

Journal of Ophthalmology of Eastern Central and Southern Africa

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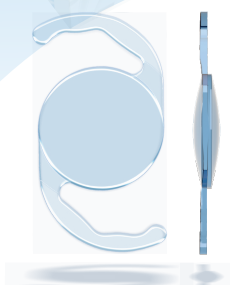
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- 
- 43 **Introducing the new JOECSA editorial board**
Arunga S
- 46 **Diabetic retinopathy screening program in Southwestern Uganda**
Arunga S, Tran T, Tusingwire P, Kwaga T, Kanji R, Kageni R, Hortense LN, Ruvuma S, Twinamasiko A, Kakuhikire B, Kataate B, Kilberg K, Gibbs G, Kakinda M, Harrie R, Onyango J
- 54 **Development of attributes relevant to satisfying ophthalmic care among health providers and adult patients at Harare Central Hospital, Zimbabwe: a mixed method study**
Kawome MM, Shamu S, Masanganise R
- 59 **The ingredients and microbiology studies of traditional eye medicine in a teaching hospital in Southwest Uganda**
Lee CP, Aggarwal S, Arunga S, Johnson S
- 64 **Mooren's ulcer in Uganda: A prospective observational case series**
Kavuma D, Arunga S, Onyango J, Leck A, Hoffman JJ, Hu VH, Burton M
- 72 **Concurrent retinoblastoma and morning glory disc anomaly in a 9 month old baby: a case report**
Nyabuga B, Njambi L, Kimani K
- 75 **Argon laser for subhyaloid retinal haemorrhage: a case report**
Kanji R, Ruvuma S, Kwaga T, Wiaffe G, Soliman A, Tuswingwire P, Arunga S

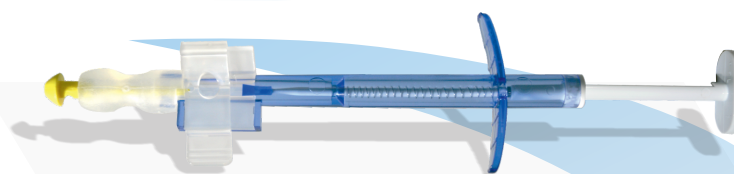


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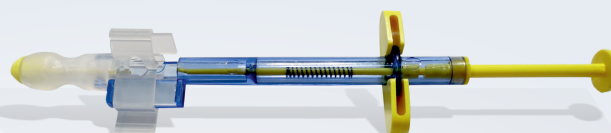


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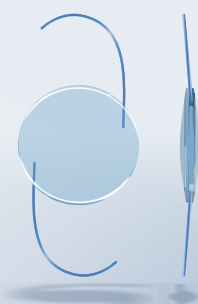
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EDITORIAL PANEL**Editor-in-Chief****Dr. Simon Arunga**

MBChB, MMed (Oph), FC,(Ophth)ECSA, PhD
 London School of Hygiene and Tropical medicine
 Lecturer, Department of Ophthalmology
 Mbarara University of Science and Technology
 Email: arungasimon@gmail.com

Co-Editor-in-Chief**Dr. Emmanuel Nyenze Muindi**

MBChB, MMed (Nbi), FEACO
 Sub-specialist; Oculoplastic/Orbit/Ocular oncology
 (LV Prasad Eye Institute and Aravind Eye
 Hospitals - India)
 Lecturer, Department of Ophthalmology
 University of Nairobi, Kenyatta National Hospital
 Email: drnyenze@yahoo.co.uk

Section Editors**Dr. Egide Gisagara**

MBChB, MMed (Oph), MSc.PHEC
 Lecturer, Department of Ophthalmology
 University of Rwanda
 Kigali, Rwanda
 egisagara@ur.ac.rw

Dr. Anne Ampaire Musika

MBChB, MMed (Mak) FEACO
 ICO Fellow Orbit & Oculoplastics (Munich)
 Lecturer, Ophthalmology Department
 Makerere University
 College of Health Sciences
 Kampala, Uganda
 Email: annamusika@yahoo.com

Dr. Consity Mwale

BSc, Human Biology, MBChB, MMed, MPH,
 FEACO, MBA
 COECSA Secretary General and
 Lusaka Provincial Health Director
 P. O. Box 32573
 Lusaka, Zambia
 Email: consitymwale@yahoo.com

Dr. Lucy Njambi

MBChB, MMed (Ophth)
 Paediatric Ophthalmology & Strabismus Specialist,
 Lecturer, Department of Ophthalmology, School of
 Medicine,
 College of Health Sciences, University of Nairobi
 P.O. Box 2683 - 00200, KNH, Nairobi, Kenya
 drnjambi@yahoo.com

Members**Dr Alemayehu Woldeyes Tefera**

MD, MSc, PHEC
 Ophthalmologist and Public Health Specialist
 Ras Desta Hospital
 Addis Ababa, Ethiopia
 Email: alexwoldtkaleb@gmail.com

Dr. Sarah Sitati

MBChB (UoN), MMed (Oph) (UoN)
 Consultant Ophthalmologists & Paediatric
 Ophthalmologist
 Kenyatta National Hospital, Kenya
 Treasurer, COECSA
 Fellow, COECSA
 Paediatric Ophthalmology/ROP
 Fellowship (ucsf, USA)
 Leading High Performing Health Organizations
 (LEHHO, Strathmore Business School)
 Email: smsixty@gmail.com

Dr. Teddy Kwaga

MBChB - Mbarara University of Science and
 Technology (MUST) 2016
 MMed (Oph) (MUST 2021)
 Ophthalmologist
 Ruharo Eye Centre, Uganda
 Email: Makabayiteddy@gmail.com

PUBLISHER

College of Ophthalmology of Eastern, Central and Southern Africa (COECSA)

Introducing the new JOECSA editorial board

In this issue, we are pleased to introduce the new JOECSA editorial board. The board was selected following an elaborate process that took over one year. It included a call for expression of interest from the wider COECSA community, training of the new board and updating of the submission and review systems.

A key change in the operations of the journal is the digital migration onto an automated online journal management system. The new board works closely with the *Eye Journal* editorial board as part of the existing COECSA-RCOphth LINKS partnership. Below is a list of the board members.



Dr Simon Arunga
Editor-in-chief

Dr. Simon Arunga trained as an ophthalmologist in Uganda in 2014. He went on to do his PhD at the London School of Hygiene & Tropical Medicine, London, UK. His thesis was titled “Epidemiology of Microbial Keratitis in Southwestern Uganda”. He works as a clinical lecturer and residency training coordinator at Mbarara University of Science and Technology, Uganda. He is also honorary visiting lecturer at the International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK. His research interest includes cornea, glaucoma, and community health with a particular interest on primary eye care. His current cornea research is on a series of Randomized Controlled Trials investigating prevention strategies and optimization of treatments for microbial Keratitis in Uganda. Dr Arunga also works as the Lions Clubs International Foundation Technical Advisor for Anglophone Africa.



Dr Emmanuel Nyenze
Co-Editor-in-chief

Dr. Emmanuel Muindi is a consultant ophthalmologist with more than 12 years' experience as an eye specialist and 6 years' experience as a sub-specialist in oculoplastics & orbit from LV Prasad Eye Institute and Aravind Eye Hospital Systems, India. He graduated as a medical doctor at Moi University in 2001, and as an ophthalmologist from the University of Nairobi in 2007. He is an International Council of Ophthalmology (ICO) Fellow and a Fellow of the College of Ophthalmologists of Eastern, Central and Southern Africa, (COECSA). He has published widely in the area of ophthalmology and presented many papers in seminars and conferences.



Dr Consity Mwale
Section editor

Dr. Consity Mwale has been working with the Ministry of Health in Zambia since 2002. Consity currently works as provincial health director for Lusaka province and is responsible for coordinating and provision of quality health care services in both public and private health facilities. In this regard, Consity passionately engages in providing technical support and mentorship for leadership and governance thereby contributing positively to health systems strengthening. Consity also lectures at the University of Zambia and Levy Mwanawasa Medical University and has great interest in research. Consity is also an executive committee member of ECSA HC and COECSA.



Dr. Lucy Njambi
Section editor

Dr. Lucy Njambi is a consultant ophthalmologist and a lecturer at the Department of Ophthalmology, University of Nairobi, Kenya since 2012. She is also an ICO fellow, Paediatrics Ophthalmology and Strabismus Fellow (CCBRT, Tanzania), Retinoblastoma Fellow- Sick Kids Hospital (Toronto, Canada). Lucy has interest in research and has several publications particularly in paediatrics ophthalmology. She has served COECSA in other capacities, previously as a member of the Scientific and Research Committee and currently as a member of the Training of Trainers programme.



*Dr. Egide Gisagara
Section Editor*

Dr. Egide Gisagara is an ophthalmologist from Rwanda, trained in Uganda in 2015 and an MSc course addition from London School of Hygiene and Tropical Medicine (UK). He has worked under Ministry of Health and University of Rwanda, closely collaborated with Fred Hollows Foundation, Vision for a Nation and One Sight. Currently, he is a consultant ophthalmologist and lecturer/visiting faculty member at University Teaching Hospital of Kigali (CHUK) and University of Rwanda/Rwanda International Institute of Ophthalmology (RIIO) respectively. He has special interest in clinical work, research and teaching.



*Dr. Anne Ampaire Musika
Section Editor*

Dr. Anne Ampaire Musika is an ophthalmologist since 2004, clinical epidemiologist/biostatistician and lecturer since 2014 at Makerere University College of Health Sciences. She is an Orbit and Oculoplastics surgeon and ocular oncologist at Mulago National Referral Hospital. Anne is the coordinator for the ICO exams in Uganda and is a member of the School of Medicine Research Ethics Committee (Makerere University). Anne's research interests include orbital tumors, ocular TB and HIV, glaucoma, residency training curriculum, diabetic retinopathy, and ocular trauma. She has participated in clinical trials for ocular safety of therapy for multidrug resistance TB and is currently a co-investigator on ocular malignancies with Aids Malignancy Consortium.



*Dr. Alemayehu Woldeyes
Member*

Dr. Alemayehu Woldeyes is a consultant ophthalmologist, (2008, AAU, Ethiopia) subspecialist on community eye health (2012, LSHTM, UK), certified RAAB (Blindness survey) trainer (2015, IAPB, UK), trained in Medical retina (2010, ICO, Finland). He got ICO and LSHTM fellowships and others. He works as a clinician (Ras Desta Hospital), clinical supervisor, lecturer (Private medical colleges), global technical advisor (Sightsavers) and is involved in charity works (Lions, Rotary international, VCS).



*Dr. Sarah Sitati
Member*

Dr. Sarah Sitati is a Paediatric Ophthalmologist and Squint specialist working at the Kenyatta National Hospital. She completed her MMed training at the University of Nairobi, Kenya, followed by a Paediatric Ophthalmology Fellowship in the US. She is the Chair of the Retinopathy of Prematurity working group in Kenya, that published national guidelines for screening and management of ROP in Kenya. Dr. Sitati has over ten years' experience in the management of paediatric and adult cataract, ocular trauma and squints. She has published research papers in local and regional journals and given several presentations in regional and international conferences. She is the current treasurer of COECSA.



Dr. Teddy Kwaga
Member

Dr. Teddy Kwaga completed her training as an Ophthalmologist in Uganda in 2021. She is currently working as an Ophthalmologist at Ruharo Eye Centre, Uganda. Her interests include glaucoma, cornea and community health. Dr. Kwaga works also as a project coordinator for the Lions Comprehensive Eye Care Project for Kigezi in Uganda.

The board is supported by an admin secretariat which includes Mr. Josiah Onyango, CEO of COECSA, Ms. Annette Abuya the journal administrator and Eng. Felix Obare the journal IT specialist.

Dr. Simon Arunga, Editor-in-Chief, JOECSA. Email: sarunga@must.ac.ug

Diabetic retinopathy screening program in Southwestern Uganda

Arunga S^{1,2}, Tran T³, Tusingwire P^{1,4}, Kwaga T^{1,4}, Kanji R¹, Kageni R¹, Hortense LN¹ Ruvuma S¹, Twinamasiko A¹, Kakuhikire B^{1,5}, Kataate B^{1,5}, Kilberg K⁶, Gibbs G⁶, Kakinda M⁶, Harrie R⁷, Onyango J¹

¹Department of Ophthalmology, Mbarara University of Science and Technology, Mbarara, Uganda

²International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK

³Department of Ophthalmology, University of Minnesota, Minneapolis, USA

⁴Ruharo Eye Centre, Ruharo Mission Hospital, Mbarara, Uganda

⁵Lions Clubs of Mbarara, Mbarara, Uganda.

⁶Lions Club International Foundation, Oak Brook, USA

⁷Latter-day Saint Charities, Salt Lake City, USA

Corresponding author: Dr Simon Arunga, Mbarara University of Science and Technology, Kabale Road, Mbarara, Uganda. Email: sarunga@must.ac.ug

ABSTRACT

Objectives: Between 2019 and 2045, the prevalence of Diabetes Mellitus (DM) will double; associated with this, the burden of Diabetic Retinopathy (DR) is also expected to increase, especially in low-resourced settings. To prevent avoidable visual impairment and blindness, early detection through screening and early treatment are necessary. To enable access to these services, we developed the Lions Diabetic Retinopathy Project for southwestern Uganda to serve the region including 17 Districts with eight million inhabitants.

Methods: A three-pronged strategy for mass screenings leveraging the existing general health system and opportunistic screening of higher-risk population. Capacity building involved training a vitreoretinal surgeon and allied eye care providers, installing critical infrastructure at the referral eye hospital, and acquiring equipment for primary health centres.

