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## Clinical Findings and Management of Acute Xerophthalmia

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### ABSTRACT

The diagnosis of acute xerophthalmia is accompanied with characteristic complaints of night blindness by the patient, however, conjunctival xerosis and Bitot's spots are other signs that follow; at this point if appropriate medical intervention is not carried out it can now progress to corneal xerosis and finally to keratomalacia (at this stage surgical intervention may be required or it ends up in blindness). Today, however, the usual treatments are limited to medications and improved nutritional intake and attention to complications that may occur. Surgical treatment/intervention is also available (that is when it progresses to keratomalacia). It is important for clinical optometrists to appreciate the clinical findings, course of the disease and weigh treatment options before pursuing intervention. This case report reviews the management of patients with acute xerophthalmia, discussing clinical findings and treatment/management options especially with improved dietary intake as they relate to the case presented. Detailed history, penlight examinations, refraction, fundus examination, were carried out. The result and the management using sunshades, natural tears, vitamin A capsules (retinol) and antioxidants showed that the prognosis for patients with acute xerophthalmia is generally fair with good visual outcome even though complication is a possibility.

**Keywords:** Xerophthalmia, night blindness, conjunctival xerosis and Bitot's spots.

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### 1. INTRODUCTION

Xerophthalmia is a condition in which the eye fails to produce tears. It may be caused by a deficiency in vitamin A and is sometimes used to describe that lack, although there may be other causes. Xerophthalmia caused by a severe Vitamin A deficiency is described by pathological dryness of the conjunctiva and cornea. The conjunctiva becomes dry, thick and wrinkled. If untreated, it can lead to corneal ulceration and ultimately to blindness as a result of corneal damage. Xerophthalmia is a term that usually implies a destructive dryness of conjunctival epithelium due to dietary vitamin A deficiency- a rare condition in developed countries. Other forms of dry eyes are associated with aging, poor lid closure, scarring from previous injury or auto immune diseases such as rheumatoid arthritis and sjogren's syndrome, and these can all cause chronic conjunctivitis. Radioiodine therapy can also induce Xerophthalmia, often transiently, although in some patients late onset or persistent Xerophthalmia has been observed.

The damage to the corneal in vitamin A associated Xerophthalmia is quite different from damage to the retina at the back of the globe, a type of damage which can be due to lack of vitamin A, but which is caused by lack of other forms of vitamin A which work in the visual system. Xerophthalmia from hypovitaminosis A is specifically due to lack of the hormone like vitamin A metabolite retinoic acid, since the condition can be reversed in vitamin A deficient rats by retinoic acid supplementation (however the retinal damage continues).



Since retinoic acid cannot be reduced to retina or retinol, these effects on the cornea must be specific to retinoic acid. This is in keeping with retinoic acid's known requirement for good health in epithelial cells such as those in the cornea.

## 2. EPIDEMIOLOGY AND MECHANICAL ETIOLOGY

Xerophthalmia usually affects children under 11 years old and "accounts for 20,000 to 100,000 new cases of childhood blindness each year in the developing countries". The disease is largely found in developing countries like many of those in Africa and Southern Asia. The condition is not congenital and develops over the course of a few months as the lacrimal glands fail to produce tears. Other conditions involved in the progression already stated include the appearance of Bitot's spots, which are clumps of keratin debris that build up inside the conjunctiva and night blindness, which precedes corneal ulceration and total blindness

## 3. CASE REPORT

A 9-year-old boy presented to our clinic- State Eye Clinic, Uyo on 19<sup>th</sup> July 2011 with complaints of burning sensation, itching, slight pains, blurring of vision at far and near in both eyes. The patient has never been to an eye clinic for any form of examination and his past ocular history was occasional use of early morning urine to wash his eyes as directed by the mother. He reported that he had not used glasses for the first time in his life. The patient's medical and family ocular history was negative and he denied taking any medications. The patient reported no history of headaches. He looked pale, withdrawn and unhappy. His entry visual acuity was 6/9 at far OD, and 6/9 at far OS. Pinhole acuity 6/9 OD, 6/9 OS. The manifest refraction (from retinoscopy) OD was +1.00Ds yielding a visual acuity of 6/12+1 and OS - +1.25Ds yielding a visual acuity of 6/12<sup>+1</sup>.

The corrected visual acuity was 6/9 OD and 6/9 OS with a correction of 0.00 OD and 0.00 OS. Pupils were equally round and reactive to light, no afferent pupil defect was noted OU. Confrontation fields were restricted to finger count OU, Extraocular muscles were unrestricted in all gazes, and no abnormality was detected with cover test. Intraocular pressure was 17.5mmHg OU with Schiottz indentation tonometry. Anterior segment evaluation by pen light examination revealed a rough bulbar and palpebral conjunctiva OU; an uneven tear film; scanty lashes OU. The patient was dilated using one drop 1% Mydriacyl OU. Once the patient was fully dilated, an evaluation of the posterior segment was carried out using the direct ophthalmoscope. Fundus assessment revealed normal optic nerves with a cup-to-disc ratio of 0.2 OU. The neuroretinal rims were pale and unhealthy and intact. Retinal vessels appeared normal. Both macula presented normal. No dark spot was noted. Therefore the patient was diagnosed with allergic conjunctivitis.

