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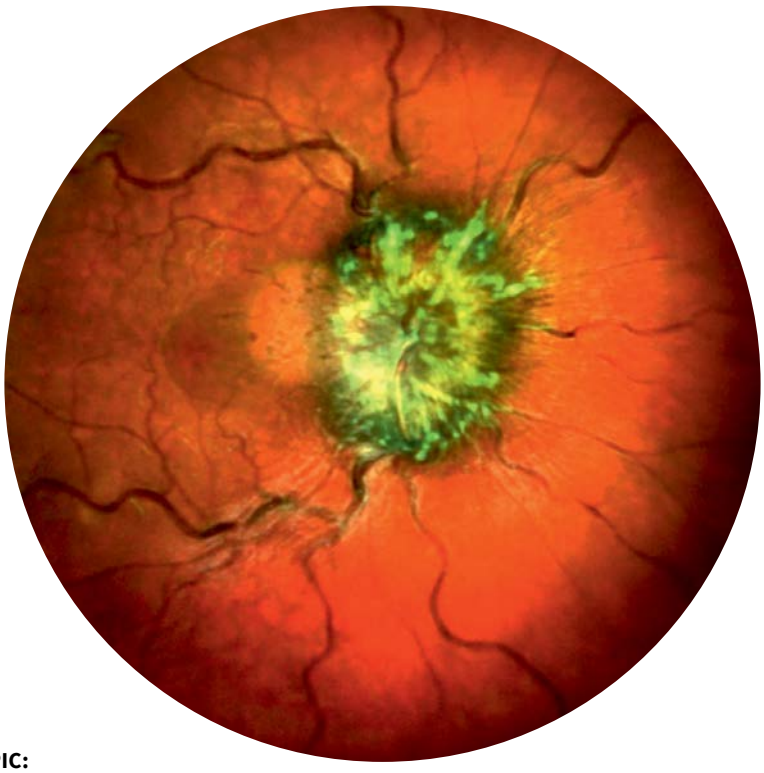

COVER PIC:
Multicolour fundus imaging right eye showing gross disc oedema with dilated tortous vessels

A challenging year ahead for healthcare services

Welcome to our final issue of 2023! In this issue, we have included three original studies, a small case series from India and a case report. Interestingly, the original studies each focus on different aspects of the three major causes of blindness in our country, viz. cataracts, glaucoma and diabetic retinopathy. Two of the original studies were performed at state hospitals in South Africa, which may be an opportunity to highlight the financial crisis facing our state healthcare service at present.

The right of access to healthcare services is guaranteed to everyone under Section 27 of the South African Constitution. It appears that South Africa has made good progress over the last 20 years in terms of healthcare on a population level. There has been an increase in overall life-expectancy, a decrease in maternal mortality rates, a decrease in mortality in the under 5-year age group and an apparent increased coverage in essential health services, including infectious diseases and reproductive healthcare. However, there are still substantial challenges to be met in the management of non-communicable diseases.

In the current financial year, around R260 billion is allocated to the funding of healthcare, of which 23% (about R60 billion) goes to the National Department of Health. Of this, 85% is transferred to provinces to fund national health in the form of grants. These include Health Facility Revitalisation grant – for funding maintenance and building of health facilities; Tertiary Services grant – funding central hospitals for services rendered to provinces; Human Resources Training grant – funding the training of health professionals and covering the salaries of medical interns and community service medical officers; and the National Health Insurance direct grants – for funding the contracting of mental health practitioners and oncology services. There is also the District Health grant (formerly the HIV/AIDS, TB and STI grant). To access these grants, provinces are required to develop business plans, which are funded subject to provinces meeting certain conditions. (Taken from: Budget 2023 – opportunity missed to refocus public health spending? February 2023, Russell Rensburg).

Our country's economy is not doing well following the Covid-19 pandemic and now loadshedding is adding more stress. The financing of the state healthcare service is seriously negatively affected by this situation. The 2023/24 budget allocation to the National Department of Health was cut by R4.4 billion, from R64.5 billion in 2022/2023 to R60.1 billion in 2023/24. Even though the R4.4 billion decline can be attributed to discontinuation of conditional grants, which were allocated for the fight against Covid-19 including vaccination, the fact is that there has been no inflation-related adjustment. National Treasury acknowledges that the health sector is under-funded to a minimum of R11 billion. Provincial administrations continue to shoulder significant cost pressures, most notably in the funding of human resources for health, which accounts for between 60 to 65% of provincial health budgets.

In a nutshell, these cuts translated to an initial R88 million budget reduction for a tertiary hospital like Groote Schuur. This amount then grew to a R240 million deficit when staff salary increases were factored into the equation, and currently stands at R264 million due to overspending by certain departments. Since the largest part of the budget is spent on staff salaries, as indicated above, any post that is vacated is currently subject to delayed filling for three to six months to save money. In all likelihood, posts at state facilities will be reduced to make ends meet next year. There are further budget cuts planned for the National Dept of Health in 2024, meaning that the outlook for healthcare services for the coming year is bleak, to put it mildly. We should focus on developing stronger partnerships with NGOs and building public-private partnerships to fund posts and enable continued service provision in future, thereby improving our healthcare services.

Please continue to support us by submitting your valuable work for publication in the SAOJ.

Prof Nagib du Toit
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1. The *South African Ophthalmology Journal* invites review articles, original studies and case reports for submission. Articles should be the original, unpublished work of the stated author. All materials submitted for publication must be submitted exclusively for publication in this journal. Written permission from the author or copyright holder must be submitted with previously published figures, tables or articles. Authors are solely responsible for the factual accuracy of their work.

2. A cover sheet is to be submitted with each manuscript. It should contain the title of the manuscript, the names of all authors in the correct sequence, their academic status and affiliations. The ORCID ID number for each author should be supplied (https://orcid.org/). The corresponding author should include his/her name, address, phone and email address.

3. Articles should be between 2 000 and 3 000 words in length. A 200-word abstract should state the main conclusions and clinical relevance of the article. Use the headings Background, Methods, Results and Conclusion. Five keywords are to be supplied at the end of the abstract.

4. Authors should declare any interests, financial or otherwise, regarding the publication of their article, under the headings of Funding and Conflict of interest. If none, this should be stated. An ethics statement regarding patient consent and/or Ethics Board approval should be included. Authors should also indicate whether the submission forms part of an 'MMed dissertation by publication' by stating so clearly on the title page.

5. All articles are to be in English and are to follow the Vancouver style of referencing. References should be numbered consecutively in the order that they are first mentioned in the text and listed at the end in numerical order of appearance. Identify references in the text by Arabic numerals in superscript after punctuation, e.g. ... trial.[13]

6. The following format should be used for references:
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7. Tables should carry Roman numerals, I, II etc., and illustrations Arabic numbers 1, 2 etc.

8. Abbreviations and acronyms should be defined on first use and kept to a minimum.

9. All figures, tables and photographs should also be submitted electronically. Each figure must have a separate self-explanatory legend. The illustrations, tables and graphs should not be embedded in the text file, but should be provided as separate individual graphic files, and clearly identified. Photographs should be saved as a 300 dpi JPEG file. Graphs and algorithms, which need to be editable, should be saved as MS Word documents or in PowerPoint. Tables should be saved either in MS Word or in a PowerPoint document. Photographs and X-rays need to be suitably anonymised. Permission should be obtained for the use of patient photographs.

10. Articles are to be submitted by email to the Editor-in-Chief, Prof Nagib du Toit at the following email address: journaleditor@ossa.co.za The text should be in MS Word. Pages should be numbered consecutively in the following order wherever possible: Title page, abstract, introduction, materials and methods, results, discussion, acknowledgements, tables and illustrations, references.

11. The Editor reserves the right to shorten and stylise any material accepted for publication.

12. For all accepted articles, authors will be requested to provide five (5) multiple choice CPD questions related to their paper.

13. Authors need to disclose whether they used artificial intelligence (AI)-assisted technologies (such as Large Language Models, chatbots, or image creators) in the production of submitted work. Authors who use such technology should describe, in both the cover letter and the submitted work, how they used it. Authors should not list AI and AI-assisted technologies as an author or co-author, nor cite AI. Chatbots (such as ChatGPT) should not be listed as authors because they cannot be responsible for the accuracy, integrity, and originality of the work. Authors should carefully review and edit the result because AI can generate authoritative-sounding output that can be incorrect, incomplete, or biased and all plagiarism that may have been produced by the AI, should be excluded.

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Endophthalmitis at Johannesburg academic hospitals: A descriptive study

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Abstract

Purpose: To describe the clinical features as well as causative organisms of exogenous endophthalmitis in patients presenting to three academic hospitals affiliated to the University of the Witwatersrand.

Design and method: A case series of endophthalmitis notified to the department of ophthalmology at the University of the Witwatersrand from January 2011 to December 2019.

Results: Fifty-two patients fulfilling the inclusion criteria were analysed. The mean age was 49.8 years. Majority were males, accounting for 51.9% of cases. Males had a significantly higher prevalence (93.7%, p<0.05) of trauma-related endophthalmitis. The commonest cause of endophthalmitis was cataract surgery-related (41.4%) followed by trauma-related (34.1%) and post-intravitreal injection (19.5%). The frequency of clinical signs were: conjunctival hyperaemia in 96%; hypopyon in 87% and vitritis in 100%. Microscopy, culture and sensitivity testing was positive in 62.2% of specimen tested. The commonest organisms cultured were staphylococcal species (24.3%), followed by streptococcal species (16.2%).

Conclusion: The commonest type of exogenous endophthalmitis in our series was cataract surgery-related and the commonest organisms cultured were staphylococcal species.

Funding: No funding was received for this study.

Conflict of interests: The authors hereby declare that they have no financial, professional or personal relationships that may have unduly influenced them in writing this article.

Keywords: endophthalmitis, clinical features, microbiological organism, trauma-related, cataract-related.

Introduction

Endophthalmitis remains the most dreaded complication of any intraocular procedure.[1] Clinical symptoms include pain, redness and vision loss. The signs associated with endophthalmitis may vary according to severity. These signs are eyelid swelling, chemosis, conjunctival injection, relative afferent pupillary defect and vitritis. Toxins produced by the infecting bacteria and the host inflammatory response cause rapid and irreversible photoreceptor damage and ongoing effects can continue long after the ocular contents have been rendered sterile.[2,3]

Risk factors for the development of endophthalmitis after cataract surgery include: posterior capsular tear, prolonged procedure time, clear corneal sutureless incisions, temporal corneal incisions, wound leak, delaying post-operative antibiotics, topical anaesthesia, adnexal disease and diabetes mellitus.[2] Other risk factors for the development of exogenous endophthalmitis include open globe injuries, post glaucoma surgery and post corneal transplantation.

The Endophthalmitis Vitrectomy Study (EVS) remains the only level one evidence on the subject.[4] EVS reported that the most common presenting symptom was pain (74% of patients) and almost all patients had reported blurred vision. Afferent pupillary defects were present in 12%, corneal ring ulcer/infiltrate in 5%, and hypopyon in 86%.[4,5,6,7]

The clinical signs which are noted are varied depending on the time to presentation and the clinical setting within which the patient with endophthalmitis presents. Patients with a history of glaucoma tend to present later and there are no differences in culture positivity rates as well as final visual outcome in patients that present early or late for treatment.[8]

The prognosis of endophthalmitis is largely dependent on the causative organism.[1] In the EVS, the most commonly isolated organism was coagulase negative *staphylococcus epidermidis.* This normal skin commensal has also been found in cultures in more recent series.[9] In other clinical settings, a similar profile of organisms are usually isolated with the exception of patients who have had glaucoma drainage devices implanted.[10]

Over the years, patient care has evolved in terms of management protocols, technological improvements and

pharmacological advances. Interventions such as prophylactic iodine, smaller ports for vitrectomy and intracameral cefuroxime and moxifloxacin have drastically improved the rates and outcomes of endophthalmitis.[1,11,12,13] Rates of endophthalmitis vary across different countries and is dependent on the clinical setting. Post cataract surgery related endophthalmitis occurs in 0.04% of patients.[1,14]

The clinical training platform of the University of the Witwatersrand's division of Ophthalmology includes three hospitals in Johannesburg, South Africa: Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), Chris Hani Baragwanath Academic Hospital (CHBAH) and Helen Joseph Hospital (HJH). These three hospitals are referral centres for cases requiring tertiary level care.

Endophthalmitis has never been studied in our setting before. We therefore decided to conduct a descriptive study of all cases of endophthalmitis which were managed in our three teaching hospitals.

Methods

A policy of notifying all cases of endophthalmitis has been implemented in all our three teaching hospitals. These notifications are reported to the University of the Witwatersrand Ophthalmology office and presented at our morbidity and mortality meetings.

A retrospective descriptive case series study was conducted of reported cases of endophthalmitis at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), Chris Hani Baragwanath Academic Hospital (CHBAH) and Helen Joseph Hospital (HJH) in Johannesburg, South Africa. Ethical clearance was approved by the Human Research Ethics Committee, University of the Witwatersrand (M211032). Ethics approval was also granted by all these three hospitals to collect data from patients' records. The study was conducted in accordance with the declaration of Helsinki.

All patients who had an acute endophthalmitis and subsequently presented in our morbidity and mortality (M&M) meetings between January 2011 and December 2019 were included in the study. Eligible patients were identified from the minutes of these meetings. Clinical records of patients who met the inclusion criteria were retrieved from the three participating hospitals for analysis.

Descriptive statistics were used to present the data and statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) version 28 and Microsoft Excel 2019.

Results

A total of 52 patients met the inclusion criteria for the study.

Gender

There were 18 females (34.6%), 27 males (51.9%) and the status of seven cases was unknown or not recorded (13.5%). A cross-tabulation analysis was done for gender. The results show that there does exist a relationship between gender and clinical setting (Fisher Exact Test significance of 0.001), ocular pain (<0.001), hypopyon (<0.001), AC Fibrin (0.027) and vitritis (<0.001).

Time to presentation

Fourteen records were missing data with regards to the number of days that elapsed between the development of symptoms and presentation to hospital and were therefore excluded from this analysis. Three patients had delayed onset post-operative endophthalmitis and were also excluded from the analysis. The mean time to presentation was 12 days (SD-16.0).

Presenting features

Table I: Summary of clinical features	
Conjunctival hyperaemia	96%
Ocular pain	100%
Hypotony	21%
Elevated Intraocular pressure	21%
Hypopyon	87%
Anterior chamber fibrin	100%
Vitritis	100%

Organism cultured

Nine were Staphylococcal species: (*Staphylococcus aureus*- 4, *staphylococcus epidermidis*- 4, *staphylococcus haemolytic*- 1).

Six were Streptococcal species: (*Streptococcus pneumoniae*- 3, *streptococcus viridans*- 1, *streptococcus mitis*- 1, *streptococcus anginosis*- 1).

Two were *Haemophilus Influenzae.*

Six were "other" organisms.

Fourteen cultures did not yield a positive result.

Visual outcome

Due to poor follow-up of patients, absence of data of best spectacle-corrected visual acuity and continued visual rehabilitation after diagnosis, final visual acuity was not reported on in this study.

Four (7.6%) patients developed no-light perceptions due to phthisis bulbi or evisceration in this series.

See *Table II* for summary of findings for age, clinical setting and visual acuity at presentation.

Discussion

Despite the rare occurrence of endophthalmitis, and the limitations of retrospective analysis, it is important to constantly review the clinical features as well as the microbiological organisms associated with endophthalmitis in practice. This will assist in developing improved clinical protocols in the prevention and management of endophthalmitis.

The average age at presentation in this study was 49.84 (SD = 28.42). This study proved a statistically significant correlation between age and endophthalmitis in the clinical settings of both trauma and cataract surgery. This is consistent with numerous other studies showing extremes of age as being a risk factor for the development of endophthalmitis. This is postulated to be so in advanced age due to reduced natural immunity and younger patients requiring more complex surgery.[1,14]

This series, in line with other studies, found a male preponderance of endophthalmitis. Possible reasons for this include behavioural differences in adherence to post-operative instructions and compliance to treatment regimens.[6]

Fifty six percent of patients in this study had light-perception vision on presentation. This is in keeping with the delayed presentation and therefore the majority of patients will require a surgical intervention as part of their initial management. Delayed presentation also has a direct effect on final visual outcome.[4,8]

This series demonstrated a higher prevalence of endophthalmitis in patients undergoing extracapsular cataract surgery compared to phacoemulsification. A similar trend was reported by Lundström *et al.* who demonstrated that extracapsular or intracapsular cataract surgery had an approximately two times more risk of endophthalmitis when compared to phacoemulsification surgery.[8]

Endophthalmitis following intravitreal injections presents earlier than post cataract surgery which conformed to the findings of this study. All intravitreal injections are given in a 'clean room' in our department and monocular patients are given intravitreal injections in a theatre setting. No clear guideline exists for administering of intravitreal injections.

Table II: Summary of demographics, clinical setting and organisms cultured			
Variable	**Category**	**N**	**%**
Hospital where patient managed	SJEH	27	51.9
	CMJAH	16	30.7
	HJH	5	9.6
	Unknown	4	7.6
Age (in years)	Average -49.8 years	41	
	0-20	9	17.3
	21-40	6	11.5
	41-60	7	13.4
	61-80	14	26.9
	>80	5	9.6
	Unknown	11	21.1
Gender	Female	18	34.6
	Male	27	51.9
	Unknown	7	13.5
Visual Acuity at presentation	Light perception	21	56
	Hand movements	10	27
	Count fingers	3	8
	6/24	2	5
	6/18	1	2
	Unknown	15	
Laterality	Right	26	50
	Left	16	30.7
	Unknown	10	19.2
Clinical setting	Cataract surgery	17	41.4
	Trauma	14	34.1
	Intravitreal injection	8	19.5
	Bleb- related	2	4.8
	Unknown	11	
Organism cultured	Staphylococcal species	9	24.3
	Streptococcal species	6	16.2
	Haemophilus Influenzae	2	5.4
	Other	6	16.2
	Culture negative	14	37.8
	Unknown	15	

A large review by Merani *et al.* advises that a sterile technique with the use of a povidone-iodine solution, omission of peri-procedural antibiotics, and wearing a mask or maintaining silence during the procedure to eliminate aerosolization of bacteria.[15]

Trauma places a major burden on the South African health care system with young males being most commonly affected. Alcohol is closely linked to incidents of non-accidental injury and the victims and assailants are commonly known to each other.[16,17,18] This series confirmed findings of other South African-based studies showing an increased proportion of young males being affected by trauma resulting in open globe injury. The ocular trauma score as proposed by Kuhn *et al.* places endophthalmitis as the second most important sign as a poor prognostic indicator for vision after globe rupture.[19,16] The EVS is only prescriptive with regards to post cataract surgery related endophthalmitis and no clear evidence-based guidelines exists for the management of endophthalmitis in other clinical settings.[13]

Our study showed a 62.2% culture positivity rate. In the EVS, a 69% culture positivity was achieved. More recent series show culture positivity to range between 33-56%. These lower rates were attributed to the fact that the EVS used vitrectomy as well as needle aspiration to collect samples, whereas current vitreous sampling methods only employ needle aspiration. Aqueous sample rates are significantly less culture-positive than vitreous samples.[1,5]

The EVS and the French Institutional Endophthalmitis Study (FRIENDS) found a similar rate of 94% Gram-positive bacteria in acute endophthalmitis after cataract surgery, and among them, 70% were coagulase- negative staphylococci belonging to the commensal flora.[20,21,22] Our series also demonstrated a predominance of staphylococcal species identified from vitreous taps and 37% had culture-negative vitreous taps.