Results: In 1.5 years, 60 DR screening camps were implemented; this led to screening of 9,991 high risk individuals for DM and 5,730 DM patients for DR. We referred 1,218 individuals with DR for further management at the referral eye hospital, but only 220 (18%) attended referral. The main barrier for not attending referral was long travel distance and the associated direct and indirect costs. Human resources trained included 34 ophthalmic nurses, five midlevel providers, and one vitreoretinal surgeon. Major equipment acquired included a vitrectomy system, an outreach vehicle, and non-mydriatic fundus cameras.

Conclusions: DR screening can be implemented in a resource-limited setting by integrating with the general primary healthcare system. However, geographic barriers stymie delivery of therapeutic services and we need to establish models to bring these services closer to areas with poorer access.

Key words: Africa, Diabetes, Diabetic retinopathy, Public health, Screening, Uganda

INTRODUCTION

In 2019, the prevalence of Diabetes Mellitus (DM) globally was 463 million adults, and is projected to increase to 700 million by 2045; 80% of people with DM live in Low- and Middle-Income Countries (LMICs)¹. In Uganda, the prevalence of DM among adults aged 18 to 69 years is 2.7% in urban settings and 1.0% in rural settings². Diabetic Retinopathy (DR), a main complication of DM, is the leading cause of blindness among working age adults globally³. In a robust metaanalysis involving studies that enumerated adults across the lifespan (eg. age 17 to 96 years), 34.6% with DM have any DR, and about one-third of individuals with DR have vision-threatening DR.⁴ In resource-rich health systems, adults with DM type II undergo a comprehensive eye examination at diagnosis and then annually^{5,6}, though this is rarely feasible in most health

systems of Uganda. At Mbarara University's adult DM outpatient clinic, only 2% of DM patients were screened for DR, even though DR was the third leading cause of visual impairment (17%) in 2014⁷. In a follow up study in 2017 surveying patients from the aforementioned DM clinic, the referral situation had not improved as significantly as we expected; of the patients eventually diagnosed with any DR, only 13.3% were referred for an eye examination prior to any visual symptoms⁸. The prevalence of DR among DM patients was 13.5%, and the proportion of visual impairment and blindness was 9.6% and 0.5%, respectively. This led to the development of the Lions Diabetic Retinopathy Project for southwestern Uganda.

The main aim of this project was to strengthen the health system for screening and treatment of DR in southwestern Uganda, ultimately preventing visual impairment among those with DM. The aim was

achieved through: 1) capacity building of the Primary Health Care (PHC) system to screen for DR and to strengthen the capacity of the main referral eye hospital in the region to treat DR; 2) intensify screening efforts in the PHC for early detection of DR; 3) create a demand for screening through sensitisation campaigns.

MATERIALS AND METHODS

This project was implemented by Mbarara University of Science and Technology (MUST) Department of Ophthalmology, Department of Internal Medicine, and

Lions Club of Mbarara. Together, we solicited funding from Lions Clubs International Foundation (LCIF) and the Latter-day Saint (LDS) Charities to procure equipment, training of key personnel and conducting screening and sensitisation campaigns.

Project area: This project served 17 Districts in southwestern Uganda covering a total population of about eight million people (Figure 1). Residents from Democratic Republic of the Congo, Rwanda, and Tanzania also reside in this area.



Figure 1: Map of Uganda showing the 17 Districts comprising the area where the project was implemented. The red star represents Mbarara city where Mbarara University and Referral Hospital Eye Centre is located. The red circle represents Kampala, the nation's capital.

Key activities

1. *Training of human resources:*

- i. *Nursing cadre –Ophthalmic Assistants (OA):* we aimed to train two nurses from the 17 Districts at MURHEC. The OAs support the midlevel and physician providers in screening patients and undertaking basic diagnostic workup.
- ii. *Midlevel cadre –Ophthalmic Clinical Officers (OCO):* Since there were five Districts without an existing OCO; we solicited nominations from the health leadership. These individuals

underwent a one-year training program at the Jinja School of Ophthalmic Clinical Officers, which is the only training program available in the country. The existing 12 OCOs from other Districts underwent a two-week intensive course on DR.

- iii. *Specialist provider – vitreoretinal surgeon:* An ophthalmologist with previous medical retina training from MURHEC underwent a one-year fellowship in vitreoretinal surgery at the Kilimanjaro Christian Medical College (KCMC) in Moshi, Tanzania and an observership at the

National Health Service Bristol Eye Hospital (NHS BEH). MURHEC and NHS BEH have a long-standing relationship under the VISION 2020 LINKS programme.

- iv. *Project management team:* A group of four (chairperson, administrator, coordinator, and technical advisor) underwent a two week course at Lions Aravind Institute of Community Ophthalmology on Project Management Training for Eye Care (<http://aurovikas.co.in/webaecshome.aspx>).

2. *Equipment for infrastructural capacity building:*

This was done at the level of the tertiary referral eye hospital in the region, MURHEC, and the Primary Health Centres (PHCs).

- i. MURHEC: the existing equipment had been provided by LDS Charities, which donated a Zeiss Cirrus HD-OCT 500 (Carl Zeiss AG, Oberkochen, Germany) for Spectral Domain-Optical Coherence Tomography (SD-OCT) and one argon laser for Panretinal Photocoagulation (PRP), while the NHS BEH donated another argon laser (Appasamy Amogh Plus, Appasamy Associates, Chennai, India) through the VISION 2020 LINKS program.

Using the LCIF funding, we purchased:

- Alcon Constellation Vision System (Alcon Laboratories, Geneva, Switzerland) for vitreoretinal surgery.
- Outreach vehicle: Toyota Land Cruiser 70 Troop Carrier (Toyota Motor Corporation, Toyota City, Japan) to transport a full team during outreach camps.
- Six portable non-mydriatic fundus cameras (Forus 3nethra Classic, Forus Health Pvt Ltd, Bengaluru, India) and six companion laptops.
- Three iCare ic100 (Icare Finland, Helsinki, Finland) for rapid intraocular pressure measurements.

- ii. *Primary Health Centres (PHCs):* All were provided direct ophthalmoscopes, retinoscopes, and automatic blood pressure cuffs and glucometers.

3. *Screening outreach camps:* We planned and conducted screening outreach camps based on a three-pronged approach

- i. *Screening at PHCs, which had been operating monthly DM clinics:* This made it feasible to screen these known individuals with DM for DR. The team performing the screenings travelled from MURHEC to all sites across the region. A more detailed protocol is elaborated in Figures 2 and 3.

- ii. Routine screening at existing DM clinics of District Hospitals, which run weekly DM clinics. One technician setup the non-mydriatic fundus camera to acquire photos during a visit.
- iii. Opportunistic screening of high-risk populations, such as corporate officers where more sedentary individuals can be screened for hypertension, DM, and DR.

Materials:

- *Registration materials:* patient forms/registration book, pens, portable laptop for registrar (if available)
- *Examination:* Snellen visual acuity charts (tumbling E should be included), penlight/muscle light, portable non-mydriatic fundus camera
- *Diagnostic:* Blood pressure cuff, glucometer, portable tonometer (portable tonometry devices based on rebound, non-contact, indentation mechanisms), mydriatic eye drops
- *Treatment:* Reading glasses, ophthalmic suspensions for dry eye and allergy
- *Infrastructure support:* screening tent/room, back-up generator when grid power source fails

Key personnel and stations include:

- Registration, which can be done by a non-medical personnel
- Health education/waiting area where patients can receive health education. This can be provided by a general nurse or an ophthalmic assistant.
- Vision and other vitals including blood pressure, intraocular pressure, blood sugar, weight, and height can be done by a nurse. In a busy screening, more than one station may be created.
- Fundus photography can be done by a trained non-medical personnel, ideally someone with experience capturing fundus photos or performing ophthalmoscopic examinations. If a dark room is not available, a blanket can be used to cover the patient to reduce ambient lighting for best image quality.
- Counseling and referral should be done by a trained healthcare provider, ideally an ophthalmic clinical officer or a midlevel provider who can interpret fundus photos and provides real time feed back to the patient. Store and forward teleretina or cloud-based artificial intelligence is limited by broadband availability in most rural areas of Sub-Saharan Africa (SSA), but these may become more realistic modalities when the information communication technology infrastructure enables.

Figure 2: Diabetic retinopathy screening outreach camp at a primary health centre

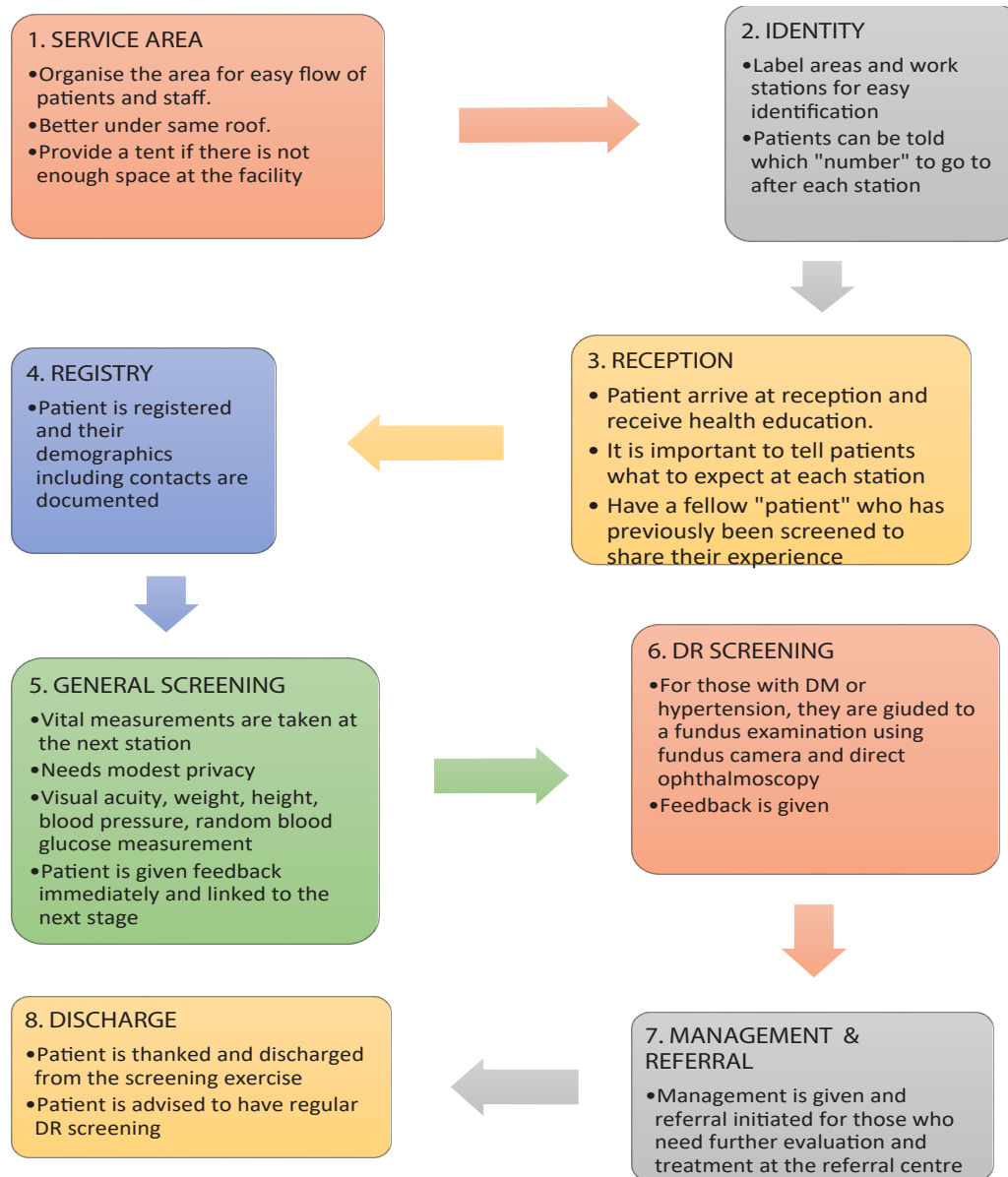


Figure 3: Flow of patients during a screening outreach camp

4. Awareness and advocacy

- Stakeholders:* DR screening needs multisectoral collaboration including local government (in Uganda's case, the District leadership), national and regional political leaders (for example, the country's national eye health coordinator), management of health facilities, potential funders, opinion leaders, religious leaders, the local Lions Clubs, other NGOs involved in eye health and/or noncommunicable diseases, DM.
- Media:* We used radio and TV talk shows, social media platform messages inviting people for screening camps and ongoing boots-on-the-ground public awareness activities on DM and DR. This improved demand for screening and receiving therapeutic eye care if indicated.
- Information Education and Communication (IEC) materials:* These were developed in

collaboration with the department of health education at the Ministry of Health, which improved alignment, used established materials, and avoided duplicating work. IEC materials included patient handbills and posters (print and soft copies). They were then officially launched by the Ministry of Health and distributed to several primary health centres in southwestern Uganda.

- Major international awareness events:* We used events such as the World Sight Day and World Diabetes Day to raise awareness about the screening activities and eye health in general. They were led by members of the collaborating Lions Clubs and activities included awareness marches and community meetings involving key leaders, such as the Minister of Health.

RESULTS

The metrics used for monitoring and evaluation are provided in Table 1. In brief, 9,991 were screened for DM, and 5,730 were screened for DR, in which 1,218 (21.3%) were then referred for therapeutic

care at MURHEC. However, only 220 of the 1,218 (18.1%) attended referral. Characteristics of this patient population are provided in Table 2. The total budget for a three-year implementation period was USD 548,133 summarized in Table 3.