### Differential Diagnosis:

1. Vernal conjunctivitis
2. Wrinkled conjunctiva
3. Xerophthalmia

He was given a prescription paper to buy:

Gutt: Ilycrom; Idroptds                    x<sup>1</sup>/<sub>12</sub>  
Tab: Loratadine:                                1 tab bds x<sup>4</sup>/<sub>7</sub>

The patient was given one month appointment for follow-up and subsequently referred to see the general practitioner in our health facility for a comprehensive medical examination.

### Follow Up #1

The patient returned on 19-08-2011 for follow-up, this time with the pastor of their local church in the village. He said the mother could not afford the drugs prescribed by me and other multivitamins prescribed by the medical doctor after the doctor's confirmation that the boy had no serious medical problem but for lack of balanced diet and that he continued



with the urine therapy and some solution prepared with herbs which was given to him by the uncle to wash his face every night before going to bed. This time around, he has lost weight remarkably, looked malnourished and gaunt. His new complaints were not seeing properly at night, dryness of the eye and sandy sensation. His entry visual acuity now dropped to 6/12 OU.

Pupils were equally round and reactive to light OU with no afferent pupil defect noted in both eyes.

One drop of xylocaine with Adrendine was instilled to measure the intraocular pressures by Applanation tonometry. The intraocular pressures remained stable with 17.5mmHg O.U.

The findings of the anterior segment evaluation by penlight examination revealed dry, thick and wrinkled conjunctiva with foamy and oval spots(Bitot's spots). The findings of the posterior segment evaluation using the ophthalmoscope remained unchanged.

The findings of the dilated fundus assessment also remained unchanged. He was placed on:

Gutt: Tears naturale ; tds x  $1/120U$

Oc: Chloramphenicol eye ointment: once nocte x  $3/520U$

Cap: Omega 3: 1 cap daily x  $1/12$

Cap: One Cap of Vitamin A (200,000IU) for one month.

Cap: Ampicillin(250mg) 1 cap tds x 5/7(to prevent secondary keratitis).

The pastor who said he has taken custody of the boy for the period was told to improve his nutrition appropriately and adequately with natural foods rich in vitamin A(carotene) and proteins such as beans and plantain meal, fresh fish diet, animal protein such as meat, eggs ,green vegetables and fruits.

Other recommendation was a pair of sunglasses.

## Follow Up # 2

The patient returned on 19-09-2011 for follow up. There were no new complaints. He did report improvement in his vision with the administered medications and improved diet. His entry visual acuity remained stable with 6/9 OU. Pupils were equally round and reactive to light OU with no afferent pupil defect noted OU. Intraocular pressures by Applanation tonometry were 17mmHg OU. The findings of the anterior segment evaluation by penlight examination revealed the disappearance of Bitot's spots but the conjunctiva remained dry and wrinkled OU. The findings of the posterior segment evaluation using the ophthalmoscope remained unchanged. Dilated fundus assessment revealed improved healthy status of the neuroretinal rims. The other findings of the dilated fundus assessment also remained unchanged. The patient was counseled and the pastor encouraged ensuring that proper and improved nutrition continues. He was instructed to return again in three months for follow-up but was asked to return sooner if any changes were noted. He was also placed on:

Gutt: Tears naturale: 1 drop tds x  $3/12$

Tab: Multivitamins: 1 tab dry x  $3/12$

Cap: Omega 3: 1 cap lly x  $3/12$

## Follow Up # 3

The patient returned on 19-12-2011 for follow-up. There were no new complaints. He denied any change in medical history and reported improvement in his vision. His entry visual acuity remained stable with 6/9 at 6M N.5 at near OU. Pupils were equally round and reactive to light, no afferent pupil defect was noted OU. Intraocular pressures by applanation tonometry were 16.8mmHg OU. Penlight examination findings revealed complete total disappearance of Bitot's spots, reduced dryness and wrinkleness of the conjunctiva OU. Dilated fundus assessment remained unchanged with improved healthy status of the neuroretinal rims. He had now gained some weight and looks very happy.