Mirzania *et al.* showed a worsening of the final visual acuity in patients who presented three or more days after onset of symptoms of endophthalmitis compared to patients who presented within two days of onset of symptoms. In our series, the average time to presentation was 12 days which lead to worse vision recordings at presentation and this ultimately led to the majority of patients requiring surgical intervention as opposed to more conservative measures.[8]

Pain is the most common symptom in this series and fibrin, hypopyon, conjunctival hyperaemia are the most common clinical signs.

The severity and outcome of postoperative endophthalmitis in cataract surgery mainly depend on several risk factors related to patients' demographics such as old age, males, rural residence, and immunosuppressive conditions such as diabetes mellitus.[5] The unfavourable visual outcomes of postoperative endophthalmitis in cataract surgery ranges from decreased visual acuity less than 6/60 to the loss of the eye.[3] Final visual acuity was not reported on in this study due to poor follow-up of patients, absence of data of best spectacle-corrected visual acuity and continued visual rehabilitation after diagnosis.

Conclusion

Endophthalmitis is a rare and dreaded complication of any intraocular procedure that could lead to significant visual morbidity. The commonest type of exogenous endophthalmitis in our series was cataract surgery-related and the commonest organisms cultured were staphylococcal species. Unique to our study is the high proportion of trauma-related endophthalmitis and the late presentation of patients for ophthalmic care. Most patients had light perception at presentation requiring a surgical intervention. Four patients had developed

phtisis bulbi or no light perception vision in this series.

Limitations

The limitations of this study include its retrospective design, rarely occurring disease, small sample size, possible under-reporting of cases of endophthalmitis to the department and challenges with record-keeping in three different hospitals over a period of nine years.

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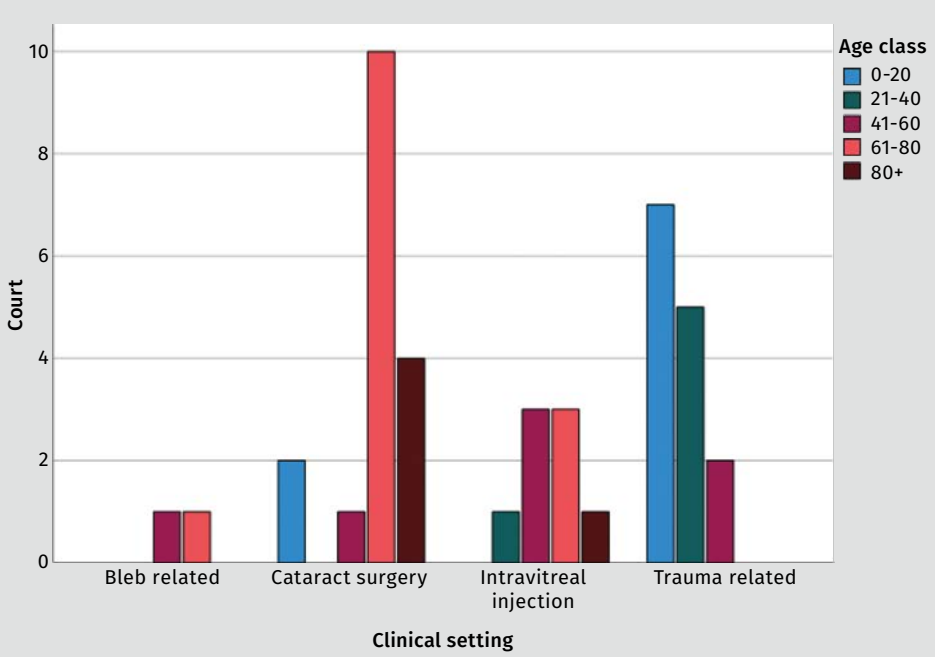

Figure 1: The relationship between age and clinical setting

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Surgical outcomes of 5/0 polypropylene gonioscopy-assisted transluminal trabeculotomy (GATT) for primary management of open-angle glaucoma in Eswatini

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Abstract

Background: This study describes the outcomes and safety of 5/0 polypropylene gonioscopy-assisted transluminal trabeculotomy (GATT) in managing patients with open-angle glaucoma in a resource-constrained, rural, African setting.

Methods: A retrospective chart review identified 55 eyes of 52 patients who underwent GATT for open-angle glaucoma at Good Shepherd Eye Clinic in Siteki, Eswatini. The procedure, done without concurrent cataract surgery, was performed by a single ophthalmic surgeon. The outcome measures were a change in intraocular pressure (IOP) and the number of antiglaucoma medications prescribed postoperatively. Success was defined as IOP reduction ≥ 20% from baseline or IOP ≤ 18mmHg in the six months postoperatively. Any complications related to GATT were reported.

Results: The mean age of the study population was 60 (range 25-82) years. The baseline IOP decreased from a median of 28mmHg (IQR 6) to 14mmHg (IQR 8), in the 19 patients assessed at six months, a reduction of 50%. The mean number of prescribed antiglaucoma medications decreased from 1.2 (SD 0.9) to 0.6 (SD 1.0). The success rate of GATT in controlling open-angle glaucoma was 79% at six months. Transient postoperative hyphaema and IOP spikes were the most common complications.

Conclusion: Polypropylene-GATT is a cost-effective and safe surgical option for patients with open-angle glaucoma. It should be considered a surgical option for managing open-angle glaucoma in resource-constrained settings.

Conflict of interest: The authors have no financial or any conflict of interest to declare.

Keywords: Glaucoma, GATT, glaucoma surgery, Africa, Prolene-GATT

Introduction

Glaucoma is the leading cause of irreversible vision loss and the second most common cause of blindness globally.[1] Glaucomatous blindness in Africa is double the global prevalence.[2]

Intraocular pressure (IOP) is the major modifiable risk factor, and lowering IOP by medical, laser or surgical means is necessary to prevent glaucomatous visual field loss.[3,4] Unchecked raised IOP causes permanent damage to the ganglion cells, and if left untreated, it can lead to irreversible vision loss.

Topical antiglaucoma medications are the most common first-line standard of care for open-angle glaucoma (OAG) in high-income countries.[5] In African and other low- and middle-income countries (LMIC), a once-off surgical IOP-lowering intervention may be more suitable in resource-constrained and rural settings.[6,7] Patients often travel long distances to access medical care and are frequently lost to follow-up because of a lack of transport, finance, or trust in traditional medical services.[8]

Although trabeculectomy remains the gold standard of surgical management, the procedure has well-documented complications, including unpredictable wound healing and a life-long risk of endophthalmitis.[9-12]

Micro-invasive glaucoma surgery (MIGS) that lowers IOP by enhancing the outflow of the aqueous humour while limiting disruption to the sclera or conjunctiva has become increasingly popular for the surgical management of open-angle glaucoma.[13] The primary aim of using these procedures is to reduce complications, especially regarding ongoing bleb care.

Expensive single-use implantable devices used in MIGS curtail their use in resource-limited settings. In contrast, gonioscopy-assisted transluminal trabeculotomy (GATT), a type of MIGS procedure, uses cheap and readily available ophthalmic materials and equipment. Polypropylene GATT uses a 5/0 Prolene® suture and has been advocated for glaucoma management in LMICs.[14-17] Polypropylene GATT is a sutureless, bleb-less and efficient procedure with fewer long-term complications than traditional filtration surgery, it has proven efficacy and an acceptable safety profile.[13-22] Importantly, it also preserves conjunctiva for further surgical intervention. While GATT offers many potential benefits, research in an African setting, where glaucoma is so prevalent, is limited.

This study describes the outcomes and safety of 5/0 polypropylene GATT in the primary surgical management of patients with OAG in a resource-constrained, rural, African setting.

Material and methods

A retrospective chart review was performed for all 52 patients who underwent GATT for open-angle glaucoma at Good Shepherd Eye Clinic in Siteki, Eswatini, between January 2017 and July 2020. The procedure, without concurrent phaco-emulsification, was performed on 55 eyes by a single ophthalmic surgeon. Patients were excluded if they were under 18, had previous incisional glaucoma surgery, or had lost or incomplete medical records. Ethical approval to conduct the study was obtained from the Eswatini Health and Human Research Review Board (SHR332/2021) and the University of KwaZulu-Natal Biomedical Research Ethics Committee (BREC/00003412/2021).

Preoperative clinical data were recorded, including best corrected visual acuity, slit-lamp biomicroscopy, IOP using a Goldmann applanation tonometer or rebound hand-held tonometry (iCare® Tonometer, iCare Finland), fundoscopy with optic disc assessment for each patient. A detailed history of antiglaucoma medications was obtained.

Surgical procedure

A modified GATT technique originally described by Grover was used.[23] Pilocarpine, 2% drops, was instilled around 30 minutes preoperatively, and a sub-tenon local anaesthetic was given. A temporal clear corneal paracentesis was created with a 1.8mm keratome or 15-degree blade. A second tangential paracentesis was made infero-nasally. A cohesive viscoelastic (Sodium Hyaluronate 1.4%) was injected into the anterior chamber (AC). The patient's head was turned to face away from the temporally seated surgeon, and the microscope was tilted to allow optimal visualisation of the nasal (AC) angle. A Swan Jacob gonioscopy lens was placed onto the cornea, and the nasal angle structures were identified. A 26-gauge needle was used to create an initial 1 to 2-clock-hour goniotomy. Viscoelastic was inserted to help open the AC angle. Thermal cautery was used to slightly blunt the tip of a 5-0 Prolene® (polypropylene) suture, which was then inserted into the AC through the paracentesis. The suture was gripped with microsurgical forceps in the AC (MST micro forceps®, MicroSurgical Technology, Redmond, Washington, USA) and fed into the goniotomy to cannulate Schlemm's Canal. The placement was confirmed by direct visualisation. The suture was continuously fed through the canal until the distal end of the suture appeared through the goniotomy. It was then grasped, and traction was applied until the suture had created a complete 360-degree trabeculotomy. If a 360-degree goniotomy was not possible and the suture was visible in the anterior chamber, a partial goniotomy was performed on the portion that could be successfully cannulated. The AC was washed out with a balanced salt solution. Viscoelastic and an air bubble were left in the AC to reduce postoperative hyphaema. Corneal wounds were hydrated, and a sub-conjunctival steroid and antibiotic were injected at the end of the procedure.

Postoperatively, a combination of topical dexamethasone and chloramphenicol, as well as pilocarpine 2%, was prescribed for regular instillation for one month. Patients were advised to sleep upright for at least 14 days. Topical and systemic glaucoma medications were discontinued postoperatively and re-initiated if a raised IOP persisted after consecutive visits. Postoperative examination for complications and IOP spikes were performed on day one, after one week, one, three and then six months, or more frequently as needed. Pilocarpine was used primarily to reduce peripheral anterior synechiae formation and was not considered an antiglaucoma treatment for this study.

Outcome measures

The outcome measures were postoperative IOP changes and the number of antiglaucoma medications used. A postoperative IOP less than or equal to 18mmHg, or a 20% or greater reduction in IOP from baseline, without any glaucoma medications, was a successful outcome. The surgery was deemed to have failed if the IOP criteria were not met, additional IOP lowering surgery was needed, and there was the loss of light perception or hypotony (IOP less than 6mmHg). All reported intraoperative and postoperative complications were recorded. A postoperative hyphaema was recorded as a complication if layered blood was visible in the AC. Postoperative IOP spikes were defined as an IOP greater than or equal to 30mmHg within one month of surgery.

Statistical methods

Data were entered into Microsoft Excel®, which was used with Jamovi® (Jamovi Project 1.6, R 4.0) to calculate appropriate summary statistics. The effectiveness of the intervention was measured by observing the post-GATT IOP at set time intervals. The paired sample t-test was

Table I: Baseline clinical characteristics of 52 patients (N = 55 eyes) with open-angle glaucoma managed with gonioscopy-assisted transluminal trabeculotomy (GATT) in Eswatini

Variables	Values
Males	37 (67%)
Mean age (range)	
Males	59 (25-81) years
Females	61 (38-82) years
Laterality	
Right	32 (58.2%)
Left	23 (41.8%)
Pseudophakic	2 (3.6%)
Preoperative intraocular pressure	
Median (IQR)	28mmHg (6)
Mean (SD)	28mmHg (10)
Preoperative medications mean (range)	1.2 (0 - 3)
Mean vertical cup-to-disc ratio (SD)	0.8 (0.2)
Preoperative visual acuity (decimal)	
1.5 - 0.33	33 (60%)
0.25 - 0.1	14 (26%)
<0.1	8 (14%)

SD – standard deviation.
IQR – interquartile range.

used to calculate a statistically significant reduction in intraocular pressure after GATT and a reduction in glaucoma medication. A p-value of <0.05 was considered statistically significant.

Results

Fifty-five eyes of 52 patients with open-angle glaucoma with a GATT procedure were included in the analysis (*Table I*). The mean age of the study sample was 60 years. Two-thirds (n = 37) were males. The population was primarily of black African descent. The mean vertical-cup-to-disc ratio was 0.8 (SD 0.2). The preoperative visual acuity (VA) in the eye before GATT was 1.5 - 0.33 in 33 (60%), 0.25 - 0.1 in 14 (26%) and less than 0.1 in 8 (14%) of the eyes. Only two (3.6%) patients were pseudophakic. The median preoperative IOP was 28mmHg, and a mean of 1.2 antiglaucoma medications was used preoperatively. Ten of the patients (18%) who underwent GATT in this study for OAG had an IOP less than 21mmHg at baseline, and 29 (53%) had IOPs higher than 27mmHg (*Table II*). Most (43, 78%) eyes had a complete (360^0) goniotomy, 12 underwent partial GATT, 11 had 180^0 or less, and one had a 270^0 goniotomy.

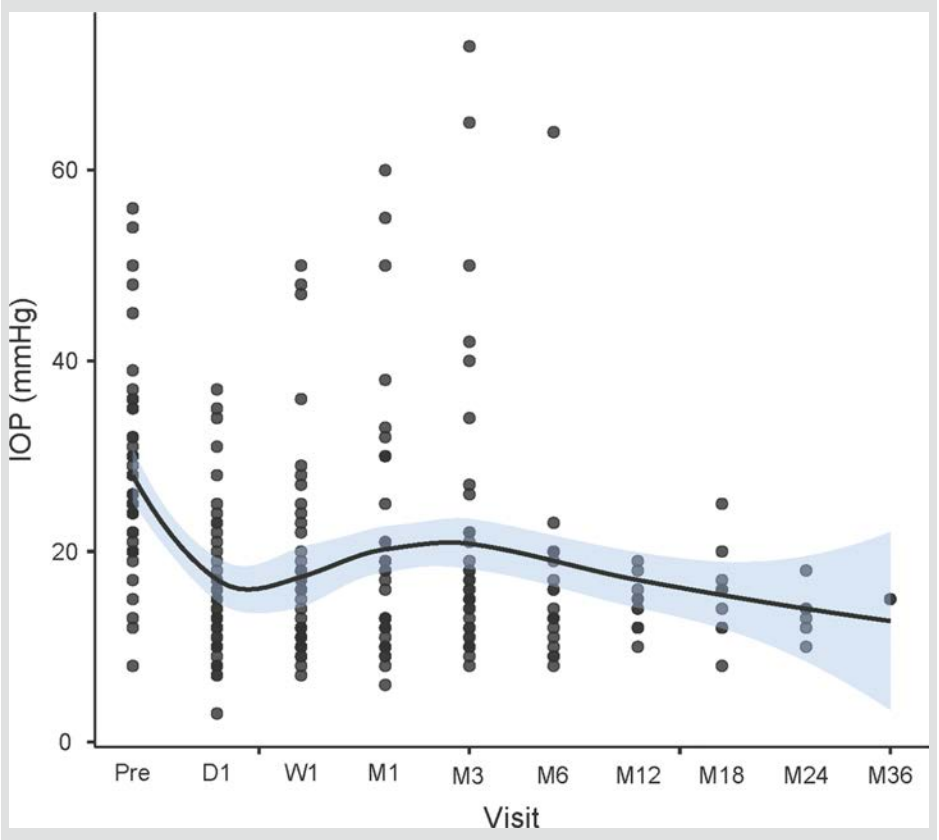

Figure 1: Individual Intraocular pressure per visit. Smoothed regression line with standard deviations

Table II: Outcomes of gonioscopy-assisted transluminal trabeculotomy (GATT) performed on 52 patients (N = 55 eyes) with open-angle glaucoma in Eswatini

	Pre-op		Day 1		Week 1		Month 1		Month 3		Month 6		Year 1	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Number of eyes	55	100%	52	95%	46	84%	35	64%	37	67%	19	35%	10	18%
GATT outcome														
Failed	-	-	6	12%	10	22%	15	43%	16	23%	4	21%	4	40%
Success	-	-	46	88%	36	78%	20	57 %	21	57%	15	79%	6	60%
Intraocular pressure (mmHg)														
Mean IOP (SD)	28	(9)	16	(7)	17	(10)	21	(13)	21	(15)	17	(12)	15	(3)
Mean IOP reduction	-	-	12	43%	11	39%	7	25%	7	25%	11	39%	13	46%
Median (IQR)	28	(6)	13	(8)	13	(10)	17	(16)	15	(9)	14	(8)	15	(3)
Median IOP reduction (%)	-	-	15	54%	15	54%	11	39%	13	46%	14	50%	13	46%
p-value						<0.001		0.047		0.007		0.003		0.002
<21 mmHg	10	18%	41	79%	35	76%	23	66%	26	70%	17	89%	10	100%
21-27	16	29%	6	12%	5	11%	3	9%	5	14%	1	5%	0	0%
>27mmHg	29	53%	5	10%	6	13%	9	26%	6	16%	1	5%	0	0%
Visual acuity (Decimal)														
Good 1.5 - 0.33	33	60%	36	41%	28	61%	23	65%	23	62%	12	63%	9	90%
Moderate 0.25 - 0.1	7	13%	12	23%	5	11%	6	17%	5	14%	2	11%	0	0%
Severe < 0.1	15	27%	19	37%	13	29%	6	17%	9	25%	5	27%	1	10%
Topical glaucoma medications (n)														
0	18	33%	52	100%	46	100%	32	91%	27	73%	14	74%	6	60%
1	14	25%	0	0%	0	0%	0	0%	3	8%	1	5%	2	20%
2	20	36%	0	0%	0	0%	1	3%	3	8%	1	5%	2	20%
3+	3	5%	0	0%	0	0%	2	6%	4	11%	2	63%	0	0%

Table III: Complications of gonioscopy-assisted transluminal trabeculotomy with open-angled glaucoma managed in a resource-constrained setting in Eswatini

Total eyes (N)	55
Intra-operative complications:	
Iris damage	4 (7.2%)
Anterior capsular rupture	1 (1.8%)
Postoperative complications:	
Hyphaema	30 (54.5%)
Hyphaema requiring AC washout	2 (3.6%)
Endophthalmitis	0
Hypotony	1 (1.8%)
Descemet Membrane detachment	0
Choroidal effusions	0
Corneal oedema	0
Postoperative IOP spikes*	15 (27.3%)

*Postoperative IOP spikes were defined as an IOP greater than or equal to 30mmHg within one month of surgery.

