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Nigerian Journal of Ophthalmology Editorial Comments

It is with great delight and enthusiasm that the Editorial board presents this issue of the Nigerian Journal of Ophthalmology. This issue marks the transition of the Journal from a biannual publication to a triannual (four-monthly) one. In addition, this transition coincides with the 30th anniversary of the journal. The issue delivers a variety of general ophthalmology as well as subspecialty articles.

The article by Murthy et al. describes the refractive error profile of patients with Duane retraction syndrome. They report that hyperopia was the most common refractive error among the entire study population as well as within each of the subgroups, that is, the esotropic, exotropic, and orthotropic types of Duane syndrome. The article highlights the need for comprehensive evaluation of patients with Duane syndrome including cycloplegic refraction for those with esotropia, as previously advocated by Kekunnaya et al.[1]

Feyijimi et al. present the findings of their study on the relationship between some anthropometric parameters including neck circumference and intraocular pressure in healthy adults. They observed positive correlations between anthropometric parameters (weight, body mass index, and neck circumference) and intraocular pressure. Their findings suggest the need for further research on the role of weight reduction and similar lifestyle modifications in the management of ocular hypertension and primary open-angle glaucoma.[2]

In another original research article, Amita et al. compared the Sanders–Retzlaff–Kraff (SRK) II formula with the Barrett Universal (BU) II formula for calculating intraocular lens power for cataract surgery in eyes with normal axial length. They found no statistically significant difference between the refractive prediction errors of both formulas. Their results imply that the older generation SRK II formula is still accurate and relevant for biometry in high volume centers or low resource settings where the facilities such as internet access required for the use of the newer generation BU II formula may not be readily available.

Besides, Inaku et al. describe the pattern, prevalence, and types of ophthalmic tumors seen over eight years at the University of Calabar teaching hospital, Cross River state. They noted that malignant tumors were as common as benign ones and that majority of cases were characterized by late presentation and diagnosis. This article buttresses the need for better awareness among the general public about the importance of early presentation as well as the need for wider coverage of health insurance schemes and programs in Nigeria.[3]

There are two case reports in this issue that describe patients with secondary strabismus due to uncommon causes. The first case report describes a case of acquired Brown syndrome following head trauma that was successfully treated with oral steroids. The second report details the occurrence of acute acquired comitant esotropia following amniotic membrane transplantation for the treatment of a shield ulcer in a patient with vernal keratoconjunctivitis. In another case report, Babalola et al. describe a patient who presented with a rare combination of Vogt–Koyanagi–Harada syndrome and HIV/AIDS infection. This report demonstrates the role of a high index of suspicion and thorough investigation of patients presenting with features of bilateral uveitis.

On behalf of the editor-in-chief and the entire editorial board, I welcome our subscribers to read the articles featured in this issue of the Nigerian Journal of Ophthalmology.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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Refractive Profile in Duane Retraction Syndrome

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Abstract

Aim: To study the refractive error profile of patients with Duane retraction syndrome (DRS). Methods: We conducted a retrospective analysis of patients diagnosed with DRS between January 2015 and December 2018 at a tertiary eye center. All case files of patients diagnosed with DRS were retrieved and analyzed. Following parameters were collected from the records: demographic data, laterality of involvement, type of DRS, type of refractive error, presence of anisometropia, and presence of amblyopia, if any. Type of refractive error was correlated with type of DRS. Results: Seventy-seven eyes of 74 patients were included with age range of 2 to 65 years. There were 42 female patients and 32 male patients. Exotropic DRS with unilateral presentation was the commonest pattern. Left eye was predominantly involved in unilateral DRS. Hyperopia (58.1%) was the most common refractive error in both esotropic and exotropic DRS. Anisometropia was present in 16% cases, with anisoastigmatism being the most common refractive error in them. Amblyopia was reported in only three cases with anisometropia being the cause. Abnormal head posture was reported in most of the patients (81%). Upshoots and downshoots were common in exotropic DRS. Conclusion: Hyperopia was the most common refractive error in both esotropic and exotropic DRS. Amblyopia was reported in a few cases and was due to anisometropia. This underscores the importance of proper evaluation of refractive error in patients with DRS.

Keywords: Duane syndrome, exotropic DRS, hyperopia

INTRODUCTION

Duane retraction syndrome (DRS) is a congenital anomaly of the sixth cranial nerve nuclei along with aberrant innervation from the third cranial nerve. It is a rare condition with a prevalence of approximately 0.1% of the general population[1,2] and less than 5% of all strabismic cases.[1-4]

Binocular vision is preserved in DRS despite the restriction of eye movements owing to occurrence of compensatory head posture in most of the cases. Hyperopia and anisometropia are refractive errors commonly reported in esotropic DRS (eso DRS). The presence of amblyopia is variable ranging from 3% to 40%.[1,5,6] Anisometropia, not strabismus, is commonly the cause of amblyopia in such cases.

Though the occurrence of hyperopia in eso DRS and importance of its correction is documented, the exact type of refractive error in various types of DRS has not been widely studied or reported. Hence, the aim of this study was to analyze the refractive error profile of patients with DRS and also to correlate it with type of DRS.

MATERIALS AND METHODS

Retrospective review of case records of patients diagnosed with DRS from January 2015 to September 2018 presenting to outpatient department of our pediatric ophthalmology and strabismus unit was done. The records that were complete in terms of documentation of oculomotor evaluation and cycloplegic refraction were included, whereas those with incomplete documentation were excluded.

Parameters including demographic data such as age and sex, laterality (unilateral/bilateral), type of DRS (exotropic/esotropic/orthotropic), cycloplegic refraction values, presence of anisometropia, and amblyopia were collected from the records.

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The DRS was classified into eso DRS, exotropic (exo DRS), and orthotropic (ortho DRS) on the basis of deviation in primary gaze. Deviation was measured with alternate prism cover test (APCT) or modified Krimsky test depending upon the visual acuity; APCT was used if visual acuity was better than 6/18 in both eyes.

Documentation of cycloplegic refraction readings was noted. Cycloplegic refraction was performed with Auropent (Aurolab, Madurai, India; cyclopentolate1%) or Homide (Indoco Remedies, Mumbai, India; homoatropine 2%) and Tropicacyl plus (Sunways, Mumbai, India; phenylephrine 5% + tropicamide 0.8%).

Refractive error was categorized into myopia, hyperopia, myopic astigmatism, hyperopic astigmatism, and emmetropia on the basis of cycloplegic refraction. Spherical equivalent was considered for the classification of refractive error. We classified as emmetropia when refraction was Plano +/- 0.5 diopters sphere (DS); myopic astigmatism if refraction showed cylinder of >- 0.5 with no spherical component; hyperopic astigmatism if refraction showed cylinder of more than +0.5 with no spherical component; myopia when spherical error (SE) was more than − 0.5DS which was further categorized into mild, moderate, and high if SE was less than − 3.00DS, −3.00DS to less than −6.00 DS, and greater than or equal to −6.00DS, respectively. Finally, hyperopia if SE more than +0.5DS and was further classified as mild, moderate, and high depending on SE less than +2.50, +2.50 to less than 5.0, and greater than Anisometropia was said to be present if there was a difference of 1 DS in spherical equivalent between two eyes. The frequency of type of refractive error in DRS patients and its correlation with type of DRS was noted. Other associated clinical features such as up/downshoots, globe retraction, and presence of abnormal head posture recorded also was noted.

RESULTS

Seventy-seven eyes of 74 patients with DRS were included with age range of 2 to 65 years. Majority of patients were in the age group of 0 to 9 years. Females were predominantly involved in all types of DRS with male to female ratio of 1:1.3 [Figure 1, Table 1].

Considering laterality of occurrence, 71 cases were unilateral (95%), whereas 3 (5%) cases were bilateral. Left eye (OS) was more commonly affected (53/71) when compared with right eye (18/71) [Table 2].

Exotropic DRS was the most common type reported (46/74 patients) followed by eso DRS (19/74) patients and ortho DRS (9/74) [Table 3]. Further vertical strabismus was noted in primary gaze in eight cases.

Hyperopia (58.1%) was the commonest refractive error followed by myopic astigmatism (27.27%) and myopia (7%) in all types of DRS.

Hyperopia ranged from +0.50DS to +4.0DS and myopia ranged from −0.50DS to − 6.0 DS.

Table 1: Sex distribution according to type of Duane retraction syndrome

<table>
<thead>
<tr>
<th>Sex</th>
<th>Exo DRS</th>
<th>Eso DRS</th>
<th>Ortho DRS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>22 (47.8%)</td>
<td>5 (26.3%)</td>
<td>5 (55.5%)</td>
<td>32 (43.24%)</td>
</tr>
<tr>
<td>Female</td>
<td>24 (52.1%)</td>
<td>14 (73.6%)</td>
<td>4 (44.4%)</td>
<td>42 (56.76%)</td>
</tr>
</tbody>
</table>

Data are presented as n (%). DRS, Duane retraction syndrome; Eso DRS, esotropic DRS; Exo DRS, exotropic DRS; Ortho DRS, orthotropic DRS.
In subcategories of refractive error on the basis of spherical equivalent, mild hyperopia was most common. Hyperopia was the most common refractive error both in eso DRS and exo DRS [Table 3].

Anisometropia was present in nine cases, anisoastigmatism being the most common (seven cases) followed by anisohyperopia (four cases) and anisomyopia (three cases). Amblyopia was noted in three cases, of which two were anisohyperopia and one with anisoastigmatism. No case of strabismic amblyopia was noted in our study.

Abnormal head posture was seen in 60 cases in our study, face turn (92%) being the most common followed by head tilt (7%) and chin down (1%). Signs of aberrant innervation in the form of upshoots and globe retraction were reported in 28 and 60 patients, respectively. Upshoot (23 out of 28) downshoots (5 cases) accounting to total of 37.8% and being more common in exo DRS (50%) was noted.

### DISCUSSION

The present study explored the refractive error profile and other clinical characteristics of patients diagnosed with DRS.

Kekunnaya et al.[8] noted female preponderance in 60% cases especially in unilateral type I DRS. Kirkham[9] and O’Malley et al.[10] have found DRS types II and III to be more prevalent in females compared to males. Our study showed female predominance (57/74 cases) in all types of DRS (eso, exo, and ortho DRS) similar to other studies of individual types of DRS.

