Original Article

Tractional Retinal Detachment: Prevalence and Causes in Nigerians

Dennis George Nkanga, Chineze Thelma Agweye, Ogugua Ndubuisi Okonkwo[1], Wilson Ovienria[2], Olukorede Adenuga[3], Toyin Akanbi[1], Martha-Mary Ekong Udoh, Idris Oyekunle[1], Affiong Andem Ibanga, Collaborative Retina Research Network (CRRN), Study Report 1

Department of Ophthalmology, University of Calabar Teaching Hospital, Calabar, [1]Department of Ophthalmology, Eye Foundation Hospital, Lagos, [2]Department of Ophthalmology, Irrua Specialist Hospital, Benin City, [3]Department of Ophthalmology, University of Jos Teaching Hospital, Jos, Plateau State, Nigeria

Abstract

Aim: To determine the causes of tractional retinal detachment (TRD) in Nigerians. **Materials and Methods:** A prospective, multicentre study evaluating eyes diagnosed to have TRD. History, clinical examination (including visual acuity, intraocular pressure measurement, anterior segment examination and dilated fundoscopy) and systemic evaluation (including previous diagnosis of diabetes, hypertension, sickle-cell disease and others) were performed in TRD eyes out of a cohort of retinal detachment eyes. **Results:** The prevalence of TRD of the 237 patients diagnosed with RD within a one-year study period was 25.7% (61 patients). Eighty eyes were diagnosed with TRD. Thirty-eight eyes of nineteen patients (31%) were bilateral, and 42 (69%) were unilateral. There were 38 male patients (62.3%) and 23 female patients (37.7%). The mean age was 52.3 ± 12.7 years (11–69 years). 88.5% of all TRD patients had an associated systemic disease, diabetes being the most common disease in 88.8% of them. Proliferative diabetic retinopathy was the most common cause of TRD (77.5%) and the most common cause of bilateral TRD. Both trauma and proliferative sickle-cell retinopathy occurred in 3.8% of the eyes. 68.8% of TRD eyes were blind at the presentation. However, the causes of TRD did not show any significant association with blindness ($P = 0.819$). **Conclusion:** Proliferative diabetic retinopathy poses a significant threat to vision, being the most common cause of TRD. Early detection and treatment of proliferative retinopathy in diabetes and sickle-cell disease, and trauma prevention will significantly reduce the burden of blindness due to TRD.

Keywords: *Nigeria, proliferative diabetic retinopathy, proliferative sickle-cell retinopathy, retinal detachment, trauma*

Introduction

Retinal diseases are a significant cause of irreversible and reversible loss of vision. Retinal detachment (RD) was the most common indication for surgery in a series of vitrectomies reported in Africa.[1] RD has been a significant occurrence in reports on retinal disease from Africa. RD occurs when the neurosensory retina (NSR) separates from the underlying retinal pigment epithelium (RPE).[2] Embryologically, these two layers are neuroectodermal in origin, with no actual anatomic junctions formed between the cells of the two layers.[3] Therefore, the forces of attachment between the NSR to RPE are weak, and when overcome, RD occurs, re-establishing the potential space between the two layers.[3] Occurrence of RD carries a risk of visual impairment or blindness.[4] RD is categorised into etiological types featuring certain clinical appearances, including the more common rhegmatogenous retinal detachment (RRD), tractional retinal detachment (TRD) and exudative retinal detachment (ERD).

In TRD, the NSR is pulled off the RPE due to the contraction and elevation effect of proliferative membranes, which are present over the vitreous or retinal surfaces in the absence of tears on the retina.[3,5,6] In some cases, the contractual forces induce a retinal tear, resulting in combined traction–rhegmatogenous RD (TRRD). Proliferative membranes, primarily responsible for the tractional forces, could arise from various aetiologies, such as proliferative diabetic retinopathy (PDR), which accounts for most cases of TRD. Other causes of TRD include penetrating trauma, proliferative sickle-cell retinopathy, proliferative vitreoretinopathy, posterior uveitis, retinal vasculitis, and retinopathy of prematurity.[5,6] The exact epidemiology of TRD amongst black Africans and Nigerians has not been reported in large-scale studies. Therefore, we performed a multicentre cross-sectional survey to ascertain the hospital-based

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Address for correspondence:
Dr. Ogugua Ndubuisi Okonkwo, Eye Foundation Hospital, 27 Isaac John Street, GRA. Ikeja, Lagos, Nigeria.
E-mail: o_okonkwo@yahoo.com

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prevalence and causes of TRD in a cohort of Nigerian RD patients.