The median postoperative IOP was significantly ($p<0.05$) lower than the preoperative IOP of 28mmHg at all follow-up points. The median IOP was 13mmHg at one week, 17mmHg at one month, 15mmHg at three months, 14mmHg at six months and 15mmHg at one year (*Table II* and *Figure 1*). The percentage reduction in the median IOP compared to the baseline IOP was 55%, 39%, 46%, 50% and 48%, respectively, at the follow-up visits. The success rate at one- and three months was 57%, and at six months it was 79%. At six months, 17/19 (89%) had a pressure of 21mmHg or less compared with only 10/55 (18%) preoperatively. Five of 55 eyes (9.1%) underwent post-GATT surgical intervention for uncontrolled IOP (*Table IV*).

There was a statistically significant ($p<0.05$) drop in the mean number of reported postoperative medications prescribed from 1.2 preoperatively to 0.3 (SD = 0.9) at one month and 0.6 (SD = 1.0) at three months. By six months, the number of IOP-lowering medications prescribed was not statistically significant to the baseline, but at six months, 15/19, 79% did not require anti-glaucoma medications.

Visual acuity dropped on day one postoperatively, but from postoperative week one, the change in VA was not significant from baseline ($p = 0.65$). No patients progressed to No Light Perception (NLP). No sight-threatening complications occurred during surgery or follow-up.

Table IV: Description of five patients with gonioscopy-assisted transluminal trabeculotomy with open-angled glaucoma who required further IOP-lowering interventions

#	Age (years) and sex	Type of intervention	Timing of intervention
1	38 Female	Trabeculectomy	2 months
2	52 Female	Trabeculectomy	6 months
3	25 Male	Trabeculectomy	3 months
4*	81 Female	Lens extraction	3 months
5	82 Female	Trabeculectomy	3 months

*Patient developed angle-closure type glaucoma with peripheral anterior synechiae. The IOP only settled after a clear lens extraction followed an initial laser peripheral ridotomy.

Minor postoperative hyphaema occurred in 30 eyes (55%) on day one. However, only two eyes (3.6%) required AC washout at two weeks postoperatively due to unresolved hyphaema and associated IOP spikes. Fifteen (27%) postoperative IOP spikes occurred. Four occurred on day one postoperatively, three occurred within two weeks, and the remaining eight occurred one month postoperatively.

The dropout rate at each postoperative follow-up visit increased. Thirty-seven of the 52 patients (71%) remained in the study for three months, but only 19 (37%) were seen at six months.

Discussion

This study reports on the outcomes and safety of GATT for OAG in a resource-constrained rural African setting. The predominantly black African participants were from Eswatini or the neighbouring countries of Mozambique and South Africa. In this context, patients with glaucoma typically present at an advanced stage, often with unilateral or bilateral glaucomatous blindness. African patients with glaucoma also tend to have higher IOP and present at a younger age.[24-26] Poverty, poor awareness, and limited access to services are barriers to receiving appropriate antiglaucoma therapy, which can contribute to unnecessary glaucoma blindness in Africa.[27]

The surgical management of OAG with GATT in our study shows great promise, with effective lowering of IOP at all follow-up visits from one week to one year compared to baseline. The median IOP six months after GATT was 14mmHg, and a mean of 0.6 antiglaucoma medications were prescribed per patient. The overall success rate was 79% at six months postoperatively. The results are comparable to other studies of GATT and add to the evidence that it is an effective surgical intervention for open-angle glaucoma. Studies have shown a mean IOP at 12 months post-GATT ranging from 12mmHg to 16mmHg, with the mean number of antiglaucoma medications ranging from 0.6 to 1.9.[14-22]

Comparing surgical success or failure among GATT studies can be challenging as different definitions and IOP cut-offs have been applied. The surgical success in this study of 79% at six months, is comparable to other studies with similar criteria. A study from Peru (N = 32) combining GATT and phacoemulsification had 66% success at six months, while a Chinese study (N = 124) had an 80% one-year success rate in patients with primary open-angle glaucoma (POAG).[16,21]

The rate of post-GATT surgical intervention for uncontrolled IOP in this study was similar to other recent studies. Five of 55 eyes (9.1%) underwent subsequent IOP-lowering surgery. Reported rates of additional surgical intervention range from 2.4% in primary open-angle to 9.1% in uveitic glaucoma.[5,21] Most eyes in this study 50 (91%) were spared conjunctival surgery and would still have this option if required later.

The mean number of preoperative antiglaucoma medications prescribed was 1.2 (range 0 to 3), which was low compared to 3.4 in larger (N = 104) studies of GATT in Turkey and 3.1 in China (N = 124).[18,21] The lower number of preoperative medications likely reflects the predilection for earlier surgical management of open-angle glaucoma in this study setting.

Visual acuity remained relatively stable throughout the postoperative period. Postoperatively, an initial drop in VA was seen on day one, likely related to residual hyphaema and expected postoperative inflammation. Two patients lost three and four lines of vision because of the progression of cataracts. Four patients had cataract surgery following GATT in the study's follow-up period. Two patients had worse than baseline vision; both

were over 80 years of age with advanced glaucoma, a high baseline IOP and postoperative hyphaema.

In this study, GATT was assessed to be a safe procedure (*Table III*). No patients lost light perception or had endophthalmitis. One patient had hypotony (IOP 3mmHg) postoperatively, which resolved in a week. Polypropylene GATT surgery is technically demanding, and it takes time to develop surgical proficiency.[19] Fewer intra-ocular complications were encountered as surgical experience improved. Performing GATT on pseudophakic patients or combining it with phacoemulsification would have mitigated the potential for lens damage and probably enabled better anterior chamber angle visualisation.

Transient hyphaema and IOP spikes are the most common postoperative complications reported and one study reported that all patients had some blood in the AC postoperatively.[19] Thirty (55%) of the study population had a postoperative hyphaema on day one, which was likely underreported due to an inconsistency in the definition of a hyphaema. Only two patients (3.6%) required AC washout. A recent study of GATT in patients with POAG in China reported that 2 out of 66 (3%) patients who underwent GATT without phacoemulsification had massive hyphaema and IOP spikes that needed AC washout.[21] Significant postoperative hyphaema has previously been identified as a risk for surgical failure.[28]

Postoperative IOP spikes are a well-documented complication of GATT surgery, with incidences ranging from 15% to 49% and are often associated with surgical failure.[15,18,20-22] A quarter (14) of our patients had postoperative IOP spikes. These were managed conservatively, preferring to keep patients' medication-free, even with a slightly higher IOP. The number of IOP spikes could have skewed the data, hence the reason for using the median as the measure of the success of GATT.

The aetiology of IOP spikes occurring post-GATT is multifactorial and includes compromised outflow due to hyphaema or some viscoelastic retained in the AC.[16,20] More intensive topical or systemic antiglaucoma medications may blunt the severity of IOP spikes, which might be necessary for patients with advanced glaucoma. Bridging medications to lower IOP in the initial postoperative period have been proposed and would be recommended.[15,18,22] Combining GATT with phacoemulsification significantly reduced the frequency of IOP spikes from 55% to 17% in a comparative study of 124 patients in China.[21]

The loss to follow-up in this study was substantial. Only 19 (37%) patients were assessed at six months, most likely exacerbated by the stringent COVID-19 lockdown in Southern Africa in 2020. Poor follow-up is a common feature of glaucoma care in this rural African setting. Patients on chronic topical antiglaucoma medication can have difficulty obtaining treatment due to various infrastructural challenges. Despite poor follow-up, many of our patients who underwent GATT had sustained IOP control.

The surgical option of GATT has been promoted as a safe, cost-effective glaucoma in LMICs, but there remains some concern about its suitability in an African context. In Grover's seminal study on the effectiveness of GATT, patients with more advanced glaucoma were found to be at a higher risk of failure.[14] However, subsequent studies have shown that patients with moderate to severe open-angle glaucoma and more aggressive glaucoma subtypes can be effectively managed with GATT.[15,18-20] Poor outcomes have been reported in African-American patients with GATT and MIGS. However, the effective IOP-lowering of GATT in this study suggests that GATT can be a MIGS option in treating open-angle glaucoma in black African patients.[22] Though not explicitly measured in this study, we found the GATT procedure to be efficient and economical. Another observation was less intense clinic follow-up and more rapid visual improvement compared to filtering procedures. Patients who need to travel long distances would appreciate this. As a result, this conjunctiva-sparing glaucoma surgery can potentially replace trabeculectomy as the primary surgical approach in resource-constrained settings.

The study's limitations included its retrospective, non-comparative design and the modest sample size. Loss to follow-up in the postoperative period was significant and was exacerbated by movement restrictions during the COVID-19 pandemic. The inability to perform Goldmann applanation tonometry on all patients is a limitation. A prospective comparative study of GATT, GATT with phacoemulsification and trabeculectomy in a similar setting with significant sample size and longer-term follow-up would be valuable.

This study adds to the evidence that GATT is a viable and safe option for the surgical treatment of open-angle glaucoma, particularly in resource-constrained settings.

Conclusion

Polypropylene GATT is a cost-effective and safe surgical option for patients with open-angle glaucoma in a resource-constrained setting. Although further prospective and more extensive studies are required, GATT is a feasible and appropriate way to manage glaucoma in Africa. It can be offered as first-line surgical treatment in suitable patients once surgical proficiency has been attained.

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Visual outcomes following Bevacizumab intravitreal injections for Diabetic Macular Oedema at Groote Schuur Hospital, Cape Town

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Abstract

Aim: To assess the efficacy of initiation of treatment of diabetic macular oedema (DMO) with intravitreal bevacizumab injections in a real-world setting at a state institution in South Africa.

Methods: We performed a retrospective cohort study of patients receiving intravitreal bevacizumab for diabetic macular oedema at the Groote Schuur Ophthalmology outpatient department. Consecutive patients who were initiated on three monthly loading doses during the period of February 2019 to August 2019 were included and followed up for at least three months. Patients with ocular conditions or procedures which might confound the final visual acuity were excluded. Change in visual acuity was assessed. Visual acuity (VA) was converted to LogMAR for analysis. Optical coherence tomography (OCT) analysis was performed at the start of treatment and after three loading doses to assess change in central retinal thickness (CRT).

Results: Twenty-nine eyes of 22 patients met the inclusion criteria. Mean follow up after the first injection was 3.86 months (SD ± 1.08). The mean VA change from first injection to final follow up was -0.0610 LogMAR (SD ± 0.170 p = 0.0642). CRT reduced on average by -29.1 µm (SD ± 75.4p = 0.0471).

Conclusions: In our setting, intravitreal bevacizumab did not improve VA significantly but the anatomical outcomes in patients with DMO were better after at least three injections. Compared to larger trials, the VA gain and OCT changes in a real-world setting were lower than anticipated.

Keywords: Diabetic Macular Oedema (DMO), Bevacizumab (Avastin), real-world, loading dose, VA, OCT.

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Introduction

The prevalence of diabetes mellitus (DM) is predicted to increase from 463 million in 2019 to 700 million in 2045.[1] Diabetic retinopathy (DR) is a preventable cause of visual impairment and visual loss.[1,2] Diabetic macular oedema (DMO) is the leading cause of vision loss in the working age population.[1-4] Global prevalence of DMO for the period 2015-2019 was estimated at 4.6%, with estimates being significantly higher in African countries, at around 21.5% (range 6.3-32%).[1,4,5]

Inflammation and oxidative stress due to high level of glucose in DM cause the release of vascular endothelial growth factors and other angiogenic and proinflammatory factors. These result in increased retinal vascular permeability, breakdown of the blood retinal barrier, and the resulting DR and DMO.[6]

Treatment options for various forms of retinopathy include laser, anti-VEGF and corticosteroids.[6,7] Several studies have demonstrated the efficacy of different anti-VEGF agents, many of which are FDA approved such as ranibizumab, aflibercept, brolicizumab or faricimab. Bevacizumab is used off-label in many developing countries.[8] Bevacizumab is a recombinant

humanised monoclonal IgG1 antibody that binds to and inhibits VEGF.[9] Numerous studies have compared the safety and efficacy of intravitreal bevacizumab for the treatment of macular oedema including diabetic macular oedema and showed comparable effectiveness to other anti-VEGFs.[10-12]

DMO can be diagnosed with slit lamp examination, fundus photographs, fluorescein angiography or OCT. OCT has surpassed other means due to its high reproducibility of results, non-invasiveness and accuracy. Apart from diagnosing DMO, OCT is used to follow progression over time as well as providing details regarding the retinal architecture. Of note, macular thickening is not directly correlated with visual acuity, possibly due to variability in duration of oedema as well as ischaemia of the retina.[13]

Different regimens have been used in the administration of anti-VEGF intravitreal injections such as monthly, Pro Re Nata (PRN) or Treat and Extend. In the RIDE and RISE landmark trials, a monthly regimen was used for two years achieving highly significant results.[14] This intensive regimen of injections has practical challenges in a real-world setting. In the READ 2 trial, intravitreal injection was given every month in the first year, then less frequently, with resultant statistically significant improvement.[13-15] However, RESOLVE, RESTORE and DCRC network protocols I and T have shown similar results can be achieved with monthly injection for three to four months and then PRN treatment guided by visual acuity and OCT.[13,16-18]

Numerous randomised clinical trials (RCT) have been done to evaluate the efficacy of anti-VEGF on DMO with good improvement on visual acuity and OCT.[13-18] However, results from RCTs may not represent the outcome in real world setting.[3] The recommended regimens were strict, with a regular interval administration and many patients were excluded if they had concomitant ocular and systemic factors, such as high HbA1c, or reimbursement or other access issues.[3,7,8] HbA1c was used as entry criterion in many of the RCTs such as DCRC.net protocols which have a criteria of HbA1c less than 8.5% to be included.[3,8] Systemic conditions associated with DMO include higher systolic blood pressure, longer duration of diabetes and higher HbA1c.[13]

In real world setting patients may be more diverse demographically and clinically than those in RCTs.[3] It is not clear whether data from well controlled environment of RCTs also represents real world clinical practice.[3,7] Collection and analysis of real-world data defines real world evidence. It may have lower ranking in terms of grading of evidence but it can supplement findings from RCTs.[3,7] Real world evidence is often less robust but it represents clinical practice on a daily basis.[3]

In South Africa, the patients' demographics and glucose control and other systemic factors are very different to those in major trials.[3] Limited financial and human resources restrict treatment to one class of anti VEGF (Bevacizumab), prevent extended regimes of intensive (monthly) treatment and prevent inclusion of all patients irrespective of diabetic control or initial VA. For patients, there is often limited access to care and limited use of glucometers due to costs.

At the time of the study, patients with DMO presenting to the Groote Schuur Hospital Eye Clinic were manged with a loading dose of three Bevacizumab injections if their vision was better than 6/36 on Snellen chart (0.78 LogMAR) and their OCT had foveal involving DMO. They were reviewed after their third injection and their VA and OCT central retinal thickness were remeasured for improvement. If there was persistent DMO, a further three injections were given until improvement or until no more improvement was observed. If there was improvement on OCT, then further injections were given on a pro re nata (PRN) regime.

Given the difference in real world patient profile compared to those in highly regulated RCTs, we aim to assess the VA and OCT outcomes of our patient population after an initiation dose of three bevacizumab injections.

Methods

The aims of this study are to assess the efficacy of three intravitreal bevacizumab injections given as initiation treatment for DMO. The primary outcome was to measure change in visual acuity after at least three bevacizumab injections. The secondary outcome was to assess change in macular thickness as measured by OCT.

Study design and setting

This was a retrospective cohort study. Patient examination as well as intravitreal bevacizumab injection were performed at Groote Schuur Ophthalmology outpatient department. Visual acuity was tested using the Snellen visual acuity chart at 6m and then converted into the logarithm of minimal angle of resolution (LogMAR) for statistical purposes. OCT studies were carried out by ophthalmic technicians. The Heidelberg Engineering OCT Spectralis software version 6.0 was used to obtain OCT images for the patients. Ocular examination as well as OCT interpretation was performed by ophthalmology registrars and consultants within the department of ophthalmology at Groote Schuur Hospital. If patients had received previous bevacizumab injections prior to enrolment in the study, the date of the last bevacizumab injection prior to the loading treatment was recorded.

Patient selection

Consecutive patients who were initiated on at least three injections loading treatment of bevacizumab during the period February 2019 to August 2019 and who followed up for at least three months were included. Data was collected from patients' folders. The inclusion criteria were patients older than 18 years old with type 1 or 2 diabetes and having macula oedema. Patients who had previous bevacizumab treatments were included if they were initiated on a new loading regime during the study period.

Patients were excluded if they had concurrent ocular pathology which would affect VA measurement e.g., corneal scar, vitreoretinal interface disorders, and patients who had cataract surgery between first injection and follow-up, as this would also confound the VA outcome.

Data analysis

Data was analysed using R Studio. Paired T test was used for data analysis.

Ethical considerations

Ethical approval for this study was obtained from the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee (HREC REF:519/2020).

Bevacizumab is used in our clinics on an off-label basis with patients' informed consent. Its use is currently standard of care at our facility for treating DMO based on proven efficacy in large clinical trials.[1,2,8-13]

Results

Twenty-nine eyes of 22 patients met inclusion criteria. Thirteen patients (59.1%) were females. The patients' ages ranged from 50 to 77 years, with a mean of 65.7 years (SD ±7.89). Twenty (69%) eyes

received bevacizumab prior to the study period while nine (31%) were treatment naive. The average time between the first dose of the loading regime and last bevacizumab received was 6.23 months (SD ± 4.63). The time it took for patients to receive their first injection from the date of booking was on average 2.11 (SD ± 0.817) months. The final visit, which is the average time from the first injection to the time seen after the third injection, was 3.86 months (SD ± 1.08).

The mean VA at booking was 0.450 LogMAR (SD ± 0.243). The mean VA at the time of first injection was 0.495 LogMAR (SD ± 0.243). Therefore, the VA worsened from the time the patient was booked to the time the patient actually received the injection, with the difference being 0.0457 LogMAR (SD ± 0.175), approximately 2 EDTRS letters.

