vascularized mass with no communication to the globe.

The patient was subjected to surgical exploration for possible pathologic diagnosis by either excisional or incisional biopsy by an orbital surgeon. Intraoperative, a double walled cystic, dark brown vascularized mass was identified, and the posterior limit of the mass was unreachable. Incisional biopsy was done and specimen was sent for pathologic evaluation (Figure 4).

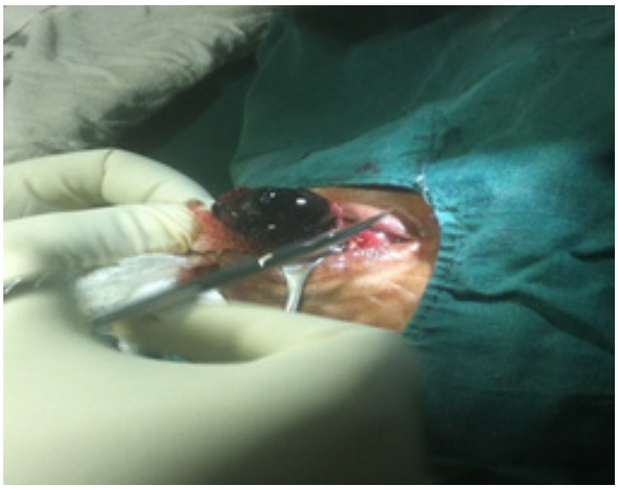

Figure 4: Excision of mass

Pathologic section showed well-delineated tissue with solid sheets of dicohesive cells having vesicular nuclei, prominent eosinophilic nucleoli and moderate cytoplasm containing dark brownish pigment which was suggestive of the diagnosis of malignant melanoma of the left conjunctiva (Figure 5).

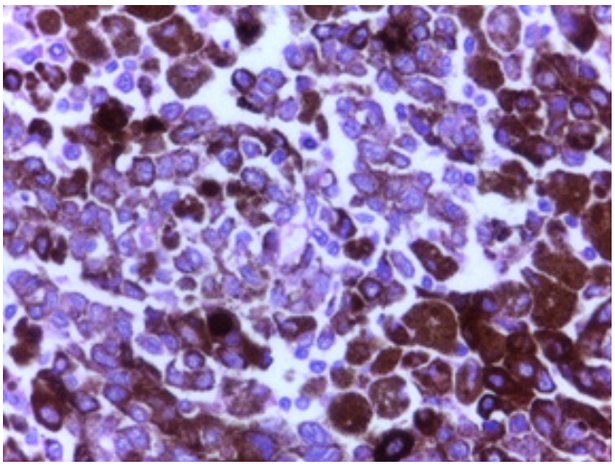

Figure 5: Histologic section

Figure 6: 1 month post operation

Post-operatively the patient was followed at the oculoplasty clinic, counseled for possible subsequent exenteration of the left orbit and also referred to the oncology department for secondary opinion and follow up (Figure 6).

DISCUSSION

Given the nature and the duration of the lesion, no malignant condition was initially considered as a differential diagnosis. Instead, the possibility of scleromalacia perforans causing sclerouveal staphyloma or huge conjunctival cyst was entertained. The diagnosis of conjunctival malignant melanoma confirmed with the histopathologic study.

Conjunctival melanoma is a relatively rare condition carrying high lethal potential[1-4]. It spreads through the lymphatics, primarily to the preauricular lymph nodes and sequently to the submandibular and cervical nodes. Excisional biopsy is the only way to differentiate melanoma from a benign lesion[4].

The primary treatment is surgical excision of the entire tumour with wide surgical margins of 3-5mm. Exenteration is indicated once the orbit is involved. The prognosis is poor and life expectancy is short for those associated with regional lymph node metastases [9, 10].

CONCLUSION

Although conjunctival melanoma is a rare tumour, it should be included in the differential diagnosis of slowly growing conjunctival masses or sclerouveal staphylomas. Early detection and treatment is crucial as conjunctival malignant melanoma is associated with a high mortality and metastases rate.

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