Table 1: Scorecard based on the project objectives and targets

Indicator	Target	Completed	(%)	Comment
Training				
Project management team	4	4	100%	Training was done at Aravind, India
Vitreoretinal Surgeon	1	1	100%	Sandwich training done at Bristol Eye Hospital, UK and Kilimanjaro Christian Medical College, Tanzania
Ophthalmic Clinical Officers (OCOs)	5	5	100%	These were formerly nursing staff at the participating facilities from districts without any eye cadre. They received a one-year training at the national school for Ophthalmic Clinical Officers, Uganda
Refresher trainings on DR	34	24	59%	For districts which already had eye health personnel, these were invited and given a refresher training on DR screening and management
Ophthalmic Assistants	34	34	100%	A nurse from each district was identified and trained as Ophthalmic Assistants to support the OCOs in providing routine screening
Infrastructure development				
Procure an outreach motor vehicle	1	1	100%	A 2 door 13-seater 4x4 Land cruiser for outreach purposes
Non-mydriatic fundus cameras	6	6	100%	3-nethra classic from Forus, India with tabletop chin support
Posterior segment vitrectomy system	1	1	100%	Alcon constellation machine
Portable tonometers	1	3	300%	One air puff tonometer was procured and two were donated by the vision 2020 Links partnership
Backup power generator	1	1	100%	
Service delivery				
Screening outreach camps	60	60	100%	These were conducted mostly at the primary health centres with an active DM clinic in the 17 Districts
Number of people screened for DM	10,000	9,991	100%	Opportunistic screening for DM was conducted to cater for the patients with previously undiagnosed DM type II, which generated more DR screenings
Number screened for DR	10,000	5,730	57%	
Number referred for care	N/A	1,218		21% of patients screened for DR required referral; of these individuals, 20% had visually significant cataract, 15% had uncorrected refractive error, 10% were glaucoma suspects, and 8% had any severity of DR
Number attending referral	N/A	220		18% of those referred attended their referral at MURHEC
Number of people treated with anti-VEGF or panretinal photocoagulation	775	175	23%	We have not commenced vitreoretinal surgery since the planned launch was March 2020 then the country was locked due to the COVID-19 pandemic

Table 2: Characteristics of diabetic retinopathy screening population (N = 5730)

Age (in years)	Median (IQR), range	56 (46 – 66), 10-100
Sex	Female (%)	4189 (73.1)
	Male (%)	1541 (26.9)
Presenting visual acuity, in better eye (Snellen metric)		
	>6/6 to 6/12, frequency (%)	4629 (80.8%)
	<6/12 to <6/18, frequency (%)	288 (5.0%)
	6/18 to 6/60, frequency (%)	561 (9.8%)
	3/60 or worse, frequency (%)	252 (4.4%)
Any diabetic retinopathy in at least one eye, frequency (prevalence estimate)		290 (5.1%, 95%CI, 4.5 – 5.7)

Table 3: Budget by category of expenses

Category of expense	Expense in USD (% of total)
Therapeutic services and infrastructural development	209,823 (38.3%)
Screening implementation	157,092 (28.7%)
Human resources development	98,492 (18.0%)
Stakeholder involvement, advocacy, operations	60,612 (11.1%)
Community education and sensitization	22,114 (4.0%)

It is important to highlight that this project was intended to be implemented from October 2018 to September 2021. At the midway point, the project was delayed by five months due to the Covid-19 pandemic. From March to July 2020, the government of Uganda enacted a nationwide movement restriction in which any individual walking in public needed to have proof that they were an essential service worker. Motor vehicles without a special permit were stopped, cited, and forced to return to the originating locale. In healthcare, only emergencies were managed at health facilities and this applied to ophthalmic care as well. The screening outreach camps were temporarily suspended, and the intended launch of vitreoretinal surgery was delayed until the third quarter of 2020. In our estimation, there were likely individuals who could have presented for urgent surgery (e.g. macula-on retinal detachment), but the strict movement restriction of civilians severely curtailed healthcare seeking behaviour overall, including general accident and emergency (A&E) visits.

DISCUSSION

Lessons learned - what worked well

Involving stakeholders early was critical for success. Each partner had a strength that created synergy. For example, the Uganda Ministry of Health helped obtain the necessary regulatory approvals, developed IEC materials, authorized procurement of equipment for government health facilities. The local government officials supported establishment of screening outreach camps at local primary health centres, granting permission for training of personnel and recruiting

the most appropriate candidates, and importantly committing to recognising and remunerating the staff for retention. The Lions Clubs each robustly generated awareness and mobilisation for screening. The LCIF's connections to LAICO allowed the project management team to directly learn from proven management techniques and processes from leaders in this field in southern India.

Identifying personnel through the local governments for further training mitigated risk of "brain drain". These individuals were nurses already on their payroll of the local government budget and had strong social attachments to their community. It was very easy for them to return to their stations after the training. The shortage of nurses, midlevel providers, and ophthalmologists is widely documented in SSA⁹. The vitreoretinal surgeon (Dr. Sam Ruvuma) was already a medical retina specialist on the faculty at MUST. He experienced countless cases in which patients could not attend referral to the capital city for surgical retina and eventually losing vision. This emboldened his resolve to establish a surgical retina service and practice in this region of the country.

Building the DR screening around established DM clinics is a well-recognised, evidence-based intervention that increases uptake of the DR screening⁵. In our project, we were able to support several Districts to start DM clinics that were previously non-existent. This project also facilitated knowledge transfer of establishing and running DM clinics among the Districts.

Leveraging existing collaborations and networks added value to the project goals. For example, the VISION 2020 LINKS programme provided the

opportunity for the vitreoretinal surgeon training at KCMC and enhanced training of MUST's staff on grading DR. Local Lions Clubs were instrumental in serving as hubs for multisectoral collaboration. For instance, a Lions Club members spearheaded screening at a local bottling facility, a local headquarter of a medium-sized bank, and the regional prison.

From a comprehensive eye care standpoint, we were able to identify and refer patients with other common ophthalmic conditions, such as corneal diseases, cataract, and glaucoma suspects. Several common causes of visual impairment can be potentially addressed by any population eye health project with an initial focus on one risk group or disease process.

Challenges and pitfalls

Although over 1,200 patients were referred, only 18% attended referral at MURHEC despite the individual counselling, IEC, media campaigns, and community sensitization efforts. Follow up calls to those not attending referral resulted in over 50% reporting that the costs of transport was the main barrier. This was disproportionately higher among patients who came from far-flung districts compared to those that were nearer to MURHEC. None of those referred from the furthest Districts of Kabale, Kisoro, Rubanga, and Rukiga attended MURHEC, whereas nearly 50% of those referred from Mbarara District attended. While geography and its implicated transportation costs is an independent predictor of healthcare seeking in other studies on DR from East Africa^{10,11}, the 50% in Mbarara who did not attend suggest that there still existed beliefs about eye health that must be modified given the referral process was clear and patients were educated on how manageable DR can be. Patients tend to perceive that they do not need to be concerned about their vision while still functional. Unfortunately, this perception is one of the reasons why late presentation is so frequent in SSA countries^{7, 12-15}, and the treatment outcomes for DR is suboptimal¹⁶. Even in large randomized-controlled trial settings in high-income countries, follow-up noncompliance is as large as one third by the fifth year¹⁷. To deal with this, we must attempt to implement as many "one and done" interventions as possible, such as combined panretinal photocoagulation and anti-VEGF injection, bilateral anti-VEGF injection, or bilateral sequential cataract extraction to name a few.

The second largest barrier for those who do attend referral is out of pocket expenditures. Because of the project's funding, all examinations and diagnostics have been fully subsidized. Treatment costs have been cost shared at 70-80%. A policy level solution to this would be the long-awaited national insurance scheme. The national and local leadership have made significant strides toward realizing this plan since 2005. A medium-term policy solution is through bulk contract purchasing through the essential medicines

programme¹⁸. Bevacizumab costs USD 550 per vial and typically enables 20 injections, thus the patients pay up to USD 27.5 per injection. The price can be as low as USD 2.75 per injection if bevacizumab is included in the essential medicines list and procured as a bulk contract. These financial barriers seem insurmountable, but the cost-effectiveness of proactive screening and treatment of DR is well-established¹⁹, even in low-resourced settings²⁰.

Moving from patient barriers to the service side of the equation, an ongoing challenge is keeping the trained OCOs and ophthalmic assistants engaged in eye healthcare. Our solution is to ensure these individuals have the space and supplies they need to carry on their work. Through intense lobbying by the project management team, the PHCs and District Hospitals allocated space for eye clinics at each of these locations, but there was an existential risk of new leadership reassigning these spaces to more well-funded or higher volume activities, such as expanding immunisation programmes, especially when the Covid-19 vaccines become available, or male circumcision³ and family planning.

At MURHEC, equipment maintenance has been an ongoing challenge. In retrospect, we should have funded the training of a biomedical engineer to service major ophthalmic equipment that can be done independent of the vendor, decreasing the instances where a manufacturer sends a technician from a regional hub. We advocate a more favourable approach to LMIC country health systems by these manufacturers by training local human resources to cover the more basic repair issues. The business benefit to the manufacturers would be expanded volume of purchases by governments. While MURHEC has been able to maintain its ophthalmic equipment, there are many instances of donated equipment falling into disrepair.

CONCLUSIONS

This DR screening and treatment project provided evidence that this can be successfully implemented in resource-limited settings and integrated into the general health system through human resources and infrastructural development. The lessons learned apply to other countries in SSA. However, linking screening to therapy remains challenged by geographic barriers. Based on this, LCIF has supported another project to decentralize a package of basic ophthalmic surgeries, such as cataract extraction, by strengthening the secondary level health facilities.

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Conflicts of interest: KK, GG and MK are all employees of LCIF. Part of this data was presented at the IAPB meeting in Dar es Salaam, October 2019.

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Development of attributes relevant to satisfying ophthalmic care among health providers and adult patients at Harare Central Hospital, Zimbabwe: a mixed method study

Kawome MM¹, Shamu S², Masanganise R¹

¹Department of Ophthalmology, University of Zimbabwe, College of Health Sciences, PO Box A178, Avondale, Harare, Zimbabwe

²Department of Community Medicine, University of Zimbabwe, College of Health Sciences, PO Box A178, Avondale, Harare, Zimbabwe

Corresponding author: Dr Martina Mwabva Kawome, Department of Ophthalmology, University of Zimbabwe, College of Health Sciences, PO Box A178, Avondale, Harare, Zimbabwe Email: dr.martinakawome@gmail.com

ABSTRACT

Objective: To develop attributes relevant to satisfying ophthalmic care among health providers and patients.

Design: Mixed-method study.

Settings: Harare Central Hospital Eye Unit, Zimbabwe.

Subjects: A convenience sample of 30 eligible adult patients who had come for eye care at the outpatients' department and 18 health care providers.

Methods: This study was conducted as the first phase of a two-phase broader study. We held five focus groups with patients and doctors separately and twelve in-depth key informant interviews with nurses. Participants were asked to identify attributes of the care process they regarded as leading to satisfying eye care. We recorded full details and used a tallying method to record frequencies. We then ranked and identified key attributes, with the top three attributes regarded as the most important.

Results: The study developed nine attributes from health providers and seven attributes from health users. The most important attributes for health providers were the availability of drugs, good staff attitude and the availability of equipment. Patients prioritised good staff attitude, adequate information and the availability of doctors. All the attributes mentioned by health users were mentioned by health providers but ranked differently.

Conclusion: Both clinical and nonclinical attributes of care were considered by health providers and health users. Overall, attributes that were important to patients were linked to interpersonal relations (attitudes, communication, availability of, and access to doctors). Health providers' preferences were mostly clinical (drugs and equipment). Acknowledging these differences in perspectives may help policymakers when designing frameworks for quality health services.

Key words: Patient-centred care, Attributes, Satisfaction

INTRODUCTION

Patient satisfaction is a crucial component of any health delivery system. It has become a measure of clinical outcomes and an indicator of the quality of health services¹. Perceptions of satisfaction are derived from an appraisal of the care process and clinical outcomes. Satisfied patients have been reported to have better clinical outcomes². Furthermore, unfavourable outcomes may be accepted by satisfied patients, reducing the likelihood of litigation. Health providers who serve satisfied patients report greater job satisfaction and have a lower chance of burnout³. This healthy balance results in continuous uptake of health services with resultant economic benefit to the health funders⁴. There is therefore an increase in health care satisfaction surveys, with countries such as Germany making patient satisfaction surveys mandatory^{1,5,6}.

Internationally, there is an unprecedented move away from physician (health provider)-centred care

towards the concept of patient-centred care, in an effort to meet the demands of dynamic health systems⁷. Physician-centred care focuses on a disease, its investigation and the objective outcomes⁸. Patient-centred care is defined as providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions⁷. Patient-centred care is associated with better patient outcomes⁹. In patient-centred care, health providers and patients share decision making. As a result, the care process focuses not only on clinical measures but also considers other aspects of wellbeing such as emotions, spirituality, mentality and financial status. As a result patient-centred care is associated with better clinical and non-clinical outcomes⁹. Hospitals practising patient-centred care have been found to have higher patient satisfaction levels⁴. Measuring and recording patient satisfaction can give an insight into the extent of patient-centred care offered by a health service provider.