Primary outcome of visual acuity

The mean VA at the final visit was LogMAR 0.434 (SD ± 0.249). The difference between the VA from the time of first injection to the final visit was LogMAR -0.0610 (SD ± 0.170 P = 0.0642), a gain of 3.05 EDTRS letters.

Secondary outcome of central retinal thickness on optical coherence tomography

The mean OCT central retinal thickness (CRT) at booking was 436 µm (SD ± 127). The mean CRT at the final visit was 407 µm (SD ± 143). The difference on OCT CRT was -29.1 µm (SD ± 75.4 P = 0.0471) indicating a small but significant reduction in thickness.

Discussion

The results of our study showed that there was minimal, non-statistically significant improvement in vision of patients who received three bevacizumab injections. The average baseline VA in our cohort was 0.78 logMAR (Snellen 6/36) or better. The baseline VA in the DCRC.net studies Protocol T and other RCTs, like BOLT study, were better and range from 0.30 LogMAR (Snellen equivalent 6/12) to 0.60 LogMAR (Snellen equivalent 6/24).[12,19] These trials have shown that better baseline VA correlates with more significant improvement of VA after three initial injections as well as more reduction in OCT thickness.[12,19,20]

Other reports from real world settings also show poorer responses to loading regimes than those produced from RCT's.[14,16,17,31]

The RESOLVE study had an improvement of eight ETDRS letters and CRT of -150 µm after three injections.[17] RESTORE, if extrapolated from the graph, had a six letters improvement and -120 µm on OCT.[16] RIDE saw an improvement of seven letters and -175 µm at four months while RISE had nine letters and -180 µm if extrapolated from the graph.[14] In a study of real world clinical setting by Maggio *et al.* found that after three months loading the improvement in VA was five letters and that of CMT was -107 µm.[31]

The OCT improvement measured in our study was small compared to larger trials.[3,7-9] The average OCT gain after three injections was about 29.1 µm which is around 6.7%. A multicentre study by Arevalo *et al.* for the Pan-American collaborative retina study group evaluated the six months follow up after three loading doses of bevacizumab found a reduction of 111.3 µm, about 28.8%.[27]

The UKPDS showed that improving both glucose control and blood pressure control reduced the risk of retinopathy.[21] Ideally diabetic control of patients, by means of their HbA1c level, should be included in our study. Unfortunately we did not have HbA1c values within three months from the date of booking. In our setting of resource limitations, at the time of the study, a patient was allowed to only have one HbA1c taken per year and that was usually done by the hospital following up the patient for their diabetes. Thus the gap between the HbA1c and the time of booking was too big to associate the control of diabetes with DMO. A 1% decrease in HbA1c was equal to a 31% reduction in retinopathy.[22] In a post HOC analysis of the DCRC.net protocol T, it was found that for each 1% increase in HbA1c, the VA was reduced by one letter on the ETDRS chart, and that it was statistically significant p<0.001.[23t] Higher HbA1c correlates statistically with poorer response to anti-VEGF treatment.[22-26] BOLT study the average HbA1c at baseline was 7.6%.[19] The average HbA1c in the Western Cape from a study from 2015 to 2020 was estimated to be 9.0%, which is higher than in the BOLT study baseline.[19,28,32] In our study we did not have HbA1C data before the intravitreal bevacizumab injection, but we suspect that HbA1C levels were likely to be significantly higher than those of patients in larger trials.

Blood pressure (BP) control also reduces the risk of diabetic retinopathy.[19,21] In the BOLT study the baseline mean systolic BP was 138 and diastolic was 76.[19] In our study we did not take into account the BP control which could have been a contributing factor to the retinopathy.

Larger studies have demonstrated that visual improvement correlated with VA at baseline.[19] We also noted that patients who started with worse vision did not improve as much as patients who has better vision at presentation. Unfortunately our sample was too small to make a conclusion.

Poor patient follow-up is a consistent problem.[33] We needed to exclude a significant number of patients, around 30 eyes of 23 patients, due to lack of clinic attendance and follow up. In a study by Angermann *et al.*, the loss to follow up for DMO patients being treated with intravitreal anti VEGF resulted in worse visual outcomes compared to compliant patients as well as a 13 times increased risk of progression to proliferative diabetic retinopathy.[33.] Treatment in certain real-world settings is thus far removed from the outcomes of RCTs.

The limitations of the study include its small retrospective design. Additional data such as HbA1c or control of hypertension were not included. We did not assess patients for macular ischaemia, either by fluorescein angiography or OCT angiography. Macular ischaemia may have a negative effect in the on vision in patients with DMO after bevacizumab is injected.[26,34]

Conclusion

In a real-world setting, the initiation loading dose of three bevacizumab injections produced a small, non-statistically significant improvement in VA of three EDTRS letters, less than in larger trials. Similarly, the OCT CRT improved by a smaller amount of -29.1 µm compared to approximately -120 µm in larger studies. The response to initiation of treatment with three bevacizumab in a real-world setting may not be as good as predicted by large, randomised trials. Further real-world prospective studies are required to assess outcomes of bevacizumab injections for diabetic macular oedema in our populations.

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Development of severe ocular disorders following vaccination against COVID-19: A case series

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Abstract

Purpose: To report the occurrence of severe ocular illnesses in patients after receiving the adenoviral vector-based Covishield vaccine against COVID-19.

Methods: Best-corrected visual acuity (BCVA) measurement and dilated fundus examination were done during the presentation and after treatment in all cases.

Results: In the first case, bilateral disc oedema along with dilated vessels and retinal haemorrhages in the posterior pole indicated bilateral optic neuritis, which progressed to complete ophthalmoplegia within two days. In the second case, fundus examination revealed bilateral dot blot haemorrhages with cotton wool spots, macular oedema, and mild disc oedema indicating bilateral venous stasis retinopathy. In the third case, bilateral fundus examination showed cotton wool spots with microaneurysms and infiltration of anterior vitreous face (AVF) cells which indicated intermediate uveitis. The presence of AVF cells was further confirmed by optical coherence tomography (OCT). In all the cases, no other underlying causes of these disorders were found. Moreover, in all the cases, intravenous steroid treatment followed by oral steroids or oral steroids alone in a tapering dose resulted in complete resolution of ocular signs.

Conclusions: Severe ocular disorders may develop after taking the adenoviral vector-based vaccine against COVID-19. Hence, people who develop ocular disturbances after vaccination should seek immediate medical treatment.

Keywords: Vaccine, COVID-19, complete ophthalmoplegia, venous stasis retinopathy, intermediate uveitis, vitritis.

Introduction

Covishield, identical to the adenoviral vector-based Oxford-AstraZeneca vaccine (ChAdOx1 nCov-19), has been the most popular vaccine against COVID-19 in India.[1] Although the vaccine has proved its efficacy and safety in clinical trials, several cases of post-vaccination adverse effects due to arterial events and venous thromboembolism have also been reported.[2] Such adverse incidents after COVID-19 vaccination also include severe ocular diseases such as retinal vein occlusion, uveitis, and acute macular retinopathy.[3,4,5,6] Inflammatory reactions triggered by the vaccine are considered to be responsible for such incidents.

In this study, we report three different ocular disorders – optic neuritis with complete ophthalmoplegia, venous stasis retinopathy, and intermediate uveitis – that developed after the administration of the second dose of Covishield. All the patients developed ocular symptoms within 10 days of vaccination. Other probable causes of the symptoms such as infection and diabetes were ruled out by laboratory tests. All the data was collected from patient files after getting their informed consent.

Case reports

Case 1

A 35-year-old healthy female with no known systemic illness presented with decreased vision, pain, restricted ocular movement in both eyes, headache, and vomiting, five days after taking the second dose of Covishield. BCVA was 6/36 in both eyes (OU). The Ishihara test revealed that her colour vision was defective OU. Further examination showed that the patient had a sluggish reacting pupil, clear lens, and restricted abduction. Dilated fundus examination revealed bilateral disc oedema with dilated tortuous vessels and retinal haemorrhages (*Figure 1a, b*). Fundus fluorescein angiography (FFA) revealed a normal early phase with late disc leak and staining around the vessels near the disc suggestive of disc oedema (*Figure 1c, d*). A diagnosis of optic neuritis was made. The intraocular pressure (IOP) was 18 mmHg OD and 16 mmHg OS. Blood tests revealed normal complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), antinuclear antibodies (ANA), fasting blood sugar (FBS), postprandial blood sugar (PPBS), interleukin 6 (IL-6), D-dimer,

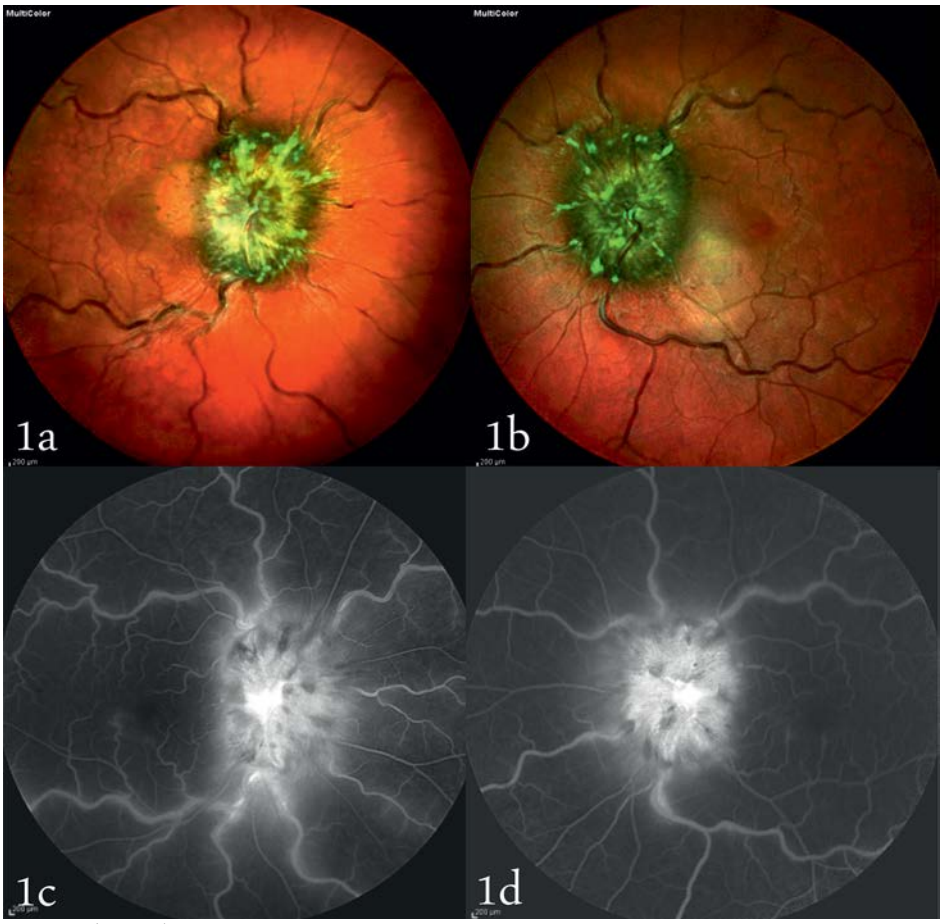

Figure 1 (case 1): a, b – Multicolour fundus imaging right and left eye showing gross disc oedema with dilated tortous vessels. c, d – Late phase angiography showing disc leakage and staining around vessels.

partial thromboplastin time (PTT), and activated partial thromboplastin time (aPTT). HIV and venereal disease research laboratory (VDRL) tests were also negative. After two days, she developed complete ophthalmoplegia. Magnetic resonance imaging (MRI) of the brain and orbits of the patient revealed normal results. The patient was initially treated with intravenous methylprednisolone (1 gm) for five days. This was followed by oral steroids (1 mg/kg body weight) in a tapering dose. After treatment, the patient showed improvement in the ocular symptoms and the oedema gradually disappeared. At the last follow-up a month later, the patient's BCVA had improved to 6/6 (OU) with full ocular movement, the disc oedema was resolved, and there was complete resolution of posterior pole haemorrhage.

Case 2

A 40-year-old healthy female with no known systemic illness presented with a gradually diminishing vision for seven days. She received the second dose of the Covishield vaccine 10 days earlier. Ocular examination showed that her BCVA was 6/12 OD and 6/18 OS. The anterior segment was normal, and the IOP was 14 mmHg OU. Dilated fundus examination showed multiple dot blot haemorrhages with cotton wool spots, macular oedema OU with mild disc oedema OD indicative of venous stasis retinopathy (*Figure 2 a, b*). FFA showed multiple hyper-fluorescent spots OU with late disc leak OD in the late phase (*Figure 2 c, d*). Optical coherence tomography (OCT) showed macular oedema with foveal detachment OU (*Figure 2 e, f*). Blood tests revealed normal CBC, ESR, CRP, ANA, FBS, PPBS, IL-6, D-dimer, PTT, and aPTT. HIV and venereal disease research laboratory (VDRL) tests were also negative. The patient was treated with oral steroids at tapering doses (1 mg/kg body weight). A month after treatment, there was bilateral complete resolution of cotton wool spots and disc oedema, and the patient completely recovered.

Case 3

A 38-year-old healthy male with no known systemic illness presented with blurry vision in both eyes for two days. He received the second dose of the Covishield vaccine seven days prior. Ocular examination revealed that the patient's BCVA was 6/6 (OD) and 6/9 (OS); the anterior segment was normal; and IOP was 12 mmHg OD and 14 mmHg OS. Dilated fundus examination showed bilateral cotton wool spots with microaneurysms and anterior vitreous face (AVF) cells (+1) (*Figure 3 a, b*). Bilateral intermediate uveitis was diagnosed. FFA showed a few hyper-fluorescent spots in the late phase corresponding to the microaneurysms, and OCT showed the AVF cells (*Figure 3 c, d, e*). Laboratory tests were done to exclude ocular inflammation. The patient showed normal CBC, ESR, CRP, ANA, FBS, and PPBS. His Mantoux test was negative. The patient was treated with oral steroids at tapering doses, (1 mg/kg body weight) and there was bilateral complete clearing of vitritis with other fundus finding.

Discussion

To date there have been variety of diseases caused by ocular inflammation following COVID-19 vaccination.[6] Such diseases include bilateral optic neuritis, acute anterior uveitis, acute macular neuroretinopathy, panuveitis, posterior uveitis, intermediate uveitis, central retinal vein and occlusion.[7] In this study, we report three more such cases. One patient developed optic neuritis with complete ophthalmoplegia. Optic neuritis is commonly associated with inflammation, infection, and vaccination.[8] Although rare, optic neuritis has also been reported following the administration of adenovirus-based anti-COVID-19 vaccine.[9] However, we could not find any case of optic neuritis associated with complete ophthalmoplegia in the literature as an effect of anti-COVID-19 vaccine. Thus, as per our knowledge, this is the first case of such a development after COVID-19 vaccination. Other common causes of ophthalmoplegia, such as tumours, infection, or diabetes were not found in the patient. Other known causes of optic neuritis were also not found in the patient. As the patient fully recovered after the administration of steroids, we postulate that vaccine-induced inflammation was probably responsible for the disease.

In the second case, the patient developed venous stasis retinopathy after receiving the Covshield vaccine. This was similar to the findings of Damasceno *et al.*, where the patient also developed scattered lesions resembling cotton wool and a few haemorrhages in the posterior pole of the eye after administration of the identical AstraZeneca vaccine.[10] However, in that case, the symptoms appeared a month after administration of the first dose of the vaccine. But in our case, the symptoms appeared after only 10 days after the second dose, which indicates quicker development of thrombotic events

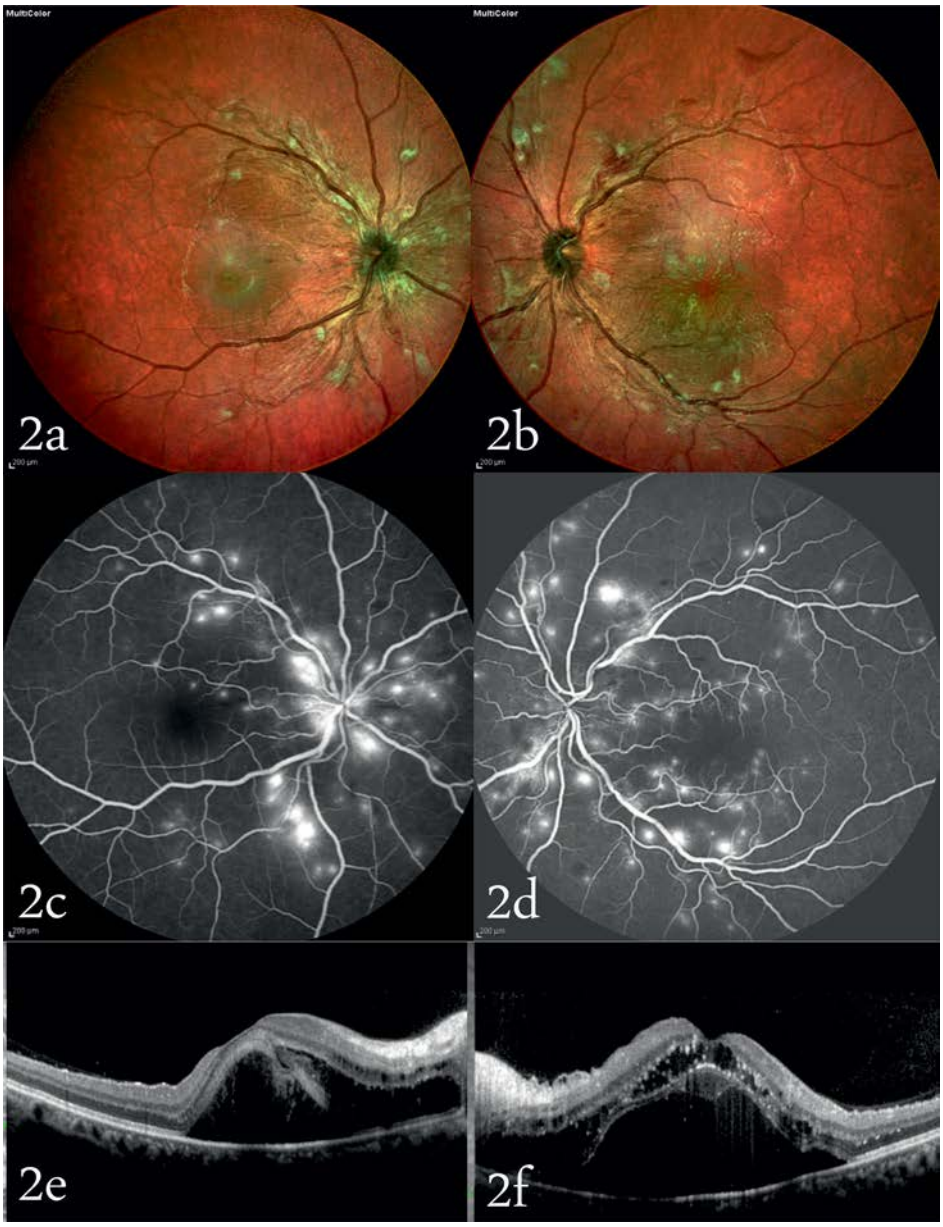

Figure 2 (case 2): a, b – Multicolour fundus imaging showing multiple soft exudates, dot blot haemorrhages and macular oedema. c, d – angiogram of both eyes showing multiple hyperfluorescent spot corresponding to microaneurysm. e, f – OCT showing macular oedema with foveal detachment.

as the number of vaccine dose increases. Thrombosis with thrombocytopenia syndrome (TTS) has been reported after 3-21 days of administering this vaccine by the World Health Organization (WHO).[11] Although the mechanisms were unclear, the WHO did not rule out a possible causal relationship between this vaccine and TTS. In our case, we postulate that after vaccination, the patient went to a prothrombic state similar to disseminated intravascular coagulation. We found another case of venous stasis retinopathy following COVID-19 vaccination in the literature.[12] However, in that case, the patient received the mRNA-based vaccine. Our report shows that similar incidents can happen after administering the adenovirus-based vaccine as well.

