OCULAR INJURIES FROM EXPLODING BOTTLES OF CARBONATED DRINKS IN ASABA

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ABSTRACT

Aim: To highlight the presentations and outcomes of eye injuries from explosion of bottles containing carbonated drinks at FMC, Asaba over a 2 year period.

Method: A retrospective study which had consecutive series of 4 eyes of 4patients at the eye clinic from 2020-2022, and diagnosed with any form of bottle cork injury. Information obtained were age, sex, occupation, laterality, situation around the injury, type of agent, visual acuity, and other examination details at presentation and follow up, and treatment

Results: Three out of the five injured eyes (60%) were female's aged I1-35yrs. The males affected were 3 and 8 years old who were playing. Mean age of participants was 17 years. All ladies were injured while packing chilled carbonated drinks for sales. The right eye was affected in 3 (60%) of the 5affected eyes. Symptoms include; pain, redness and sudden deterioration of vision. Three patients had a presenting VA of Hand Motion and the other had light perception. VA remained IIM at 1 wick 3 months, except for the boy who had 6/60 at 1 week and 6/12 at I month. They had varying degrees of cataracts, 2 had retinal detachment, lens subluxation and vitreous hemorrhage in 2, while one eye is going phthisical

Conclusion: Ocular injuries from explosion of carbonated drink containing glass bottles which may be from flying glass splinters or bottle caps result in catastrophic ocular complications. Proactive steps needed to prevent such injuries especially at the workplace are of utmost importance.

INTRODUCTION

Ocular injuries from bottles of carbonated drinks occur from provoked or unprovoked forceful opening of corked/capped bottles containing such drinks. The explosion results in high velocity flying of the bottle tops/caps or glass fragments and usually occur due to unguarded handling of these bottles or accidental bursting of the cork while taking the bottle off a refrigerating chamber or shelf.' According to Cavalini they cause a destructive type of injury with characteristic phase of compression, decompression with an increase in anterior-posterior diameter beyond its physiological range due to the impact of the high velocity missile. Consequent upon this, a wide range of possible injuries (open or closed globe injuries) follow the impact as almost every part of the eye is affected, potentially leading to corneal abrasion, laceration, globe rupture, hyphemia, cataract, lens rupture, iris injuries, vitreous hemorrhage, retinal and choroidal tears and optic nerve avulsion.

Bottle cork or fragment injuries are an important cause of visual impairment and blindness. Earlier reports suggested a predominant involvement of the right eye because of more prevalent right-handedness, these bottles are often held with the right hand.

Aetiological agents and distribution vary per country. From corks (champagne/ wine bottles) in Europe and America, to metal caps of carbonated soda drinks and beer which were commoner in Africa. In Germany, Sprang et al (1995), reported that injury from bottle caps were responsible for 76% of all ocular injuries in their series. In Ibadan, Nigeria. A report by Bekibele et al implicated broken Coca-Cola "bottles (50%), beer (25%), as the main culprit while non-alcoholic grape juice bottle were the least (6.25%). Another series in Port Harcourt, Nigeria by Pedro-Fgbe et al showed that 83.3%(5/6) of such injuries were from glass splinters of Coca-Cola M bottles following explosion while 16.7% (1/6) was from caps of a Coca-Cola bottle.

In this study, we report a series of 5 patients who presented with ocular injuries following explosion of carbonated bottled drinks who presented to the ophthalmology department of FMC Asaba.

Methods: This was a retrospective study which had consecutive series of 5eyes of 5 patients at the eye clinic of the ophthalmology department of FMC Asaba between July 2020 and July 2022, diagnosed of having bottle cork injury. Information obtained were age, sex, occupation, laterality, situation around the injury, type of agent, visual acuity, and other examination details at presentation and follow up, and treatment.

RESULT: A total of three out of the five injured eyes (60%) were females aged 11-35yrs. The only male was an 8 year old boy. Mean age of participants was 17 years. All ladies were injured while packing chilled carbonated drinks for sales. The right and left eyes each were affected in 50% of cases. All had identical presenting symptoms: pain, redness and sudden deterioration of vision. Figure 1 and 2 show the different variety of ocular injuries which follow such an explosion.

TABLE I-BIODATA

BIODATA	A	B	C	D	F
AGE	35	14	11	8	3
SEX	F	F	F	M	M
OCCUPATION	Trader	High school student helping mother in shop	High school student helping out her mother	Pupil	Pupil
AETIOL.OGICAL. ACENT/EVENT	Carbonated bottlle drink being packed	Carbonated bottle drink from the frdgc	Carbonated bottle drink from the fridge	Playing With friends (vague history)	Splinter fioman exploded drink while playing

TABLE 2-SHOWING THE PRESENTING CLINICAL FEATURES

	A	B	C	D	E
PAIN	x	x	x	x	x
DETERIORATION OF VISION	x	x	x	x	x
PRESENTING VA	IIM	IIM	IIM	LP	NC
LATKRALITY	OD	OS	OS	OD	OD
LID INJURY		x	x		
CONJUNCTIVAL INJECTION	X	x	x	x	x
CORNEAL LACERATION	x	x	x	x	
SCLERAL.LACERATION	x	x	x		x
SHALLOWAC		x	x	x	x

ISPHAEMA	
IRIS PROLAPSE	x x x x
IRREGULAR PUPIL	x x x
CATARACT	x x
LENS RUPTURE	x
VITREOUS PROLAPSE	x
POSTERIORVIW	

Keys: OD= Right, OS Left, HM= Hand motion, LP light perception, NC=no cooperative

The commonest presentation was pain, deterioration of vision, and conjunctival injection while the least presentation was vitreous prolapse was the least common and was seen in only one patient.

