Case Report

Ultraviolet Keratitis in a 20-Year-Old Engineering Student and the Role of Physician Advocacy in Workplace Safety: A Case Report

[1]Ajuonuma FO, [1]Tijani SG

[1]Department of Family Medicine, 44 Nigerian Army Reference Hospital Kaduna, Nigeria

Corresponding author: Fidelis Onykachi Ajuonuma, *Department of Family Medicine, 44 Nigerian Army Reference Hospital Kaduna, Nigeria; fkatchydr@yahoo.com; +2347037787042*

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Abstract

Background: Ignorance of workplace hazards leads to increased morbidity and mortality among workers. Primary care physicians are best suited as gatekeepers in healthcare systems to identify at-risk populations. Physician advocacy is one veritable tool that can be used to ensure workplace safety.

Case Summary: This report discusses the management of ultraviolet keratitis in a new engineering student exposed to arc welding without appropriate personal protective equipment. He and his course mates were largely ignorant of the health hazards associated with the workplace. An at-risk population was identified, and physician advocacy yielded great results in protecting the health of this population.

Conclusion: Effective patient advocacy requires skill, training and practice and this is highly recommended for all primary care Physicians.

Keywords: Ultraviolet Keratitis, Population at-risk, Physician Advocacy, Workplace Safety, Case Report.

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Introduction

It is common knowledge that primary care physicians are the gatekeepers in any health system and as such they have to identify populations at risk for prompt preventive interventions.[1] This role when neglected exposes at-risk populations to health hazards.[2] This case report illustrates the role of physician advocacy as a tool in primary care to protect at-risk members of our practice population.

Case Report

Our patient was a 20-year-old Engineering student who woke up in the morning with pain in both eyes. The pain was sudden in onset and continuous. It was aggravated with movement of the eyes and made better by keeping the eyes still. It was non-radiating and up to $\frac{7}{10}$ in severity. He had associated foreign body sensation, tearing and increased light sensitivity as he tried to open his eyes to daylight. He looked at the mirror and saw that both eyes were red. There was no associated purulent eye discharge or gumming together of the eyelids

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however he noticed his vision was hazy. He had no history of trauma to the eyes. He had no contact with people who had the red eyes of "Apollo". He had no prior history of recurrent eye itching and redness. There was no history of any prior drug ingestion, eye instillation or abuse of substances. His class started welding practice the previous day in the engineering workshop. He admitted to participating in the workshop without personal protective eye equipment. He had no headache, fever, nausea and vomiting. He did not apply any medications or home remedies. Due to the worsening symptoms, he came to the hospital for treatment. He was afraid of losing his sight as he had no idea what caused it since "Apollo" was not in season. He could not go to the workshop but expected to be treated. His other systems as reviewed were normal. He had no significant past medical history and no known history of allergies. He lived off-campus, took tobacco in no form, and did not drink alcohol or abuse any substance. He had no recent travel history. His general physical examination was normal although he was in obvious painful distress. He had normal eyelids and lashes. Visual acuity was $\frac{6}{12}$ bilaterally. The pupils were round, symmetrical and reactive to light directly and consensually. The cornea was bilaterally hazy, conjunctivae and sclera were hyperaemic. There was no foreign body seen on the lid eversion on both eyes. The anterior chambers were clear and of normal depth. Funduscopy showed normal retinal vessels with a cup-disc ratio of 0.4. Fluorescein test showed bilateral punctate corneal green stains on blue light limited to the palpebral fissure. The other systems were normal. A diagnosis of ultraviolet keratitis secondary to arc welding radiation exposure was made. Other identified problems include his ignorance of the health hazards of arc welding and the non-use of personal protective equipment (PPE). He was told that UV keratitis also called welders' arc eye was a flash burn injury to the outer layer of the cornea (the transparent part of the eyes) when exposed to any UV radiation source like looking at the welding arc without safety goggles. The essence of early commencement of treatment; to reduce pain, encourage healing and prevent complications were explained to him and a common ground was reached. A drop of 1% cyclopentolate was instilled into each eye. He was given tabs. Ibuprofen 400mg bd for three days, and Gentamycin eye drop to both eyes qid for 5 days. His fear of losing his sight was allayed as healing (re-epithelization) normally occurred within 48 hours. An Excuse Duty certificate for three days was issued to him to explain his absence from the workshop and to ensure he rested his eyes. He was to return in three days for review.

At the first follow-up, he had no complaints as all his symptoms had resolved. He rested his eyes and adhered to his prescription. He reported that most of his group members had the same eye problem. A focused eye examination showed complete resolution with normal findings. A diagnosis of resolved UV keratitis secondary to arc welding radiation exposure was documented. The opportunity was seized to give him an education on occupational health hazards and the essence of consistent and proper use of PPEs especially in the Engineering profession. The dangers of arc welding especially the exposure of the eyes to UV radiations and the need to always be in protective booths, overall, welder's safety goggles and helmet was reiterated. An advocacy letter was written to the Dean School of Engineering Technology (SET) of their Polytechnic which notified him of the outbreak of welder's arc eye among new engineering students on workshop practice. He was encouraged to ensure the provision of PPEs for the students and enforce consistent and proper usage to prevent health hazards. He was equally assured of the authors` availability to give a health talk to the instructors and students on occupational hazards and safety at his earliest convenient time. Our patient also had voluntary counselling and screening for hepatitis B, C, and HIV as part of disease prevention and health promotion. He was counselled on physical exercise, restful sleep and healthy eating for health maintenance.