The third patient developed vitritis, a condition of cellular infiltration of the vitreous body that occurs due to intermediate uveitis.[13] New-onset uveitis after COVID-19 vaccination has been reported before,[4] and our report further adds to such cases. We postulate that the vasculitis-like reaction developed due to a widespread endothelial dysfunction in the patient. The condition resolved quickly after steroid treatment, indicating that it happened due to post-vaccination inflammation. The reactions reported in this study could arise due to the adenovirus vector. Adenoviruses being highly immunogenic, immune reactions against the vector are not unusual. Moreover, truncated soluble variants of the SARS-CoV-2 spike proteins produced from the adenoviral anti-COVID-19 vaccine may also result in thrombotic events in the host.[14,15]

This study does not establish a causal relationship between the Covishield vaccine and ocular diseases. So few incidents of adverse reactions do not outweigh the benefits of the vaccine. However, awareness about such ocular disorders after anti-COVID-19 vaccination is necessary. As patients usually fully recover after prompt detection and treatment, immediate reporting of ocular disturbances such as discomfort, redness, or blurred vision after the administration of vaccines against COVID-19 is strongly recommended.

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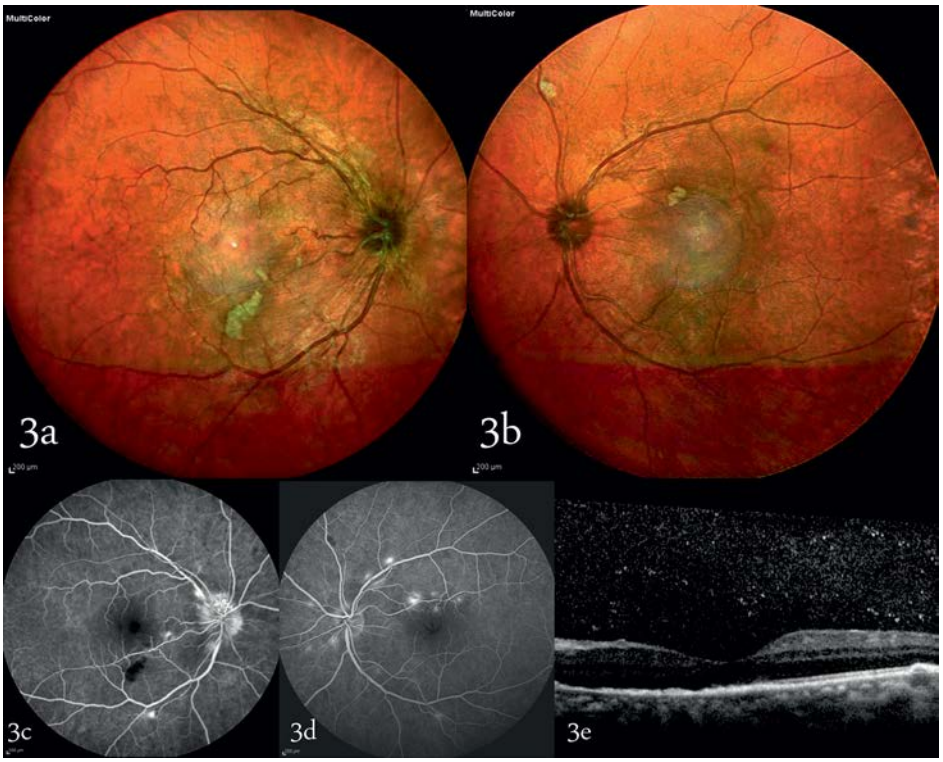

Figure 3 (case 3): a, b – Multicolour fundus photo showing few soft exudates and dot haemorrhage. c, d – FFA showing hyperfluorescent spots in late phase suggestive of leaking microaneurysm. e – OCT showing multiple hyper reflective spots suggestive of vitreous cell.

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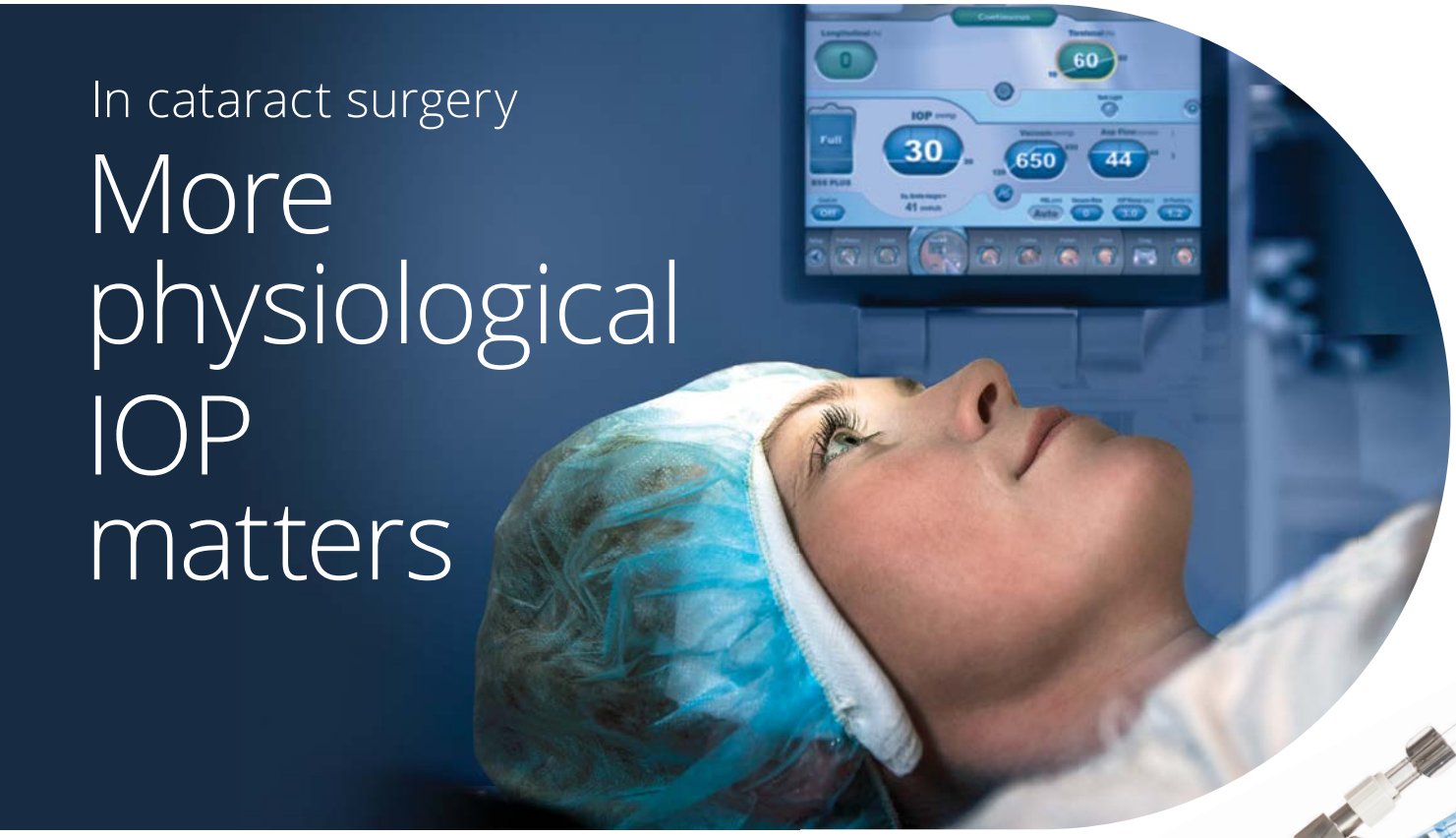

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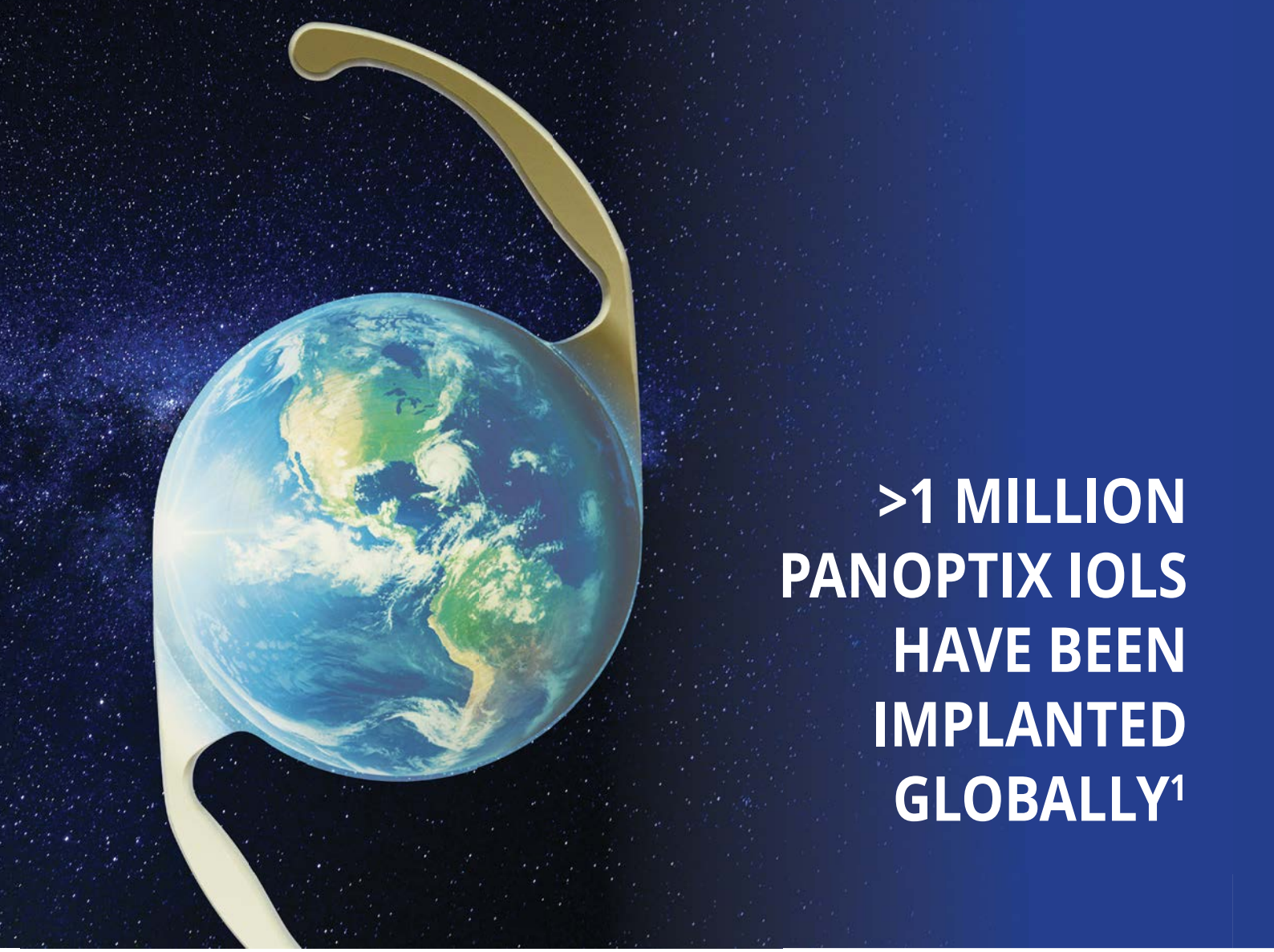

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Eyes within the eye
A case report of intraocular live motile worm

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Abstract

Background: Gnathostomiasis is a parasitic disease caused by third-stage larvae of the Gnathostoma worm. Human infection happens mostly following eating raw or undercooked fish. We present a case with clinical and morphologic features of Ocular Gnathostomiasis to alert clinicians about the possible existence of this condition in South Africa.

Keywords: Intra Ocular Worm, Ocular Gnathostomiasis.

Funding: Nil.

Conflict of interests: None.

Case presentation

On 19 April 2022, an eight-year-old boy from the Boskop Dam area, located about 30km north of Potchefstroom, was referred to our eye clinic with pain, redness, and swelling of the right eye, allegedly following trauma.

According to his grandmother, who had accompanied him at the time, and based on the referral note from the primary health care centre, seemingly, a stone hit his right eye as he was riding his bicycle. This incident happened about a week earlier, prior to him seeking help from the primary health care centre.

There was a history of a previous admission of the child to the paediatric ward of Potchefstroom Hospital in November 2021 for a workup for Fever of Unknown Origin (FUO). Other than that, the patient had an unremarkable past medical or surgical history of significance.

He did not have any history of travel outside his home village.

Examination findings

Snellen visual acuities of the right and left eyes were 6/15 and 6/7.5 respectively.

Extraocular movements were normal, and no crepitation was felt on palpation.

There was peri-orbital oedema and ptosis of the right eye. The eyelids and peri-orbital skin were dark in colour (*Figure 1*). The conjunctiva was injected, and the cornea was clear with no abrasion or laceration. The anterior chamber had 3+ cells. The pupil was round, and pigment deposits were noted on the lens. Dilated fundus examination was unremarkable.

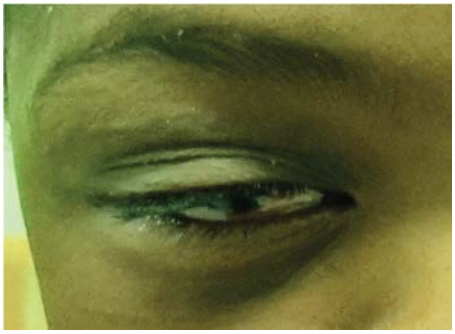

Figure 1: Appearance of right eye on presentation.

Based on the history and clinical findings, the patient was admitted with a working diagnosis of traumatic uveitis of the right eye, secondary to blunt trauma. Topical steroids and cycloplegic drops were administered.

Despite the treatment, the swelling and inflammation levels did not improve, and seemed to worsen. The patient developed a fibrinoid exudate and flare in the anterior chamber that prompted intensification of the anti-inflammatory medication.

Blood work-up

White cell count was raised at 14.71 × 10^9/L (3.90-10.20 × 10^9/L), with neutrophils 11.36 × 10^9/L (1.70-5.00 × 10^9/L), monocytes 0.94 × 10^9/L (0.00-0.80 × 10^9/L) and eosinophils 0.69 × 10^9/L (0.00-0.70 × 10^9/L).

Full blood count done during the previous admission in November 2021 had white cell count of 6.16× 10^9/L and eosinophil level at 0.01× 10^9/L. The patient had a 70 times increase in absolute eosinophilia. C-reactive protein was also elevated at 22 mg/L (normal range <10 mg/L).

On the morning of the fifth day of admission and despite intensifying treatment, there was still no significant response observed. A slit lamp microscope

examination revealed a small active motile whitish worm about 3 mm in length floating in the anterior chamber. It appeared to have two relatively large eyes. However, they may not have been actual eyes and were more likely to be the head bulb of a male third stage larvae of Gnathostoma. We subsequently observed a second worm when reviewing the images.

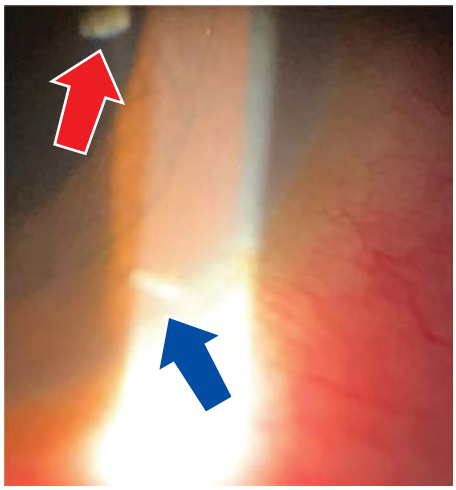

Figure 2: Note the cylindrical morphology (Nematode).

Following the detection of the 'worm', a decision was made to take the patient to the operating theatre for anterior chamber washout and possible retrieval of the worm. This decision was taken in the light of a poor response to the intensified treatment.

Admission to theatre was unfortunately delayed by several hours due to difficulty in obtaining the parents' consent as they lived in a distant and remote rural area. In theatre later that day, the worm could no longer be seen in the anterior chamber.

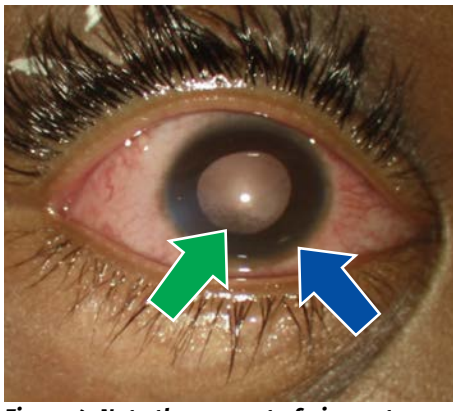

Figure 4: Note the amount of pigment granules deposited on the lens (green arrow), 'worm' position (blue arrow).

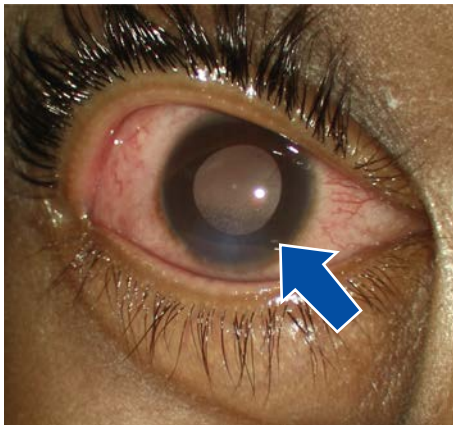

Figure 5: Note change of position of the worm (blue arrow).