Figure 1. Patient B, Pre and post op

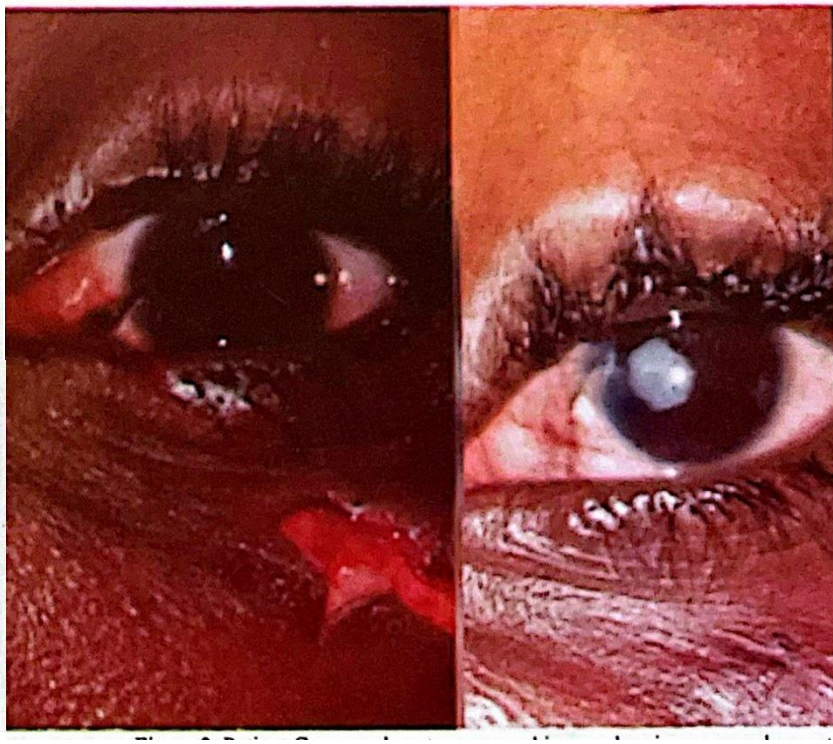

Figure 2. Patient C, pre and post op. second image showing a secondary cataract

DISCUSSION

This retrospective review shows a unique pattern where younger females present with trauma from nonviolent/abusive scenarios. Whereas, the boys were younger and got injured while playing with their peers, one had a milder degree of injury and better outcome compared to older albeit young females (girls/ladies) who got

injured while involved in an economic activity. In fact, B&C were assisting their mothers' small scale business in the sales of refreshment. This study predominantly affected people of younger age group as against other series in Nigeria which had predominantly young adults.*5

The epidemiology of those affected is similar to findings by Pedro-Egbe et al in which 5 out of 6 patients with similar injury were females. However, the review had a younger population (mean age of 17 years) with 3(60%) school children aged 8-14 years.

There was unilateral involvement in all cases of the review with predominant right involvement, OD: OS =3:2. Most (80%) ended up with severe visual impairment (legal blindness). This is similar to the curlier report by Pedro-Egbe et al and higher than reported by Kuhn et al'', unlike this study, they (US, Mexico, Hungary) reported that injury also involved bystanders. Case E, the 3 in this series also fits into the description of a 'bystander'.

Carbonated drinks are notorious for causing ocular injuries following explosives. These have been reported in Nigeria by Bekibele et al' (at Ibadan, 2003), Pedro-Egbe et al (Port-Harcourt 2011) and other parts of the world.

Glass fragments from breakable bottles have been implicated in most severe cases of injury. In his study, 40% were due to corks of glass bottles, 20%suspected to be glass fragments (C and E), while D who had the least severe injury was from cap of a plastic bottle forcefully opened while friends (children) were playing.

This is quite high compared to earlier reports in Ibadan 31.3% Nigeria,' 38%in US,24% in Germany,20% in Israel.'''' It was however lower than report by Pedro-Egbe et al'' (80%), 83.3% in India and 87 in Kuwait.

An arguable reason for the difference between this study and higher earlier study is the fact that plastic and metallic-based cans are currently replacing glass bottles for carbonated beverages. This is equally plausible with the lower number in Europe and US as they have more plastic vessels than glass except for carbonated drinks whose corks have been majorly implicated in those climes Cavalini et al (2003), Cavalini et al (2001).

Another factor that explains it is heat and agitation of bottles during movement. Exposure of carbonated drinks to heat is thought to cause release of CO2 which generates energy sufficient enough to cause explosion even when unprovoked. Also, defective/old storage materials, in addition, may also increase the chances of explosion. However, in the case of the A and C in the report, the explanation is that freezing cause's expansion of the carbonated liquid which increases its volume, thus seeking the area of least resistance (cork area) for its expansion. This freezing

may be the reason for predominant cork injury noted in this report as against glass fragments found to be more with molecule agitation (effervescence) under higher temperature.

Possible limitations are the retrospective design which may have accounted for some loss of data. A ready-made proforma will ensure structural data collection and is recommended for the future. Also we relied on history to determine the nature of the offending agent (bottle cap or glass splinter), there is a possibility that the information is inaccurate with bottle splinter injury actually called bottle cap injury. Also, the relatively small sample size in this study compared to other referenced literature. However, this is significant considering the interval of two years within which the injuries occurred as against 5-10 years in some of the other referenced studies.

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