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# Management and survival rate of retinoblastoma patients at evangelical church of West Africa (ECWA) eye hospital, Kano

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**Abstract**
**Background:** Clinical management of retinoblastoma poses challenge in poor-resource setting. Enucleation, with chemotherapy are often available treatment options with attendant sequelae.
**Aim**: Evaluate the management and survival rate of patients at Evangelical Church of West Africa Eye Hospital, Kano between December 2014 and January 2006.
**Methods:** Retrospective study of 110 retinoblastoma patients, with parent(s) consent. The patients' biodata and relevant medical history were analysed.
**Results**: Sixty-seven (60.9%) were males. The mean age at presentation was 2.6 years. The average time lapse between manifestation of symptoms and presentation to hospital was 7.1 months. Commonest form of presentation was proptosis (61.8%). Encleation with chemotherapy was the intervention with the highest number of survival rate after 4 year follow-up. There was weakly positive association between the survival rate and the intervention employed.
**Conclusion**: Commonest presentation of retinoblastoma are proptosis, cat eye reflex and fungating mass. The survival rate is low (6.4%).

**Keywords:** retinoblastoma, management, survival rate, ECWA eye hospital

## Introduction

Retinoblastoma is a primary malignant intraocular tumour that arises from neuroectoderm of a developing retina. It is the most common primary intraocular tumor of childhood [1]. In Nigeria, retinoblastoma has been found to be the second commonest childhood tumor accounts for approximately 1% of all deaths from cancer in paediatric age group [2-4]. The clinical management of patients with retinoblastoma often poses a huge challenge in poor-resource setting where ignorance, poverty and late presentation of cases hold sway leading to poor survival rate of the patients [4]. Enucleation, exentration, external beam radiotherapy, focal therapies such as cryotherapy, laser and plaque radiotherapy, combination of focal therapy with chemoreduction are often the available options for the treatment of retinoblastoma with their attendant sequelae.

The mode of presentation of the disease is an important factor in timely diagnosis, choice of treatment modality and the survival rate of the patient. Leucocoria, strabismus, proptosis, fungating orbital mass, orbital cellulitis, phthisis bulbi, anisocoria, heterochromia iridis, inflammatory signs, nystagmus, microphthalmia/buphthalmos, hyphema, ptosis, aniridia, vitreous haemorrhage are various forms of the presentation of reinoblastoma [5-8]. The mode of presentation of the disease varies among countries probably due to different levels of awareness of the disease among the public, availability and accessibility of medical facilities in that country and cultural/religious beliefs. Parents/care-givers may not accept the diagnosis of cancer in the eye in young children and thereby seek treatment from unorthodox traditional healers and prayer houses.

The average age at diagnosis is 18 months and vast majority become clinically apparent before the age of 3 years. Patients with bilateral tumors present earlier than those with unilateral involvement. Retinoblastoma has no sex predilection [9].

Depending on the mode of presentation, the stage of the disease and the general health condition of the patient at presentation, the treatment of retinoblastoma could be exentration, enucleation, orbital external beam radiotherapy followed by enucleation, chemotherapy and/or orbital radiotherapy.

The current treatment modality globally, aims at preserving the eye ball [10]. Reasons for globe preservation even in eyes with advanced disease and poor visual potential include the compromise of orbital bone growth (despite a seemingly adequate replacement of the socket volume with an alloplastic implant and properly fitted prosthesis), poor ocular motility and unsatisfactory cosmetic results. Psychologically, the loss of an eye can be a lifelong disability for parent and child alike. Some cultures and religious beliefs do not accept the removal of the eye or any part of the body. Parents may choose to leave an eye with retinoblastoma in place even if it means the child will develop metastatic disease or even death of the child.

External beam irradiation has been shown to salvage approximately 50% of eyes with Reese–Ellsworth group Vb disease [11]. Side effects of radiation include cataract, retarded orbital bone growth, and secondary neoplasms. In an effort to

minimize the complications of external beam radiation, systemic chemotherapy has emerged as a strategy to treat intraocular retinoblastoma in combination with focal modalities (e.g., laser treatment, cryotherapy) [12]. Although success rates with chemoreduction vary between centers, as many as 50% of advanced eyes have been salvaged with 6 to 9 months of treatment with multiagent chemotherapy regimens that may include carboplatin, vincristine, etoposide, and cyclosporine [13]. Side effects of multiple chemotherapeutic agents to young children are bone marrow suppression leading to neutropenia, severe thrombocytopenia, secondary acute myelogenous leukemia and sepsis [14].

As a result of the advances in treatment and early presentation, survival rate of retinoblastoma cases is more than 90% in advanced countries [15]. However, in developing countries including Nigeria, the survival of patients with retinoblastoma is very low [16]. Our work aims at evaluating retrospectively the management of management and survival rate of retinoblastoma patients at Evangelical Church of West Africa (ECWA) Eye Hospital, Kano between January 2006 and December 2014.