We were unable to locate the worms, despite best efforts to inspect the posterior chamber as well. A thorough irrigation of the anterior and posterior chambers was performed.

Additional information obtained from the child's mother, revealed that the boy has a pet dog which sometimes consumes fresh fish caught from the dam. Given the patient's close relationship with his dog, we were prompted to consider the possibility of a parasitic infection. Based on this new information, stool and urine analyses were requested which all returned negative for parasites. Serologic tests for Entamoeba, Schistosoma and Echinococcus were done, and came back negative. Unfortunately, it seems currently there is no serologic test available for the detection of Gnathostoma in South Africa. Contrasted computed tomography scan of brain and orbits was also performed to rule out possible intracranial involvement, and this was also unremarkable.

In consultation, and on the recommendation of the paediatricians, the child received a course of oral Albendazole. After the irrigation of the anterior chamber, and together with the Albendazole treatment, there was immediate and significant improvement in the level of inflammation. Finally, on day 12 of admission (30 April 2022), we were able to discharge the patient home with the eye being relatively stable and comfortable.

The patient was followed up a few times and during the last visit in June 2022, vision of the affected right eye had

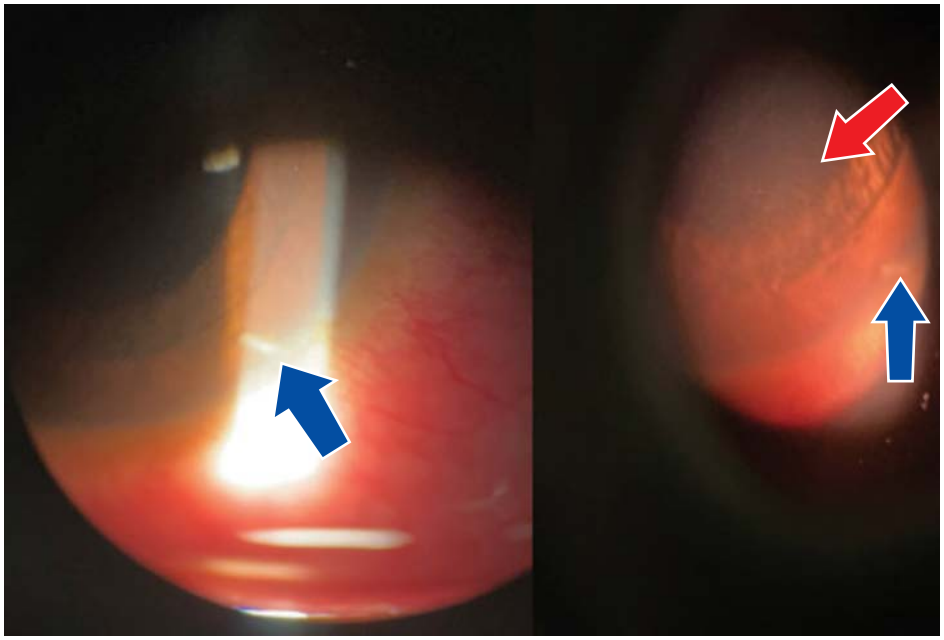

Figure 3: Note the change in position of the worm in the subsequent picture – (blue arrows) and dispersion arising from worm activity on the iris body – (red arrow).

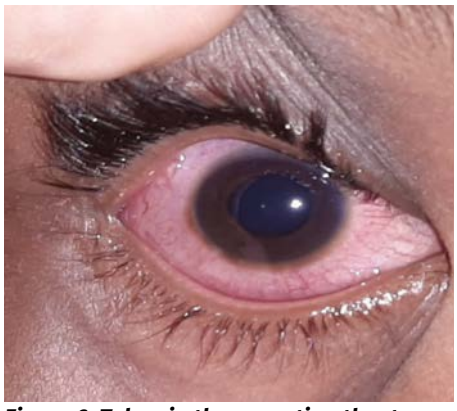

Figure 6: Taken in the operating theatre. Note that the worm can no longer be seen in the anterior chamber.

Figure 7: Follow-up visit in June 2022.

improved from 6/15 to 6/7.5 on the Snellen chart. The eye had remained stable with no signs of inflammation in both the anterior and posterior segments.

Discussion

Gnathostomiasis is a zoonotic parasitic disease. Among 13 recognised species in the world, there are at least six species that infect humans. The most common species is Gnathostoma spinigerum.[1] The disease is commonly endemic in countries where the population has a habit of consuming raw fish dishes. Thailand, Japan and Mexico are the three major endemic countries.[2, 4] There have been limited case reports of confirmed and probable Gnathostomiasis from the Southern African region, mostly in tourists visiting the Okavango River delta area of Botswana and nearby western Zambia. No apparent cases of involvement of the ocular, visceral and central nervous systems were reported.[1]

Humans usually become infected following consumption of raw or under-cooked fish or other intermediate hosts like chicken or birds. Infection can also occur through consumption of water contaminated with copepods (small crustaceans) infected with second stage larvae. An alternative route of infection is through penetration of the skin by the third stage larvae from contaminated meat during food handling.[3, 4, 6]

Humans are not definitive hosts and parasites fail to reach sexual maturity in humans but may remain alive for up to 10 years.[3]

Adult worms live in a tumour-like mass in the stomach of definitive hosts, for example, dogs, cats and pigs.

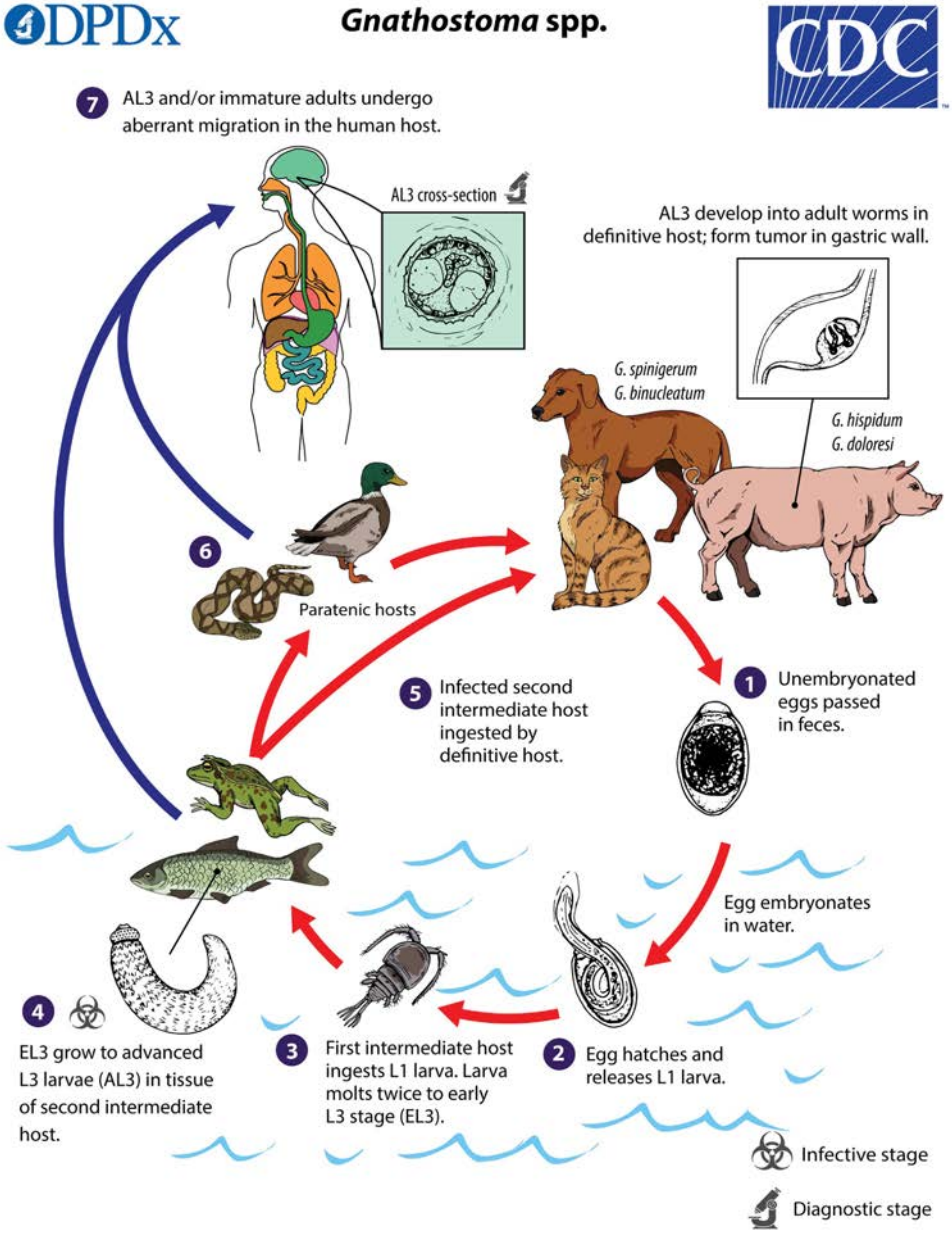

Figure 8: Life cycle of Gnathostoma, adapted from Centres of Disease Control and Prevention website. Available at: https://www.cdc.gov/dpdx/gnathostomiasis/index.html

Eggs are released from host faeces to the environment. In fresh water, within seven days eggs hatch to first stage larva (L1). Freshwater copepods are first intermediate hosts, ingesting first stage larvae which then develop into second stage larvae (L2). Fish, frogs, snakes and birds are second intermediate hosts which consume copepods and second stage larvae (L2), which then migrate to their muscular tissue and develop into third stage larvae (L3). The life cycle starts again when dogs, cats and pigs consume the infected fish or birds (*Figure 8*).[6, 7]

Advanced L3 larvae in second intermediate host including humans usually measure approximately 2.30-4.40 mm in length.[7] What we initially saw and assumed were worms in our patient, were most likely larvae that were about 3 mm in length.

After ingestion of larvae, patients may develop fever, abdominal pain, nausea and vomiting. Our patient's earlier admission in November 2021 with Fever of Unknown Origin (FUO) might have been symptoms and signs actually following ingestion of larvae at that stage.

Most common clinical findings include migratory cutaneous swelling and eosinophilia. In severe cases larvae invade internal organs such as lung, liver, eyes, nerves, spinal cord and brain which may result in blindness, paralysis, coma and even death. CNS involvement is associated with the highest mortality ranging from 8% to 25%.[6, 7]

The most common manifestation of intraocular Gnathostomiasis is anterior uveitis and intraocular larvae,[4, 5] which may have been the case with this patient.

The other common ocular manifestations are eyelid oedema, conjunctival erythema and chemosis, hyphaema, vitreous haemorrhage, retinal scarring and detachment and rarely, central retinal artery occlusion, leading to blindness.[3,7] Cases of central serous chorioretinopathy (CSCR) following ocular Gnathostomiasis have also been reported.[11] Our patient presented with advanced eyelid oedema, and secondary ptosis that was similar to soft tissue swelling following blunt trauma.

Although other worms such as Strongyloides stercoralis, Ascaris lumbricoides, and Taenia solium cysticercosis can cause ocular larva migrans, Gnathostoma spinigerum is more often associated with a unique unilateral form of ocular larva migrans, where an actively motile parasite can be seen more

often in the anterior and less frequently in the posterior segment of the eye. In our case, investigation for other possible parasites returned negative.

Considering the rural environment and presence of domestic animals and flies, one of the other differential diagnoses could be ophthalmomyiasis interna. However, based on the morphological features of the larvae under the slit lamp microscope, and due to the time of the year, which was not active fly season, this possibility is less likely.

Gnathostoma larvae is highly invasive and motile, and if left untreated, can cause a wide range of symptoms until they die.[3]

The parasite is capable of migration to various parts of the eye, hence the potential widespread structural damage and severe intraocular reaction.[5]

The larvae possibly enter the eye through the posterior retina, as it has been associated with macular scarring, rupture of the nasal branch of the central retinal artery, or retinal tear with choroidal haemorrhage near the optic disk.[5]

Once inside the eye, parasites usually tend to migrate to the anterior chamber and the eye is the only organ where the larva can be seen directly, in vivo.[6]

According to some literature, ocular involvement is rarely a cause of eosinophilia[6,3], but in our case eosinophilia was at the upper limit of normal which might be due to possible cutaneous or visceral migration of larvae prior to ocular involvement. The eosinophil count is considerably higher than the patient's previous level during his admission in November 2021.

Human Gnathostomiasis can be diagnosed based on clinical features, elevated blood eosinophil level and a relative exposure history which includes living or traveling to endemic regions and ingesting raw or under-cooked fish or chicken.[7]

Because the definitive diagnosis of Gnathostomiasis through identification of parasites is not always possible, immuno-diagnosis can be used.[9]

A western blot assay has been developed but this is only available at the Research Institutions of certain countries, for example, Thailand and Switzerland.[6] It seems currently there is no serologic testing for Gnathostomiasis available in South Africa.

Prior to the advent of serologic tests, diagnosis was made by isolation of larvae, but this is difficult in migratory skin lesions and not practical for visceral disease.[3,9] The larvae have been described as having a distinct white globular head bulb.[4]

Management

Human Gnathostomiasis can be treated medically with a course of Albendazole, which is the first drug of choice. Adult regimen is 400mg twice daily for 21 days, with efficacy over 90%. Ivermectin is an alternative treatment.[6] In some cases, treatment may need to be repeated.[7]

Specific treatment of ocular Gnathostomiasis involves surgical removal of the parasite.[11] Delay in diagnosis and treatment may cause blindness.[10]

Prevention

Fish caught from rivers for human consumption should be adequately cooked or boiled and meat should be kept frozen at temperatures of minus 20 degree Celsius for at least three to five days prior to consumption.[3]

Conclusions

Our patient had no history of travel outside his home area but is a resident in the vicinity of Boskop Dam Nature Reserve. We postulate that L3 larvae were brought by migratory birds to the dam area. These birds were possibly hunted and consumed by wild and/or domestic canines and felines. In these hosts, the L3 larvae matured into adult worms and laid eggs, which were then passed into the water via their faeces and then consumed by copepods and fishes. The life cycle of Gnathostoma may have started there. The patient may have consumed the fish and thereby ingested the larvae.

Given that Boskop Dam is a major source of drinking water for the Potchefstroom community[8] and a site for recreational activities and fishing, the possibility of the Gnathostoma parasite existing in the surrounding Potchefstroom area is a concern. Based on the above hypothesis, the possibility exists of the Gnathostoma parasite being present in other dams and nature reserves that are visited by migratory birds in South Africa. A formal study would be necessary to test this hypothesis or concern.

Acknowledgement

Thanks to Professor J Frean, National Institute for Communicable Diseases, for information regarding availability of serologic testing for Gnathostomiasis in South Africa.

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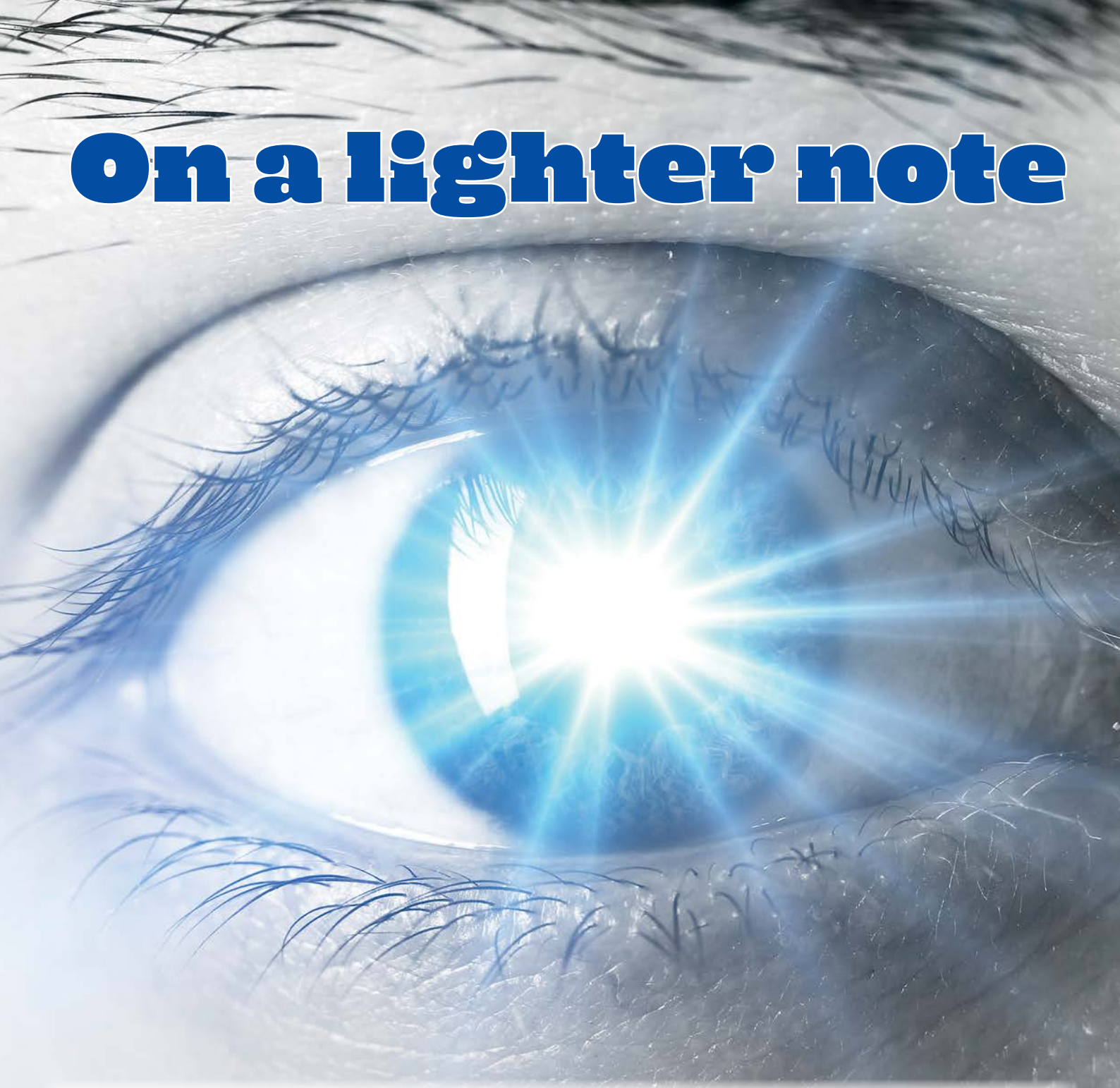
On a lighter note



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* Many ophthalmologists implement treatment for 2 or more weeks with dose tapering to prevent adverse reactions and clinical relapse. A follow-up, after 1 week, for a decision about whether to stop or continue treatment in patients still experiencing symptoms or inflammation is recommended. [1] Levofloxacin/dexamethasone for 1 week, followed by another week of dexamethasone alone was not inferior to 2 weeks of tobramycin/dexamethasone in preventing or reducing inflammation and in preventing infections. [3]

** FDC - Fixed-dose combination

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THE DOCTOR CRISIS

A battle for autonomy and academic respect in healthcare

In recent years, the healthcare system has been plagued by a multifaceted crisis that extends beyond the issues faced by patients. It is a crisis that has deeply impacted the very core of our profession, affecting doctors in ways that are detrimental to their autonomy and academic standing. The doctor crisis is not just about addressing the healthcare system's shortcomings, but also about understanding the significant burden it places on the men and women who dedicate their lives to the service of others.

