Management practices for diabetic macular edema (DME) at one comprehensive eye unit in Kenya.

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Abstract

Introduction: Diabetic macular edema (DME) is a leading cause of vision impairment among diabetic patients. Traditional grid laser treatment is no longer considered the gold standard treatment, with anti-VEGF therapy emerging as the preferred approach. The objective of this study is to evaluate the management practices for diabetic macular edema (DME) by consultants ophthalmologists at Kikuyu Eye Unit, particularly in the context of the paradigm shift introduced by anti-vascular endothelial growth factor (anti-VEGF) therapy, and to assess the associated visual acuity outcomes

Materials and Methods: A retrospective hospital-based case study was conducted over six months (October to March 2018). Data were extracted from theatre lists and laser room registration books. Patient files and records were reviewed to gather information on individuals treated with intravitreal injections or laser for DME during this period. All patients treated for DME within the study period were included.

Results: The study population had a mean age of 50 years or older in 95.9% of patients. Treatment distribution was as follows: 146 eyes (61.3%) received anti-VEGF monotherapy, 6 eyes (2.5%) received triamcinolone alone, 50 eyes (21.0%) underwent central laser treatment, and 36 eyes (15.1%) received combination therapies. Notably, 93 eyes (39.1%) received three or more anti-VEGF intravitreal injections. Post-treatment, 58% of eyes demonstrated a satisfactory visual acuity outcome, defined as a gain of ≥5 ETDRS letters. However, follow-up adherence was suboptimal, and a limited number of patients underwent blood glucose monitoring and optical coherence tomography (OCT) evaluations.

Conclusion: The management of DME at KEU aligns with current treatment guidelines, with anti-VEGF therapy being the most common approach. Visual acuity outcomes were satisfactory for 58% of eyes tested post-treatment. However, there is a need for improved patient follow-up and complementary investigations to enhance treatment outcomes. DME remains a significant challenge for ophthalmologists.

Key Words: DME, Anti VEG, Intravitreal injection, LASER Therapy

Introduction

Diabetic Macular Edema (DME) is a leading cause of vision impairment in individuals with diabetes, particularly in regions with high diabetes prevalence. As the global burden of diabetes continues to rise, there is an increasing need for effective management strategies to address DME, which is characterized by the accumulation of fluid in the macula due to diabetic retinopathy. In Kenya, where the prevalence of diabetes is steadily increasing, DME has become a significant public health concern, affecting not only the quality of life of patients but also the healthcare system's capacity to manage these cases effectively(1).

Traditionally, the treatment of DME involved laser

photocoagulation therapy, which aimed to reduce the risk of vision loss by targeting abnormal blood vessels in the retina. However, over the past decade, there has been a paradigm shift towards more advanced therapies. New trends in the treatment of DME now include anti-VEGF (vascular endothelial growth factor) injections, corticosteroids, and surgical interventions, which have shown promising results in improving visual outcomes and providing more individualized care for patients (2,3,4,5).

This study aims to explore the early trends in the treatment of DME in Kenya, with a particular focus on the adoption of novel therapies and their effectiveness within the local healthcare context. By understanding these emerging treatment trends, healthcare providers in Kenya can better tailor interventions to meet the needs of DME patients, improve clinical outcomes, and potentially reduce the long-term burden of vision impairment caused by diabetic complications. This research provides valuable insights into how the evolving landscape of DME treatment is shaping the future of diabetic eye care in Kenya (6).

Materials and methods

This was a retrospective hospital-based study of patients diagnosed with diabetic macular edema who were treated at PCEA Kikuyu Eye Unit Hospital.

The Eye Unit is a tertiary/referral Eye health institution and one of the largest and most comprehensive Eye unit in Eastern and central Africa regions.

The study was carried out over a period of 6 months (from October 2018 to March 2018).

All consecutive patients who presented to the department were enrolled into the study.

Hospital authorization was given to access patients files. From the theatre lists and laser room registration book, patients were identified by the card number and data were extracted from files/cards of patients treated with intravitreal injection or laser for DME during the study period. All patients were treated by consultants ophthalmologists.

All patients treated for diabetic macular edema during the study period were included and relevant data were analyzed.

All data obtained were documented through a questionnaire and analyzed with SPSS version 16. The data analyzed were presented in simple descriptive tables and charts.