## Materials/Methods

A retrospective study of 110 retinoblastoma patients that were managed at ECWA Eye Hospital, Kano from January 2006 to December 2014. All children diagnosed with retinoblastoma and whose parent(s) consented were recruited in this study. The patients' ages, gender, relevant past medical and ocular history, family medical and ocular was recorded. Data were analysed with statistical package for social sciences (SPSS) version 20(IBM Corp. Armonk, NY).

## Results

A total of 110 cases of retinoblastoma were reviewed. Sixty-seven (60.9%) were males while 43 (39.1%) were females. The mean age of presentation of retinoblastoma was 2.6 years (SD ±1.5 years). The age range at presentation was 3 months to 8 years. The difference in the age groups of participants in this study was not statistically significant (p=0.116)

**Table 1:** Age and Sex Distribution of the study population

| Age Group | SEX | | Total (%) |
|---|---|---|---|
| | F (%) | M (%) | |
| 0-6 mths | 0 ( 0 ) | 2 (1.8) | 2 (1.8) |
| >6-12 mths | 6 (5.5 ) | 3 (2.7) | 9 (8.2) |
| >1-3 years | 23 (20.9) | 46 (41.8) | 69 (62.7) |
| >3-6 years | 11 (10.0) | 15 (13.7) | 26 (23.7) |
| >6 - 8 years | 3 (2.7) | 1 (0.9) | 4 (3.6) |
| Total | 43 (39.1) | 67 (60.9) | 110 (100) |
| Pearson Chi-Square Test = 7.398 p-value = 0.116 | | | |

**Table 2**

| Duration of Symptoms before Presentation | Form of Presentation of Retinoblastoma | | | Total (%) |
|---|---|---|---|---|
| | Cat Eye Reflex (%) | Proptosis (%) | Neglected Retinoblastoma (Fungating Mass) (%) | |
| 0-3 mths | 18 (16.4) | 32 (29.1) | 4 (3.7) | 54 (49.1) |
| >3-6 mths | 11 (10.0) | 14 (12.7) | 0 ( 0 ) | 25 (22.7) |
| >6-12 mths | 3 (2.7) | 16 (14.6) | 3 (2.7) | 22 (20.0) |
| >1-2 years | 1 (0.9) | 3 (2.7) | 1 (0.9) | 5 (4.5) |
| >2 - 4years | 0 ( 0 ) | 3 (2.7) | 1 (0.9) | 4 (3.7) |
| Total | 33 (30.0) | 68 (61.8) | 9 (8.2) | 110 (100) |
| Pearson Chi-Square Test = 21.398 p-value = 0.018 | | | | |

The mean time lapse between manifestation of symptoms and patients' presentation to the hospital was 7.1months (SD±11.97 months). The most common form of presentation was proptosis (61.8%). The difference in the duration of symptoms before presentation and the forms of presentation of retinoblastoma in this study was statistically significant.

**Table 3:** Post-intervention Period of Survival versus Intervention/ Procedures

| Period of Survival after Intervention | Intervention/Procedures | | | | | | | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | Chemotherapy (%) | Primary Enucleation (%) | Enucleation/ Chemotherap (%) | Chemoreduction/ Enucleation (%) | Chemoreduction/ Enucleation/ Radiotherapy (%) | Exenteratio/ Chemotherap (%) | Chemotherapy/Exenteration/Radiotherapy (%) | |
| 0-3 months | 16 (14.6) | 4 (3.6) | 13 (11.8) | 6 (5.6) | 0 ( 0 ) | 2 (1.8 ) | 0 ( 0 ) | 41 (37.3) |
| >3-6months | 7 (6.4) | 6 (5.6) | 5 (4.5) | 4 (3.6) | 2 (1.8) | 2 (1.8) | 1 ( 0.9 ) | 27 (24.5) |
| >6-12mths | 5 (4.5) | 3 (2.7) | 7 (6.4) | 1 (0.9) | 3 (2.7) | 1 (0.9) | 2 (1.8) | 22 (20.0) |
| >1-2years | 2 (1.8) | 1 (0.9) | 7 (6.4) | 1 (0.9) | 2 (1.8) | 0 ( 0 ) | 0 ( 0 ) | 13 (11.8) |
| >2 - 4years | 1 (0.9) | 4 (3.6) | 0 ( 0 ) | 2 (1.8) | 0 ( 0 ) | 0 ( 0 ) | 0 ( 0 ) | 7 (6.4) |
| Total | 31 (28.2) | 18 (16.4) | 32 (29.1) | 14 (12.7) | 7 ( 6.4) | 5 (4.5 ) | 3 ( 2.7 ) | 110(100) |
| Pearson's Chi Square Test = 34.691 p-value = 0.073 | | | | | | | | |
| Linear by Linear Association = 0.257 | | | | | | | | |

Chemotherapy, primary enucleation, enucleation with adjunct chemotherapy, chemotherapy with subsequent enucleation and radiotherapy, exentration with adjunct chemotherapy and chemotherapy followed by exentration and radiotherapy were the treatment modalities used in this study as shown in table 3 above.