Determinants of patients' satisfaction are not universal, and tend to vary across nations and individuals^{5,10,11}. A study in Germany among 39 hospitals, noted that the greatest predictor of satisfaction was the treatment outcome followed by nurse kindness⁵. In Tanzania, the greatest predictors of health facility preference were health provider-related factors¹⁰. A systematic review on determinants of patient satisfaction found inconsistent relationships between patient satisfaction and patient-related factors⁴ whereas a satisfaction survey in public clinics in Zimbabwe concluded that there was a relationship between client satisfaction and services delivery¹¹. The authors did not characterise the determinants of patient satisfaction and recommended further research on patient satisfaction and perceptions.

Ophthalmic care involves the provision of treatment (for eye diseases, refractive problems, and functional disorders), prevention (mainly involved with screening), and advice (public health ophthalmology). According to the national eye strategy of Zimbabwe (2014-2018), eye health diseases and conditions are among the top five reasons for outpatient visits. They are a major cause of morbidity contributing to poverty at individual, family, community and national levels. The Zimbabwe national eye strategy aims to promote quality in eye care¹². Integrating patient-centred eye care could improve the quality of ophthalmic care in Zimbabwe.

To date, there has been no published literature on patient satisfaction in ophthalmic care in Zimbabwe. This study, therefore, describes and compares local perspectives on satisfying ophthalmic care in both the health providers and the health service users. Our findings will aid in understanding local patterns and will be used to design a local framework to improve satisfaction with patient-centred eye care. The information will also add to the limited knowledge of the determinants of satisfying ophthalmic care in Zimbabwe.

MATERIALS AND METHODS

This study was the first phase of a two-phase study. The main objective was to identify attributes contributing to satisfying ophthalmic care in Zimbabwe. These attributes were then used to design a questionnaire for the second phase. The study was done from July to December 2018 in an ophthalmic setting at Harare Central Hospital Eye Unit, a tertiary referral unit in Harare, Zimbabwe. Zimbabwe is a low income country in southern Africa. Adult patient participants were men and women of mixed ages attending the outpatients department for eye care. Health providers were nurses and doctors not exclusively ophthalmic. Patients and doctors who were eager and willing to share their ideas were conveniently recruited for separate focus group discussions. Twelve nurses were recruited for in-depth

key informant interviews as it was not feasible to have a group discussion due to their work commitments. There were no financial incentives. The 30-minute focus group discussions were held in the outpatients' department eye unit, with six patients or doctors in each. A trained facilitator (MK, the main researcher) led the focus group discussions and in-depth key interviews. A trained assistant researcher assisted with focus group control and data capture. Participants were asked which attributes of the care process were important in leading to satisfying eye care. Ideas mentioned were written down in detail and frequencies were noted using a tallying method. Focus groups for patients and key informant interviews were held until saturation of data was reached. For example, the frequency of key words that formed the basis of establishing attributes in the focus group discussions and in-depth interviews guided us in determining the level of saturation and cut-off. We undertook a simple data analysis to identify and rank attributes. The top three ranked attributes were considered to be the most important.

Ethical approval was obtained from the Joint Research Ethics Committee (JREC) for the University of Zimbabwe College of Health Sciences and Parirenyatwa Group of Hospitals, Medical Research Council of Zimbabwe (MRCZ) and Harare Central Hospital.

RESULTS

In total, we held five focus group discussions and 12 key informant interviews. Four of the focus groups were among patients and one was held with doctors. In total, nine attributes were identified in health providers' groups and seven in patients' groups. All seven attributes mentioned by patients were also mentioned by health providers. Emerging attributes are listed in descending order of popularity as shown in Table 1.

Table 1: Attributes relevant to satisfying ophthalmic care identified by patients and health providers in focus group discussions and interviews

Health providers' attributes (in descending order)	Patients' attributes (in descending order)
1. Availability of drugs	1. Staff attitude (good)
2. Staff attitude (good)	2. Adequate information
3. Availability of equipment	3. Availability of doctors (more clinics)
4. Short waiting time	4. Availability of drugs
5. Enough space	5. Enough space
6. Adequate information	6. Short waiting time
7. Availability of doctor (more clinics)	7. Clean environment
8. Clean environment	
9. Good food	

Health providers regarded the availability of drugs as the most important attribute, followed by good staff

attitude and the availability of equipment. Patients prioritised good staff attitude, followed by adequate information and the availability of sufficient doctors/clinics. Both groups listed enough space as important, but this was less important for patients than health providers.

DISCUSSION

In exploring the perceptions of patient satisfaction with eye care, we developed nine attributes for health providers and seven attributes for health users. The most important for health providers were the availability of drugs, good staff attitude and availability of equipment. Patients prioritised good staff attitude, adequate information and availability of doctors. All attributes mentioned by health users were also mentioned by health providers.

For the health providers, availability of drugs was ranked highest. With current resource constraints in local hospitals, patients sometimes have to outsource prescribed drugs. Providing patient care in the absence of appropriate prescribed medicines can be a major frustration to the health provider and patients. The health provider may, therefore, perceive the unavailability of drugs as a cause of patient dissatisfaction. Consistent with physician-centred care, the health provider may also be more likely than a patient to focus on the disease process and its treatment with medical/clinical modalities. There may therefore be less focus on nonclinical components of care such as interpersonal relationships¹³. This focus on disease, as opposed to the diseased person, has been highlighted since time immemorial. It has been a bone of contention among medical practitioners who are encouraging others to consider nonscientific elements of patient care for better outcomes^{8,14}. Our study adds to this body of knowledge.

In contrast to the health providers, patients regarded staff attitude as the most important factor contributing to their satisfaction with eye care services.

It is plausible that patients prioritise staff attitudes as these are easier to evaluate and judge than technical components of care^{15,16}. For example, in Tanzania where a discrete choice experiment of preferences for delivery care among 3,003 Tanzanian women was performed, the greatest predictor of health facility preference by patients was kind treatment by doctors¹⁰.

Similarly, in Bangladesh where client satisfaction and quality of health care in rural Bangladesh was studied, the most powerful predictor for client satisfaction was provider behaviour, even in the case of short consultation times (averaging 2 minutes 22 seconds) and long waiting times¹⁷. These studies found that technical competence did not strongly predict patient satisfaction. In contrast, a preference study in Zambia found that the technical quality of care, as represented by the thoroughness of the examination, was the most important quality

attribute, followed by staff attitudes¹⁸. There was no mention of clinical competence in our study. Training health personnel to improve interpersonal relationships with patients at institutional levels may help increase patient satisfaction.

Patients regarded adequate information as far more important to their satisfaction than health providers did. Our study supports findings from others which have reported an unmet demand for adequate patient information in Europe¹⁹. In a satisfaction study in Nigeria, only 37.2% of participants received sufficient information during the course of their treatment². Other studies have reported that health professionals undervalue the need for communication with patients²⁰, despite the fact that the Patient Charter includes patients' right to adequate information²¹. Drawing patients into the decision-making process encourages them to be partners in their own care. This shared understanding of potential problems can help the health provider and the patient accept less favourable clinical outcomes²². It is possible that health providers underestimate the need for comprehensive information due to the paternalism often practised in health care in some less developed nations²⁰. With the international shift to patient-centred care, patients require adequate information if they are to be satisfied².

Availability of equipment was an attribute which was only mentioned by health providers, who ranked it third. This makes intuitive sense, as the availability of equipment impacts on the ease of doing a task and may result in job satisfaction. In contrast, it is likely that patients do not appreciate the importance of available equipment and may also reflect their perception that the health providers are competent²⁰. Indeed, such a perception might also explain why patients ranked the availability of doctors third and health providers ranked it seventh. In developing countries, patients are likely to perceive doctors as knowing everything and might therefore not consider the need for clinical components such as medical equipment^{15,16}.

Notably, even in more developed countries such as Croatia, patients were comfortable losing their autonomy to a physician because of the perceived competency of the physician²⁰. The availability of sufficient space was ranked low by providers and patients. The relative unimportance of space and privacy could be explained by the fact that ophthalmic consultations are not privacy sensitive while disciplines such as obstetrics demand privacy. Good food was another attribute only mentioned by health providers. This supports findings from a preference study in Zambia, in which 'hotel' service had no bearing on patients' preference for a health service¹⁸.

Neither patient nor health provider regarded the affordability of health services as a priority. However, affordability may have been indirectly addressed by patients, who prioritised the need for available drugs.

When drugs are not available in a hospital, they have to be outsourced, becoming an added cost that may have a negative financial bearing on lower socioeconomic groups which are a majority in a developing country such as Zimbabwe¹⁸. A South African study reported that people were more likely to seek public sector health services if they received the medicine they needed²³.

Perspectives of health users and health providers differed both in the attributes identified and their ranking. Most studies have determined the perspectives of health users, but there is relatively little literature on the perspectives of health providers. Health provider-related determinants which include technical care, interpersonal care, physical environment, access (accessibility, availability, finances), organisational characteristics, continuity of care, and outcomes of care are the pillars of patient-centred care^{4,9}. The perspectives of health providers and health user may vary as a result of differences in sociodemographics²⁴. The health provider may not comprehend impairment through the patients' view, and may thus fail to respond appropriately to the patients' needs and preferences, resulting in dissatisfaction with health care²⁵. One of the aims of the study was to increase our understanding of local perceptions of health user and health provider in ophthalmology, which are known to differ across contexts²⁴ and affect the care process¹⁷. Acknowledging different perspectives may help policymakers when designing frameworks for quality health services.

This study was strengthened by having separate focus group discussions of patients and doctors, which allowed for free expression of opinions. A weakness of the study was that fewer focus groups were held for health providers than patients. Nurses had in-depth interviews instead of focus group discussions. These disparities can be a source of bias in information gathered. However the authors believe that meaningful conclusions can still be made from the gathered information. The second part of the study will use a standard questionnaire from the gathered information and will engage ophthalmic health providers as opposed to any health practitioner.

CONCLUSION

Health providers and health users consider both clinical and nonclinical attributes in assessing satisfaction with eye care services. Patients' prioritised interpersonal relations (attitudes, communication and availability and accessibility to doctors). Health providers' preferences were mostly clinical (drugs and equipment). Acknowledging these differences in perspectives may help policymakers when designing frameworks for quality health services.

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The ingredients and microbiology studies of traditional eye medicine in a teaching hospital in Southwest Uganda

Lee CP¹, Aggarwal S¹, Arunga S^{2,3}, Johnson S¹

¹University of Virginia, Department of Ophthalmology, Charlottesville, VA, 22908, USA

²Mbarara University of Science and Technology, Department of Ophthalmology, Mbarara, Uganda

³International Centre for Eye Health, London School of Hygiene & Tropical Medicine, Keppel street, WC1E 7HT, London, UK

Corresponding author: Prof Sandra M Johnson, Mason Eye Center, University of Missouri, Columbia, MO, USA. Email: smjeyes@gmail.com.

ABSTRACT

Objective: The aim of this study was to investigate the usage, ingredients, and microbiological profile of Traditional Eye Medicine (TEM) at a teaching hospital in southwest Uganda.

Methods: This was a single-center prospective pilot study that included 11 individuals who used TEM before presenting to a tertiary eye center of the Mbarara University of Science and Technology (MUST) between February 15th, 2017, and February 24th, 2017. We noted the patients' demographics, chief complaints, reasons for using TEM, and duration of treatment. We obtained the 19 samples of TEM and reviewed botanical contents and the microbiologic profile via gram staining, KOH staining, and cultures on blood-heart infusion agar, blood agar, chocolate agar, and potato dextrose agar.

Results: The most common reason for using TEM was cultural belief, followed by the cost of western medications and distance to the eye clinic. Cataracts and allergic conjunctivitis were the most common diagnoses made. The major contents were botanical sources. Sixteen out of 19 samples (84%) showed positive microbial culture; 6 samples were polymicrobial, and 10 were monomicrobial. *Klebsiella* species was the most common microorganism, being isolated from 13 samples. Other bacterial organisms included *Staphylococcus aureus* and *Bacillus* species. Fungal species such as *candida* and *aspergillus* species were isolated as well.

Conclusion: Most of our patients used TEM due to cultural beliefs. Eighty-five percent of the TEM samples showed positive microbiology culture, predominantly with *Klebsiella* species. Further microbiologic studies are warranted to identify the correlation between the use of TEM, corneal contamination, and corneal ulcers.

Key words: Traditional Eye Medicine (TEM), Uganda, Bacterial keratitis, Fungal keratitis

INTRODUCTION

According to the World Health Organization, about 90% of the world's visually impaired people live in low-income countries¹. The prevalence of blindness is approximately 1% in sub-Saharan Africa (SSA), and the important causes of blindness include cataracts, trachoma, and glaucoma². The estimated population of Uganda is over 33 million, with a prevalence of visual loss of 3.9%². In the paediatric population, visual loss due to corneal ulceration is the second leading cause of subnormal vision in Uganda³.

Access to eye care is limited in rural areas of Uganda, as there are only about 40 ophthalmologists and 200 ophthalmic clinical officers in the entire country, and most of them practice near the capital, Kampala³. Ophthalmic clinical officers, who are nurses or medical personnel with one year of training in ophthalmology, refer patients to ophthalmologists or optometrists, offer surgical assistance, and provide eye care in rural areas. Due to the lack of access to appropriate eye care in the rural areas, Traditional Eye Medicines (TEM) are commonly used in Uganda and other African countries⁴⁻⁸.