Ethical clearance was sought for and obtained from the ethical committee of the hospital.

Results

A total of 146 patients (238 eyes) were analyzed out of whom 73 were female and 77 were male. Their distribution by age was as shown in Table 1 and majority of them (95,9%) were aged 50 years and above.

Table 1: Distribution of the study participants by age

Age in years	18-35	35-40	50-60	>60	Total
Number of patients	6	0	67	73	146

Distribution/total treatment

Total Distribution of type of treatment per Eyes (include mixed treatment):

Avastin = 179 Eyes
Central Laser = 55 Eyes
IVTA = 22
Lucentis = 11

Among the analyzed eyes,75.2% were treated with Avastin (Bevacizumab), making it the most used intervention

Distribution of number of Avastin injections per eyes

Seventy-one-point four percent of patients received at least 3 Avastin intravitreal and among them only 29% had more than 3 intravitreal injections.

Total number of Avastin per eyes= 73 (one eye) +53x2(total both eyes) = 179 Avastin intravitreal injections.

Distribution of Lucentis intravitreal injection

Eleven eyes received Lucentis but None of the patients who received Lucentis had more than 3 injections.

Distribution of IVTA injections

Twenty-two eyes received IVTA but none of the patients had more than 3 injections.

Table 2: Distribution of mixed treatment

Treatment	One Eye	Both Eyes	Total no. of Eyes
Avastin/Laser	9	11	31
IVTA/Laser	2	1	4
Avastin/Lucentis	2	1	4
Avastin/IVTA	3	0	3
Lucentis/Laser	0	0	0
Total eyes mixed	16	26	68

The most frequent mixed treatment was Avastin intravitreal and Laser.

Follow-up

Out of a total of 146 patients (238 eyes), 120 patients (82.2%) (196 eyes) were compliant with follow-up. Among these, visual acuity data were available for 110 patients (91.7%) (179 eyes).

The comparison of the patients visual acuity before and after treatment was as shown in Table 3 below.

Table 3: Comparison of visual acuity before and after

Visual acuity	6/6-6/18	<6/18-6/60	<6/60-cf3m	<cf3m
Before treatment	21	91	38	46
After treatment	53	73	27	26

Table 4: Visual acuity after treatment

Visual acuity	Number of eyes
Improved	66
Stable	44
Decreased	29

Table 5: Visual acuity improvement

VA improved	Number of eyes
1 line	24
2 lines	27
3 lines	9
4 lines	4
5 lines	2
Total	66

Most patients who experienced improved visual acuity showed an improvement of one or two lines.

Visual acuity decreased by one line in 14 eyes, two lines in 10 eyes and three lines in 3 eyes.

Most follow-up-compliant patients experienced improvement in visual acuity.

Few patients had OCT done before and after treatment (Table 6).

Table 6: Number of eyes done OCT

OCT before treatment		OCT after treatment		Not Specified
Yes	No	Yes	No	
22	87	15	73	6

Discussion

The findings of this study offer valuable insights into how diabetic macular edema (DME) is managed at Kikuyu Eye Unit, highlighting the distribution of treatment modalities and associated visual outcomes.

Patient Demographics and Gender Distribution

The study population consisted predominantly of individuals aged 50 years and above, reflecting the age-related increase in DME prevalence, especially among those with type 2 diabetes. Gender distribution was nearly equal between males and females, aligning with existing literature suggesting minimal gender disparity in the prevalence of diabetic retinopathy (DR) and DME. The Wisconsin Epidemiologic Study of Diabetic Retinopathy identified age and duration of diabetes as key risk factors for DME development, which helps explain the older demographic seen in this study(7).

Types of treatment

Most eyes were treated with anti-vascular endothelial growth factor (anti-VEGF) monotherapy, affirming its role as the current standard of care for DME. The landmark Protocol T study by the DRCR Retina Network demonstrated the superiority of anti-VEGF agents in improving visual acuity and reducing central retinal thickness, findings that are mirrored in this study's treatment trends.

Among patients receiving anti-VEGF therapy, bevacizumab (Avastin) was the most used agent. Its widespread use, despite being off label, can be attributed to its significantly lower cost compared to ranibizumab (Lucentis) or aflibercept (Eylea). Numerous studies, including Protocol T, support its efficacy, particularly in cases of center-involved DME. The economic advantage of Avastin makes it a practical choice in resource-constrained settings(8).