Several studies have noted unilateral presentation being common than bilateral occurrence and with left eye being predominantly involved.[11-13] Similar findings with respect to laterality and predominant eye involved were noted in our study population.

Kekunnaya et al.[12] reported esotropia as most common primary position deviation, followed by orthotropia. According to Isenberg and Urist,[14] in patients with unilateral type I DRS, esotropia occurred more frequently than exotropia; in type II, exotropia was common whereas esotropia, exotropia, and orthotropia occurred equally in type III cases. We classified DRS according to type of primary gaze deviation and not as types I, II, and III unlike previous studies. Our study showed exotropia as the most common primary gaze deviation in contrast to other studies attributable to difference in classification used. Exotropia was probably more common in our study because exotropia is more common in India unlike earlier studies from western countries where the commonest type of strabismus is esotropia.

Kekunnaya et al.[12] reported an occurrence of upshoot or downshoot in 43% of their cases and occurring commonly in unilateral DRS types I and III. Mohan et al.[13] found the prevalence to be significantly greater in DRS types II and III. Upshoots and downshoots amounting to a total of 37.8% were more common in eso DRS in our study comparable to its occurrence in DRS types II and III in the report by Mohan et al.[13]

Kekunnaya et al.[15] have shown that 30% to 80% of patients with eso DRS have hypermetropia or hypermetropic astigmatism greater than +1.50DS, some even more than +4.00DS. Hyperopia and associated accommodative component in eso DRS have also been reported. The importance of hyperopic correction to correct the accommodative component in eso DRS before surgery has been stressed. Hyperopia (43%) was the most common

### Table 2: Laterality of involvement in relation to type of Duane retraction syndrome

<table>
<thead>
<tr>
<th>Type of DRS</th>
<th>RE*</th>
<th>LE*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exo DRS</td>
<td>14</td>
<td>31</td>
<td>45</td>
</tr>
<tr>
<td>Eso DRS</td>
<td>1</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Ortho DRS</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>53</td>
<td>71</td>
</tr>
</tbody>
</table>

Data are presented as n (%). DRS, Duane retraction syndrome; Eso DRS, esotropic DRS; Exo DRS, exotropic DRS; ortho DRS, orthotropic DRS. *Bilateral cases are not included in this table.

### Table 3: Type of refractive error and correlation in various types of Duane retraction syndrome

<table>
<thead>
<tr>
<th>Type of refractive error</th>
<th>Eso DRS</th>
<th>Exo DRS</th>
<th>Ortho DRS</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperopia</td>
<td>14</td>
<td>26</td>
<td>5</td>
<td>45</td>
<td>58.44%</td>
</tr>
<tr>
<td>Myopia</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7%</td>
</tr>
<tr>
<td>Myopic astigmatism</td>
<td>4</td>
<td>16</td>
<td>1</td>
<td>21</td>
<td>27.27%</td>
</tr>
<tr>
<td>Plano</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3.8%</td>
</tr>
<tr>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>47</td>
<td>10</td>
<td>77*</td>
<td></td>
</tr>
</tbody>
</table>

DRS, Duane retraction syndrome; Eso DRS, esotropic DRS; Exo DRS, exotropic DRS; ortho DRS, orthotropic DRS; NA, not available. *Refers to number of eyes analyzed.
refractive error followed by myopic astigmatism (22%) and myopia (5%) both in eso DRS and eso DRS in our study. This finding underscores the importance of evaluation and appropriate management of refractive error in both eso DRS and eso DRS.

Tredici and Von Noorden\[16\] found a 17% prevalence of anisometropia and 3% prevalence of amblyopia in these patients. Kirkham\[9\] found anisometropia >1D in about 40% of cases. O’Malley et al.\[10\] reported strabismic amblyopia in 11% and anisometropic amblyopia in 3% of their patients. In present study, anisometropia (1.0DS) was noted in 12% cases, anisoastigmatism being most common (9.4%). Amblyopia was reported only in three cases, out of which two had anisohyperopia and one had anisoastigmatism. The difference from other studies may be due to smaller sample size and retrospective nature of our study.

There are few limitations in our series in terms of sample size and retrospective nature of the study. In addition, the impact of refractive correction on the abnormal posture or primary gaze deviation in these patients was not studied.

**Conclusion**

Refractive errors were reported in most of the patients of DRS. Hyperopia being the commonest type of refractive error, both in eso DRS and eso DRS. Upshoots and downshoots were common in eso DRS. Exo DRS and unilateral occurrence was more common in our series. Amblyopia was reported in very few cases. Proper evaluation of refractive error in patients with DRS is important.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

Relationship between Anthropometric Parameters, Neck Circumference, and Intraocular Pressure among Normal Adults in Ile-Ife

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Abstract

Aim: To determine the relationship between anthropometric parameters, neck circumference (NC), and intraocular pressure (IOP) among the adult population in Ile-Ife, Nigeria

Method: A descriptive cross-sectional study was conducted among 450 randomly selected nonglaucoma subjects from the students and staff population of Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria. Ethical clearance for the study was obtained from the institution and written informed consent was obtained from subjects. The demographic profile of subjects was documented and measurements of anthropometric parameters, NC, and IOP were carried out. Data were analyzed using statistical software SPSS 23.0. The bivariate linear regression model was used for correlation analysis and the level of statistical significance was set at \( P < 0.05 \).

Results: Four hundred and fifty subjects were examined comprising 194 males (43.1%) and 256 females (56.9%). The mean age was 34.26 ± 11.78 years. The mean values for height, weight, body mass index (BMI), and NC were 1.67 ± 0.09 m, 70.7 ± 14 kg, 25.49 ± 4.91 kg/m², and 34.65 ± 2.79 cm, respectively. The weight and height were significantly higher in males than in females but BMI was higher in females. The mean IOP for all the subjects was 14.40 ± 3.26 mmHg. Weight, BMI, and IOP significantly increased with age, and mean IOP also significantly increased with increasing height \( (P = 0.045) \), weight \( (P = 0.005) \), NC \( (P = 0.0005) \), and BMI \( (P = 0.0001) \).

Conclusion: Increased weight, BMI, and NC were found to be significantly associated with IOP elevation, which is a risk factor for glaucoma

Keywords: Anthropometric parameters, intraocular pressure, neck circumference, Nigerian adults

Introduction

The relationship between anthropometric parameters and intraocular pressure (IOP) may be complex due to the association of these parameters with various systemic factors such as diabetes mellitus, hypertension, cardiovascular diseases, and obesity which are also risk factors for glaucoma. Several authors have shown varying patterns of relationship between different anthropometric parameters and IOP.¹⁻⁴ Pasquale et al.¹ in a prospective cohort study on the relationship between anthropometric parameters and incidence of primary open-angle glaucoma (POAG) revealed that increased body mass index (BMI) is protective of POAG especially in the female gender. Dielemans et al.² in the Rotherdam study showed no relationship between obesity and onset or severity of glaucoma in males but in females, though obesity was shown to be rather protective as obese female subjects had reduced IOP. However, other authors showed a positive relationship between IOP and BMI relative to gender and age.³⁻⁴ Wu and Leske³ in the Barbados eye study showed that IOP increases with increasing BMI. Lin et al.⁴ in a Taiwan-based study reported that IOP increases with increased BMI and of more significant in the older age group.

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In Nigeria and other African countries, there are few reported studies on the relationship between IOP and anthropometric parameters among which are studies by Ebeigbe and Omokhua[9] in Benin which showed a positive relationship between IOP and BMI. Lai et al.[6] in Tanzanian revealed that IOP may reduce with increasing height, but found to increase with obesity. Neck circumference (NC) which is often not measured routinely along with the conventional anthropometric parameters (height, weight, and BMI) in the adult is also known to be an index for obesity.[7] Few studies were found to relate NC with IOP. Theelen et al.[8] found no relationship between NC and IOP but neck retroflexion was found to increase IOP. Markowitz and Mitchell[9] reported that men with NC >43 cm and women with NC >40 cm were classified as high risk for sleep apnea syndrome and at high risk for developing glaucoma. The mean change in IOP from sitting to supine was higher in the group with larger NCs, although it was not statistically significant. The Markowitz and Mitchell[9] findings suggested that NC may indirectly be related to IOP.

The pattern of relationship between anthropometric parameters and IOP varies in a different environment as shown in various reports with fewer studies from the developing countries.[10-12]

This study is aimed at determining the relationship between anthropometric parameters and IOP among normal Nigerian adults.

**Materials and Methods**

It was a descriptive cross-sectional study carried out at Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria. The hospital is affiliated with the Obafemi Awolowo University for training medical students, nursing students, medical records, and physiotherapy students. It is also a center for postgraduate medical training in many surgical and medical subspecialties. Based on the calculated sample size, 450 subjects were randomly selected from a study population comprising staff and students of the institution between the ages of 18 and 60 years. Subjects already diagnosed to have glaucoma, ocular hypertension, or normal-tension glaucoma whether on medications or not were excluded. Subjects with current ocular infections, conditions preventing reliable applanation tonometry, or any deformity that may preclude accurate measurement of height were also excluded. Approval of the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, was obtained in accordance with the ethical standards and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Written informed consent was obtained from all individual participants included in the study. All subjects had demographic and clinical data including age, sex, and occupation. Anthropometric parameters were measured which included their height, weight, BMI, and NC. Similarly, all subjects had Snellen visual acuity and Goldmann applanation tonometry (Haag-Streit, Mason, Ohio, USA); for IOP, measurement was carried out twice at a 1-hour interval between 8 am and 12 pm and the average IOP value was computed and documented. The IOP in the right eye only was considered for analysis. Before measurement of study parameters, a detailed ocular and systemic examination were performed to rule out glaucoma and other ocular and systemic comorbidities that could cause elevated IOP and such patients were excluded from the study.

Data collected were analyzed using Statistical Package for Social Study (SPSS 22.0, Chicago, Illinois, USA) software. The mean values and standard deviations of quantitative variables were carried out. One-way analysis of variance used to determine the effect of age groups and gender on the anthropometric parameters and IOP. Correlation analysis was performed to show the relationship between height, weight, BMI, and NC, respectively, on IOP using a bivariate linear regression model. The level of statistical significance was set at a P-value <0.05.