The erosion of autonomy

Autonomy, a fundamental principle of medical practice, has become increasingly compromised for doctors. The rise of bureaucratic red tape, rigid insurance regulations, and the ever-growing influence of corporate entities have eroded our independence. It is disheartening that after years of study to become a specialist, we have less control over patient treatment plans. We are also burdened with excessive paperwork, administrative duties, and ever-changing regulations that shift their focus away from patient care. Additionally, a lack of respect for academic expertise and rigorous training undermines the trust between doctors and patients.

The dearth of respect for academics

While every profession evolves with time, it is essential to strike a balance where doctors can rely on their expertise without being overshadowed by patients' lack of faith or misguided beliefs.

Respect for academia and scientific inquiry lies at the heart of the medical profession. However, doctors today face a disconcerting lack of appreciation for their expertise and rigorous training. The rise of Dr Google and the democratisation of medical information have inadvertently undermined the authority of medical professionals. Patients armed with a few online searches now challenge doctors' diagnoses and treatment plans.

As colleagues, we ourselves are also responsible to a degree. In recent years, the pursuit of higher remuneration has taken centre stage, influencing the dynamics within the medical profession. Registrars are trained in public sector academic institutions but there is often more respect and recognition for successful private sector counterparts than our academic departments. The focus on earning potential has led to an environment where doctors prioritise personal gain over the collective advancement of the profession. The fear of misuse of guidelines by insurers, has slowed the development and updating of these from an academic perspective. The plight of the public sector doctor has not gone beyond recognition of the plight to the point of due respect and assistance.

The healthcare system is in the midst of a critical juncture, grappling with a crisis that extends beyond the patient experience. We cannot control all of it.

The society plays a fundamental role in championing the cause and driving positive change within the medical profession. With a renewed focus on reclaiming autonomy, and fostering academic respect, we can restore the essence of medicine, creating a more fulfilling and sustainable future for doctors and, ultimately, better healthcare outcomes for all.

Dr Farah R Moti
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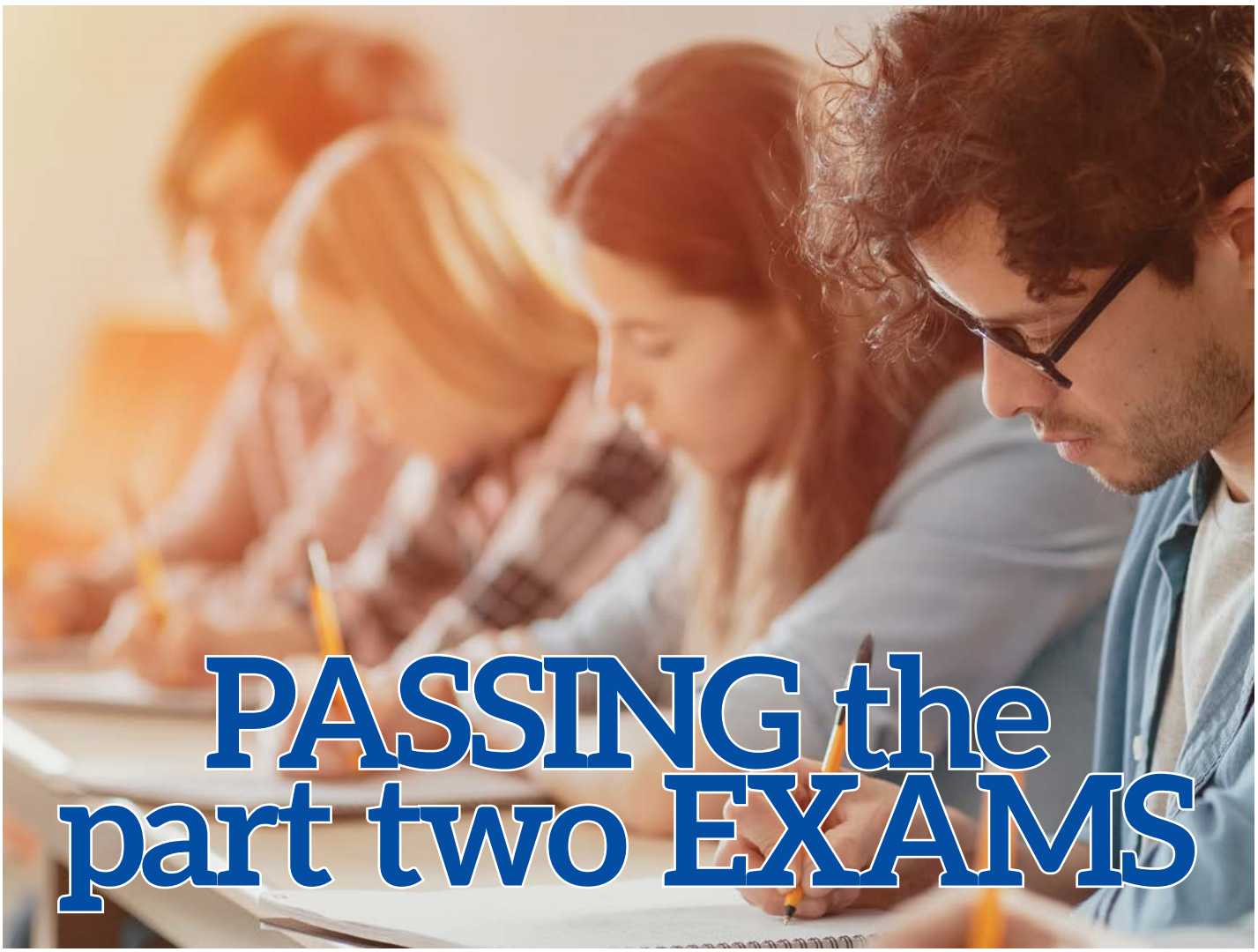

PASSING the part two EXAMS

At our last journal club meeting, we had the pleasure of the attendance of two senior registrars from Wits who had just written their final part two ophthalmology exams. I asked them if they would please give us a report back on these exams and moreover, if they could pretend that we (senior old ophthalmologists) were the candidates! I wanted to see how we would fare at passing these exams after all these years. Bear in mind that, up till now, most attendees at our journal club meetings are old senior ophthalmologists (only too keen to have an excuse to get out of the house).

It was great fun. The registrars asked the questions and we tried to answer. Then, after that, the registrars gave us their (hopefully correct) answers.

Here are some of the questions:

- What is Knobloch's syndrome?
- What is the Chandler classification of orbital cellulitis?
- Which is the most dangerous sub-type of basal cell carcinoma?
- How would you orientate the yoked prism in a patient with nystagmus that is dampened in right gaze?
- What is the snap-back sign during phaco?
- What is frosted branch angiitis?
- What are the retinal features of incontinentia pigmenti?
- What are the genetics of birdshot retinopathy, foveoschisis, and oculopharyngeal dystrophy?
- Name the types of corneal transplant rejection.
- How would you work-up a patient with recurring cotton-wool spots?

Us old senior doctors did not fare too well. I think we all would have failed!

Ismail Makda.

The two registrars seemed to know their stuff and they performed very well. I am quite sure they both passed with flying colours but we will only know the results in a few weeks.

Ismail Makda was one of the

registrars. He is a very impressive and pleasant young man who was a flight surgeon before he joined the Wits ophthalmology department. He also has a diploma in ophthalmology and has recently been elected to the Young Ophthalmologist's committee.

The other registrar was Ingrid Walters who comes from Namibia. She has an extremely impressive CV. She qualified as an optometrist cum laude at University of Johannesburg. She then qualified cum laude MBBCh at Wits. And now she is about to graduate as an ophthalmologist and has been elected as president of the Young Ophthalmologists Society.

Moreover, she is married to another ophthalmologist, Steph Lindeque, who was also a qualified optometrist before studying medicine. I am not making this up.

Ingrid Walters and Steph Lindique.

I find this type of marriage very interesting. It must be wonderful to have a spouse who truly understands and can empathise when you come home in tears after dropping a nucleus. Or when you come home elated at having successfully removed a white cataract carefully avoiding the Argentinian flag sign.

Another couple in this category is Tony Dos Ramos and Lara Sandri. Tony is a corneal specialist in Alberton and he married Lara who is a retinal specialist in Johannesburg. Lara is the only retinal specialist in Gauteng

Lara Sandri and Tony Dos Ramos.

who has a special interest in ocular tumours and oncology. She performs a great service for general ophthalmologists in Gauteng.

After the registrar quiz, Dr Sachin Bawa (ophthalmologist in Edenvale) gave us a report back from the recent ESCRS meeting that he attended in Vienna.

Sachin told us about the many new on-line IOL calculation formulae.

The Kane formula is my standard go-to formula. Barrett True-K is my favourite formula for post-lasik cases. Some of the newer on-line formulae that can be found on the internet are:

- Yeo EVO 2.0 – https://www.evoiolcalculator.com/calculator.aspx
- Pearl DGS – https://iolsolver.com/
- Cooke K6 – https://cookeformula.com/
- Hoffer QST – https://hofferqst.com/ – basically everything that was wrong with Hoffer Q has been improved in QST.
- Castrop formula – https://iolcon.org/lpcm.php
- Panacea (requires download) – http://www.panaceaiolandtoriccalculator.com/downloads.html
- The ESCRS IOL Calculator and the ASCRS IOL calculator.
- The Hill RBF formula.
- The Zeiss AI formula.
- Phaco Optics has a good biometry website but will charge you 3000 euros to use it.

Other highlights that Sachin reported:

Neuropathic pain (pain without stain) is an issue that we all face from time to time especially in post-op cases. A drop of local anaesthetic can help differentiate corneal surface issues from deeper issues. Corneal confocal microscopy can sometimes help if micro neuromas can be seen. Many treatments have been tried such as serum tears, scleral lenses, cycloplegia, tacrolimus, mixing anaesthetic drops in steroids, as well as systemic options such as gabapentans, omega 3, and migraine medications.

Toric implants can be used in keratoconus patients if the astigmatism is well-corrected with spectacles and the condition is reasonably stable. The SRK/T formula can be used for K readings less than 48D. Always aim for low myopia because otherwise these patients often end up hyperopic. Obviously toric IOLs must be avoided if the patient will be wearing hard or scleral contact lenses post-op. This is because the rigid contact lens neutralises the corneal astigmatism leaving the cyl in the toric IOL to manifest. Contact lens fitters will then need to create a special bitoric contact lens or a contact lens with a front surface cyl to correct this. Astigmatismfix.com is a great website for toric IOL surprises.

Customised CAIRS is a very interesting new concept for treating irregular and conic corneas. CAIRS stands for corneal allogenic intra-stromal ring segments. Instead of using the conventional plastic ring segments, these segments are made from donor corneas. This has the major benefit of lessening the risk of extrusions and corneal melts. It is still early days and more trials are needed especially to see long-term outcomes.

Thanks to Sachin, Ismail, and Ingrid we had a lively pleasant meeting. It is always refreshing to have younger colleagues at these meetings as we seniors can learn a lot from them and, of course, they can receive a lot of mentoring from us.

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DED: A multifactorial challenge affecting all ages

Dry eye disease (DED) has long been regarded as an age-related ailment. However, recent studies have highlighted its increasing prevalence among young adults and even children. This shift in demographics suggests that non-age-related factors are contributing significantly to the increase in DED cases.[1]

DED is defined as a multifactorial condition that affects the tears and the ocular surface, leading to discomfort, visual disturbances, tear film instability, and potential damage to the ocular surface. It is characterised by increased tear film osmolarity and subacute inflammation of the ocular surface.[1]

The impact of DED on daily life

DED poses a considerable burden on individuals' daily lives. It impairs functional vision, particularly during activities such as reading, computer usage, and driving.[1]

Reduced reading speed is a common consequence of DED and is correlated with the severity of the disease. Furthermore, DED can lead to a reduced quality of life (QoL), akin to the decrease reported in QoL for angina pectoris. Many patients also experience decreased work efficiency due to DED symptoms.[1]

Classification of DED

DED can be classified into two main categories:[2]

- Dry eye with reduced tear production (aqueous-deficient), which affects ~10% of patients.
- Dry eye with increased evaporation of the tear film (hyper-evaporative), which affects >80% of patients.

Symptoms of DED

The symptoms of DED are often non-specific but can include redness, burning, stinging, foreign body sensation, pruritus (itchiness), and photophobia (sensitivity to light). In severe cases, conjunctival scarring or corneal complications may develop.[2]

Multifaceted risk factors

Several risk factors contribute to the development of DED, transcending the conventional notion of age as the primary risk factor.[1]

- ***Age and lifestyle:*** While age is a significant risk factor, studies have shown unexpectedly high rates of DED among younger individuals, highlighting the influence of non-age-related factors. Lifestyle and behavioural elements such as contact lens use, excessive screen time, poor sleep quality, allergies, arthritis, smoking, certain medications, ocular surgery, and environmental conditions like low humidity and air-conditioning have been linked to DED in young adults and children.[1]
- ***Gender:*** Women are at a higher risk of DED across various population studies, encompassing both Sjögren and non-Sjögren types. Gender-related differences in pain perception and tolerance may play a role in reporting ocular surface and DED symptoms. However, an African study showed very little difference in the prevalence of DED in women (44%) compared to men (42%).[1,3]
- ***Ethnicity:*** Significant ethnic variations in DED prevalence exist, with Southeast Asians having a notably higher risk. The prevalence of DED in Africa is ~42%.[1,3]
- ***Genetics and environment:*** The interplay between genetics and the environment contributes to DED. Heritability for dry eye symptoms ranges from 25% to 80% for different symptoms, with moderate heritability noted for clinician-diagnosed dry eye.[1]
- ***Comorbidities:*** DED is frequently associated with various systemic conditions, including allergies, arthritis, thyroid disease, and renal failure. Neuropsychiatric diseases such as depression and anxiety have also been linked to more severe DED symptoms. Medication use, including proton pump inhibitors, anticholinergic drugs, and topical anti-glaucoma medications, is independently linked to DED symptoms.[1]
- ***Societal factors:*** Nutritional status and eating behaviours significantly impact ocular surface health. Smoking, substance use (including alcohol, caffeine, and recreational drugs), traditional medicines, and recreational activities and sports can all affect the ocular surface.[1]

The role of artificial tears in DED management

Patient education is pivotal in managing DED, given its chronic nature and the need for long-term treatment. The treatment approach varies based on disease severity and associated factors, such as meibomian gland dysfunction and ocular surface inflammation.[4]

Artificial tears stand as a cornerstone therapy for DED across all severity levels, offering several benefits, including enhancing tear film stability, reducing ocular surface stress, improving contrast sensitivity, and enhancing overall quality of life.[4]

Artificial tears come in various formulations, with the choice depending on disease severity. Products without benzalkonium chloride as a preservative are preferred for ocular surface disorders. For meibomian gland dysfunction, artificial tears containing lipids have shown promise.[4]

In severe cases, autologous serum eyedrops, rich in growth factors and anti-inflammatory substances, have demonstrated significant improvements in tear film stability and subjective symptoms.[4]

Conclusion

DED is a multifactorial condition that affects individuals of all ages. While age remains a significant risk factor, a myriad of other factors, including lifestyle, gender, ethnicity, genetics, comorbidities, and societal influences, contribute to its development. Recognising these diverse risk factors and implementing appropriate management strategies, such as artificial tears, is crucial in alleviating the symptoms and improving the QoL for individuals living with DED.

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NOVARTIS

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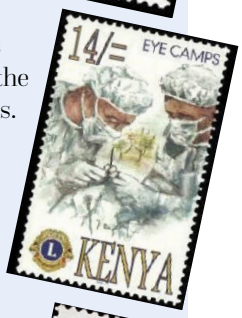
SA Ophthalmology Journal

The natural sources of ophthalmic MEDICATIONS



Juzer Surka is an ophthalmologist and enthusiastic philatelist, who first started collecting stamps and commemorative envelopes at a young age. In subsequent years he has focused his collection and research on medically themed stamps, and more specifically, on those relating to the field of Ophthalmology, where he has collected to date in the region of around 60 original stamps.

In 2005, as a member of the National Committee for the Prevention of Blindness, he was instrumental in getting the South African Postal Service to release a stamp to raise awareness around the prevention of blindness – an elegant, plain white stamp with the word 'Hello' written in braille. It was a first of its kind in the history of South African philately.

Philately is the study and collection of postage stamps. As stamp collecting gained in popularity over the years and around the world, collectors became more specialised in their areas of interests and collections; medical philately being no exception. Many countries have produced stamps on a wide range of medical topics, from health promotion and disease prevention to medical advances and notable clinicians. Ophthalmology has its fair share of stamps, and discovering them can be a fun and interesting way to learn about some of the history and heritage of the specialty.

In this series, we intend to look at various ophthalmology-related stamps, starting with famous clinicians and scientists. We hope the reader finds this to be informative and fun.

Natural plants have indeed been a source of ophthalmic medications for centuries. Many traditional and indigenous healing systems around the world have used plant-based remedies to treat various eye conditions.

Atropine

Atropa belladonna, commonly known as deadly nightshade, acts as a natural reservoir for the alkaloid atropine. The name 'atropa' comes from atropos, a word chosen because of the high toxicity of the plant. In Greek mythology, Atropos incorporates the concept of fate, communicating the inevitability of death and overseeing the definitive phase of mortality. In ancient Roman times, women of the royal class used dried fruit to dilate their pupils, a practice intended to enhance their beauty and charm. This gave the practice its Italian name 'Belladonna'. Atropa belladonna can be colloquially translated as *femme fatale*, which includes the idea of a seductive and fraudulent woman.

The flowers of deadly nightshades are bell-shaped. The leaves, roots and the berries are all poisonous as they contain atropine which inhibit the parasympathetic nervous system.

'Dry as a bone and blind as a bat' is used to describe atropine poisoning because it dries up bodily secretion causing dry mouth and eyes and blurred vision from ciliary body paralysis.

Photo credit: IgorGolovniov/ Shutterstock.com

Photo credit: Lestertair / Shutterstock.com

Albania, Poland (1981), Bulgaria, Switzerland (1974) and Yugoslavia (1957) released postage stamps to celebrate the significance of Atropine usage.