TEM are raw or partially processed materials that are applied to the eye for therapeutic effect⁹. Patients acquire TEM by manufacturing their own or purchasing from traditional healers, who are prescribers of TEM⁹. Although most traditional healers have limited knowledge and training regarding the detrimental properties of TEM, TEM are still widely used due to strong cultural and religious beliefs in Africa^{10,11}. A study from Malawi reported that 72% of their patient group used TEM as methods of self-treatment for eye diseases⁴. Known complications from TEM include corneal opacities, staphyloma, corneal ulcers, panophthalmitis, endophthalmitis, uveitis, cataract, bullous keratopathy, and blindness^{8,12}. A study from Nigeria reported that 16.7% of childhood blindness was associated with TEM¹².

Although TEM are frequently used and their harmful effects have been described, there are limited data regarding the microbiological investigation of the TEM. The objective of this study was to review the ingredients and microbiological profile of TEM at a teaching hospital in southwest Uganda.

MATERIALS AND METHODS

This was a single-center prospective study that included individuals who used TEM before presenting to a tertiary eye center of the Mbarara University of Science and Technology (MUST) between February 15, 2017, and February 24, 2017. The number of patients seen at MUST is approximately 10,000 annually, and the evaluations and treatments are offered for free. The study received institutional review board approval by the Ethics Committee of MUST, and voluntary informed consent was obtained from every participant. All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Interview questionnaires were specifically designed for TEM study and were used during patient interviews. All new patients in the eye clinic were asked about their use of TEM, and those who acknowledge the use of TEM prior to this visit were eligible for this study. These patients underwent full ophthalmologic evaluation by the in-house ophthalmologist, who then diagnosed and provided necessary treatment according to the hospital protocol.

Patients' demographic data included age, gender, and the distance between home and the eye clinic of MUST. We inquired about the ingredients used for TEM, the source, preparation methods, the duration and frequency of use, the cost, any subjective benefits and complications, and specific symptoms triggering the use of TEM. When the patients brought the samples of their TEM on their next visit, those were studied by the microbiology department of MUST.

The microbiological studies for TEM involved gram staining, KOH staining, and cultures on blood-heart infusion agar, blood agar, chocolate agar, and potato dextrose agar.

RESULTS

The study included 11 subjects (72% females) who had used TEM prior to their visit at MUST eye clinic during the study period (Table 1). The median age of our patient group was 33 years [range: 5 to 85 years] at the time of their visit. The median distance from their residence and the MUST eye clinic was 30 miles [range: 10 to 100 miles]. The median duration of TEM use was 21 days [range: 1 day to 40 years]. The chief complaints that triggered TEM use in our group included eye pain (4), foreign body sensation (4), decreased vision (2), and itching (1). Ten out of 11 patients used TEM due to their cultural beliefs, which was the most common reason for using TEM. This was followed by the cost of western medications and travel distances to the eye clinic. The primary diagnoses made by the staff ophthalmologist were cataract (3), allergic conjunctivitis (3), trichiasis (1), dry eyes (1), conjunctival concretion (1), pingueculum (1), and squamous cell carcinoma of the eyelid (1). The cost of TEM ranged from 6,000 to 100,000 Ugandan shillings (approximately US\$ 1.7 to US\$27). Nine reported that TEM helped alleviate the initial symptoms. The original symptom worsened with TEM in one patient, who stopped TEM immediately. Five patients developed new complications, such as eye pain, after TEM use; in fact, 4 out of these 5 patients stopped using TEM due to these complications. One patient continued to use TEM even after noticing eye pain.

Table 1: Patients' demographics and their TEM usage pattern

Patient	Age (years)	Gender	Distance from home (miles)	Chief complaint	Diagnosis	Reason for using TEM	Duration of TEM use
1	78	F	25	Decreased vision	Cataract	Cultural beliefs	40 years
2	28	F	12	Eye pain	Squamous cell carcinoma	Cultural beliefs	3 days
3	85	M	10	Foreign body sensation	Cataract	Cultural beliefs	3 days
4	33	F	100	Eye pain	Allergic conjunctivitis	Cultural beliefs	1 day
5	27	F	16	Eye pain	Pingueculum	Cultural beliefs	4 days
6	27	F	100	Itching	Conjunctival concretion	Cultural beliefs	3 days
7	76	M	32	Eye pain	Cataract	Cultural beliefs	4 years
8	72	F	30	Eye pain	Dry eyes	Cultural beliefs	21 days
9	13	F	54	Foreign body sensation	Allergic conjunctivitis	Distance and cost of western medicine	60 days
10	5	M	84	Eye pain	Allergic conjunctivitis	Cultural beliefs	1 year
11	58	F	30	Eye pain	Trichiasis	Cultural beliefs, cost of western medicine	21 days

Eye pain and foreign body sensations were the most common chief complaint in our study group. Ten out of 11 patients used TEM due to their cultural belief. TEM: Traditional Eye Medicine.

Ten patients out of 11 returned to the clinic with 19 TEM samples. One patient purchased the TEM from a traditional healer, and another individual bought it from the family members. The rest of the patients manufactured the TEM by themselves. The major contents were botanical sources, which were prepared by either squeezing fresh leaves or boiling the leaves. One sample was made with rotten food. Ingredients for TEM included *omuribata* (crepis species), *obugando* (*senegalia senegal*), *omuhire*, *omutengye* (rotten food), *agashongwire*, *enyabarashana* (black jack plant), *rokaka* (aloe), *Butabuta* (goat weed), tea leaves, *akihabukuriu* (*oxalis corniculata*), *omujaja* (*ocimum gratissimum*), *akaihabukuru* (*macrotyloma axillare*), *nyakabatura* (*emilia coccinea*), *akacumucumu akakye*

(*plectranthus amboinicus*), *egunga*. A taxonomist at MUST was consulted to identify the local names of the botanical sources, yet we were unable to identify names of two plants as the names differ depending on the villages.

Sixteen out of 19 samples (84%) showed positive results on microbiology culture (Table 2). Six samples showed polymicrobial results, while 10 samples were monomicrobial. *Klebsiella* species was the most common microorganism, which was present on 13 samples. Gram positive species, such as *Staphylococcus aureus* and *Bacillus* species, were shown on five samples. Fungal species, including *candida* (3) and *aspergillus* species (2), were present on 5 samples. Fortunately, none of the patients had concurrent corneal infections.

Table 2: The ingredients and microbiological culture results of TEM

TEM sample	Ingredients in local name	Microbiology culture results	Species
1	Omuribata (Crepis species)	Monomicrobial	<i>Klebsiella</i> sp.
2	Obugando (Senegalia senegal)	No growth	No growth
3	Omuhire	Monomicrobial	<i>Klebsiella</i> sp.
4	Omutengye (Rotten food)	Monomicrobial	<i>Bacillus subtilis</i>
5	Agashongwire	Monomicrobial	<i>Klebsiella</i> sp.
6	Enyabarashana (Black jack plant)	Monomicrobial	<i>Klebsiella</i> sp.
7	Rokaka (Aloe)	Polymicrobial	<i>Staphylococcus aureus</i> and <i>Aspergillus niger</i>
8	Goat weed	Monomicrobial	<i>Klebsiella</i> sp.
9	Tea leaves	No growth	No growth
10	Akihabukuriu (<i>Oxalis corniculata</i>)	Polymicrobial	<i>Staphylococcus aureus</i> , <i>Klebsiella</i> sp., <i>Candida</i> sp.
11	Egunga	Polymicrobial	<i>Staphylococcus aureus</i> , <i>Klebsiella</i> sp.
12	Enyabarashana (Black jack plant)	Polymicrobial	<i>Klebsiella</i> sp. and <i>Candida</i> sp.
13	Omujaja (<i>Ocimum gratissimum</i>)	Polymicrobial	<i>Klebsiella</i> sp. and <i>Candida</i> sp.
14	Omujaja (<i>Ocimum gratissimum</i>)	Polymicrobial	<i>Staphylococcus aureus</i> and <i>Aspergillus flavus</i>
15	Akaihabukuru (<i>Macrotyloma axillare</i>), Enyabarashana (black jack plant), Emilia coccinea (Nyakabatura)	Monomicrobial	<i>Klebsiella</i> sp.
16	Omuribata	Monomicrobial	<i>Klebsiella</i> sp.
17	Akacumucumu Akakye (<i>Plectranthus amboinicus</i>)	Monomicrobial	<i>Klebsiella</i> sp.
18	Enyabarashana (Black jack plant)	Monomicrobial	<i>Klebsiella</i> sp.
19	Omujaja (<i>Ocimum gratissimum</i>)	No growth	No growth

Sixteen out of 19 samples showed positive results on microbiology culture. *Klebsiella* species was the most common microorganism detected. TEM: Traditional Eye Medicine.

DISCUSSION

We observed a wide range of ages in our study population, which included 11 patients from the age of 5 to 85 years. The median distance from their home to the clinic was 30 miles, and eight patients had to travel more than or equal to 25 miles to be seen. Interestingly, one patient used TEM for 40 years mostly for decreased vision from his cataract. Eye pain and foreign body sensation were the most common symptoms that triggered the use of TEM in our patient group. The most common diagnoses associated with TEM use were cataract and allergic conjunctivitis. Aghaji *et al*¹³ reported that cataract and glaucoma were the most common conditions treated by traditional healers in Nigeria.

The majority of our patients used TEM based on cultural beliefs. Eight out of these nine patients believed that TEM helped alleviate their initial symptoms, even though five of them reported developing eye pain from using TEM. Surprisingly, only two patients used TEM due to the high cost associated with western medications, even when the cost of TEM could be as high as 100,000 Ugandan Shillings (approximately 27 USD) when bought from a traditional healer. The cost of TEM from our study was comparable to the cost of treatment offered by traditional healers in Nigeria (a mean cost of 19.4 USD) and South Africa (a mean cost of 20 USD)^{13,14}. The majority of individuals manufactured their own or acquired TEM from family members. Only one individual purchased it from a traditional healer. This may be due to the high cost associated with TEM and the convenience of creating their own TEM.

Only one patient reported that the distance was the primary reason for using TEM. These responses were conflicting to a study done in Ivory Coast by Lasker¹⁵ who noted that accessibility was an important factor in choosing the course of therapy. Our results reflect that most patients had faith or belief in TEM, which encouraged the use of TEM as the first-line therapy prior to presenting to the eye clinic. This was contrary to previous studies that reported the cost and affordability were the main reasons for using TEM in Nigeria^{16,17}. However, Kayoma *et al*¹⁷ also noted that the majority of their patients still considered using TEM even without the cost aspect because of fewer side effects.

The ingredients for the collected TEM samples mostly consisted of botanical sources, although one sample was made with rotten food. Previous studies reported potential contents for TEM, and examples included soap, alcohol, ground cowries, donkey and cow dung, human sputum, bird and lizard droppings, and urine^{7,13,18}. Maregesi *et al*⁷ identified preliminary

microbes in the sample TEM made with lizard droppings, and its culture demonstrated polymicrobial results including *Streptococcus* species, *Bacillus* species, *Staphylococcus aureus*, *E. coli*, *Candida albicans*, and *Aspergillus* species⁷. Our TEM samples predominantly showed *Klebsiella* species, a gram-negative species, which was present in 81% of our samples that were culture-positive. *Klebsiella* species has been associated with corneal ulcer and endophthalmitis^{19,20}. *Klebsiella*-specific polysaccharide capsules enable it to resist phagocytosis by the neutrophils, allowing it to invade the eyes more easily, especially in diabetic patients²¹. Additionally, we observed polymicrobial culture results with *Staphylococcus aureus*, *Bacillus subtilis*, *candida*, and *aspergillus* species. Our data suggest that *Klebsiella* species and fungal organisms be considered as potential causative agents when treating corneal ulcers in Uganda, especially when cultures are unavailable.

A study published by Courtright *et al*²² suggested that collaborative training programs for traditional healers in Malawi could be associated with positive results, such as lower rates of blindness and bilateral corneal disease from TEM. Our hope is that initiative for training traditional healers in African countries is stimulated by our demonstrating evidence of microbiological contamination of TEM regardless of the method of preparation.

In conclusion, this was a single-center pilot study to understand the pattern of TEM use and the ingredients and microbiologic contents of TEM. The majority of our patients chose to use TEM based on their cultural belief that TEM could treat their eye condition. The longest duration of TEM use was 40 years. Eighty-five percent of the samples collected showed positive growth in microbiology culture, predominantly with *Klebsiella* species. Further microbiologic studies comparing culture results of TEM to corneal samples will be necessary to reveal the association between the use of TEM, corneal contamination, and ulcers. Our findings suggest that there should be larger evidence-based studies to support public health interventions to minimize the use and side effects of TEM.

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Mooren's ulcer in Uganda: A prospective observational case series

Kavuma D¹, Arunga S^{2,3}, Onyango J², Leck A³, Hoffman JJ³, Hu VH³, Burton M^{3,4}

¹Faculty of Medicine, Kabale University, Uganda

²Department of Ophthalmology, Mbarara University of Science and Technology, Uganda

³International Centre for Eye Health, London School of Hygiene & Tropical Medicine, UK

⁴Moorfields Eye Hospital, London, UK

Corresponding author: Dr Denise Kavuma, Faculty of Medicine, Kabale University, Kabale, Uganda.

Email: dkavuma@kab.ac.ug

ABSTRACT

Background: Mooren's ulcer is a progressive, chronic, and painful peripheral ulceration of the cornea, commonly seen in adult men. In our set up, it has been observed to be aggressive and difficult to treat, often resulting in poor visual outcomes. There is limited published evidence on its management.

Objective: Our aim was to describe the presentation, treatment and outcomes of patients presenting with Mooren's ulcer in Mbarara, Uganda over a defined time period.

