



A RARE CASE OF BILATERAL CATARACT AS THE FIRST MANIFESTATION OF TYPE 1 DIABETES IN A 14 YEAR OLD NIGERIAN GIRL

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ABSTRACT

Diagnosis of diabetes mellitus (DM) is made in some persons in the Ophthalmology clinic when they present with eye complaints. Cataract is a common DM ocular complication in clinical practice. The objective of this report is to draw attention to cataract which is usually seen in older persons but which could be the first manifestation of type 1 diabetes mellitus (T1DM) in children and adolescents. We report this first case of a teenage Nigerian girl with a diagnosis of bilateral cataract presenting as the first manifestation of type 1 diabetes mellitus. She was later referred to the endocrinologists because of severe hyperglycaemia. She was treated to achieve a good glycaemic control and had a successful cataract surgery in both eyes. She is being followed up in both the Ophthalmology and Diabetes clinics. In conclusion, all patients presenting with cataracts irrespective of their ages must be screened for diabetes mellitus so that proactive measures can be put in place to prevent and manage other chronic complications of DM affecting the eyes and other organs. Conversely, all T1DM patients should be screened for cataract soon after diagnosis.

Keywords: type 1 diabetes mellitus, bilateral cataract, diabetes mellitus, Nigeria.

Introduction:

Diabetes mellitus, a metabolic disorder characterized by chronic hyperglycaemia, causes microvascular and macrovascular complications involving multiple systems in the body. In the eye, DM complications can involve any part of the eye from the lid to the anterior and posterior segments of the eyes. [1] According to the 9th edition of the International Diabetes Federation (IDF) diabetes atlas, about 1.1 million children and adolescents below 20 years are living with type 1 diabetes. [2] There is limited data regarding prevalence and pathophysiology of T1DM ocular complications among children and adolescents. [3] However, it is estimated that diabetic eye diseases are present in more than a quarter of persons with type 2 diabetes and half of persons with type 1 diabetes, thereby underlining the importance of regular monitoring. [4] In recent studies conducted in Enugu [5,6], Aba [7] and Uyo [8], all in Nigeria, it was reported that cataract was the commonest DM eye complication. Cataract is a rare ocular complication at the early stage of T1DM in the paediatric population [9,10] and the prevalence of early diabetic cataract among children and adolescents [3,10,11-14] ranges from 0.7% - 3.4%.

Several factors have been linked to cataract formation generally including increasing age, genetic factors, nutritional disorders, metabolic and immune disorders, poisoning, traumatic injuries and radiation exposures. [15] Chronic hyperglycemia, characteristic of poorly controlled DM, can result to

cataract due to osmotic pressure imbalance inside and outside the lens. [16] Cataract in diabetic patients typically present as anterior and posterior subcapsular subcortical opacities. [17,18] Cataract in persons living with diabetes mellitus (PLWD) are more prevalent in female adolescents in whom the disorder develops rapidly in both eyes. [17,18]

Pathophysiology of diabetic cataract early in children and adolescents with T1DM is not clear. It is postulated, however, that in the setting of long standing hyperglycaemia, the consequent diabetic ketoacidosis (DKA) and dehydration play a role in cataract formation [10,19] or cataract results from activation of the polyol pathway. [9,20] It is, also, suggested that osmotic pressure changes or oxidative stress plays an important role in development of diabetic cataract in children and adolescents with T1DM. [9,10,20]

There is a dearth of published reports from Nigeria on bilateral cataract as the first manifestation of T1DM in children and adolescents. With this rare case presenting to us at Abia State University Teaching Hospital (ABSUTH), Aba, Nigeria for the first time, we, therefore, set out to draw the attention of the medical and scientific community to this rare ocular complication of DM in Nigerian children and adolescents. It is possible they may be under diagnosed or underreported in Nigeria. In this case study, we report this rare case of a 14 year old secondary school girl who presented first to the ophthalmologist on account of bilateral cataract who was diagnosed later with T1DM complicated by diabetic ketoacidosis. Approval was obtained from the Ethics and Research committee of ABSUTH, Aba and consent was obtained from the father of the girl to use her clinical details.

Case Report:

Miss UN, a 14 year old secondary school student, presented to the ophthalmology unit of Abia State University Teaching Hospital, Aba because of bilateral blurring of vision of two weeks duration. On ophthalmic evaluation, her visual acuity was 6/36 in right eye and counting finger in the left eye. Pupillary reactions in both eyes were good, the anterior chambers were shallow and her corneas were normal. Fundoscopy showed hazy media in the right eye with no clear view while in the left eye there was no view at all. Her random blood glucose at presentation was 560mg/dl. She had a family history of DM in the mother who passed away one year earlier from end stage renal disease (ESRD) complicating DM. Father is known to have hypertension but is not diabetic.