Lucentis was used in a small fraction of patients, likely due to its higher cost. Nevertheless, clinical trials such as RISE and RIDE have validated its strong efficacy in improving both anatomical and visual outcomes in DME(8).

Intravitreal triamcinolone acetonide (IVTA) was administered to a smaller subset of patients, typically those with contraindications to anti-VEGF agents or who were non-responders. As corticosteroids, they reduce inflammation and stabilize the blood-retinal barrier, though their use is limited by potential complications such as increased intraocular pressure and cataract formation(9–14).

Central laser therapy, once the mainstay of DME treatment, was still employed in a notable portion of cases. While now considered adjunctive, laser remains beneficial in patients with focal macular edema or those inadequately responsive

to pharmacologic therapy. The Early Treatment Diabetic Retinopathy Study (ETDRS) had previously demonstrated its role in reducing moderate vision loss, and current guidelines recommend its use in specific scenarios.

Injection frequency and outcomes

Most patients underwent three or more anti-VEGF injections, aligning with the recommended loading and maintenance dosing schedules. Protocol I from the DRCR.net highlighted the importance of regular injections, particularly within the first year, to achieve meaningful improvements in vision and retinal morphology. The "treat-and-extend" and "pro re nata" (PRN) regimens commonly adopted thereafter are supported by this data.

Among Avastin recipients, a large proportion received at least three injections, consistent with chronic disease management strategies that require multiple treatments for stabilization. Literature continues to reinforce the correlation between injection frequency and favourable long-term visual and anatomical outcomes(8,10,11).

Visual acuity outcomes

Visual acuity improved in a substantial number of patients, while others maintained or experienced a decline in vision. These outcomes are in line with real-world treatment results, where anti-VEGF therapy typically leads to improvement in 60–70% of patients, but a proportion may remain stable or worsen. Contributing factors to poor visual outcomes include chronic macular edema, suboptimal baseline vision, or inadequate follow-up(17).

Follow-up challenges

Few patients had follow-up, OCT, or blood sugar monitoring. Poor follow-up adherence is a well-documented issue in managing chronic conditions like DME. Studies show that non-compliance with regular follow-up visits and systemic monitoring (e.g., HbA1c levels) negatively affects outcomes. The lack of OCT imaging also indicates a gap in monitoring retinal thickness, which is essential for guiding treatment decisions.

This gap is related to the late acquisition of OCT by PCEA Kikuyu hospital and the cost of OCT that all patients could not afford.

A multidisciplinary approach, involving endocrinologists and ophthalmologists, is often recommended to optimize both glycemic control and ocular outcomes. However, there was no endocrinologist in the hospital during the period of this study.

These findings align with existing literature on the management of Diabetic Macular Edema (DME). Poor adherence to follow-up appointments and systemic monitoring, such as HbA1c levels, has been shown to negatively impact visual outcomes in DME patients. A study published in JAMA Network Open found that nonadherence to recommended care similarly affects outcomes in patients with proliferative diabetic retinopathy(14).

Additionally, the absence of Optical Coherence Tomography (OCT) imaging hinders effective monitoring of retinal thickness, which is crucial for guiding treatment decisions. The lack of OCT imaging also indicates a gap in monitoring retinal thickness, which is essential for guiding treatment decisions(15).

Implementing a multidisciplinary approach involving both endocrinologists and ophthalmologists is recommended to optimize glycemic control and ocular outcomes. Ophthalmologists and allied healthcare professionals play a vital role in multidisciplinary diabetes management, and the establishment of dedicated diabetic macular edema clinics is proposed(15).

We also recommend a more holistic approach towards the training of ophthalmologists whereby they are enabled to manage diabetes and the related parameters more holistically like the endocrinologists to serve the diabetic patient better.

However, the absence of an endocrinologist at PCEA Kikuyu Hospital during the study period may have limited the effectiveness of such an approach.

Conclusion and emerging trends

The data from our study aligns with the broader trends in DME management, emphasizing the efficacy of anti-VEGF agents (particularly Avastin for this study) and the frequent need for multiple injections. Laser therapy no longer appears to be the gold standard as it was in the past, but it has not been abandoned and remains very useful in reducing the treatment burden for some patients. The underuse of advanced OCT monitoring and suboptimal follow-up, however, highlight areas for improvement to meet normal standard of practice

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