Encleation with subsequent chemotherapy was the intervention with the highest number of survival after a 4 year follow-up period. The difference between post intervention periods of the survival of the study population and the methods of intervention was not statistically significant (p=0.073). There was a weakly positive linear association

between the post intervention periods of the survival of the study population and the methods of intervention employed in this study.

**Table 4:** Duration of Follow-up of the study participants

| Duration of Follow-up (Months) | Frequency | Percentage |
|---|---|---|
| Lost to Follow-up | 15 | 13.6 |
| 1-3 | 49 | 44.5 |
| >3-6 | 21 | 19.1 |
| >6-12 | 16 | 14.6 |
| >12-24 | 8 | 7.3 |
| >24-48 | 1 | 0.9 |
| Total | 110 | 100 |

The period of follow-up of patients post intervention was between 1-48 months. Fifteen patients (13.6%) were lost to follow-up.

## Discussion

Retinoblastoma has neither sex nor racial predilection, and the average age at diagnosis is 18 months and vast majority become clinically apparent before the age of 3 years [9]. In our study retinoblastoma occurred among 67 males representing over 60% of population studied. The age range at presentation was 3 months to 8 years (the mean age of presentation of retinoblastoma was 2.6 years SD ±1.5 years) (Table 1). Our findings in this study compares with the study of Reddy *et al* in Malaysia where it was noted that the mean age of patients at presentation was 24.2 months with equal number of boys and girls affected [17]. However, in the Malaysian study, the study population was 64 which was less than the population that participated in this study.

The common forms of the presentation of retinoblastoma vary from country to country, probably due to difference in awareness of the disease among the various populations, the availability and accessibility of medical facilities in that geographic location and number of patients examined. Proptosis was the commonest form of presentation in our study (61.8%), followed by cat eye reflex (30%) and fungating mass (8.2%) (Table 2). This is consistent with studies in other parts of Nigeria and other developing countries of the world [18-23]. Reasons for late presentation include: ignorance of the symptom of the disease, financial constraints and preference to alternative healthcare at prayer houses or traditional healers. In the Malaysian study by Reddy *et al* [17] leucocoria as presenting sign was seen in 71.8%, followed by proptosis in 32.8% patients. Proptosis as presenting sign was reported in very low frequency from some of the developed countries like USA (0.5%) [6] and South Korea (1.4%) [24]; and this sign was not seen in any of the patients in Australia [25] and Singapore [26].

In our study, most of our patients presented late (mean time lapse between manifestation of symptoms and patients' presentation to the hospital was 7.1months (SD±11.97 months) and the common forms of presentation were proptosis (61.8%) and fungating mass (8.2%).

In this study, treatment modalities used were primary enucleation (16.4%), enucleation with adjunct chemotherapy (29.1%), chemotherapy followed by enucleation (12.7%) chemotherapy with subsequent enucleation and radiotherapy (6.4%), exentration with adjunct chemotherapy (4.5%) and chemotherapy followed by exentration and radiotherapy (2.7%). The treatment of choice depended on the stage/form of presentation, ability to pay for the procedure(s) by the parents/guardian of the patient. Chemotherapy as a single treatment option was applied only to 28.2% that presented relatively earlier. Six cycles of intravenous multiagent chemotherapy regimens with carboplatin, vincristine and etoposide were used. Orbital external beam radiotherapy (4000 Gr in 20 divided doses). Informed consent on the various available treatment options and the proposed treatment for individual patients was obtained from the parents/guardians. Enucleation as a definitive treatment for retinoblastoma leaves the patient with no choice of vision in the affected eye. External beam radiotherapy, although effective, can result in cosmetic deformity, cataracts, or retinopathy and carries an increased risk of a second non-ocular malignancy in the treatment field [23, 27].

In developing countries including Nigeria, the survival of patients with retinoblastoma is very low [16]. The findings of this study show that the survival rate of patients with retinoblastoma was 6.4% after 4 years follow-up period. In this study, encleation with subsequent chemotherapy was the intervention with the highest number of survivals (4 survivals representing 3.6% of the patients treated) after a 4 year follow-up period while chemoreduction with subsequent enucleation had 2 survivals (1.8% survival rate) after 4 years of follow-up and chemotherapy as a single treatment option had a patient (0.9% survival) after 4 years period. The difference between post intervention periods of the survival of the study population and the methods of intervention was not statistically significant (p=0.073). Also, there was a weakly positive linear association between the post intervention periods of the survival of the study population and the methods of intervention employed in this study. In advanced countries, however, as a result of the advances in treatment and early presentation of patients with retinoblastoma to the medical facilities, survival rate of retinoblastoma cases is more than 90% [15].

The period of follow-up of patients post intervention was between 1-48 months. Eight patients (7.3%) were followed up till 2 years period and one patient (0.9%) till the 4th year. Fifteen patients (13.6%) were lost to follow-up after the discharge from the hospital.

## Conclusion

The most common presenting signs of retinoblastoma are proptosis, cat eye reflex and fungating mass. The survival rate is low (6.4%) after 4 years post intervention.

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