She was referred to the Radiology Department, ABSUTH, for ocular ultrasound scan, then to the Diabetes and Endocrinology unit of the Department of Internal Medicine, ABSUTH, Aba where she was managed for diabetic ketoacidosis precipitated by community acquired pneumonia and severe acute malaria. A summary of her full laboratory test results, picture of her face and B-mode ocular ultrasound image are shown in Table 1, figures 1 & 2 respectively. After discharge by the Diabetes and Endocrinology unit, she was placed on insulin therapy and monitored till she had a successful cataract extraction few weeks later. She is being followed up by the Diabetes and Ophthalmology clinics after the surgery.

Table 1: Relevant laboratory results of Miss UN

Patient's parameters at presentation	Results	Reference values
Random blood glucose	560mg/dl	<200mg/dl
HbA1C	16.3%	<7%
Na	137mmol/l	135-148
K	4.5mmol/l	3.5-5.5
Cl	94mmol/l	96-107
HCO ₃	18mmol/l	24-32
Urea	27mg/dl	15-45
Creatinine	0.8mg/dl	0.6-1.5
FBC + blood film for malaria parasite (Mp)	Hb =13.2mg/dl, TWBC= 13.5x10 ⁹ /l Neutrophil=78%	

	Lymphocyte= 17% Basophil= 3% Monophil= 2% Mp = +++	
Serum B-hydroxybutyrate	8.3mmol/l	<5mmol/l
Urine results	Glucosuria +++ Protein- Negative Ketone ++ Nitrite- Negative Pus cells - 0-2/hpf	
Ocular USS	There was thickening and increase echogenicity of the posterior surfaces of the lenses. The vitreous humors were homogenously anechoic. The retina, choroid and posterior vitreous were intact.	
Chest radiograph	There was a homogenous opacity of soft tissue density in the right mid and lower lung zones obliterating the right heart border. Air bronchogram was noted within it due to right middle lobe pneumonia	
Sputum C/S	Yielded strep. Pneumonia organism	Organism was sensitive to Amoxil and Levofloxacin

Keywords: HbA1C= glycated haemoglobin, Na = serum sodium, K = serum potassium, Cl= serum chloride, HCO₃ = serum bicarbonate, FBC = full blood count, TWBC = total white blood cell count, Hb= haemoglobin concentration, USS = ultrasound, C/S = culture and sensitivity.



Figure 1: Face of the index patient showing bilateral cataract

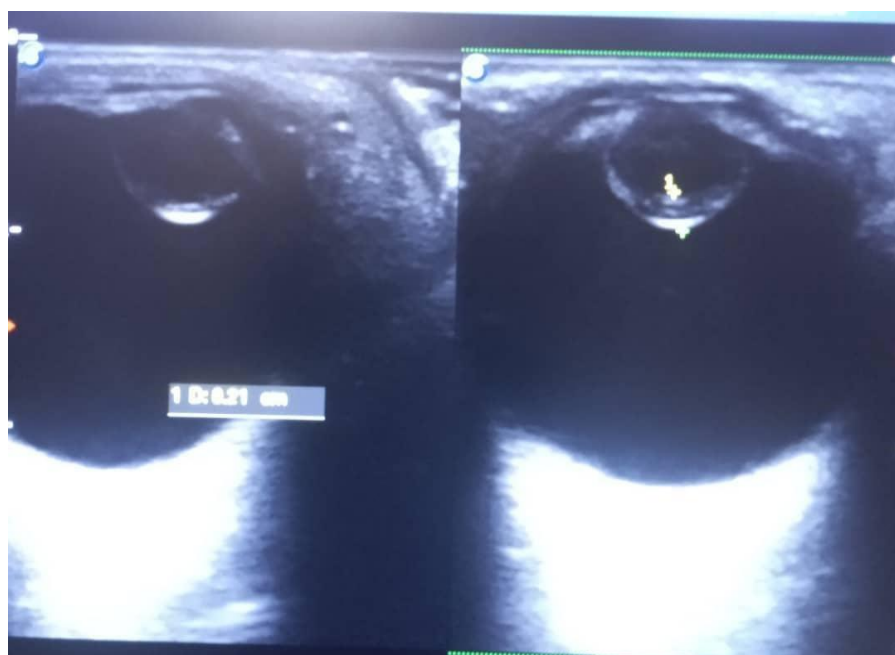


Figure 2: B-Mode Ocular Ultrasound scan showing bilateral cataract .