**Results**

A total of 450 subjects were recruited comprising 256 females and 194 males with a male to female ratio of 1:1.3. The subjects’ age varied from 18 to 60 years with a mean age of 34.26 ± 11.78 years. Sixty-one subjects (13.6%) reported a family history of glaucoma with mean IOP =15.75 ± 4.34, 186 subjects (41.3%) reported no family history (mean IOP =14.18 ± 3.13), whereas the remaining 203 subjects (45.1%) were unsure of the presence of glaucoma in their family (mean IOP =14.42 ± 2.14). P-value was 0.009. The cup to disc ratio (CDR) ranged from 0.2 to 0.8 with a mean CDR of 0.37 ± 0.13. Figure 1 and Table 1 show the effect of different age groups and genders on anthropometric parameters and IOP. The relationship between anthropometric parameters and IOP is shown in Figures 2–5 and Table 2.

**Discussion**

The mean age of the subjects was relatively lower when compared with the mean age (46.2 ± 9.3 years) in a study by Mori et al.[13] The lower mean age in this study may be adduced to the students’ population with lower age group. Subjects with a family history of glaucoma were found to have relatively higher IOPs compared with those without (P = 0.009). This finding is similar to reports by Wu and Leske[3] in the Barbados eye study and Kapetanakis et al.[14] which reported higher IOP in nonglaucoma patients with a family history of glaucoma. Family history of glaucoma is supportive of the genetic theory of POAG, but the mechanism of causing elevated IOP is widely unknown. The mean height, weight, and BMI observed in this study in both sexes were slightly higher (higher mean difference) than the findings by Okosun et al.[15] in Nigeria. Similarly, the study mean anthropometric parameters are also higher than those obtained in Lai et al.[6] in Central Tanzanian, and Mori et al.[13] studies in Japan. However, a lower mean
Table 1: Anthropometric parameters and intraocular pressure by gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ± SD</th>
<th>T-value</th>
<th>P-value</th>
<th>Mean diff</th>
<th>Conf.interval (Low – UPP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male(N = 194)</td>
<td>Female(N = 256)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.73 ± 0.633</td>
<td>17.25</td>
<td>&lt;0.001</td>
<td>0.11</td>
<td>0.10–0.12</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>73.07 ± 13.18</td>
<td>3.06</td>
<td>0.002</td>
<td>4.16</td>
<td>1.49–5.84</td>
</tr>
<tr>
<td>BMI (kg/m^2)</td>
<td>24.47 ± 4.12</td>
<td>−3.90</td>
<td>&lt;0.001</td>
<td>−1.79</td>
<td>−2.70 to −0.89</td>
</tr>
<tr>
<td>Neck circumference (cm)</td>
<td>36.57 ± 2.12</td>
<td>15.81</td>
<td>&lt;0.001</td>
<td>3.37</td>
<td>2.95–3.78</td>
</tr>
<tr>
<td>IOP (mmHg)</td>
<td>14.70 ± 3.37</td>
<td>1.67</td>
<td>0.093</td>
<td>0.54</td>
<td>−0.91 to 1.16</td>
</tr>
</tbody>
</table>

BMI, body mass index; IOP, intraocular pressure; SD, standard deviation.

Figure 1: Effect of different age groups on weight, BMI, NC, and IOP in 450 subjects. All had a P-value < 0.05, respectively. BMI, body mass index; NC, neck circumference; IOP, intraocular pressure.

Figure 2: Scatter plot of the relationship between height and IOP. IOP, intraocular pressure.

Figure 3: Relationship between weight and IOP. IOP, intraocular pressure.
difference in the anthropometric parameters was found when compared with studies in Europe and India.\(^9,10\) This disparity may be due to the different study populations, locations, and socioeconomic status. The mean NC of the study subjects was found to be slightly higher than that reported by Kumar \(^{14,16}\) with a mean difference of +1.03 cm in males and +2.0 cm in females. The mean IOP using the applanation tonometry (14.4 ± 3.26 mmHg) was higher than the mean IOP among similar study populations reported by Mori \(^{13}\) et al. in Japan with a mean difference of +3.1 mmHg. This disparity may also be due to the difference in study population (African vs. Japanese). Although when compared with a study by Lin \(^{12}\) et al. a similar mean IOP values was observed.

These anthropometric parameters and IOP were also found to increase progressively with age (\(P < 0.05\)). This increase with age was significant for weight, BMI, and IOP but with a marginal increase in NC. The vertical growth of an individual is expected to cease at certain age thus the height was not correlated for age. This increase with age was similar to what was reported by Lin \(^{12}\) et al. and Mori \(^{13}\) et al. This finding further substantiated the effect of increasing age on structural changes in the trabecular meshwork which may result in a reduction in trabecular and uveoscleral outflow facilities and hence elevated IOP in older age group.\(^{17}\) Aging is associated with moderate elevation of IOP and is also linked to progressive decline in cerebral and ocular perfusion.\(^{18}\)

Following the regression analysis, a statistically significant relationship was found between weight and IOP (\(P = 0.001\)), BMI and IOP (\(P = 0.0005\)), and NC and IOP (\(P = 0.0001\)), whereas a borderline relationship was found between height and IOP (\(P = 0.045\)). The borderline relationship between height and IOP found in this study was in contrast to what was reported by Lai \(^{6}\) et al. in the adult Tanzanian population.

**Table 2: Distribution of IOP with different BMI in the subjects**

<table>
<thead>
<tr>
<th>Body Mass Index (kg/m(^2))</th>
<th>No. of subjects</th>
<th>Intraocular pressure (mmHg)</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>(P)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>13</td>
<td></td>
<td>12.54</td>
<td>1.27</td>
<td>10.00</td>
<td>14.00</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>18.5–24.99</td>
<td>216</td>
<td></td>
<td>13.77</td>
<td>3.15</td>
<td>9.00</td>
<td>28.00</td>
<td></td>
</tr>
<tr>
<td>25–29.99</td>
<td>137</td>
<td></td>
<td>14.70</td>
<td>3.46</td>
<td>8.00</td>
<td>26.00</td>
<td></td>
</tr>
<tr>
<td>≥30</td>
<td>84</td>
<td></td>
<td>15.79</td>
<td>3.44</td>
<td>10.00</td>
<td>29.00</td>
<td></td>
</tr>
</tbody>
</table>

BMI, body mass index; IOP, intraocular pressure.

**Figure 4:** Relationship between neck circumference and IOP. IOP, intraocular pressure.

**Figure 5:** Relationship between BMI and IOP. BMI, body mass index; IOP, intraocular pressure.

![Figure 4](image-url)

![Figure 5](image-url)
which showed a significant inverse relationship. They suggested that subjects whose weight was below the mean in their gender group were approximately twice as likely to have an elevated IOP as those whose height was at or above the mean. However, many other authors who did similar studies did not correlate height with IOP probably because it is a factor that cannot be modified amongst other reasons. The positive relationship found between weight and IOP was also similar to those reported by Mori et al. and Zafar et al. Weight unlike height is a modifiable factor that may change progressively depending on the individual’s lifestyle modification.

The BMI is the most commonly used index for obesity and has been associated with glaucoma in some studies. It is a function of a person’s weight and height. In this study, it was discovered that subjects with higher BMI had higher IOP in both sexes. IOP increase was significant at BMI levels >25 kg/m² with a further increase at BMI level >30 kg/m². Several studies have shown the relationship between obesity and glaucoma using the BMI and IOP to determine the pattern and direction of the relationship. Reports from these studies on the direction of relationships have been controversial. Some declared obesity as an independent risk factor for glaucoma with a positive relationship with IOP, a few studies reported no appreciable relationship between the two variables. Some authors suggested that the reduction in aqueous humor outflow due to the elevation of intraorbital pressure with excessive intraorbital fat tissue and increase in outflow resistance for the episcleral vein through the increase of blood viscosity with weight gain may have led to the increased IOP. Obesity also increase blood viscosity through increased red cell count, hemoglobin, and hematocrit, further increasing outflow resistance of episcleral vein and resulting in elevated IOP, making it an independent risk factor for glaucoma. Moreover, obese persons have other cardiac risk factors such as hypertension, elevated serum cholesterol, and blood glucose levels which increase blood viscosity, reduces aqueous outflow, and elevate IOP. Corticosteroid which has been found to elevate IOP was also similar to those reported by Mori et al. and Zafar et al.

The NC is hypothesized by some authors to be a predictor of obesity and overweight, and that larger NC may be associated with a higher prevalence of cardiovascular risk factors such as hypertension and diabetes. Majority of the studies carried out on NC were associating a larger NC to cardiovascular diseases and obesity with a dearth of information or published data on its relationship with IOP or glaucoma. The positive relationship between IOP and NC found in this study was in contrast with findings in the study by Theelen and colleagues who found no significant relationship between NC and IOP. This may be due to the fewer numbers of subjects they studied. Possible reason for the association found in this study may be the distribution of upper body fat in the neck; where this may have a pressure effect on the blood vessels in the head and neck region. The pressure in the artery is much greater than that in the vein, whereas the flow through the vein is supported by gravity. Increased arterial pressure forces flow of blood upward despite large upper body mass, whereas gravity may not be sufficient to drain the blood through the vein into the heart, thus results in backflow and restriction along the superior vena cava. Further restriction and accumulation will cause increased episcleral backflow and elevated IOP. It is imperative to say that people with short stout necks are at higher risk of developing glaucoma through elevated IOP than individuals with long slim NC.

**Conclusion**

The BMI and NC which are major indices of obesity were associated with IOP in this study. These parameters could be explored as potential modifiable risk factors in glaucoma screening and management. One of the limitations of this study is that inferences from this study are not representative of most communities because the study was limited to subjects in an academic environment which are more health conscious and less likely to be obese compared to the uneducated population. It is recommended that further research should be performed to further establish the relationship between anthropometric parameters and IOP in other environments and should incorporate subjects of all socioeconomic statuses and different occupations for better representation of the community.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**


Comparison of the Sanders–Retzlaff–Kraff II and Barrett Universal II Intraocular Lens Formula in Eyes with Normal Axial Lengths

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Abstract

Introduction: This study evaluates the difference between two intraocular lens (IOL) power calculation formulas in postphacoemulsification surgery patients with the axial length (AXL) ranging from 22.00 to 24.50 mm. Aim: This study aimed to know the accuracy and the relevancy of Sanders–Retzlaff–Kraff (SRK) II IOL formula compared with Barret Universal II IOL formula to minimize the refractive prediction error (RPE) Value in eyes with normal AXL. Methods: This retrospective study reviews the medical records of 35 patients who had cataract surgery. The differences of RPE value in SRK II and Barrett Universal II IOL formula were analyzed using repeated-measures analysis of variance. Results: There is no statistically significant difference in the RPE value between the two IOL formulas. Each formula has the standard deviation of RPE value ±0.50 D in 62.8% of patients and ±1.00 D in 94.3% to 97.1% of patients. Conclusion: The RPE distribution range in both formulas in eyes with normal AXL was within the benchmark standard of The United Kingdom National Health Service. SRK II formula can be preferred in a high backlog country.