The patient was counseled on the improvement he was making in his eye discomfort. He was also counseled on the need for improved nutrition. He was instructed to return again in six months for follow up but was asked to return sooner if any changes were noted. He was also placed on:

Gutt: Tears naturale: 1 drop tds x  $\frac{3}{12}$   
Tab: Multivitamins: 1 tab dly x  $\frac{3}{12}$   
Cap: Omega 3: 1 cap dly x  $\frac{3}{12}$

#### Follow Up # 4

The patient returned on 19-06-2012 for follow-up with no new complaints. He bounced into my office and shook my hand twice. He looked very fine and robust. He denied any change in medical history. His entry visual acuity improved to 6/6 at 6M N.5 at near O.U. Pupils were equally, round and reactive to light; no afferent pupil defect was noted OU. Intraocular pressures by Applanation tonometry were 16.5mmHg OU. Penlight examination findings revealed a remarkable decrease in the dryness and wrinkling of the conjunctiva OU. Dilated fundus assessment was without abnormality. The patient was counseled and reassured of better prognosis. He was also counseled on the need for improved nutrition. He was advised to continue to wear his sunglasses He was also placed on: Gutt: Tears naturale: 1 drop tds x  $\frac{1}{120U}$  Tab: Multivitamins:

Cap: Omega 3:  
1 tab dly x  $\frac{1}{12}$   
1 cap dly x  $\frac{1}{12}$

He was instructed to return six months for follow up but was asked to return sooner if any changes were noted.

#### Follow Up # 5

The patient returned on 19-12-2012 for follow up. There were no new complaints. He reported he was happy with the treatment and the sunglasses. He did report improvement in his vision and that the symptoms were no more there. He denied any change in his medical history. His entry visual acuity remained stable with an improvement to 6/5-2 at far and N.5 at near OU Pupils were equally round and reactive to light, no afferent pupil defect was noted OU. Intraocular pressures by applanation tonometry were 16.1 mmHg OU. Penlight examination findings, revealed remarkably much more improvement with little or no dryness and a little wrinkled bulber conjunctiva OU. Dilated fundus assessment remain unchanged with improved healthy status of the neuroretinal rims.

The patient was counseled on the weight, confidence and stability regained. He was also counseled on the improvement he was making in his vision and on the need for improved nutrition. He was instructed to return again in six months for follow up but was asked to return sooner if any changes were noted. He was also placed on:

Gutt: Tears naturale: 1 drop tds x  $\frac{1}{120U}$   
Tab: Multivitamins: 1 tab dly x  $\frac{1}{12}$

#### Follow Up # 6

The patient returned on 19-06-2013 for follow-up. There were no new complaints. He denied any change in medical history and reported stability in his vision with or without his sunglasses. His entry visual acuity remained stable with 6/5-2 at far - N.5 at near OU. Pupils were equally round and reactive to light, no afferent pupil defect was noted OU. Intraocular pressures by applanation tonometry were 16.1 mmHg OU. He pleaded with me to talk to the pastor to adopt him as a child so that he would not return to the poor widowed mother with five other children battling to survive. He said he would want to train as a doctor and believed that the pastor would help him through school. I actually spoke with the pastor and also promised to collaborate with him in areas of needs such as books and upkeep allowance.



## 4. DISCUSSION

Vitamin A (retinol) and its naturally occurring relatives, retinaldehyde (retinal) and retinoic acid, are members of a class of over 1500 naturally occurring and synthetic compounds, the retinoids. Vitamin A is required for vision, reproduction, mucous secretion, and maintenance of differentiated epithelia (Newell FW, 1986). The major natural sources of vitamin A are dietary plant carotenoid pigments, such as beta-carotene, and retinyl esters in meat. They are converted to retinol in the small intestine. Vitamin A deficiency, usually in association with general malnutrition, is a leading cause of blindness in many under developed countries. The array of signs and symptoms grouped under the term xerophthalmia progress from night blindness (XN) to conjunctival xerosis(XIA), Bitot spots(XIB) to corneal xerosis(X2) and finally to keratomalacia(X3). Hypovitaminosis A in developed countries usually reflects inadequate absorption as the result of small bowel surgery, malnutrition, particularly alcoholism, or a dietary faddism.

Prolonged intake of dietary carotenes may lead to yellowing of the skin and conjunctiva that resembles jaundice. Chronic intake of 10-20 times more vitamin A than required may lead to increased intracranial pressure (with headache, nausea and papilledema), skeletal pain, and mucocutaneous signs. Although the patient had a good prognosis vis-a-vis good visual outcome, the patients that go on to develop the complicated form of the disease (keratomalacia) face the greatest threat to vision and significant visual damage to both eyes leaving the patient functionally disabled. This disability can affect a country's GDP because of its direct negative effect on productivity.

### 4.1 Limitation

There were no available materials to measure the tear break-up time

## 5. CONCLUSION

- This case demonstrates the role of patient history and clinical observation in the diagnosis of xerophthalmia.
- It is important for clinical optometrists to appreciate their role in educating patients about the nature of this disease and how to manage or better still carry out a professional referral.
- Although the prognosis for patients with acute xerophthalmia is generally fair, patients should continue to ensure proper nutrition that prevent vision problem and eventual blindness.
- This particular case also show that even with improvement in public health and the current programmes/interventions by international agencies to eradicate vision problems related to vitamin A deficiency through food supplementation, health education and health promotion; xerophthalmia is still seen in Nigeria and very closely related with poverty and unawareness.



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