Materials and Methods

This study was a prospective, multicentre, cross-sectional study. It was part of a larger study to examine the presentation and profile of RDs in Nigerians. Four clinics in different regions of the country contributed data for this study. Each clinic had a retina specialist who was designated the principal investigator and had the responsibility of ensuring the timely and accurate reporting of data collected. Data collection was from April 2019 to March 2020. We obtained approval from the Health Research Ethics Committee of the participating hospitals. This study adhered to the principles of the Declaration of Helsinki. Patients who attended the retina clinic and ophthalmic outpatient clinic of the day were informed about the study and given a choice to participate or not. Consenting participants were, after that, given a consent form to sign. Parents/caregivers signed the consent on behalf of minors.

Demographic data were obtained from patients with complaints of sudden or gradual diminution of vision, who were then asked for an associated history of floaters, flashes of light, ocular trauma and past intraocular surgery (including cataract surgery, glaucoma surgery, retina surgery or lasers). We noted a history of associated systemic diseases such as diabetes mellitus, hypertension, sickle-cell disease and other significant contributory diseases.

An ocular examination was performed as outlined in the study. It included visual acuity (VA) assessment of each eye using a Snellen chart. Refraction was performed (if the vision was sufficient to warrant it) to determine the best-corrected visual acuity (BCVA). The BCVA obtained from each participant was used in the data analysis. Also performed were intraocular pressure measurement and slit-lamp examination of the anterior segment, including the iris and anterior chamber angle, in search of neovascularisation. A dilated fundus biomicroscopy using a + 20D lens with scleral indentation was performed to visualise the entire retina up to the retina periphery (including the Ora Serrata) when possible.

A diagnosis of TRD was made in the presence of an immobile retina with concave contours and surfaces, fibrovascular membranes, neovascular tufts, areas of tractional detachments and subretinal bands. An ocular B-scan was performed in poor retinal view due to media opacities (such as a cataract or vitreous haemorrhage). A detached retina, evident by V-shaped insertion into the optic disc and Ora Serrata of the retina, with fibrous bands, were diagnosed as TRD.

Visual acuity was categorised using the international classification of diseases 10 code for visual impairment as indicated below near normal/mild visual impairment ≥ 6/18, moderate visual impairment 6/24 to 6/60, severe visual impairment < 6/60 to 3/60, blindness < 3/60 to no perception of light (NPL).

Data statement

Data analysis was performed using IBM statistical package for social sciences statistics version 22.0 (IBM Corp., Armonk, New York). We determined frequencies, means, median and standard deviations to summarise quantitative data. Tests of significance were done using Pearson's chi-square test. A *P*-value of < 0.05 was considered statistically significant.

Results

Demographics

A total of two hundred and thirty-seven patients in the four clinics were diagnosed with RD within the 1-year study period. Of these 237 patients, 80 eyes of 61 patients (25.7%) were diagnosed with TRD. Of the 80 TRD eyes, 38 of 19 patients (31%) were bilateral, whereas the remaining 42 eyes (69 %) were unilateral.

There were 38 men (62.3%) and 23 women (37.7%). The mean age of the 61 patients diagnosed with TRD was 52.3 ± 12.7 years, ranging from 11 to 69 years [Table 1]. The median duration of symptoms was 7.5 months (2 weeks–7 years).

Fifty-four (88.5%) out of 61 patients diagnosed with TRD had an underlying systemic disease [Table 2].