Keywords: Barrett, cataract, IOL calculation formulas, phacoemulsification, Sanders–Retzlaff–Kraff, refractive prediction error

Key Messages

Barret Universal II is one of the most accurate IOL formulas to use because of the known ability to minimize the RPE value, but due to the increased number of backlogs and some limitations that some countries had in biometric devices, the use of regression-based formula can be preferred.

INTRODUCTION

Due to the coronavirus disease 2019 pandemic, many ophthalmic healthcare services are postponed to prevent the spread of the virus. So that, as an impact, the increasing backlog for elective cataract surgery was followed.[1] Along with the increased number of demands, cataract surgery not only focuses on the visual rehabilitation but also in the implementation of cost-effectiveness in surgery as well as achieving the precise postoperative refractive prediction value.[1,2] Refractive prediction error (RPE) postcataract surgery needs to be as low as possible. The aim of the RPE value that needs to be achieved according to The United Kingdom National Health Service is ±1.00 D in 85% cases, and 0.50 D in 55% cases.[3] Accurate data measurement of axial length (AXL), anterior chamber depth (ACD), corneal curvature (K1 & K2), and intraocular lens (IOL) power calculation formula is needed.
to minimize RPE value. Several IOL power calculation formulas can be used with similar results.

One of the most accurate IOL power calculation formula nowadays is Barrett Universal (BU) II. This formula uses “paraxial ray tracing” (Gaussian/thick lens) variables to minimize the RPE value. Barrett formula is also known as “universal formula” because it was designed to be used in many kinds of lens types and AXL conditions. First introduced in 1993 and modified later in 2010. Barrett formula is easy to implement as it can be accessed freely via the Internet (http://www.apacrs.org/disclaimer.asp?info=5). This formula requires AXL, K, ACD variables, and with/without additional variables such as lens thickness and horizontal white to white distance for more accurate calculation.

In this study, we compared the accuracy of IOL power calculation methods, which was calculated automatically using SonomedPac 300A-scan device, commonly used in Atma Jaya Hospital [Sanders–Retzlaff–Kraff (SRK) II], with another more advanced formula, BU II. The aim of the study was to know whether SRK II methods were still relevant when used in comparison with newer IOL calculation methods.

**Subjects and Methods**

This retrospective study reviews the medical records of patients who underwent phacoemulsification cataract surgery and posterior chamber IOL (PCIOL) implantation between July and August 2017 at Atma Jaya Hospital, North Jakarta, Indonesia. Ethical clearance was sought and obtained from the ethical clearance committee of Medical Catholic University of Atma Jaya in September 2017 and was performed 1 week before the data were extracted. Inclusion criteria were as follows: Surgery was performed by a single surgeon with superotemporal approach phacoemulsification and PCIOL within the bag implantation (square edge, aspheric, foldable PCIOL); clear corneal incision 2.75 mm; biometric examination was carried out preoperatively with SonomedPac 300A-scan; postoperative best corrected visual acuity is 5/7.5 or better; AXL ranging between 22 and 24.5 mm; and there is no postoperative complication until the 21st days. Whereas the exclusion criteria were: eyes with any history of intraocular surgery before, ocular trauma, and intraoperative or postoperative complications that could affect the refractive outcomes.

The sample size required to compare the IOL power calculation methods was 26, calculated using repeated-measures analysis of variance (ANOVA) with 0.05 P-value, 80% of power. The mean difference of the RPE value was ±0.50 D, with standard deviation of ±0.30 D. The assumption correlation between two formulas was 0.9.

The SRK II of IOL power calculation was the results calculated automatically with SonomedPac 300A-scan and manually by using Microsoft Excel application to ensure the results. BU II was calculated by using an online calculator available at http://www.apacrs.org/disclaimer.asp?info=5 AXL, ACD, K1 & K2, and lens thickness (L) variables were extracted from the patients’ medical records for the calculation.

The RPE is known as the difference between presurgical refraction of patients subjectively in the Snellen chart and postsurgical refraction or the prediction of refractive value postsurgically from each formula. For statistical analysis, we use the smallest RPE value as a target and the data were extracted after 21 days postsurgery. The frequency and percentage of distribution from every RPE (0.50 D, 1.00 D, and 2.00 D) was calculated and analyzed to find the differences between the two formulas. Statistical analysis computed with R Statistics (version 3.3.3) and R studio (version 1.0.136). Biographical and Biometrical data were used. Repeated-measures ANOVA were used to compare the mean value of RPE from SRK II and BU II formulas.

**Results**

There were a total number of 81 postphacoemulsification eyes performed by a single surgeon. Thirty-five eyes of 34 patients met the inclusion criteria and included in this study. Demographic and biometric data are summarized in Table 1. Each median of the RPE value from BU II and SRK II formula is 0.38 D and 0.44 D [Figure 1]. The distribution analysis was performed by the histogram visualization and

**Table 1: Demographic and preoperative biometric data**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>64 (10.19)</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>43.62 (1.44)</td>
<td></td>
</tr>
<tr>
<td>Ocular</td>
<td>44.44 (1.49)</td>
<td></td>
</tr>
<tr>
<td>OD</td>
<td>2.88 (0.32)</td>
<td></td>
</tr>
<tr>
<td>OS</td>
<td>4.04 (0.66)</td>
<td></td>
</tr>
</tbody>
</table>

ACD, anterior chamber depth; AXL, axial length; K, keratometry; L, lens thickness; OD, oculi dextra; OS, oculi sinistra; SD, standard deviation.
Both formulas had the RPE value ranges within patients (formula; and 34 patients (97.1%) for SRK II formula. All refraction with better accuracy. However, this study other theories followed suit, trying to achieve postsurgical 1960 first came up with a formula for IOL calculation, various configuration, location of principal plane, and ocular regression-based IOL formula similar to SRK I, adjusting for normal AXL, is a second generation of 300A-scan method would still be relevant.

Table 2: The distribution of RPE value from BU II and SRK II formula

<table>
<thead>
<tr>
<th></th>
<th>≤0.50 D</th>
<th>&lt;1.00 D</th>
<th>≤2.00 D</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU II</td>
<td>22 (62.8%)</td>
<td>33 (94.3%)</td>
<td>35 (100%)</td>
</tr>
<tr>
<td>SRK II</td>
<td>22 (62.8%)</td>
<td>34 (97.1%)</td>
<td>35 (100%)</td>
</tr>
</tbody>
</table>

| Table 2: The distribution of RPE value from BU II and SRK II formula |
|--------------------------|----------|----------|----------|
| BU II  |                            |          |          |
| SRK II |                            |          |          |

BU, Barret Universal; D, diopter; RPE, refractive prediction error; SRK, Sanders–Retzlaff–Kraff.

quantile plot. The Mauchly sphericity test showed that the sphericity had been violated \( \chi^2(2) = 0.003, P < 0.001 \), so further analysis used the Greenhouse–Geisser correction test. Repeated-measures ANOVA test showed no significant difference in RPE value between both formulas \( F(1,17.53) = 0.75, P = 0.47 \).

Both formulas had the RPE value ranges within \(<0.50\) D in 22 patients (62.8%); \(<1.00\) D in 33 patients (94.3%) for BU II formula; and 34 patients (97.1%) for SRK II formula. All patients \((N=35, 100\%)\) had the RPE value ranging within \(<2.00\) D from the refractive target [Table 2].

**DISCUSSION**

The success of cataract surgery is determined by a good postoperative refractive value results.\(^9\) An accurate prediction of postsurgical refraction still poses a challenge. An appropriate formula to determine an accurate IOL is an essential determining factor.\(^10\) Ever since Fyodorov et al. in 1960 first came up with a formula for IOL calculation, various other theories followed suit, trying to achieve postsurgical refraction with better accuracy.\(^11,12\) However, this study evaluated the accuracy of two different IOL formulas from the older to newer generation, which are SRK II and BU II, on 35 eyes with 22 to 24.5 mm AXL to know whether the older method would still be relevant.

The SRK II, integrated in the biometric device SonomedPac 300A-scan for normal AXL, is a second generation of regression-based IOL formula similar to SRK I, adjusting A-constant empirically through thickness of the lens, optical configuration, location of principal plane, and ocular position.\(^10,13\) BU II is a fourth generation formula calculating IOL used utilizing corneal diameter and lens thickness to predict the IOL position more accurately.\(^14\) This formula utilizes the “paraxial ray tracing” theory, otherwise known as the Gaussian/thick lens variable.\(^15\)

The RPE is known as the deviation from presurgical predicted target refraction and postsurgical refraction. RPE is often used as an indicator to predict the accuracy of IOL formula.\(^14\) In this study, both formulas had good RPE ranges within the benchmark standard as The United Kingdom National Health Service presented and there was no statistically significant difference between both formulas [Table 2]. This study used repeated-measures ANOVA analysis to adjust for individual variability. Our study has a similarity with Kuthirummal et al. who also compared four IOL formulas, which include second and third regression-based formula (SRK II and SRK/T) and BU II formula. However, the study was using eyes with short, normal, and long AXL groups. This study stated that BU II had a significant difference and more superior than both of the regression-based formulas, yet more importantly both BU II and SRK/T formulas achieved the target distribution of RPE value as presented by The United Kingdom National Health Service but not for SRK II formula.\(^7\) Kane et al. also concluded that the BU II formula indeed was the most accurate formula to predict the eye with many kinds of AXL.\(^16\)

However, both regression-based formulas (SRK II and SRK/T) are still one of the most common IOL formulas used in India by most cataract surgeons. It is because they are easy to implement without the necessity of advanced biometry devices.\(^7\) And former study by Elder stated that there was no significant difference between SRK II and SRK/T to predict the refraction value in eyes with normal AXL similar with our finding.\(^17\)