Discussion:

Diabetes mellitus classically presents with polyuria, polydipsia, polyphagia, unexplained weight loss and fatigue. [1] The index patient in this report, however, presented with blurring of vision first to the ophthalmologist and not with the classical symptoms of DM. The implication of this is the need for healthcare professionals (HCP) to be aware that DM can present with any of its numerous acute or chronic complications. This underscores the need for universal screening for DM considering that it is estimated that 1 in 2 adults (232 million people) in the world currently have DM but are not diagnosed. [2] The index patient had a poor glycaemic control at presentation (HbA1C 16.3%), which invariably, corroborates the report by Iafusco et al that from A1C 12.8% - 14.1%, appearance of early diabetic cataract increases three times. [13] This underscores the leading role of increasing A1C as one of the risk factors for development of early diabetic cataracts. The overall implication is that early diabetes diagnosis and a good glycaemic control thereafter can go a long way in preventing early diabetic cataracts.

Fundoscopy in both eyes of the index patient could not show clearly the posterior segment of the eyes such that DM complications involving the retina and macula could not be diagnosed at presentation. This was because of the bilateral cataract. As a consequence, further ophthalmic examinations like fundal photograph with fluorescein angiography and optical coherence tomography (OCT) need to be carried out on both eyes as soon as feasible after cataract surgery to exclude DM retinopathy, macula oedema and other sight threatening complications that might be present in the index patient. Retinal detachment was ruled out with ultrasonography in this patient.

Diabetic ketoacidosis is an acute fatal complication of DM characterized by hyperglycaemia, metabolic acidosis and ketonaemia/ketonuria resulting from absolute insulin deficiency as is usually the situation in T1DM. The index patient had features of DKA and was managed by the endocrinologists with intravenous fluids, insulin and treatment for the precipitating infections. The mother had died from a renal complication of T2DM, therefore, it is not clear why the index patient should have T1DM which usually does not run in the family.

Diagnosis of T1DM in the index patient was based on her age less than 30 years (14 years), lean physique (weight 32kg), abnormal A1C result and requirement of insulin injection for survival and glucose control. Making a diagnosis of T1DM following hyperglycaemia could be challenging in a low resource setting where the required laboratory methods of diagnosis are not readily available. Therefore, HCPs are often constrained to rely solely on clinical criteria. Where facilities are available,

fasting C-peptide level and pancreatic islet cell autoantibodies are needed to confirm that the index patient has T1DM.

Cataract surgery remains the gold standard for the treatment of diabetic cataract [21] and of the techniques of cataract extraction in children ((intracapsular cataract extraction, extracapsular cataract extraction and phacoemulsification), phacoemulsification is the more common technique of cataract extraction in the developed world. [22] The index patient had phacoemulsification following good glycemic control and white double aspheric monofocal foldable intraocular lens implants were inserted. She did not have any of the following acute complications of cataract extraction such as incision leakage, oedema, increased intraocular pressure and uveitis. Intraoperative posterior capsular opacification was noted. This may reduce post-operative vision. Subsequently, she had secondary Yag laser posterior capsulotomy to correct this. Secondary capsulotomy was opted for because diabetic retinopathy was not ruled out pre operatively. She could, however, suffer from any of the following complications of cataract surgery - secondary glaucoma, retinal detachment and amblyopia. [23-25]

In conclusion, it is worth noting that the prompt surgery afforded the index patient with bilateral cataract will go a long way to improving her quality of life. With bilateral cataract, she could not have coped well with her academic and social activities; even self administration of subcutaneous insulin would have been challenging to her.

Conclusion/recommendation:

Even though bilateral cataract is a rare condition in children and adolescents with type 1 diabetes, it can rapidly develop especially in the setting of diabetic ketoacidosis and or prolonged poor glycemic control. It is, therefore, recommended that children and adolescents with type 1 diabetes mellitus should have their lens and retina examined regularly by the ophthalmologist. For those found to have cataracts, postoperative examination of their retina should be routinely performed and regular follow up visits to the endocrinologists and ophthalmologists is strongly advised.

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CONFLICTS OF INTEREST - Nil

AUTHOR'S CONTRIBUTIONS:

1. Dr. Marcellinus O. Nkpozi - Conception and design of the research with drafting of the manuscript. He, also, takes overall responsibility for the study.
2. Dr. Olufunmi A.I. Otuka - Collection of the data; analysis and interpretation of the data.
3. Dr. Anya Kalu - Final review and approval of the manuscript.
4. Dr. Lisa I. Eweputanna - Collection of data and critical revision of the manuscript.