Methods: A prospective case series conducted over 3 months from August 2017 to November 2017, with scheduled reviews up to 3 months. Participants' history, presentation, management and clinical course were captured. Laboratory investigations for underlying systemic diseases were performed, in addition to corneal microbiology testing.

Results: A total of eight patients (6 males and 2 females) were enrolled. The median age was 26 years (IQR 22-27.5, full range 16-32). A history of trauma was present in 3 (38%) of cases. The earliest presenting time was one month after start of symptoms. At presentation, 2 (25%) patients had normal vision, 3 (38%) had moderate vision impairment (VI), 1 (12%) had severe VI, and 2 (25%) were blind. There was no systemic disease diagnosed on investigation, but corneal microbiology revealed 3 (38%) ulcers had fungal co-infections. At 3 months, 4 (50%) patients had normal vision, 1 (12%) had moderate VI, and 3 (38%) were blind. No patients required evisceration or enucleation.

Conclusion: Most patients were below 30 years and presented late to the hospital, with advanced ulcers, leading to outcomes ranging from good to poor. Mooren's ulcer is difficult to treat and further studies to assess risk factors would be beneficial in providing evidence for better management of this condition, particularly in resource limited settings.

Key words: Mooren's ulcer, Peripheral keratitis, Marginal keratitis, Peripheral ulcerative Keratitis

INTRODUCTION

Mooren's ulcer is an idiopathic, chronic inflammation of the corneal periphery that progresses centrally, centrifugally, and posteriorly, with eventual corneal thinning. The ulcer may involve the full thickness of the cornea, leading to perforation¹. While the aetiology is unknown, Mooren's ulcer is considered to be an autoimmune disease. It is a rare disease that is hard to manage and can lead to blindness. The median age of onset varies depending on geographical location. Studies from Africa have shown the mean age of onset to be between 20 to 30 years, while those from Asia reveal the onset to be between the 6th and 8th decades². It is often seen in healthy adult men with no evidence of systemic disease³.

On presentation, patients often complain of photophobia, tearing, severe pain and red, inflamed eyes. Some studies show that clinical presentation and demographic characteristics may differ in children⁴. Examination on the slit-lamp typically shows a crescent-shaped corneal ulcer on the periphery with an undermined central edge. A linear epithelial defect

may also develop. Stromal melting can follow, with the ulcer progressing both circumferentially and centrally. This leads to corneal thinning, perforation, severe astigmatism and conjunctival or episcleral inflammation. Complications including iritis, astigmatism and central corneal scarring lead to decreased visual acuity².

Mooren's ulcer is a diagnosis of exclusion; other potential causes of peripheral ulcerative keratopathy, including those associated with underlying systemic disease, must be considered and ruled out with appropriate investigations⁵. Treatment is challenging, often with poor clinical outcome. Therapeutic options include steroid therapy (topical and/or systemic), conjunctival resection, conjunctival cryotherapy, immunosuppressive therapy, and surgical intervention⁶. Evidence for Mooren's ulcer treatment is scanty: no randomized control trial has been done to show which treatment modality is the most effective.

A retrospective audit on Mooren's ulcer from Southwestern Uganda found limited evidence to guide clinical practice⁷. In order to address this, this study was undertaken, to provide more data on this rare but potentially blinding disease.

MATERIALS AND METHODS

This study was approved by the regional Research Ethics Committee and conformed to the tenets of the Declaration of Helsinki. The total study duration was six months: patients recruitment for three months, who were followed up for a subsequent six months.

Study participants

All patients attending the recruitment centres clinically diagnosed with Mooren's ulcer between 15th August 2017 to 15th November 2017 were enrolled. Data on history, clinical examinations, treatment, and follow up were recorded. The definitions used were:

- (i) *Early case of Mooren's ulcer*: This was defined as a unilateral active crescent-shaped peripheral ulcer manifesting with stromal ulceration and an undermined central edge, typical of Mooren's ulcer. No perforation and no impending perforations, with less than 50% stromal thinning, and normal anterior chamber and iris; or anterior chamber inflammation but with normal iris⁸.
- (ii) *Advanced Mooren's ulcer*: Active peripheral ulceration with more than 50% stromal melting showing impending perforations or already perforated corneas. Bilateral disease and anterior chamber inflammation, or iris were also included in this category^{8,9}.

Assessment

The demographic details and history from each patient were recorded according to the agreed protocol. Snellen vision assessment was done in a well-lit room, at 6 meters, using the World Health Organization classification of vision system¹⁰. All participants were assessed on a slit-lamp, following the structured protocol with details on assessment of eyelids, ocular surface features, corneal ulcer details (site, perforation, size, infiltrate status), and anterior chamber and iris inflammation. The bulbar conjunctival hyperaemia was graded using the Efron Grading Scales, which assigns 5 grades, from grade zero to grade four¹¹. The anterior chamber inflammation was graded using the SUN Working Group Scheme¹². A senior ophthalmology resident and consultant ophthalmologist assessed the patients on each review, filling the protocol form independently and discussing any varied findings until a consensus was reached. After a clinical diagnosis, all the study participants had the following investigations performed: Complete Blood Count (CBC), Rheumatoid Factor (RF), Routine Counselling and HIV Test (RCT), Random Blood Sugar (RBS), Erythrocyte Sedimentation Rate (ESR), VDRL, stool analysis for parasites, and Chest X-Ray (CXR). All the patients also had corneal tissue specimens collected for microbiology. The corneal scrape samples were

processed at the a microbiology laboratory using Gram stain, Potassium Hydroxide (KOH) wet preparation, calcofluor white stain, lactophenol cotton blue stain, culture on blood agar, chocolate agar, potato dextrose agar and in brain heart infusion broth.

Treatment and follow-up

Each patient was initially treated empirically with prednisolone 1% eye drops (locally formulated) 2-hourly and ofloxacin 3% eye drops (Biomedica Remedies, India) 2-hourly, until microbiology results were available. After review of the microbiology results, patients with no evidence of infection stopped using the antibiotic eye drops and continued receiving the same prednisolone that was initially given.

Patients with fungal co-infection were treated with natamycin 5% eye drops (Zonat Sunways, India) hourly and topical steroid treatment was halted and restarted at the clinician's discretion during follow-up. The prednisolone eye-drops were tapered at the clinician's discretion, depending on the response of the inflammation to medication, and eventually replaced with prednisolone 0.5% eye drops (locally formulated)^{13,14}. Every patient was also treated with atropine 1% eye drops (locally formulated). Increased intraocular pressure was treated with timolol 0.5% eye drops (locally formulated). Patients with Mooren's ulcers that were perforated or had impending perforations, also received prednisolone tablets starting with 60mg once daily, which was slowly tapered over the course of the reviews by 5mg decrements every week¹⁵. All locally made drugs were formulated. The consultant ophthalmologist and senior ophthalmology resident discussed treatment decisions on each review. Each patient was followed up for 3 months, at intervals of 1 week, 3 weeks and at 3 months. The treatment was adjusted accordingly on each review, depending on the response. Clinical photographs were taken after each assessment and review, using a Nikon SLR D7000 camera with a 105mm macro lens.

Each case is reported individually, presented with their clinical photographs. The main outcome measures were best corrected visual acuity on the final day of follow-up at 3 months, and inflammation status of the eye on slit-lamp examination, progression of ulceration. A good outcome is defined as cessation of inflammation with normal vision, no active ulceration, and no pain, or normal vision with minimal inflammation, which is defined as grade 2 or lower conjunctival injection and grade 1 or lower anterior chamber cells, with early active ulceration. A moderate outcome was defined as cessation of inflammation with poor vision, or continuing inflammation with poor vision but with preservation of the eye. A poor outcome was one in which the eye was removed, or advanced active ulceration and inflammation with poor vision.

RESULTS

A total of eight patients were enrolled over 3 months. Two of the participants were female, giving a male to female ratio of 4:1. The median age was 26 years, (IQR

22.0-27.5), with a range of 16-32 years. A summary of the demographic characteristics can be found in Table 1, together with clinical features at presentation and final review.

Table 1: Patient characteristics at presentation and visual outcome

Case	Age (Years)	Sex	History of Trauma	TEM Use	Duration of symptoms before presenting to hospital (Months)	Presenting Vision (Snellen)	Perforation on presentation	Co-infection	Final Vision (Snellen)	Status on day 90	Final outcome
1	27	M	Yes	Yes	10	1/60	Yes	Fungal	PL	360-degree ulceration	Moderate
2	23	M	No	Yes	2	3/60	Yes	Fungal	HM	Total corneal involvement	Poor
3	16	M	No	Yes	2	6/12	No	None	6/7.5	Reactivation after healing and default from treatment	Good
4	28	F	Yes	Yes	1	HM	Yes	None	1/60	Reactivation after default from treatment	Moderate
5	25	M	No	Yes	1	6/6	No	None	6/6	Reactivation after healing	Good
6	32	M	No	Yes	1	6/24	No	Fungal	6/12	Healed	Good
7	21	F	No	Yes	2	6/48	No	None	6/48	Active inflammation with associated corneal fungal infiltrates after default from treatment	Moderate
8	27	M	Yes	Yes	2	6/24	No	None	6/18	Healed	Good

Legend: TEM: Traditional Eye Medicine; PL: Perception of Light; HM: Hand Motion

All the patients presented with a history of pain and redness for at least one month before coming to the hospital, and all the patients had used Traditional Eye Medication (TEM) before presenting to hospital. Three patients (38%) reported a history of non-penetrating trauma. Two of the causes of trauma were from sticks and one was from an insect. Three patients (38%) already had perforations at the time of presentation. No patient presented with bilateral disease. At presentation, 2 (25%) patients had normal vision, 3 (38%) had moderate Vision Impairment (VI), 2 (25%) had severe VI, and 1 (12%) was blind. No patient presented with bilateral disease.

Of the systemic investigations done at presentation, only one of the patients had a positive VDRL. This patient did not receive any syphilis treatment and did not attend at the intermediate visits, returning only on the 90th day treatment. On repetition of the test on day 90, the results were negative.

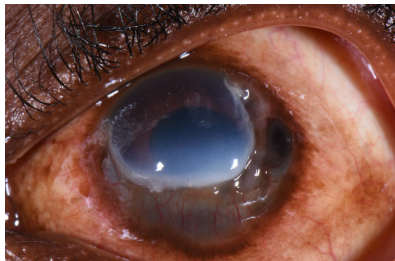
The patient had no symptoms or signs of syphilis from history and examination and the initial test was subsequently reported as a false-positive result. The rest of the systemic tests, for each patient, were normal. Microbiology samples revealed 3 (38%) of the patients had fungal co-infection: calcofluor white preparations were positive; two of whom had also presented with perforated ulcers. Culture results were negative, for all patients. There were no cases of bacterial co-infection.

Three of the patients missed at least one review, however all the patients were reviewed on day 90. None of the patients developed any new perforations after presentation. At 3 months, 4 (50%) patients had normal vision, 1 (12%) had moderate VI, 1 (12%) had severe VI, and 2 (25%) were blind. Four patients (50%) had a good outcome, three (38%) had a moderate outcome, and 1 (12%) had a poor outcome. The images and details of follow-up can be found in Figure 1.

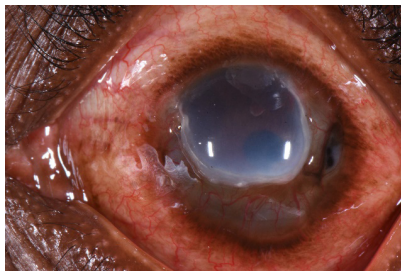
Presentation

Case 1: Advanced Mooren's ulcer with a perforated ulcer spanning 8 clock hours, with fungal co-infection. Vision 1/60.

The patient was initially started on prednisolone 1% eyedrops, which were stopped after microbiology results showed fungal co-infection. He was then started on natamycin 5% eyedrops and prednisolone tablets

**Interim follow-up**

Day 21: The ulcer had extended to span 9 clock hours, with increased inflammation. The same treatment was continued

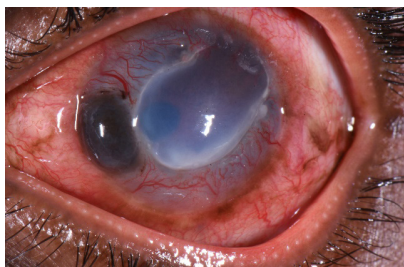
**Final follow-up**

Day 90: A 360 degree spread of ulcer with no pain and highly vascularized. This was a moderate outcome. Vision PL

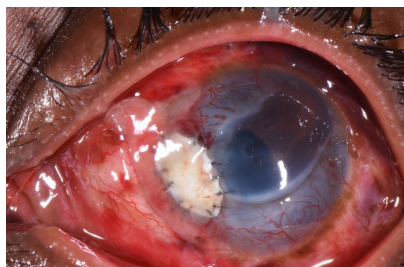


Case 2: An advanced perforated ulcer spanning 10 clock hours, with fungal co-infection. Vision 3/60.