Although both SRK II and BU II formulas achieved the target distribution of RPE value as presented by The United Kingdom National Health Service and there was no statistically significant difference between both formulas in our study, these findings must be interpreted with caution and some number of limitations should be borne in mind. In spite of partial coherence interferometry (PCI), biometric examination was performed preoperatively using applanation technique with SonomedPac 300A-scan. A study by Cooke and Cooke stated that the BU II formula performs better when the measurement is done using PCI.\(^8\) Furthermore, Zhang et al. stated that the BU II formula had the lowest RPE compared to some other formulas in patients with high myopia (AXL >24.5 mm).\(^5\) But the sample in this study had a normal AXL range (22–24.5 mm). The PCI has the highest test accuracy, followed by the immersion technique then the applanation technique. PCI has the advantage of higher accuracy in patients with myopia, pseudophakia, and staphyloma.\(^18\) The accuracy difference in applanation technique (contact technique) can be due to the pressure on the cornea, causing the AXL to be 0.1 to 0.3 mm shorter than other methods.\(^19\) However, trained surgeons will be able to achieve relatively similar AXL results even using A-scan biometry.\(^18\) On the other hand, PCI is less accurate in cases of mature cataracts, posterior subcapsular cataracts, or in patients with difficulty in visual fixation. The A-scan is more appropriate for these types of cases.\(^20\) The authors believe that PCI is still a superior approach to use, but not in every situation due to the cost.\(^21\)

Based on these findings, we concluded that the use of regression-based formula in eyes with normal AXL still can be relevant especially in a low-resource setting. The high backlog number of cataracts in Indonesia requires effective and efficient operative procedures. Remembering that our data analysis did not find any statistically significant
difference from both IOL formulas used on eyes with normal AXL. Additionally, the RPE distribution range between two formulas was still within the benchmark standard of The United Kingdom National Health Service.

**Conclusion**

Postoperative vision is an indicator of cataract surgery success. An important factor in determining postoperative refraction is the accuracy of the IOL formula. Our study did not find any statistically significant difference in RPE between SRK II formula and BU II in patients with normal ocular AXLs. A cheaper procedure can be used in the limited setting area.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

Pattern of Ophthalmic Lesions in a Tertiary Health Institution in South-South, Nigeria


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Abstract

Objective: Ophthalmic tumors are tumors that occur in the eyes and other related structures. These lesions involve a wide range of pathologic conditions ranging from benign to malignant lesions and are common in Africa. Although there have been a number of published reviews on this subject, none was carried out in this environment. This study seeks to determine the pattern, prevalence, and types of ophthalmic tumors reported in Calabar, southern Nigeria. Methods: Patient’s hospital records were retrieved from the Department of Pathology, University of Calabar teaching hospital within the period of 2008 to 2016 and analyzed to obtain required information. Results: A total of 70 ophthalmic tumors were diagnosed during the study period of which 50.0% were malignant. Males were slightly more affected than females (ratio 1.3:1) accounting for about 55.7%. The top three ophthalmic malignant tumors were squamous cell carcinoma, retinoblastoma, and embryonal rhabdomyosarcoma contributing 21.4%, 17.1%, and 5.7%, respectively, of all eye tumors. Dermoid cyst (8.5%) was the most common benign ophthalmic tumor reported. In all, three cancer incidence peaks were observed at 0 to 10 (42.9%), 21 to 40 (43.2%), and 41 to 50 (14.3%) age groups. Retinoblastoma was the most common cancer in children and squamous cell carcinoma was commoner among adults. Conclusion: The prevalence of malignant and benign eye tumors was the same in this review. A delay in diagnosis was a characteristic feature. Early presentation to eye-care facilities for appropriate and early intervention is highly recommended to prevent potential loss of eyesight and even death.

Keywords: Benign eye tumors, Calabar, cancer, dermoid cyst, epithelial tumors, malignant eye tumors, ophthalmic lesions, retinoblastoma, squamous cell carcinoma

INTRODUCTION

Ophthalmic lesions simply refer to the pathology of the eye and its related structures. It involves a wide range of pathologic conditions ranging from benign lesions (noncancerous) to malignant lesions (cancerous) that develop in or around the eye. However, benign or malignant ophthalmic lesions can cause vision problems or disfigurement if they are left untreated. They can also spread to various parts of the body such as the optic nerve, the brain, and the rest of the body, posing a threat to the life of an individual. The eye which is a special and unique sensory organ exhibits a diverse histologic feature; hence, the knowledge of normal ocular structure and spectrum of pathologic changes is of utmost importance especially in providing histologic diagnosis of ophthalmic lesions. There exists a high variation in the pattern and frequency of ophthalmic lesions in different regions of the world. According to a World Health Organization (WHO) 2010 report, out of the world’s 39.4 million blind population, the African region accounts for 5.9 million (15%) ranking third after China (20.9%) and India (20.5%). Symptoms of
Ophthalmic tumors vary depending on if they are benign or malignant and their site. In children with eye tumors, common symptoms include a large white or reddish painful pupil, redness or swelling near the eye, bulging or crossed eye, and bright red birthmark on or near the eye.[1] It is strongly advised that patients who notice such symptoms visit the clinic immediately as early diagnosis will increase the chances of preservation of sight. Although there have been different reports on ophthalmic lesion in Nigeria and in other countries, we could not find any such report in Cross River State (CRS) which is situated in the southern region of Nigeria. This study would probably be the first report of the pattern and prevalence of ophthalmic lesions in CRS, South-South Nigeria.

**Research Design**

This was a retrospective study involving the review of patient’s ophthalmic biopsy records from 2008 to 2016 in the Department of Pathology, University of Calabar.

**Materials and Methods**

The University of Calabar teaching hospital (UCTH) is located in the southern senatorial district of CRS. It is a tertiary hospital with a capacity of 600 bed spaces and receives referrals from all secondary health facilities within and outside CRS. The Department of Pathology is involved in the evaluation, categorization, and diagnosis of tumors from any part of the body. No record was available for the year 2012. The specimen had been fixed, processed, and stained with hematoxylin and eosin (H&E). The use of special stains such as Mallory phosphotungstic acid hematoxylin and immunohistochemistry for CD20, S100, and Desmin were employed where necessary.

Biodata comprising of age, sex, nature of specimen, site of tumor, and diagnoses was retrieved from the laboratory records and the tumors were classified as either benign or malignant following the WHO international classification of eye tumors and its adnexa.[3] Analysis was performed by EPI Info and variables were expressed as frequencies and percentages. The study was approved by the Health Research Ethics Committee of the UCTH.

**Results**

A total of 70 ophthalmic lesions were recorded within the study period. Thirty percent were benign and 50% malignant, whereas borderline tumors and pseudotumors constituted approximately 7% and 13%, respectively [Figure 1]. Males were slightly more affected than females (ratio = 1.3:1) accounting for about 55.7%. The top three ophthalmic malignant tumors were squamous cell carcinoma (15), retinoblastoma (12), and embryonal rhabdomyosarcoma (4) comprising 43%, 34%, and 11% of the malignant tumor, respectively [Table 1]. A few border-line, premalignant lesions were also observed; these were predominantly conjunctiva squamous cell intraepithelial neoplasia (4) and low-grade astrocytoma (1). Dermoid cyst (6) was the most common benign tumor accounting for about 8.6% of total ophthalmic lesions. Also reported were some pseudotumors; granulation tissue (4) was the commonest among this group followed by chronic granulomatous inflammation (most probably tuberculosis; 2) and panophthalmitis (2) [Table 2]. Forty percent (28) of all the tumors were from mesenchymal origin, followed closely by epithelial tumor (33%) [Table 3]. Although there were more mesenchymal tumors, epithelial malignancies were still the predominant malignant tumors observed [Table 3]. All the developmental tumors were benign, whereas all the pigmented tumors were malignant. Of the 12 cases of retinoblastomas reported, 11 (91.7%) occurred in children under the age of 10 years. Cases of squamous cell carcinomas (21.4%) were reported in adults 20 years and older and accounted for 83.3% of all ophthalmic malignancies among adults between 21 and 40 years of age. The peak incidence of ophthalmic tumors was at the first decade of life accounting for about 21.4% [Table 4].

**Discussion**

Ophthalmic lesions remain an important cause of morbidity and mortality worldwide. Several studies have indicated that 50% to 70% of adult patients with acquired immunodeficiency syndrome (AIDS) will experience...
ophthalmic complications in their lifetime. As incidence rate of HIV and AIDS are reported to increase, there is a likelihood of an increase in ophthalmic lesions especially in developing countries such as Nigeria. However, a staring observation in our study was the relatively small number of ophthalmic specimens sent to the pathology department for diagnosis during the period under review in comparison with studies from other centers covering comparable duration. Some researchers elsewhere reported as much as 210 and 440 orbital samples in Lagos and Ibadan over a 10- and 11-year period, respectively. The former was limited by age conducted among children 14 years and younger. Umar et al. in Kano and Akpe et al. in Benin City, Nigeria reported patient populations of 438 and 148 over comparable durations of 12 and 8 years, respectively. One reason for the relatively low samples in our study may be that some of the patients with ophthalmic tumors did not reach our center possibly due to the location of the teaching hospital in the state. The UCTH is located at one end of the CRS some 300 km away from some local government areas in the state. This distance may be as much as three times more than other teaching hospitals located in neighboring states such as Ebonyi and Enugu. Doctors working at secondary health facilities may consider it more convenient to send patients to these other relatively closer government-owned tertiary hospitals. Another possible reason could be due to the periodic free eye surgery program that is organized by the CRS government. Many people take advantage of this program especially because it is free. Access to eye care at the University of Calabar teaching hospital will require out of pocket expenses. Unfortunately, surgical biopsies from such programs rarely get to the pathology departments for proper diagnoses probably due to the fee for service involved. It may also be due to lack of poor usage of laboratory services by patients in the center or that such tissues are rather sent to other private pathology facilities around the institution.