Photo credit: ilapinto/ Shutterstock.com

Photo credit: Zvonimir Atletic/Shutterstock.com

Cocaine

Originating in South America, Erythroxylum coca is a plant from which the powerful stimulant cocaine is derived, primarily extracted from its leaves.

Within the field of ophthalmology, the integration of cocaine gained prominence under the influence of Carl Koller, a pioneer in this area. Notably, it was Sigmond Freud, the renowned founder of psychoanalysis, who introduced Koller to this substance.

Koller's ground breaking research highlighted cocaine's efficacy as a local aesthetic, effectively inducing temporary numbness in the eye and rendering it insensitive to pain.

This discovery held profound implications for critical procedures such as cataract extraction, where effective pain management was imperative. While its contemporary applications in ophthalmology have become more limited, Erythroxylum coca's usefulness now lies in its ability to induce vasoconstriction in the nasal mucosa during

Rwanda recognised the importance of cocaine by featuring it on this stamp in 1969.

dacryocystorhinostomy procedures. Additionally, it serves as a diagnostic tool for cases of Horner's pupil, especially when the clinical symptoms are not immediately apparent.

Scopolamine

Scopolamine can be derived from the plant Scopolia Carniolica. Scopalamine contains atropine-like action causing cycloplegia and mydriasis. It is used in anaesthesia to decrease peri-operative bodily secretion.

Hyoscymaus Niger is also called henbane or stinking nightshade. Like atropine it belongs to the solanacea family. Scopolamine can be derived from the roots of this plant. Scopolamine is used medically to dilate the eye; to depress the central nervous system, which effect makes it valuable as a sedative and pre-aesthetic and to prevent motion sickness.

Scopolamine's effect on the central nervous system also makes it useful as a 'truth serum', by means of which uncooperative persons may be forced to answer questions. This method of interrogation is common in popular fiction.

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Scopolamine acknowledged by Yugoslavia (1959), East Germany (1981), Yugoslavia (1963) Pakistan, East Germany and Czechoslovakia through the issuance of commemorative postage stamps.

Digitalis

Digitalis, a medication employed in the treatment of cardiac failure and cardiac arrhythmia, is derived from the foxgloves plant. The individual credited with introducing digitalis into the realm of medical practice is William Withering. Withering was born in Wellington, Shropshire, England, in the year 1741.

In cases of excessive dosage, digitalis can lead to various ocular manifestations, such as disturbances in colour vision (often characterised by a perception of yellow colour, known as xanthopsia), visual anomalies, hallucinations, scotomas, and retinal damage resulting in abnormal ERG (Electroretinogram) amplitudes. It is worth noting that the renowned Dutch painter, Vincent Van Gogh, suffered from suspected digitalis poisoning due to his extensive use of yellow paint. He also grappled with epilepsy, for which he was administered digitalis as it was a commonly used remedy to manage seizures.

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East Germany, Czechoslovakia, Romania and Yugoslavia (1961) paid tribute to the valuable role of digitalis on their postage stamps.

Quinine

Quinine, derived from the bark of the Cinchona plant native to Peru, played a pivotal role in the history of medicine. Prior to its discovery, there was no effective treatment for malaria, and the majority of those afflicted with the disease succumbed to it. Quinine's significance extended beyond its medicinal use, as it found its way into tonic water, a key ingredient in the beloved beverage, gin and tonic. British colonists in tropical regions held a particular fondness for this drink, and it was believed that their regular consumption of tonic water contributed to their resilience against malaria, ultimately prolonging the reign of the British Empire.

Republic of Congo (1963), Poland (1962, Malaria Eradication) and Rwanda (1970) celebrated the 150th Anniversary of the discovery of Quinine by releasing special postage stamps.

However, it's important to note that excessive quinine intake can lead to adverse effects, including retinal artery spasms and, in severe cases, blindness. This condition is referred to as cinchonism, and its ocular symptoms encompass blurred vision, altered colour perception (dyschromatopsia), heightened sensitivity to light (photophobia), difficulty seeing in low light conditions (night blindness), restricted visual fields, retinal blood vessel constriction, and optic nerve atrophy.

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New FDC levofloxacin-dexamethasone for post-cataract surgery: A potential turning point

The following article is a summary of a CPD-accredited article available on www.medicalacademic.co.za

Visual impairment is a significant concern in South Africa, with cataracts being a leading cause. As cataracts cloud the lens of the eye, clear vision is compromised, and the risk of developing cataracts increases with age. Factors such as poor diet, sun exposure, genetics, and certain medications can contribute to their development.

The symptoms of cataracts can vary based on the location of the opacity in the lens. Surgical intervention is the most effective and cost-efficient way to restore vision in cataract patients. Different surgical techniques, such as extracapsular extraction and phacoemulsification, are available, each with varying risks and recovery times. In some cases, lens surgery can also be used to address presbyopia, the natural loss of near vision.

The decision to undergo cataract surgery is based on a significant decrease in vision that impairs daily life or if there are specific indications, such as lens-related glaucoma. While cataract surgery is generally safe, there are potential complications, ranging from mild discomfort to more severe issues like posterior capsule opacity and retinal detachment.

A number of surgical techniques are available

Manual extracapsular cataract extraction (ECCE): A traditional surgery technique in which the lens is extracted through a large incision. This technique is less expensive than other methods but has a higher risk of complications such as posterior capsule opacity (PCO), age-related macular degeneration, and corneal oedema.[5]

Manual small-incision cataract surgery (MSICS): A newer technique that uses a smaller incision than ECCE. This reduces the risk of complications and allows for a faster recovery time.[5]

Phacoemulsification: Ultrasound-based phacoemulsification is considered the gold standard.[3] It uses ultrasonic waves to break up the lens, which is then removed through a small incision. This technique has a lower risk of complications than ECCE and MSICS and allows for a faster recovery time.[5]

Femtosecond laser-assisted cataract surgery: Another newer technique that uses a laser to create incisions and break up the lens. This technique has the potential to reduce the risk of complications even further, but it is more expensive than phacoemulsification.[5]

Refractive lens exchange (RLE): In some cases, lens surgery may also be used to treat presbyopia, which is the natural loss of near vision that occurs with age. In these cases, the lens does not necessarily show opacity. RLE can be used to achieve normal vision (emmetropia) for distance vision with a new artificial lens, even if the patient has a high level of ametropia.[3] RLE has a higher risk of complications than cataract surgery, but it can provide better vision.[5]

Post-operative complications can include elevated intraocular pressure with corticosteroids and allergic reactions to antibiotics. To control inflammation and prevent infection, a short pharmacological strategy involving a combination of levofloxacin and dexamethasone eye drops has been studied. This strategy was found to be non-inferior to standard treatment, potentially reducing antibiotic resistance.

Studies have shown that the penetration of levofloxacin and dexamethasone into the aqueous humor is effective when administered in combination as fixed-dose combination (FDC) eye drops. These findings address concerns about pharmacokinetic interference between the two active ingredients.

The safety profile of FDC levofloxacin-dexamethasone was generally positive, with no significant differences in adverse events compared to standard treatment. This combination was well-tolerated, did not impact corneal opacity or permeability, and did not cause irritation or sensitisation potential.

FDC levofloxacin-dexamethasone offers a potential turning point in managing patients after cataract surgery. Its efficacy in preventing and treating ocular inflammation, preventing infection, and reducing antibiotic resistance makes it a promising addition to the treatment arsenal. This new approach has the potential to improve treatment adherence and patient outcomes while maintaining safety and addressing unmet needs in cataract surgery.

In conclusion, FDC levofloxacin-dexamethasone has the potential to revolutionise the management of post-cataract surgery patients. Its combination of effectiveness, safety, and potential for reducing antibiotic resistance makes it a compelling option in the field of ophthalmology. As cataracts continue to affect a significant portion of the population, advancements like FDC levofloxacin-dexamethasone bring hope for improved outcomes and enhanced patient care.

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American Society of Cataract and Refractive Surgery (ASCRS) Congress 2023

5-8 May 2023

San Diego, California, USA

Dr Elizabeth Yeu – the new President of ASCRS.

Dr Ron Yeoh – Winner of 2023 ASCRS Film Festival.

Dr Philip Kraukamp, Dr Agnes Risko and Dr Luis Botha.

Dr Edward Holland and Dr Marguerite McDonald who was inducted to the Hall of Fame.

Prof Steve Arshinoff with Karen and Howard Gimbel MD.

Dr Nicole Fram, Dr Elizabeth Yeu and Dr Ruth Lapid.

Dr Agnes Risko and Mr Alastair Douglas.

Dr David Chang and Dr Helena Ndume – winner of the Humanitarian Award.

Dr Abhay Vasavada and Dr Agnes Risko.

2023/2024 South African & Africa congresses and meetings

NOVEMBER 2023

ICRRD Conference– International Conference on Retinoblastoma and Retinal Disorders (ICRRD)

Date: 04-05 November 2023
Venue: Cape Town
Website: https://waset.org/retinoblastoma-and-retinal-disorders-conference-in-november-2024-in-cape-town

FEBRUARY 2024

OSSA Congress 2024

Ophthalmology Society of South Africa Congress
Date: 29 February-02 March 2024
Venue: Boardwalk Convention Centre, Gqeberha (PE)
Website: https://2024.ossacongress.co.za

APRIL

International Conference on Retinoblastoma and Retinal Disorders (ICRRD)

Date: 15 April 2024
Venue: Cape Town
Website: https://conferenceindex.org/event/international-conference-on-retinoblastoma-and-retinal-disorders-icrrd-2024-april-cape-town-za

International Conference on Surgical Ophthalmology (ICSO)

Date: 15-16 April 2024
Venue: Cape Town, South Africa
Website: https://waset.org/retinoblastoma-and-retinal-disorders-conference-in-april-2024-in-cape-town?utm_source=conferenceindex&utm_medium=referral&utm_campaign=listing

MAY 2024

South African Glaucoma Society (SAGS) Congress 2024

Date: 24-26 May 2024
Venue: Zimbali Resort, KwaZulu-Natal
Website: https://www.sags.co.za

JUNE 2024

South African Vitreoretinal Society (SAVRS) Congress

Date: 14 -17 June 2024
Venue: Kwa-Maritane Lodge, Pilanesberg National Park, North West Province
Website: https://www.savrs.co.za

2024 International congresses and meetings

JANUARY

International Conference on Ophthalmology and Glaucoma Treatments (ICOGT)

Date: 11-12 January 2024
Venue: Singapore
Website: https://waset.org/ophthalmology-and-glaucoma-treatments-conference-in-january-2024-in-singapore

FEBRUARY

International Conference on Ophthalmology and Macular Degeneration (ICOMD)

Date: 04 February 2024
Venue: Bangkok, Thailand
Website: https://waset.org/ophthalmology-and-macular-degeneration-conference-in-february-2024-in-bangkok

International Conference on Management of Ophthalmological Surgery and Ophthalmology Practice (ICMOSOP)

Date: 15 February 2024
Venue: London, United Kingdom
Website: https://conferenceindex.org/event/international-conference-on-management-of-ophthalmological-surgery-and-ophthalmology-practice-icmosop-2024-december-london-gb

MARCH

5th World Congress Ophthalmology and Vision Science

Date: 18-19 March 2024
Venue: Zurich, Switzerland
Website: https://opthalmologycongress.insightconferences.com

APRIL

International Conference on Retinoblastoma and Retinal Disorders (ICRRD)

Date: 05 April 2024
Venue: Cancún, Mexico
Website: https://waset.org/retinoblastoma-and-retinal-disorders-conference-in-april-2024-in-cancun

MAY

Retina World Congress

Date: 9-12 May 2024
Venue: Marriott Harbor Beach, Fort Lauderdale, Florida
Website: https://retinaworldcongress.org/congress-information/2024-retina-world-congress/

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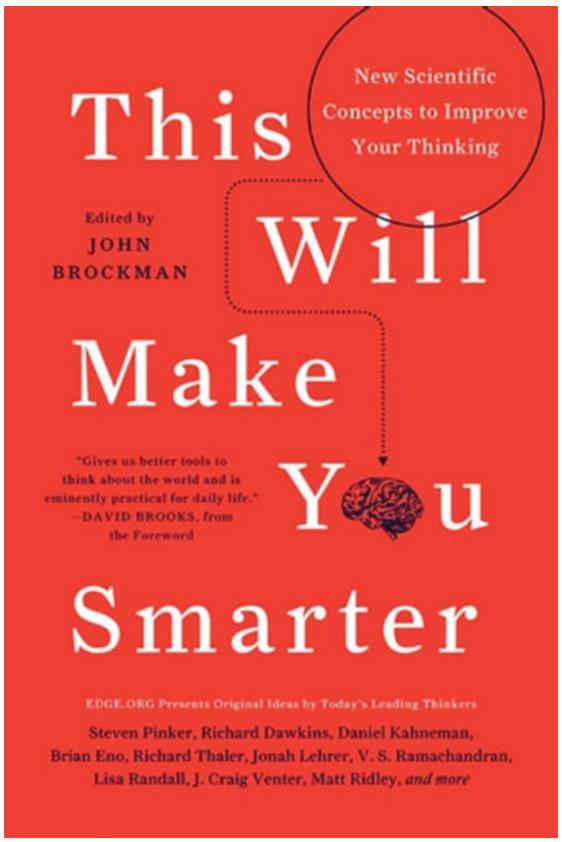
This Will Make You SMARTER



Title: This Will Make You Smarter

Editor: John Brockman

Publisher: The Edge Foundation

Year of publication: 2012

Number of pages: 415

Reviewer: Clive Novis (clivenovis@mweb.co.za)

In the last edition of SAOJ, I published a review of one of John Brockman's other *Edge* books. I found that book so interesting and useful that I decided to read one of his other books. I chose this one because I am acutely aware of the age-related rusty changes occurring in my own brain. I need to become smarter.

To refresh your memory about these books, I've extracted a snippet from my previous review:

The Edge Foundation has been publishing annual books for many years. Each book poses a question of scientific interest. The question is then sent to approx. 150 well-known scientists and intellectuals. They are requested to answer the question in a way that will be understood by an intelligent lay person. The answer must also be short: less than three pages. So the books end up with bite-sized wisdom from some of the brightest minds on the planet.

The Edge question that Brockman proposed for this book is: What scientific concept would improve everybody's cognitive toolkit?

I cannot name all 150 intellectuals who answered this question and were published in this book, but some of the more well-known ones are Martin Rees, Sean Carroll, Craig Venter, Richard Dawkins, Daniel Kahneman, Carlo Rovelli, Aubrey De Grey, Martin Seligman, Steven Pinker, Alison Gopnik, Danial Dennett, Lisa Randall, Jonathan Haidt, Sam Harris, VS Ramachandran, Matt Ridley, Robert Sapolsky, Brian Eno, and Eric Weinstein.

Some of my favourite answers

Gary Marcus (American psychologist and cognitive scientist) explains the basic difference between human memory and computer memory and why the computer's memory is so vastly more efficient. He puts it down to the fact that the computer organises information by assigning every memory to a master map in which each bit of information is assigned a unique location. By using this concept one can improve one's own memory.

David Brooks (columnist, *New York Times*) says that we need more integration between different fields to improve our overall intellectual performance. He asks: "Why do we have one field, psychology, concerning the inner life and another field, sociology, concerning the outer life, when the distinction between the two is porous?

Richard Dawkins (evolutionary zoologist, Oxford University) thinks that all schools should teach their pupils how to do double-blind controlled experiments so that we all can learn not to generalise from anecdotes, learn critical and sceptical habits, and improve our cognitive toolkit.

Max Tegmark (physicist, MIT) bemoans that 'Our global scientific community has been a spectacular failure when it comes to educating the public'. A scientific lifestyle requires a scientific approach to both gathering and using information. It also involves changing your mind when faced with information that disagrees with your views.

Gino Segre (physicist, Pennsylvania University) talks about the usefulness of thought experiments. He reminds us of the great 'gedanken' experiments of Einstein and Niels Bohr in their famous controversy over quantum physics. He also gives a clever example of using a thought experiment to understand why two objects of different masses fall at the same rate in a vacuum.

Dylan Evans (lecturer in behavioural science, Ireland) claims that economics is the discipline that can most improve everyone's cognitive abilities. 'No other field of study contains so many ideas ignored by so many people at such great cost'.

Matt Ridley (British science writer, journalist, businessman) emphasises the importance of the collective intelligence. That is to say that for society to progress networking between individuals who have specialised knowledge and skills is essential. This is why central planning is no match for the ground-up collective intelligence and 'the nodes in the human neural network are people themselves'.

Gerd Gigerenzer (psychologist, Berlin). Knowing how to read and write is no longer enough. Risk literacy is also very important for individual and societal progress. Statistical thinking is the ability to understand and critically evaluate uncertainties and risks.

Nick Bostrom (Professor of philosophy, Oxford University). *Play the Game of Life* invented by British mathematician John Conway in 1970. Just one hour of playing this game (easily available on the internet) will illustrate how the laws of physics govern our universe.

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Footnote: TPGS – D-α Tocopherol polyethylene glycol 1000 succinate[4]

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To report an Adverse Event, e-mail Adcock.AEReports@adcock.com or call 011 635 0134. To request a copy of the current approved package insert or references, e-mail: Helpdesk.MedicalAffairs@adcock.com

References: 1. VisuXL®. Professional Information. September 2017. 2. VisuXL® Instructions for use [Data on file]. 3. VisuEVO® Approved Package leaflet. Information for the user. 4. VisuXL® Gel Instructions for use.

VisuXL® 10 ml bottle. Composition: 100 ml of VisuXL® contains: 100 mg of cross-linked hyaluronic acid sodium salt; 100 mg of Coenzyme Q10; 500 mg of Vitamin E TPGS (D-α-tocopheryl-polyethylene glycol 1000 succinate); buffered isotonic solution up to 100 ml. **VisuEVO® Ophthalmic Solution. Composition:** Liposomes from soya phospholipids, algae oil (DHA+EPA), Vitamin A palmitate, Vitamin D, disodium EDTA, PEG 400, Boric acid, Sodium tetraborate, buffered isotonic buffered with pH 7.20. **VisuXL® Gel. Composition:** Each 100 ml of VisuXL® Gel contains: Coenzyme Q10 100mg, Vitamin E TPGS (D-α-tocopheryl-polyethylene glycol 1000 succinate) 500 mg, cross-linked sodium Carboxymethylcellulose 400 mg, Poloxamer 407 9000 mg, Disodium EDTA 100 mg, buffered isotonic solution q.s. to 100 ml. For full prescribing information refer to the approved package insert. **Applicant:** Genop Healthcare (Pty) Ltd. PO BOX 3911, Halfway House, 1685, South Africa. Tel 0861 436 674. Co. Reg. No. 1984/011575/07. www.genop.co.za. Marketed by Adcock Ingram Healthcare (Pty) Ltd. Reg. No. 2007/019928/07. Private Bag X69, Bryanston, 2021, South Africa. Tel +27 (00) 11 635 0000. www.adcock.com. 01/2023/PROMO/16

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