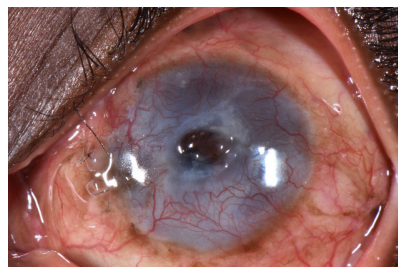
The patient was initially started on prednisolone 1% eyedrops, which were stopped after microbiology results showed fungal co-infection. He was then started on natamycin 5% eyedrops and prednisolone tablets



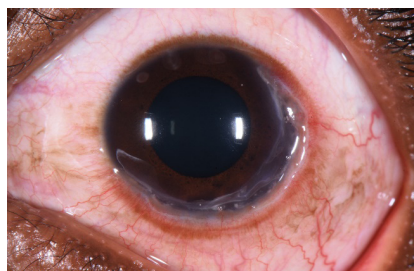
Day 7: Scleral graft done over the perforation. The same treatment was continued



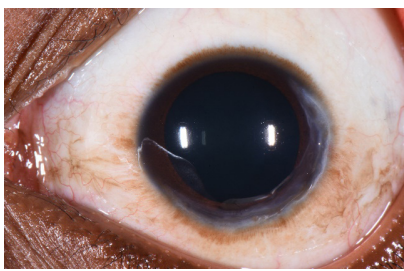
Day 90: poor outcome with failed scleral graft, central perforation and total corneal involvement. Vision HM



Case 3: Early Mooren's ulcer spanning 7 clock hours. Vision 6/12. The patient was started on prednisolone 1% eyedrops



Day 21: A healed ulcer with scar. All treatment was stopped.



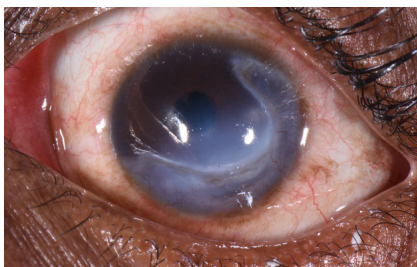
Day 90: There was reactivation of ulceration. Vision 6/7.5



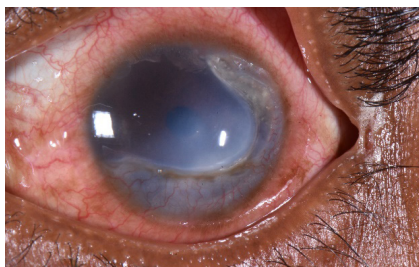
Case 4: Advanced ulcer with perforation spanning 8 clock hours. Vision HM. The patient was started on prednisolone 1% eyedrops and prednisolone tablets



Day 21: Healing ulcer with reduced inflammation. The same treatment was continued



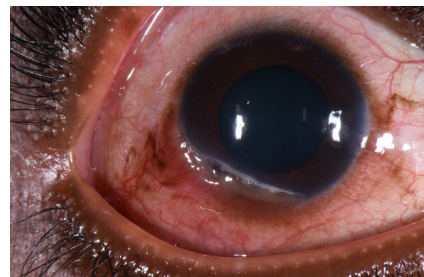
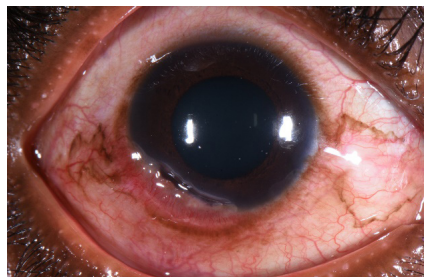
Day 90: Patient had gone off treatment for a month and there was reactivation of inflammation. Vision 1/60.



Case 5: Early Mooren's ulcer spanning 3 clock hours. Vision 6/6. The patient was started on prednisolone 1% eyedrops

Day 21: Healing ulcer. The prednisolone 1% eyedrops were tapered slowly

Day 90: Reactivation of the ulcer after healing. Vision still 6/6



Case 6: Early Mooren's ulcer spanning 7 clock hours, with fungal co-infection. Vision 6/24. The patient was initially started on prednisolone 1% eyedrops and prednisolone tablets

Patient did not attend interim reviews and steroid treatment could not be changed after the microbiology results were available

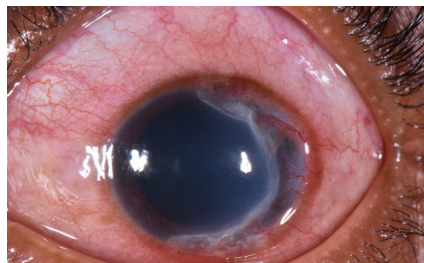
Day 90: Patient returned on the last day with active inflammation and corneal infiltrates. He had been on and off treatment. Poor treatment compliance. Vision 6/12



Case 7: Early ulceration spanning 7 clock hours, with increased intraocular pressure. Vision 6/48. The patient was started on prednisolone 1% and timolol eyedrops

Day 21: Patient did not attend regularly with poor treatment adherence. Whilst on medication, the ulcer was healing. Timolol eye drops were stopped and prednisolone eyedrops were tapered

Day 90: On day 90 of follow-up, the patient had seen no reason to return to hospital and was assessed at her home. She had no complaints of pain, vision in the left eye was 6/48. Microscopic examination could not be performed at this time. All treatment was tapered. No clinical photographs were available.



Case 8: Healing Mooren's ulcer spanning 5 clock hours. Vision 6/24. The patient was started on prednisolone 1% eyedrops

Patient did not attend interim reviews

Day 90: Despite not attending, patient had been compliant with treatment. He returned with a healed ulcer. Vision 6/18

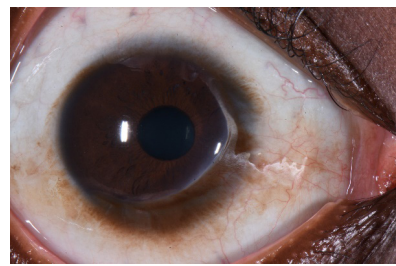


Figure 1: Clinical images of participants' corneas at presentation and follow-up

DISCUSSION

Mooren's ulcer is a relatively rare disease. In keeping with this, 8 patients were enrolled over the course of 3 months. This is in line with a retrospective audit done in Uganda, showing a near doubling of Mooren's ulcer cases over the course of three years, from 14 cases in 2013, to 24 cases in 2015⁷. The participants had a male to female ratio of 4:1. This is comparable to other studies done in Africa with Uganda having a ratio of 8:1, and ratios of 3.6:1 and 4:1 found in different studies in Nigeria^{7,16,17}. This value is much higher than the ratio found in Caucasians (1.6:1) and in China (1.35:1), even though the evidence still shows that males are at a higher risk than females^{18,19}. The difference between men and women may be attributed to increased risk factors in men, for example, men having more ocular trauma than women but this may differ in various regions¹⁹. In this study, two of the three patients with a history of trauma were male.

The median age of study participants at 26 years is comparable to other studies on Mooren's ulcer done in Africa^{7,16,17,20-22}. This is in contrast to studies from Asia, Europe and North America, where the median age is higher (48 years in China and 65 in India)^{9,18,23,24}. Many of the patients presented with an advanced form of Mooren's ulcer; this is similar to a study from Nigeria²². This could be attributed to the late presentation of the patients as all of them reported to the hospital after experiencing the symptoms for at least one month and after trying various medications. None of our patients presented with bilateral ulcerations during the follow-up period, which is different from studies done previously, even in Africa, where bilateral ulcerations made up to 30% of all cases^{16,20}. Three patients presented with perforated ulcers and these were the ones who had more than half of the cornea involved, with the lesion spanning 6 or more clock hours.

It was interesting to note that three patients had fungal co-infection. It is plausible that this could be attributed to use of Traditional Eye Medication (TEM) to treat the ulceration in the eye. This might not be a reliable indicator because not all patients who used TEM had co-infection. Microscopy should be performed in patients with Mooren's ulcer to rule out co-infection. Where microbiology testing is not possible, antifungal, and antibiotic prophylaxis may need to be guided by local disease patterns. In Uganda, fungal keratitis is the leading cause of microbial keratitis and therefore treatment with a readily available antifungal eyedrop is important²⁵.

This autoimmune ulceration is often a diagnosis of exclusion⁵. The association of Mooren's ulcer to helminthiasis has been discussed before but there was no such parasitic infestation in our patients on stool examination²⁶⁻²⁸. Additionally, all the tests carried out on the study participants were either negative or

normal. One patient tested positive on the VDRL test but had no signs or symptoms of syphilis on history and investigation. A repeat VDRL test after 3 months was negative despite the patient receiving no treatment for syphilis. This likely indicates a false positive test and has no bearing on the Mooren's ulcer diagnosis²⁹. This finding can justify the clinical diagnosis of Mooren's ulcer without need for extensive investigations in resource limited settings, where many of the tests are expensive. However, systemic investigations still have a role to play and should be done whenever possible.

The outcomes ranged from good, with the ulceration healed and the vision normal, to poor, with the inflammation still active and the vision poor. Most patients who had moderate or poor outcomes presented with advanced and perforated ulcers. Despite this, there was no eye removal. The poor outcome could be attributed to the severity of the ulceration on presentation.

Additionally, more aggressive forms of Mooren's ulcer have been reported in younger patients, as compared to older ones and this could also contribute to poorer outcomes since our oldest participant was 32 years old. Follow-up of patients in this rural setting can be difficult and some of the patients discontinued their medication, only to return later with worse symptoms and progression of the ulceration. Three of the patients also had reactivation of the ulcer after healing and poor compliance in maintenance of treatment. It is worth considering that patients with Mooren's ulcer need to be on a long course of treatment, for better outcomes.

STUDY LIMITATIONS

Unfortunately, due to resource limitations, a more intensive and regular follow-up schedule, which our patients would have benefited from, was not possible. Additionally, this is a relatively small case series and therefore the evidence provided needs to be interpreted with this in mind. As Mooren's ulcer is a rare disorder, prospective studies are challenging particularly if limited to a single geographical area. A multi-national, prospective study would be highly beneficial, and would provide more generalizable data to ophthalmologists globally.

CONCLUSIONS

- (i) There were more males than females in this study, most of them below 30 years of age. The use of Traditional Eye Medicine (TEM) was common.
- (ii) The participants of this study presented late to the hospital and so often presented with advanced forms of ulceration.
- (iii) Systemic investigations were negative or normal except for one VDRL false positive.
- (iv) Some participants presented with fungal co-infected ulcers.

- (v) The treatment of Mooren's ulcer is difficult particularly in a resource limited setting where long-term and intensive follow-up is key, and topical steroid therapy may need to be used long-term to prevent reactivation of the ulcer.
- (vi) All good outcomes were observed in participants who presented earlier to the hospital, with mild to moderate visual impairment.

RECOMMENDATIONS

- (i) The use of Traditional Eye Medication (TEM) is a public health concern and extensive health education needs to be carried out to reduce the frequency. Additionally, adequate yet simplified education on the identification and referral of Mooren's ulcer patients should be emphasized for medical personnel within the country, so there is a reduction in the late presentation of these patients to an eye hospital.
- (ii) Clinical diagnosis of Mooren's ulcer would be adequate in low resource settings where extensive systemic investigations are difficult to get
- (iii) Further studies to assess the risk factors and efficacy of the medication for Mooren's ulcer would be beneficial.

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Availability of data and materials: The data and materials used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Concurrent retinoblastoma and morning glory disc anomaly in a 9 month old baby: a case report

Nyabuga B, Njambi L, Kimani K

Department of Ophthalmology, College of Health Sciences, University of Nairobi, Kenya

Corresponding author: Dr Lucy Njambi. Email: drnjambi@yahoo.com

ABSTRACT

Concurrent occurrence of retinoblastoma and other ocular anomalies is rare. Appearance of leukocoria in the other eye usually signals bilateral disease although this is not always the case. This emphasises the need of careful examination always. We present a case of retinoblastoma and morning glory disc anomaly in a baby. Both conditions had leukocoria in each eye, which was noted at different stages of the clinical evaluation. Although our patient did not have other associated features, this scenario requires distinct multi-disciplinary approach for management of each of the conditions and any accompanying clinical disorders.

Key words: Morning glory disc anomaly, Retinoblastoma, Concurrent

INTRODUCTION

Retinoblastoma (RB) is the most common intraocular malignancy in children. It mostly affects children below 5 years¹. It can be unilateral or bilateral. The presenting signs include leukocoria, strabismus, an inflamed eye, hyphaema, glaucoma and proptosis in advanced cases². Most of the affected persons usually have no other congenital ocular anomalies and this association is rare³. We present a rare case of a baby who had concurrent presentation of retinoblastoma and Morning Glory Disc Anomaly (MGDA).

CASE REPORT

A 9 month old girl presented at Kenyatta National Hospital (KNH) with history of a white reflex in the right eye since 2 months of age with no squint, redness or proptosis of the eyes. There was no history of blepharospasms, tearing or photophobia. She had no history of ocular trauma or surgery. Antenatal, birth and developmental history was normal. Family history of retinoblastoma was negative. On examination, she had normal general exam findings, no lymphadenopathy, bone, scalp or abdominal masses. Vision in the right eye was no perception of light, while she could fix and follow light in the left eye. Extraocular muscle motility was free in both eyes. The corneal reflex test (Hirschberg) was central in both eyes. The anterior segment of the right eye had leukocoria while on the left eye it was normal. On indirect fundoscopy in the clinic, a white reflex was seen in the right eye, while in the left eye a large disc, with peripapillary atrophy and abnormal vessels were noted. The white reflex was clearly visible by torch examination as shown in Figure 1. B scan ultrasound of the right eye showed hyperechoic vitreous mass filling more than half of the vitreous cavity that was persistent on reduced gain (Figure 2). A

clinical diagnosis of retinoblastoma of the right eye and disc anomaly left eye was made. Examination under anaesthesia (indirect ophthalmoscopy and Retcam imaging) of the right eye showed features consistent with retinoblastoma and the optic disc was inaccessible. In the left eye, there was no tumour but a large excavated disc with peripapillary atrophy and radial distribution of the retinal vessels as shown in Figure 3. The patient underwent myoconjunctival enucleation of the right eye and prosthesis fitting. Histology of the right eye confirmed retinoblastoma with no high risk features (no optic nerve, sclera or choroidal invasion) (Figure 4). The patient was planned for regular examinations under anaesthesia and follow up by the paediatric ophthalmologist. She was referred for evaluation by the paediatrician and neurologist in view of systemic association of MGDA. On follow-up post right eye enucleation, the left eye also revealed a white reflex on uniocular fixation (Figure 5).