In this study, males were slightly more affected than females with a male to female ratio of 1.3:1. This was similar to findings of several studies on the pattern of ocular tumors in Nigeria and even outside Nigeria. This male preponderance in our environment has been attributed by some researchers to be due to higher attendance of male subjects at hospitals in Nigeria arising from the relative importance the society attaches to the male over the female child. This may not be far from the truth as most communities in Nigeria see the male child as the

<table>
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<th>Table 2: Summary of different lesions, number of cases, and percentages</th>
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<td><strong>Tumors</strong></td>
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<tr>
<td>Squamous cell carcinoma</td>
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<td>Retinoblastoma</td>
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<td>Embryonal rhabdomyosarcoma</td>
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<td>Kaposi sarcoma</td>
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<td>Ocular melanoma</td>
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<td>Conjunctival melanoma</td>
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<td>Low-grade pilocystic astrocytoma</td>
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<td>Chronic granulomatous inflammation</td>
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<td>Conjunctival dysplasia</td>
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<td>Trichoepithelioma</td>
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<th>Table 3: Classification of ophthalmic lesions according to cell of origin</th>
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<td><strong>Category</strong></td>
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<td>Epithelial tumors</td>
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<td>Mesenchymal tumors</td>
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<td>Developmental tumors</td>
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<td>Pigment tumors</td>
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<td>Inflammatory/pseudotumors</td>
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<th>Table 4: Age distribution of malignant tumors</th>
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<td><strong>Diagnosis/age (years)</strong></td>
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<tr>
<td>Squamous cell carcinoma</td>
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$n,$ number.
future of the family and this is likely to influence care, attention, and educational investment on them. The same male predominance though was reported by researchers outside Africa.\[16\] However, a male to female ratio of 1:1 was reported by researchers in Benue State, North-Central Nigeria.\[17\] Other studies reported more ophthalmic tumors in females (1:1.2) in the South-West,\[18\] North-West region of Nigeria\[19\] and in Nepal.\[19\] There was a wide variation in the distribution of ophthalmic lesions from these studies. Malignant ophthalmic lesions were as common as benign ones accounting for 50% of all tumors in this study. This is at variance with most similar studies conducted among Nigerians,\[6,9,11,14,17,20\] The relatively small number of cases in this study may have contributed to this observation. Studies with more cases have consistently demonstrated a higher percentage of malignant over benign eye lesions.\[9,10\] The general observation is that malignant eye tumors are more frequent than benign ones. This is not likely the case but probably due to the fact that most surgeons will not send benign lesions for histologic appraisal.

Our study indicated that the most common ophthalmic malignancies in Calabar were squamous cell carcinoma and retinoblastoma accounting for 21.4% and 17.1%, respectively. This is similar with reports from a study carried out in Benin City, Nigeria, although with slightly lower frequencies than ours.\[11\] Retinoblastoma was reported by other researchers in Nigeria to be the most common ophthalmic malignancy.\[6,10-12,18\] It is important to note that 98% of retinoblastoma occurs within the age range of 0 to 10 years and that is the same trend we observed in this study where over 90% occurred in the same age bracket. It still remains the most prevalent childhood ophthalmic cancer as reported in Singapore.\[16\] Squamous cell carcinoma was the most common ophthalmic malignancy in adults in Nigeria and Africa as a whole and most prevalent skin cancer.\[21\] The upsurge in the prevalence of squamous cell carcinoma may be the association of the tumor with HIV/AIDS.\[7\]

Rhabdomyosarcoma of embryonal origin was diagnosed in four cases accounting for about 5.7% of the entire ophthalmic tumor and 11.4% of the malignant lesions. This finding is similar to studies carried out in Kano, northern Nigeria, where incidence rate of rhabdomyosarcoma was recorded to be 6%.\[10\] All the four cases of embryonal rhabdomyosarcoma in our study were within the age range of 0 to 10 years. Furthermore, all the pigmented tumors were malignant and were found to be melanoma. Studies by Omotoso et al.\[22\] showed that melanoma could be distributed all over the body with only 2.8% on the orbital region. Benign lesions constituted 30% of all cases reviewed. Dermoid cyst was the commonest benign tumor accounting for 75% of the developmental lesions. This is at variance with the Kano report,\[16\] where squamous papilloma and hemangioma were the predominant benign lesions. Pediatric orbital tumors differ and are distinct substantially from adult types, more often congenital benign lesions and infections ranging from developmental cystic lesions (e.g., dermoids, teratoma), to vascular lesions (e.g., capillary hemangioma, lymphangioma) to optic nerve gliomas (e.g., pilocysticastrocytomas).\[23\] Inflammatory lesions or pseudotumors often mimic lesion that would require surgical intervention. Omotoso et al.\[24\] in 2013 described onchocercoma, histoplasmosis, mycetoma, and tuberculosis as some of the common inflammatory conditions that mimic tumor. Chronic granulomatous inflammation most probably TB constituted 22.2% of the inflammatory lesion reported in the study.

**Conclusion**

This study revealed a high prevalence of retinoblastoma among our children and squamous cell carcinoma among young and middle-aged adults. Late presentation is the rule rather than the exception. Doctors and patients alike should be encouraged to utilize the histologic services available in the institution. There is need for further studies on the progression of some of the premalignant lesions reported in this study and more advocacies for early intervention on these tumors.

What is already known on this topic

1. HIV/AIDS may aid the development of ophthalmic malignant eye tumors
2. Malignant ophthalmic lesions are commoner than benign tumors

What this study adds

1. Malignant eye lesions may just be as common as benign one in CRS contrary to most other states in Nigeria
2. Ophthalmic cancers have bimodal peaks in CRS, one in children 0 to 10 years of age (retinoblastoma) and the second peak in adults 21 to 10 years old (squamous cell carcinoma).

**Authors’ contributions**

A. Omotoso conceived the study, collected data, and wrote the initial draft. K. Inaku edited the manuscript and made further inputs as required. A. Ibanga, S. Okonkwo, M. Kooffreh-Ada, and P. Ada reviewed the manuscript for intellectual content and accuracy. G. Ebughe and I. Bassey had a final overview of the manuscript. All authors reviewed and approved the final manuscript.

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**Conflicts of interest**

There are no conflicts of interest.

**References**


Resolution of Posttraumatic Brown Syndrome in a Child Following Treatment with Oral Steroid: A Case Report

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Abstract

Aim: To report a case of acquired Brown syndrome in a child following trauma and its response to oral steroids. Case Report: A 4-year-old child was brought to us with complaints of adopting abnormal head posture following a fall while playing and injuring his head. On examination, he had features of the acquired Brown syndrome of the right eye. Magnetic resonance imaging of the brain and orbits was normal. A course of oral steroids was given and the symptoms resolved after a month of treatment. Conclusion: Acute onset of abnormal head posture following trauma warrants keen evaluation of ocular movements and cover tests in all gazes to ascertain the cause. Acquired Brown syndrome should be considered in children following head trauma and it responds well to oral steroids.

Keywords: Abnormal head posture, brown syndrome, trauma

INTRODUCTION

Brown syndrome with its characteristic limitation of elevation in adduction was first described by Harold W. Brown[1] in 1973, and may present as a congenital or acquired condition. The restricted movement of the superior oblique tendon in its pulley viz. trochlea is the underlying pathogenesis for both congenital and acquired forms. This has been attributed to shortness of the superior oblique tendon or of the anterior sheath of superior oblique muscle in congenital forms.[1-3] With the detailed understanding of congenital cranial dis-innervation disorders, it is classified under these disorders currently.[4]

Acquired Brown syndrome has been reported more commonly in association with inflammatory and idiopathic causes than following trauma,[5-7] and steroids have been the mainstay of treatment in acquired Brown syndrome.[6-8]

CASE REPORT

A 4-year-old boy was brought by his parents with abnormal head posture following a fall one week prior to presentation. Parents had noticed a little amount of nasal bleed following the fall. There was no loss of consciousness or any abnormal behavior following the fall. There was also no history of fever, neck stiffness, seizures, or weakness of limbs prior to the complaints. His past medical history and birth history were normal. On examination his general physical condition was normal.

Ophthalmic examination showed that his best-corrected visual acuity in both eyes was 6/6 with Snellen number chart and N6 with near vision chart. The child adopted a face turn towards the left along with a head tilt to the right. Extraocular movements showed a limitation of elevation (~3) in the right eye [Figure 1]. Alternate Prism Cover Test (APCT) showed left hypertropia of 8 prism dioptries (PD) in primary gaze, 12 to 14 PD in left gaze, and orthophoria in right gaze. Left hypertropia was also noted in up gaze (approximately 20–25 PD) and left head tilt (14–16 PD). Anterior segment and fundus examinations were found to be within normal limits. No torsion was noted on fundus examination. A provisional diagnosis of right acquired Brown syndrome was made and radiological investigations that...
included magnetic resonance imaging (MRI) of the brain and orbit were carried out to rule out fracture orbit or inferior oblique palsy. MRI reports showed no significant abnormalities.

The patient was started on oral steroids, that is, prednisolone 1 mg/kg body weight that was tapered over 1 month. After 1 week, the child was symptomatically better. There was a reduction in abnormal head posture, the extraocular movement showed only minimal limitation of elevation on adduction (−1) and APCT showed left hypertropia of 3 PD in primary gaze, and 5 PD in left gaze and left head tilt. The dose of steroid was tapered and the patient was asked to come for a follow-up visit after a week. The patient was asymptomatic after a month with complete resolution of abnormal head posture. Extraocular movements were full in all directions of gaze and APCT showed no deviation in primary gaze and all gaze positions [Figure 2].

DISCUSSION

Acquired Brown syndrome can be due to local orbital inflammation from contiguous infection of the paranasal sinuses or the globe, or the result of general inflammation like rheumatoid arthritis, systemic lupus erythematosus, or idiopathic tenosynovitis. It can also be secondary to direct trauma (injury or iatrogenic following excessive superior oblique tucking) in the region of the trochlea of the superior oblique or rarely due to primary and secondary tumors of the orbit.[1-3]

Our case presented with abnormal head posture following trauma with no other systemic associations; suggesting trauma as the etiology. MRI findings may be inconclusive in acquired cases, but neuroimaging was done in our case to rule out other causes of Brown syndrome.

Inflammatory etiology such as post febrile illness or idiopathic conditions have been reported as causes of the acquired Brown syndrome in children.[5-7] Our case is unique in being of posttraumatic etiology in a young child.

Steroids in various routes of administration viz., oral, intramuscular, and intra-trochlear routes have been shown to be useful in treating acquired Brown syndrome.[6-8] Intra-trochlear steroids were used by Ravilla et al.,[7] in children not responding to oral steroids while oral steroids were used by Chhablani et al.,[6] similar to our case. Treatment of systemic inflammatory conditions is needed when acquired Brown syndrome is caused by such conditions. Our case, which was secondary to trauma, responded promptly to oral steroids.

