

Airbag Related Ocular Injuries: A Short Case Series

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ABSTRACT

Airbags are designed to protect occupants of motor vehicles from injuries in the event of a crash but have been implicated in some serious ocular injuries after road traffic accidents (RTAs). Diagnosis of airbag related ocular injuries requires a high index of suspicion. Using a retrospective hospital-based, noninterventional study design, we evaluated the frequency and severity of airbag-related ocular injuries in patients presenting with ocular trauma to the eye clinic over a 4 years period. The case notes of patients managed for varying degrees of ocular injuries over a 4 years period in an eye clinic were reviewed. Patient demographics, the cause of injury, type of vehicle, speed, specific ocular structures injured, visual morbidity, and visual outcome were assessed. An 150 cases were identified and enrolled in the study. Only 8 (5.3%) of them were victims of RTAs. Airbag deployment was the mechanism of injury in 2 (1.33%) patients. Details of these two patients are reported. There was bilateral involvement in the two patients that had airbag-related ocular injuries. Each of the patients sustained a ruptured globe in one eye, and one of them became bilaterally blind from airbag-related ocular injuries. Airbag-related ocular injuries can be very severe, and this mechanism of injury should be considered during the assessment of victims of RTAs with ocular injuries.

Keywords: Airbag injuries, ocular trauma, road traffic accidents

INTRODUCTION

Airbags have reduced the fatality in road traffic accidents (RTAs) by 31–32%,^[1] but are associated with serious ocular and facial injuries directly attributable to their inflation.^[2–4] Airbag-associated trauma to the eyes can occur in low-speed (10–30 mph) collisions.^[5,6] They may affect any ocular structure.^[7] Blunt ocular trauma may result from the mechanical force of a rapidly deployed airbag directly. Intermediary hard objects such as eyeglasses and pipes may cause penetrating eye injuries.^[8–11] Chemical burns may result from the combustion of sodium azide on airbag inflation.^[12,13] Awareness of the spectrum of airbag-associated ocular injuries will improve early diagnosis and optimum patient management.^[7] We reviewed the medical records of ocular trauma patients presenting as

emergencies to the study center during 4 years study period to ascertain the frequency of occurrence of airbag-related ocular injuries and the severity of the injuries sustained.

MATERIALS AND METHODS

A review of the clinic, ward, and theatre registers was done to identify patients managed for ocular trauma during the study period. The case notes of all patients seen and managed for ocular trauma over a 4 years period (January 2006–December 2009) were reviewed retrospectively. The frequency, severity, and visual outcome of patients who sustained airbag related ocular injuries were determined. Age, gender, the cause of injury, type of injury, eye involved, initial, and final visual acuities (VAs) were recorded. Type of injury was grouped as either open globe or closed globe injury. Open globe injuries were further classified as rupture or laceration (penetrating, perforating or intraocular foreign bodies). Contusions and lamellar lacerations were classified as closed globe injuries.^[14] At the end of follow-up, the visual outcome was assessed as poor if the best-corrected VA was <6/60, fair if VA was between 6/60 and 6/18, and good if the vision was ≥6/12.

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RESULTS

Over 70% of the patients in this study were aged 30 years and below. A male predominance was evident with a male-female ratio of 2.49:1. There were 107 males (71.3%) and 43 females (28.7%). Nine (6%) of patients had bilateral ocular injuries. An 159 eyes of 150 patients were managed for ocular trauma during the study period.

The most common type of ocular trauma observed was closed globe injury occurring in 104 (56%) eyes. Blows to the eyes with the fist were the most common agent of injury occurring in 32 (20.7%) eyes. Airbag related ocular injury was the mechanism of injury in only 2 (1.33%) patients. Initial VA was found to be a significant predictor of final VA ($P < 0.001$).

Eight patients (5.33%) had RTA related ocular injuries. Two (25%) of these RTA victims had airbag-related ocular injuries. Both patients were male and were <45 years old. Though both eyes were involved in only 9 (6%) of all the patients with ocular trauma studied, the two patients with airbag-related ocular injuries had bilateral involvement. Of the four eyes of the two patients involved, two eyes (50%) were ruptured (one eye of each patient) while their contralateral eyes had a severe closed globe and penetrating eye injury respectively.