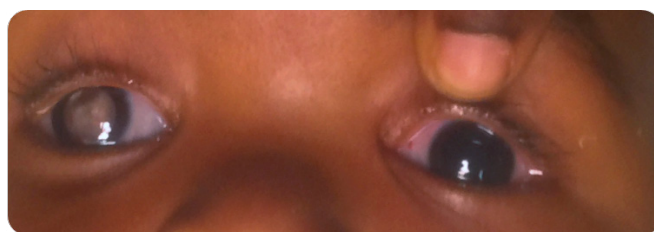


Figure 1: White reflex (Leukocoria) in the right eye

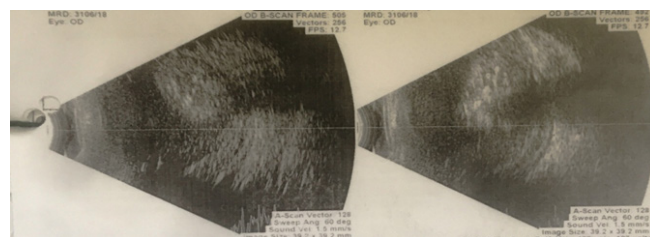


Figure 2: B scan ultrasound of the right eye

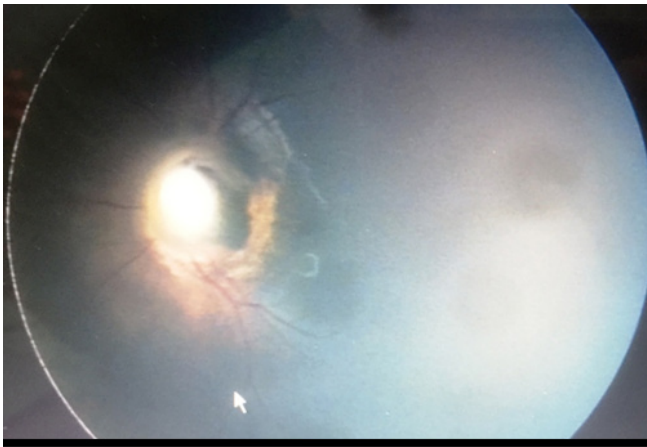


Figure 3: Retcam images of the left eye showing radial pattern of vessels around an excavated disc and peripapillary atrophy

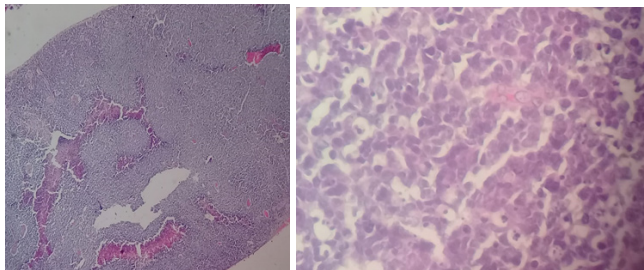


Figure 4: Histology slides of the right eye showing features consistent with retinoblastoma



Figure 5: Post RE enucleation follow-up; Left eye shows white reflex due to the disc anomaly

DISCUSSION

Retinoblastoma normally presents in isolation. Rarely, it may be associated with other ocular anomalies such as persistent foetal vasculature and retinopathy of prematurity^{4,5}. In our search, we found only one case report in literature of simultaneous presentation of retinoblastoma with MGDA⁶.

Though a rare occurrence, the combination of these two conditions poses a peculiar scenario in the management of the child, which we wish to highlight. Firstly, in the absence of genetic testing for retinoblastoma in our setup, there is a 15% likelihood that the child may have germline mutation with the risk of developing tumours in the left eye, second cancers later in life and passing the mutation to her offsprings. This calls for life-long eye examination and follow-up for herself and her offsprings⁷.

On the other hand, MGDA which is usually unilateral but can be bilateral, has both ocular and

systemic associations. It was first described in 1970 by Kindler, having a characteristic resemblance to the morning glory flower with features of an enlarged excavation of the optic disc, abnormal retinal vascular pattern, annular pigmentation surrounding the nerve head, and a characteristic glial tuft⁸. It is thought to result from sporadic embryological maldevelopment of lamina cribrosa and the posterior sclera⁹. In the eye, there is risk of associated strabismus, microphthalmos, afferent pupillary defects, cataract, coloboma of the crystalline lens, serous retinal detachment in 30% of the cases and choroidal neovascularization. Vision is generally poor with only a third of the patients attaining normal vision¹⁰. Facial abnormalities such as hypertelorism, cleft lip and palate have also been reported. Systemic association include central nervous system malformations such as abnormal narrowing of cerebral arteries (Moyamoya disease), encephalocoeles and corpus callosum agenesis^{11,12}. Others include abnormalities of the endocrine, respiratory and renal systems¹¹.

Although our patient did not have obvious ocular or systemic anomalies at the time of initial management, it is important to emphasise the need for close follow-up and comprehensive evaluation by a multidisciplinary team of experts for early mitigation of any untoward events related to either the retinoblastoma or the MGDA. In addition, more than one ocular condition may coexist hence the need for complete and bilateral eye examination.

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Argon laser for subhyaloid retinal haemorrhage: a case report

Kanji R¹, Ruvuma S¹, Kwaga T¹, Wiaffe G¹, Soliman A¹, Tuswingwire P¹, Arunga S^{1,2}

¹Department of Ophthalmology, Mbarara University of Science and Technology, PO Box 1410, Mbarara, Uganda

²International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK

Corresponding author: Dr Raheel Kanji, Department of Ophthalmology, Mbarara University of Science and Technology, PO Box 1410, Mbarara, Uganda. Email: raheelkanji@gmail.com

ABSTRACT

To present a case of severe pre-retinal haemorrhage that was treated with Argon laser posterior hyaloidotomy. A 30-year-old female, non-diabetic and non-hypertensive patient presented with sudden painless loss of vision in the left eye and no history of trauma. Her vision was counting fingers in that eye. Retinal imaging showed severe pre-retinal haemorrhage over the macular area. Argon laser posterior hyaloidotomy was immediately performed. Blood drained inferiorly into the vitreous cavity with clearance of the premacular area. Her vision improved to 6/9 within 30 minutes. Neglect of early intervention for preretinal haemorrhage with the Argon laser leads to complications such as vision loss and prolonged time for visual recovery. Argon laser hyaloidotomy is a viable option for prompt vision recovery.

Key words: Argon laser, Subhyloid haemorrhage, Pre-retinal haemorrhage, Hyaloidotomy

CASE REPORT

Day 0: A 30-year-old female patient presented to Mbarara University and Referral Hospital Eye Centre (MURHEC) with a one-day history of sudden painless loss of vision in her left eye. The patient did not have any complaints of headache, with no history of diabetes mellitus, hypertension, trauma, no medical history of hormonal contraceptives, anticoagulants or anti-platelets use. The rest of her medical history was unremarkable. General exam was largely normal, BP 110/65 mmHg; PR 78 beats per minute, Temperature 36.5°C, BMI 28,—On ocular examination, presenting visual acuity was 6/5 OD and counting fingers in OS with no improvement on pinhole and refraction. Slit lamp examination of the anterior segment was normal in both eyes. Fundus photography with a Fundus Camera (Appasamy Non Mydriatic) revealed an extensive fresh pre-retinal haemorrhage in the left eye covering the macular area with normal optic disc, retinal vessels (Figure 1). The attending vitreoretinal surgeon advised immediate Argon laser hyaloidotomy having made a diagnosis of spontaneous sub-hyaloid retinal haemorrhage. On fundoscopy of the right eye optic disc, retinal vessels and the macula were normal in appearance.

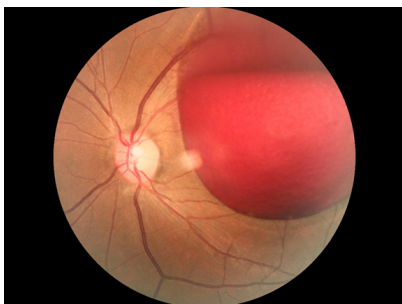


Figure 1: A colour fundus photograph of the patient's left eye upon presentation. A preretinal haemorrhage covering the macula vision loss

Procedure: After patient counselling, her left pupil was dilated using Gutt-Tropicamide followed by an anaesthetic (Gutt- Amethocaine) applied a few minutes later. Using Argon laser (Appasamy Green Laser, Model: AMOGH PLUS 532nm), Ocular mainster (standard) focal/grid OMRA-S argon/diode laser lens, a posterior hyaloidotomy performed using laser pulse energy (3 shots of 500μ spot size, pulse durations of 100 milliseconds, 3.1 mW of power) to perforate the posterior hyaloid face, allowing the blood to drain inferiorly (Figure 2).



Figure 2: Colour fundus photograph of the patient's left eye immediately after the perforation of the posterior hyaloid face with the Argon laser (posterior hyaloidotomy), (blue arrows)

Following the procedure, fundoscopy was repeated and there was clearing of the macular area free of haemorrhage which led to a rapid improvement in central vision. The visual acuity improved within hours to 6/9 OS.

Day 30: The patient was called in for a follow up visit, where all basic routine investigations were done including, vitals, which were in the similar range as her initial visit, slit lamp examination was done, fundoscopy of the left eye revealed a floater in the vitreous, optic

disc, retinal vessels and central macula was normal with a laser spot scar seen on the inferiorly and fundus photography done whose picture is shown in Figure 3.

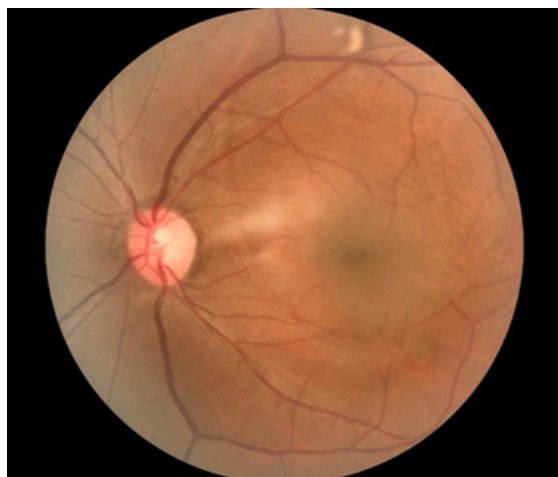


Figure 3: Colour fundus photograph of the patient's left eye 30 days after the performance of Argon laser of the posterior sub-hyaloid membranotomy (posterior hyaloidotomy)

DISCUSSION

Preretinal haemorrhage is a condition of blood accumulation between the posterior vitreous face and the retina¹. It can be caused by several conditions, which include; proliferative diabetic retinopathy (31-54%), retinal vein occlusion (4-16%), sickle cell retinopathy (0.2-6%), valsalva retinopathy, retinal artery macroaneurysm (0.6-7%), age related macular degeneration (0.6-4%) and trauma (12-19%). Other causes include shaken baby syndrome, blood disorders, hypertension².

The mechanisms of preretinal haemorrhage fall into three main categories: abnormal vessels that are prone to bleeding, normal vessels that rupture under stress, or extension of blood from an adjacent source¹. Typically preretinal haemorrhage is caused by bleeding of the new vessels due to traction from the posterior hyaloid².

Patients present with unilateral painless loss of vision due to the blood accumulation in the premacular area between the retina and posterior hyaloid face³.

Upon presentation of a patient with a preretinal haemorrhage, it is very important to identify the underlying cause in order to proceed to effective treatment. If left untreated, preretinal haemorrhage may take several months to be absorbed, and consequently, if haemorrhage involves the premacular area, it is essential to treat as soon as possible depending on the visual needs and availability of equipment's³.

Argon laser hyaloidotomy is an effective treatment for fresh premacular subhyaloid haemorrhage and a safe alternative to pars plana vitrectomy. However, this may not be a feasible option where the media is not clear⁴.

Blood is drained into the vitreous cavity, where it is left to be absorbed within the next few weeks to months without causing any other complications. Although it is safe and effective, the procedure has some limitations. It is of great importance to be accurate and be performed in the lower part of the haemorrhage and as far as possible from the fovea to avoid any damage in this particular area, and also away from major blood vessels. Additionally, drainage should be attempted from a location where there is significant haemorrhagic elevation⁵.

Complications of Argon laser membranotomy, have been described in the literature such as epiretinal membrane, retinal breaks, retinal detachment and macular hole formation, but complications have been related to the underlying cause of the haemorrhage, probably because of growth factors that are supposed to stimulate proliferation of entrapped cells along the ILM and retinal surface⁶.

Pars plana vitrectomy can be used in the management after a successful laser hyaloidotomy. Indications include; non resolving haemorrhage, failed laser hyaloidotomy etc. The efficacy of the procedure and the improvement of visual acuity largely depends on the underlying cause of the haemorrhage⁷.

In our case scenario, Argon laser hyaloidotomy due to early patient presentation and intervention lead to prompt management and enhanced outcome.

CONCLUSION

In our case, the presence of subhyaloid haemorrhage between the vitreous cavity and the retina overlying the macula managed with Argon laser hyaloidotomy accomplished a better outcome. Consequently, as demonstrated in the current case, it is essential to admit the patient for bedrest and follow-up post procedure.

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