Figure 1: Nine gaze photographs showing primary gaze left hypertropia and limitation of elevation in adduction in the right eye at presentation.
CONCLUSION

In conclusion, the occurrence of acute onset abnormal head posture following trauma warrants detailed oculomotor evaluation to ascertain the cause. Acquired Brown syndrome should be considered in children following trauma and it responds well to oral steroids.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES


Figure 2: Nine gaze photographs showing primary gaze orthotropia and improvement of elevation in adduction in the right eye after a month of treatment.
Acute Acquired Comitant Esotropia after Amniotic Membrane Transplantation in a Case of Vernal Keratoconjunctivitis

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Abstract
Acute acquired comitant esotropia (AACE) is an uncommon form of strabismus in older children and adults. It is characterized by acute onset concomitant esotropia and diplopia. It can occur as a result of monocular occlusion, vision loss, physical stress, or high myopia. We describe a child with chronic vernal keratoconjunctivitis with nonhealing shield ulcer who presented with AACE due to disruption of fusion following amniotic membrane transplantation. To the best of our knowledge, AACE following amniotic membrane transplantation has not been reported till date.

Keywords: Acquired comitant esotropia, acute esotropia, amniotic membrane

INTRODUCTION
Acute acquired concomitant esotropia (AACE) represents a relatively uncommon distinct subtype of esotropia, which occurs in older children, adults, and even the elderly.[1-3] It is characterized by acute onset concomitant esotropia and diplopia. Various types of esotropia have been described, such as type I or Swan type, type II or Franceschetti type, and type III or Bielschowsky type.

Type I or Swan type: It results from temporary or permanent monocular occlusion or vision loss. The duration of interruption of fusion required to develop acute concomitant esotropia is not clear though.[2,3]

Type II or Franceschetti type: It is associated with physical or psychologic stress, low hyperopia, and minimal accommodative component with large-angle esotropia.

Type III or Bielschowsky type: It is associated with varying degrees of myopia and shows equal deviation at distance and near.[2,3]

Vernal keratoconjunctivitis (VKC) is a bilateral, usually seasonal, recurrent, allergic inflammation of the conjunctiva occurring in children and young adults. Treatment of VKC requires a multipronged approach that includes topical or systemic therapy and surgical treatment in the form of corneal plaque removal and amniotic membrane transplantation (AMT) for severe shield ulcer. AMT is known to be progressively absorbed by 2 weeks.[4]

We present a case of VKC with nonhealing shield ulcer, which was treated with AMT. Follow-up after 2 weeks showed development of esotropia in our case. Occurrence of type I AACE after AMT and patching of the operated eye is rare and hence being reported.

CASE HISTORY
A 9-year-old boy diagnosed with chronic VKC presented to us with a history of diplopia and convergent squint in left eye. The child had undergone AMT in the left eye 2 weeks earlier for nonhealing shield ulcer. No history of trauma or symptoms of raised intracranial tension were noted. There was no history of squint previously.

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On examination, visual acuity was found to be 20/20 N6 in the right eye and 20/40 N6 in the left eye. No abnormal head posture was noted. Alternate prism cover test (APCT) showed 35 prism diopters (PD) of esotropia at distance and 35 to 40 PD of esotropia at near. APCT showed 30-PD esotropia in all gazes, with no A or V pattern. Ocular motility examination showed normal range of movements [Figure 1].

Examination of the anterior segment showed papillae in upper tarsal conjunctiva in both eyes, with healing shield ulcer in the left eye. Results of the posterior segment examination were found to be within normal limits. Cycloplegic refraction (cyclopentolate 0.05% eye drops twice and tropicamide eye drops once were used 10 minutes apart and retinoscopy was performed after last drop) showed (OD) +2.0/-0.50 at 40° and (OS) +2.0/-0.5 DC at 60°.

Magnetic resonance imaging (MRI) of the brain was advised, which showed cystic lesion of 2.3 × 1.3 cm in the right cerebellopontine angle suggestive of arachnoid cyst. No aberrant vascular loops or neurovascular conflict was observed. Type I AACE was diagnosed.

The child was prescribed glasses and alternate patching for 2 hours/day. Child was compliant with glasses. At 1-month follow-up, APCT with spectacles showed 35-PD esotropia at distance and 35- to 40-PD esotropia at near. Lateral gaze measurements were 30-PD esotropia. Worth four-dot test (W4DT) showed alternate suppression.

Repeat MRI of the brain performed 4 months later showed persistent right cerebellopontine angle cyst of no significant interval change in size, morphology, or mass effect. After taking neurologist opinion, squint surgery was advised under general anesthesia.

Child was wearing glasses for 5 months before surgery. Bimedial recession of 11 mm from the limbus was performed. The immediate postoperative day cover test revealed orthophoria at distance and near. One month after operation, the child revealed orthophoria at distance and near [Figure 2]. At last follow-up, stereopsis was observed to be 100 seconds of arc.

DISCUSSION

The AACE is an uncommon form of strabismus occurring in children or young adults.[5] Burian and Miller[1-3] classified acute onset concomitant esotropia into three distinct categories – types I, II, and III. All have common features of being acute in onset, concomitant, with a relatively large angle of deviation, good binocular potential, and no underlying neurologic disease.

Type I AACE occurs after patching for therapeutic reasons or as a result of monocular or asymmetric visual loss. The resulting strabismus in children and young adults is usually in the form of an esotropia, whereas in adults exotropia predominates.[5,6]
Although most children who develop comitant esotropia after occlusion or asymmetric visual loss have hyperopia, several reports emphasize that this may occur in the absence of significant refractive error. Patients with type I AACE will invariably have a history of monocular occlusion or visual loss.

Various intracranial lesions have been reported to be associated with AACE, such as hydrocephalus, Chiari type I malformation, and tumors of cerebellum, brainstem, or sellar region. The presence of A or V pattern and nystagmus should suggest underlying neurologic process.\[^{6,7}\]

A number of treatment options are suggested for AACE including prisms, botox, and surgical correction.

Symptoms of sudden onset of diplopia and esotropia in our patient following patching of the operated eye with AMT suggest type I or Swan type of AACE.

In this case described, AMT (which broke the liable fusion) served as an artificial interruption of fusion. This represents a peripheral obstacle to binocular vision. This is similar to three cases of AACE related to occlusion described by Buch and Vinding\[^{8}\] in a series of 48 cases (same as type I).

As intracranial tumors are also known to be associated with AACE,\[^{7}\] neuroimaging was performed, which in this particular case showed insignificant right cerebellopontine angle arachnoid cyst. The tumors of the brainstem, cerebellum, and corpus callosum and pituitary region have all been reported to be associated with acute onset esotropia. In our case, the small cyst was not associated with compressive effects that could have caused esotropia.

The angle of strabismus remained almost the same with hyperopic correction; thus, surgery was the choice of correction. Other options such as prisms were not considered because of the large angle of esotropia and botox owing to it being a temporary measure. Fusion was restored successfully by performing strabismus surgery with good stereopsis. The child had orthophoria in the postoperative period, with fusion response on WFDT.

According to most studies in nonneurologic cases of AACE (Swan and Franceschetti types), binocular vision is so good that patients retain good stereoscopic vision, which comes as a clue to diagnose retrospectively.

In conclusion, cases of acute acquired esotropia demand carefully obtaining history and careful examination to look for neurologic causes before planning treatment. Correction of strabismus by surgery as opted in our case is usually successful in restoring fusion and stereopsis.

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Figure 2: Nine-gaze photograph showing orthotropia in primary gaze.
**Conflicts of interest**

There are no conflicts of interest.

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A Tale of Two Syndromes: Vogt–Koyanagi–Harada Disease and Acquired Immunodeficiency Syndrome in a Nigerian Female

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Abstract

A 54-year-old female Nigerian presented with a 1-week history of sudden deterioration of vision in both eyes. There was no antecedent history of ocular trauma, floaters, nor flashes of light. However, she gave a history of a febrile illness associated with headaches and malaise 2 weeks prior to onset of ocular symptoms. She is a known retroviral-positive patient on treatment with highly active antiretroviral therapy for the past 5 years but is not a known hypertensive nor diabetic. At presentation, the best corrected visual acuity was hand movement in both eyes. Anterior segment examination of both eyes revealed fine keratic precipitates on the corneal endothelium with flare and inflammatory cells in the anterior chamber and grade 1 nuclear sclerosis. Dilated binocular indirect ophthalmoscopy of both eyes revealed pink disks with blurred margins total exudative retinal detachments. An assessment of Vogt–Koyanagi–Harada syndrome in a patient with human immunodeficiency virus/acquired immunodeficiency syndrome was made. Bilateral exudative detachment resolved with improvement of her best corrected visual acuity to 6/9 in both eyes after systemic treatment with steroids.

Keywords: Vogt-Koyanagi-Harada, HIV/AIDS, Exudative retinal detachment, Vitiligo, Hearing deficit, Alopecia, HAART

INTRODUCTION

Granulomatous inflammatory conditions involving the eyes typically present with mutton fat keratic precipitates, inflammatory cells in the anterior chamber, vitritis, panuveitis, and granulomas. These diverse etiology of granulomatous ocular inflammation which include tuberculosis, sarcoidosis, and Vogt-Koyanagi-Harada disease (VKH) may present with exudative retinal detachments. Detailed clinical evaluation and investigations are the bedrock of differentiating and arriving at the definitive diagnosis of these varying ocular granulomatous inflammatory conditions.[1-3]

The VKH syndrome is a granulomatous, multisystemic, autoimmune disease which affects pigmented tissue such as the eye, inner ear, meninges, skin, and hair which are populated by large numbers of melanocytes.[3] The common ophthalmic presentation of VKH is with bilateral diffuse panuveitis. This syndrome was first described by Koyanagi and then Harada and Vogt at different times; subsequently, the identified clinical signs were noted to involve the same spectrum; hence, the name VKH syndrome.[4] It typically occurs in Asians, people from the middle East, and native Americans but said to be quite rare in Africans.[5]

Nevertheless, a few cases have been documented in people of African descent including an African-American, two Nigerians and a Ugandan respectively.[6-8] The occurrence of VKH with human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) is rare and only one case in an Indian female has been documented in literature to the best of our knowledge.[9] This case report showcases the rare combination of VKH syndrome and HIV/AIDS infection in a female Nigerian.