Causes of tractional retinal detachment

Of the 80 eyes seen, 11 (13.8%) had previous intraocular surgery [Table 3]. Three eyes (3.8%) had a history of prior eye trauma. Ocular trauma was penetrated in one eye and blunt in two eyes.

Table 1: Age distribution of tractional retinal detachment patients

Age	Frequency	Percent (%)
<25 years	4	6.6
26–45 years	9	14.6
46–65 years	41	67.3
>66 years	7	11.5
Total	61	100.0

Table 2: Systemic disease associations in tractional retinal detachment patients

	Frequency	Percent (%)
DM	29	53.6
HTN/DM	19	35.2
HIV	1	1.9
HTN	1	1.9
SCD	3	5.5
Uncertain	1	1.9
Total	54	100.0

DM: diabetes mellitus, HIV: human immunodeficiency virus, HTN: hypertension, SCD: sickle-cell disease

Table 3: Intraocular surgery in tractional retinal detachment eyes

Ocular surgeries	Frequency	Percent (%)
Cataract surgery	3	27.3
Globe repair	1	9.1
Intravitreal Injection of Avastin	1	9.1
Unknown	6	54.5
Total	11	100.0

Table 4: Causes of tractional retinal detachment

Causes of TRD	Frequency (*n* = 80 eyes)	Percent (%)
PDR	62	77.5
PSCR	3	3.8
Trauma	3	3.8
HIV-associated retinopathy	2	2.4
Unknown	10	12.5
Total	80	100.0
Causes of bilateral TRD	**(*n* = 38 eyes)**	
PDR	32	84.2
PSCR	2	5.3
Trauma	2	5.3
Unknown	2	5.3
Total	38	100.0

TRD: tractional retinal detachment, PDR: proliferative diabetic retinopathy, PSCR: proliferative sickle-cell retinopathy, HIV: human immunodeficiency virus

Table 5: Causes of combined tractional-rhegmatogenous retinal detachment

	Frequency	Percent (%)
PDR	7*	53.8
PSCR	1	7.7
Trauma	1	7.7
Unknown	4	30.8
Total	13	100.0

PDR: proliferative diabetic retinopathy, PSCR: proliferative sickle-cell retinopathy

*Four eyes of two patients had combined TRD–RRD secondary to bilateral PDR and three had unilateral disease

Proliferative diabetic retinopathy was the most common cause of TRD (62 eyes, 77.5%), whereas trauma and sickle-cell retinopathy accounted for three eyes each (3.8%, respectively). HIV retinopathy was responsible for TRD in 2 eyes (2.4%). We could not identify the cause in 10 eyes (12.5%) [Table 4]. Proliferative diabetic retinopathy was also the most common identified cause of bilateral TRD.

A total of 13 eyes of 11 patients had combined TRRD [Table 5]. In this category, two patients had bilateral disease (four eyes) secondary to PDR, and three with uniocular disease also arose from PDR.

Table 6: Presenting visual acuity in tractional retinal detachment eyes

	Frequency (n) eyes	Percent (%)
6/12 and better	1	1.3
6/12 to 6/18 (mild visual impairment)	–	–
<6/18 to 6/60 (moderate visual impairment)	13	16.3
<6/60 to 3/60 (severe visual impairment)	11	13.8
<3/60 and worse (blind)	50	62.5
NPL (no light perception)	5	6.3
Total	80	100.0

Table 7: Presenting vision versus causes of tractional retinal detachment

	PDR	PSCR	Trauma	HIV retinopathy	Unknown
6/12 and better	4 (6.5%)				
<6/18–6/60	10 (16.1%)	2 (66.7%)	–	–	1 (10%)
<6/60–3/60	7 (11.3%)	–	–	–	2 (20%)
<3/60–LP	37 (59.7%)	1 (50%)	3 (100%)	2 (100%)	6 (60%)
NLP	4 (6.5%)	–	–	–	1 (10%)

Vision in tractional retinal detachment eyes

Table 6 summarises the visual presentation in the TRD eyes. Of the 80 TRD eyes, the majority were blind, with visual acuity less than 3/60 and worse (50 eyes, 62.5%), and five eyes (6.3%) had NPL.