The first patient with airbag-related ocular injuries was a front seat passenger in a jeep, which was involved in a head-on collision with a moving truck, which had lost control. He was wearing a three-point seat belt loosely and was sitting forward close to the dashboard. The driver of the jeep was drunk but not speeding. On impact, the airbag was deployed, and he sustained bilateral ocular injuries. He was not wearing eyeglasses at the time of the accident. He had multiple facial burns, bilateral periorbital edema, sub-conjunctival hemorrhage, chemosis, corneal edema and hyphema. In addition, he had iridodialysis in the right eye (RE) involving two clock hours and the left globe was ruptured. His vision was hand movement RE and no perception of light (NPL) in the left eye (LE). An assessment of closed globe injury RE and severe penetrating eye injury LE was made. Cranial and orbital computerized tomography scan revealed a fracture of the anterior wall of the right maxillary antrum with an ipsilateral antral hematoma and an ill-defined LE ball with a posteriorly dislocated lens. Ocular B-scan of the RE revealed mild anterior vitreous hemorrhage and thickening of the retina suggestive of commotio retina [Figure 1]. He had an urgent primary repair of the left ruptured globe done. The right hyphema cleared spontaneously within a week to reveal extensive posterior synechiae involving 210° of the pupil,

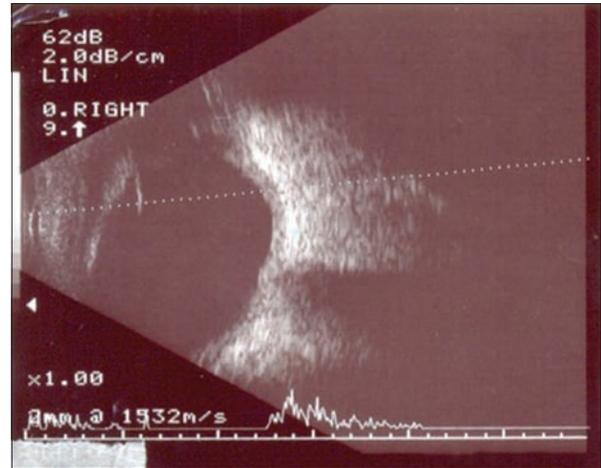


Figure 1: Ocular B-scan of case 1

traumatic cataract, vitritis and traumatic maculopathy. His vision in the RE improved to counting fingers (CF) at 1 m. He had right cataract extraction 8 months posttrauma, and his vision improved to 6/36. He had a vitreo-retinal review for his RE and macular surgery considered unnecessary. Refraction did not improve his distance correction, and he had low vision assessment done.

The second patient was a 38-year-old male driver whose vehicle lost control and hit the concrete wall separating the two sides of the road. He was not wearing spectacles or a seat belt at the time of the accident. He sustained bilateral ocular injuries. The vision in the RE was NPL and CF at 1 m in the LE. He had a ruptured globe in the RE and a corneoscleral laceration in the LE. He had surgical repair of the injuries in both eyes. The postoperative unaided VA was NPL RE and 6/9 LE. The vision in the LE improved to 6/5 with refraction ($-1.00DS/-0.75D_{cyl} \times 90$).

DISCUSSION

Ocular trauma occurred more in the younger age groups (70.6% of the patients were <30 years). The two patients who had airbag-related ocular injuries in this study were <45 years old. Several studies in Nigeria have found that trauma is commoner in younger patients.^[15-17] There was a male predominance in this study as 107 (71.3%) of the subjects were male, and the male-female ratio was 2.49:1. The two patients with airbag-related ocular injuries were males. This male predilection has been reported by other studies on trauma epidemiology.^[17-20]

Only 8 (5.3%) patients with ocular injuries after RTA were enrolled in this study. Of this unusually small number, 2 (25%) had airbag-related ocular injuries. This proportion is alarming. Anderson *et al.*,^[2] reported

that airbag-related ocular injuries represented 4.4% of all motor vehicle crash-related injuries while airbags reportedly caused only 3% of all automobile crash related ocular injuries in the study by Duma *et al.*,^[9] This disparity may be due to the smaller sample size in this study. It is also likely that other RTA victims with multi-system injuries co-managed outside the eye clinic were not included in this study. A prospective study design with protocols put in place at all the emergency units of the hospital will help assess the true frequency of occurrence of airbag-related ocular injuries.

Possible etiological factors identified for airbag-related ocular injuries in this study were improper or nonusage of seat belts and sitting forward close to the dashboard. One of the patients with airbag-related ocular injuries was sitting forward in the vehicle and became bilaterally blind after the accident. Sitting forward has been identified as a risk factor,^[21] and a case of bilateral blindness from airbag-related ocular injuries has previously been reported in Nigeria.^[22]

Nonusage and improper usage of seatbelts possibly contributed to the severity of injuries sustained in this study. Unrestrained passengers have an increased risk of severe ocular injury,^[23] and posterior segment trauma.^[23-25] Appropriately used seat belts have been associated with less severe ocular injuries not involving the posterior segment and better visual outcomes.^[26]

Airbag-related ocular injuries can cause severe visual impairment and ocular morbidity. The bad condition and pot holes on Nigerian roads may inadvertently trigger airbag release considering the fact that the level of mechanical vibrations attributable to badly surfaced roads are perhaps over and above the expectation of the designers of the vehicles. There is a need for regular airbag servicing and maintenance, for increased physician awareness of its occurrence and continued the education of commuters on the appropriate use of safety devices installed in vehicles.

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