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CASE REPORT

A 54 year old woman presented via the accident and emergency department with a 1-week history of sudden deterioration in vision in both eyes which she noticed while driving. There was no antecedent history of trauma nor entry of any foreign body. She gave a positive history of a febrile illness associated with malaise and frontal headaches 2 weeks prior to the onset of ocular symptoms. There was no associated history of floaters, flashes of light, haloes, nor ocular pain. She has been using spectacles for reading in the last 5 years. There was no associated history of cough, weight loss, night sweats, nor neck stiffness. An onset of hearing deficit and tinnitus were noticed at the time of onset of ocular symptoms by the patient. She is a known retroviral positive patient diagnosed ten years ago on highly active antiretroviral therapy (tenofovir and lamivudine). She is being treated for peptic ulcer disease but she is not a known hypertensive or diabetic. She has no known allergies and has never received blood transfusions.

The best corrected visual acuity at presentation was hand movement in both eyes with accurate light projection. Anterior segment examination of both eyes showed fine, fresh nonpigmented keratic precipitates on the endothelium in both eyes with flare and grade 2 inflammatory cells. Bilateral nuclear sclerosis grade 2 was present. The intraocular pressure measured by applanation tonometry was 10 mmHg in both eyes.

Ocular examination of the fundi with binocular indirect ophthalmoscopy revealed vitreous cells with blurring of the disc margins, shifting subretinal fluid with a total bullous, and exudative detachment bilaterally. No retinal breaks nor holes were identified. Bilateral exudative retinal detachment with retinochoroidal thickening was confirmed with ocular B-scan ultrasonography, as shown in Figure 1a & b.

The general and systemic examinations were essentially normal. An assessment of bilateral panuveitis in a known retroviral disease patient to rule out choroidal tuberculosis and posterior scleritis was made.

Various investigations were ordered to identify the possible etiology of the bilateral exudative retinal detachments. The erythrocyte sedimentation rate was 36 mm/hour which was slightly above the normal value of ≤20 mm/hour in females, whereas the CD4+ count of 1011 cells/mm³ was within the normal range of 500 to 1200 cells/mm³. The viral load was 10 copies/mL which is <200 copies/mL and is interpreted to mean that our patient had undetectable virus levels indicating good response to HAART; hence, she cannot transmit the virus to others. The full blood count, fasting blood sugar, liver function test, chest X-ray, and Mantoux test were all within normal limits. These investigations ruled out the possibility of infective etiology such as tuberculosis and other granulomatous inflammations such as sarcoidosis.

Our patient was commenced on guttae dexamethasone 2 hourly both eyes, guttae tropicamide tds, tablets omeprazole 20 mg bd, mist magnesium trisillicate, and intravenous methyl prednisolone 1000 mg at 1 mg/kg body daily for 3 days. She was discharged home and subsequently commenced on tablets prednisolone 60 mg daily which was gradually tailed off during her follow-up clinic visits over 3 months.

She was given a referral to the ENT clinic for review by the otorhinolaryngologists who scheduled her for audiometry. The CD4+ and viral load levels were also being monitored by the infectious disease physicians.

During the first 4 weeks of her weekly follow-up visit after discharge, the best corrected visual acuity remained at hand movement in both eyes with minimal resorption of the subretinal fluid. At the sixth week follow-up visit, post-commencement of treatment with steroids, the best corrected visual acuity was noticed to have improved to 6/24-1 and 6/18 in the right and left eyes, respectively.

She also complained of hypopigmented patches on her face and forehead associated with loss of hair around the temples.

Figure 1: Ocular B-scan ultrasonography images of the right and left eyes at presentation showing subretinal fluid (red arrow) & retinochoroidal thickening (blue arrow).
weeks prior to this clinic visit, as shown in Figure 2. Dilated binocular indirect ophthalmoscopy revealed some resorption of the subretinal fluid with shallow retinal detachment [Figure 3a,b]. Optical coherence tomography of the macula performed after commencement of corticosteroid therapy as the subretinal fluid resolved showed few intraretinal cystic spaces with atrophy of the retinal pigment epithelium and loss of the ellipsoid zone bilaterally which was more pronounced in the left eye [Figure 4a & b].

The visual acuity progressively improved over the next 3 months of follow-up and by the fourth month postcommencement of treatment best corrected visual acuity in both eyes had improved to 6/9 bilaterally. The anterior segment was essentially quiet bilaterally with intraocular pressures of 13 mmHg by applanation tonometry in both eyes.

Fundus examination revealed cup disk ratio of 0.3, mild temporal “disc” pallor, resolution of vitritis, attenuated vessels, few hyperpigmented spots at the macula with total resorption of the subretinal fluid, and an orange, sunset glow appearance of both fundi, as shown in Figure 5. Oral prednisolone was gradually tailed off. From 60 mg alternate days over 6 months.

As at the last follow-up visit, her ocular status is stable with best corrected visual acuity maintained at 6/9 in both eyes. She is regular on her HAART and being followed up by the infectious disease unit.

DISCUSSION

Our index patient, a known retroviral infection on HAART presented with a 1-week history of deterioration of vision in

![Figure 2: Hypopigmented vitiligo patches are seen on the face and forehead with areas of alopecia along the frontal hairline and temples of the patient.](image2)

![Figure 3: Fundus photographs of both eyes showing blurring of the disc margins more pronounced in the left eye (purple arrow), resolving subretinal fluid (red arrow) and hazy media presumably due to vitritis.](image3)

![Figure 4: Optical coherence tomography scans of the right and left eye after commencement of corticosteroid therapy as subretinal fluid resolved showing few intraretinal cystic spaces, disruption of the ellipsoid zone and retinal pigment epithelium atrophy more pronounced in the left macula.](image4)
both eyes. Clinical features of bilateral panuveitis represented by fresh keratic precipitates, anterior chamber cells, vitreous cells, and bilateral exudative retinal detachment were present in both eyes. Systemic and ocular investigations performed ruled out inflammatory conditions such as tuberculosis and posterior scleritis that could present in a similar pattern, hence, the delay in diagnosis of VKH. The appearance of vitiligo and alopecia aided in clinching the diagnosis of VKH in subsequent clinic visits.

Immune recovery posterior scleritis is described as a non-infectious occurring in retroviral-positive patients with cytomegalovirus retinitis or other intraocular infections. It occurs when there is a substantial increase in CD4+ T-lymphocyte count. This diagnosis was ruled out in our patient, as the signs of unilaterality of disease, periorcular pain, and the classic T-sign of diagnosis was absent and our patient had CD4+ count values within normal limits.\[10\] Sympathetic ophthalmitis was also ruled out as a possible etiology of the exudative detachment, as there was no antecedent history of ocular trauma or surgery.

Vogt-Koyanagi-Harada syndrome has been classified into four stages namely the prodromal phase, the acute uveitic stage, the convalescent phase and the chronic/recurrent stage.\[3\] Our index patient’s symptoms started with the headaches, febrile illness, malaise, and tinnitus in the prodromal stage before she subsequently presented to our retina unit in the acute uveitic stage with bilateral panuveitic features and exudative retinal detachment.

She had good response to intravenous methylprednisolone and subsequently oral prednisolone which was gradually tailed off over a 6-month period. Corticosteroid therapy is the mainstay of treatment in VKH, though immune modulators such as azathioprine and methotrexate may be used especially in cases of patients with poor response to steroids.\[3,6,7,9\] Our patient had a good response to corticosteroid therapy with resolution of her ocular symptoms and improvement in the best corrected visual acuity from hand movement at initial presentation to 6/9, respectively, in both eyes.

Depending on the presenting clinical features, diagnosis of VKH may be classified as complete, incomplete, or probable VKH.\[5,11\] Our patient had a diagnosis of complete VKH as all the five defining features which include no preceding history history of ocular trauma, lack of laboratory evidence of other uveitic entities, bilateral ocular involvement presenting as choroiditis, or reflected as bullous and serous retinal detachment. Other defining features in our patient were diffuse choroidal thickening on B-scan ultrasonography and sequelae of sunset glow fundus with retinal pigment epithelium clumping. Presence of neurologic and auditory findings of tinnitus and headaches and integumentary finding of both vitiligo and alopecia established the features of complete VKH thus, clinching the diagnosis.\[11\]

Sunset glow fundus is a clinical feature in the convalescent phase; a sequelae of exudative retinal detachment and depigmentation of the choroid are observed as a characteristic orange glow of the retina due to loss of choroidal melanocytes.\[12\] This was also the endpoint of the fundus changes in our patient after reabsorption of subretinal fluid with some pigmentation at the macula.

VKH is thought to be an autoimmune inflammatory condition that is mediated by T-lymphocyte cells that target melanocytes with a larger proportion of cells being of the helper CD4+ cells variety in comparison with the cytotoxic CD8+ cells.\[3,5,13\] The human immunodeficiency virus targets the CD4+ cells which usually initiate immune response of the body.\[14\] Hence, it has been postulated that an immune dysfunction may be responsible for this occurrence as both VKH and HIV/AIDS act along similar cell lines of the CD4+ and CD8+ cell varieties.

Only one other case of VKH with HIV/AIDS has been reported in literature in which the patient was diagnosed with probable VKH in the chronic recurrent stage with bilateral cataracts, secondary angle closure glaucoma, sunset glow fundus, and vitiligo.\[9\] These authors also considered the fact that this coexistence in this patient may just be a rare incidence.

Figure 5: Fundus photographs of both eyes showing orange, sunset glow appearance, retinal pigment epithelial and atrophic changes (green arrow) at the macula after resolution of the exudative retinal detachments.
The CD4+ count of our patient was 1100 c/mm, whereas her viral load was 10 copies/mL, which were both within normal limits with no history or clinical signs suggestive of recent opportunistic infection or immunosupression. In depth research is necessary to understand and correlate any associations between VKH and HIV/AIDS infection.

**CONCLUSION**

VKH is a possible etiology of bilateral panuveitis in patients with retroviral disease. It is essential to thoroughly investigate and rule out other infective and inflammatory ocular conditions more commonly associated with HIV/AIDS to arrive at the diagnosis. Auditory deficit, alopecia, poliosis, and vitiligo in VKH are a sequelae of destruction of melanin-bearing cells due to the autoimmune response attack on the melanocytes and melanocyte-associated antigens. Though a rare association of HIV/AIDS, a high index of suspicion, detailed clinical history, and evaluation with appropriate laboratory work-up is essential for prompt and accurate diagnosis and management.

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**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**


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