Among the blind eyes (BCVA < 3/60), PDR accounted for 37 eyes (75.5%) out of 49 eyes, while 4 (80%) out of 5 eyes with NPL vision were also due to PDR [Table 7]. The vision in TRD eyes matched with the causes of TRD is represented in Table 7. Causes of TRD were not significantly associated with blindness ($P = 0.819$).

Discussion

RD is a significant concern in sub-Saharan Africa, according to the results of a recent study on the profile and burden of retinal diseases in our region.[7] TRD is a less encountered form of RD than the more common RRD. In our study, the prevalence of TRD was 25.7% and was bilateral in 31% of patients. TRD is commonly associated with systemic diseases, as this study reported an 88.5% association with systemic disease. DM was associated with 48 patients (88.8%). Proliferative retinopathies are the most common cause of TRD, and PDR contributed significantly to the number of cases. PDR was the most common cause of uniocular and bilateral disease and

combined TRRD. PDR was also the most common cause of blinding disease. In such proliferative vitreoretinopathies, contractile forces (membrane or bands) exert a pull effect on the neurosensory retina, eventually slowly separating it from the RPE.[8] In cases where a rhegmatogenous component to the TRD occurs, the progression of the disease could be more rapid, involving the macular within weeks or a few months depending on the site of traction.[9,10] Considerable retinal ischemia could be present in some cases, further complicating the already complex situation.

Epidemiological studies on TRD are very few compared with RRD, possibly because of TRD's multiple proliferative retinopathy aetiology.[5] A male preponderance was observed in our research, contrary to the study in Denmark.[8] The mean age of patients in our study was lower than in n Denmark.[8] Generally, demographic studies report a younger population in Africans compared with Europeans;[5] the age in our study population findings may reflect this.

Our study agrees with other African reports regarding PDR being the most common cause of TRD. These studies from Nigeria (6.7%) and Ethiopia (9.6%) also report that PDR predominantly caused TRD.[1,11] Our analysis also validates previous reports that DM is the most identified systemic association of TRD.[5,12,13] Hypertension alone was not a common systemic association. However, hypertension was responsible for as much as 35% of TRD eyes associated with DM. This finding confirms that uncontrolled hypertension has an impact on increasing the risk for the progression of diabetic retinopathy to advanced proliferative disease.[14] In our study, sickle-cell retinopathy and trauma did not feature prominently as significant causes of TRD.

TRD is slowly progressing and threatens the vision in advanced disease when it encroaches on the foveomacula area. In a peripheral location and before macula involvement, a patient may have normal or near-normal vision and could be unaware of the extent of the disease until an examination of the fundus. Late presentation to the clinics for an eye examination, a common finding amongst citizens of lower socioeconomic countries,[2,15] plays a significant role in this occurrence and reflects the poor health-seeking behaviour in these countries. Our research revealed that over 2/3 of patients were blind in the affected eye at presentation. PDR accounts for 41 (76%) of 54 blind eyes.

The burden of TRD blindness secondary to PDR, in this study, again highlights the need for a well-established national screening program for diabetic retinopathy (DR). Systematic screening for DR and monitoring of systemic risk factors for the progression of DR will involve organising scheduled fundus examination for all people of appropriate age living with diabetes mellitus in the country. The use of affordable, mobile, portable handheld devices for fundus photography will significantly improve the acceptability and accessibility of such a service, as shown elsewhere.[16-18] Early treatment of PDR using retinal laser photocoagulation will prevent evolution to or progression to macula involving TRD.[19] Other national DR screening programs have proven and validated the positive impact of early screening and treatment.[16,20] In conclusion, TRD eyes are at a significant risk of blindness; heightening awareness of this risk among patients and caregivers will significantly benefit early identification of at-risk eyes. The early detection and treatment of proliferative retinopathy in diabetes and sickle-cell disease, including campaigns on trauma prevention, will significantly reduce the burden of blindness due to TRD.

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Conflicts of interest

There are no conflicts of interest.

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