He returned in two weeks for a second follow-up with no complaints. His serology results were non-reactive and he had commenced covid-19 and hepatitis B vaccinations. He was counselled against risky sexual behaviour and the use of illicit substances. The advocacy letter to their dean was productive. The school had procured enough PPEs for their use during workshop sessions, and we were equally invited to give health talks to the students and their instructors. He expressed satisfaction with the care and the education he had received. He was discharged to his school clinic for his continued healthcare.

Discussion

Ultraviolet keratitis is the inflammation of the epithelium of the cornea caused by exposure of insufficiently protected eyes to ultraviolet (UV) rays.[3] UV radiation is

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harmful to both the skin and the cornea of the eyes. Its source can be natural (sun) or artificial (electric arc welding torch, halogen lamps, electric sparks, lightning, photographers flood light etc.) When UV keratitis is caused by UV rays from the electric arc during a welding process, it is called "arc eye" or "welder`s flash eye".[4] UV keratitis clinical syndrome presents with ocular pain, tearing, conjunctival chemosis, blepharospasm, photophobia and deterioration of vision typically several hours after exposure.[3] This was the case of our patient, an Engineering student who had a positive history of unprotected involvement in an arc welding workshop in school and some hours later presented with acute eye symptoms. UV keratitis is common among welders. About 2.5 million people succumb to eye injuries annually and globally more than 500,000 blinding injuries take place.[5] Welders are amongst the most at-risk people because their work involves cutting metal objects, soldering, and in some cases brazing. In Accra Ghana, 73.7% of electric arc welders had eye problems, in Kampala, Uganda 59.9% while in Nigeria, 66.4%.[5] Studies have identified the risk factors in these welders to include electric arc welding type, increasing monthly income, non-use of eye PPE while working, improper use of eye PPE, lack of training on the use of eye PPE, and exposure to nearby welding activities.[5] He and some of his course mates were exposed to electric arc welding without the use of eye PPE and they did not have a prior orientation before commencing the workshop practice. These risk factors exposed them to the UV keratitis.

It has been found that even very short unintentional exposure of the eyes to the arc welding light will cause injury to the cornea.[6] The UV irradiation to the transparent cornea unlike the skin that has protective pigment (melanin) induces DNA lesions on the epithelial cells. These damaged cells will undergo apoptosis, be removed by autophagy and be replaced within 48 hours.[7] The diagnosis of UV keratitis is made clinically. The presentation with ocular pain, tearing, conjunctival chemosis, photophobia and blepharospasm with reduced visual acuity typically several hours after exposure and the presence of punctate keratitis that is limited to the palpebral fissure on fluorescein staining is confirmatory.[3,8] He presented some hours after their welding practice with the above symptoms, his visual acuity was reduced and fluorescein staining confirmed a corneal lesion limited to the exposed palpebral fissure. Re-epithelization takes place within three days however treatment is required to reduce pain and prevent infection. Recommended treatment includes the use of cycloplegics, topical antibiotics and wetting agents. Topical NSAIDs are not recommended as they retard the healing process.[3,9] He received topical cyclopentolate, gentamycin and oral ibuprofen with good effect. Studies done in Nigeria and other countries showed that health education brought about a significant increase in awareness and use of personal protective equipment among welders.[10] There is a need for proper education of welders on workplace hazards, and the types and use of different protective devices in other to safeguard their health.[10] He was not aware of the workplace hazards in electric arc welding hence the opportunity was used to educate him generally on the workplace hazards in the Engineering profession and the essence of proper and consistent use of PPEs.

He had other course mates who suffered the same exposure and also developed keratitis hence the need for advocacy to the Dean of Engineering. This health advocacy role is very vital in protecting the health of a population at risk. This role has been described as when "physicians responsibly contribute their expertise and influence to improve health by working with the patients, communities, or populations they serve to determine and understand needs, develop partnerships, speak on behalf of others when needed, and support the mobilization of resources to effect change."[11] The advocacy letter to the Dean was very productive. The school purchased enough PPEs for the use of the students, and their awareness of workplace hazards was also raised through health education, consistent and proper use of the PPEs became enforced. The lesson learnt from this case is that effective patient advocacy requires skill, training and practice and this is highly recommended for all primary care Physicians who see their practice population as a population at risk.[12] Physician advocacy as a core competence should be acquired during training and not neglected during practice.[2]

Conclusion

Our patient received comprehensive care and the ability to recognize a population at risk and through Physician advocacy cause positive changes to protect the health and wellbeing of the people was also demonstrated.

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Declarations

Ethical Consideration: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his clinical information to be reported in the journal. The patient understands that name and initials will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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