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Bottle-cork injury to the eye: a review of 13 cases

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PURPOSE. *To analyze the anatomic and functional consequences of wine-cork injury to the eye in relation to the patient's age and the type of cork and wine.*
METHODS. *We retrospectively studied 13 patients, six women and seven men, presenting to our department with bottle-cork injury to the eye between January 1999 and June 2001.*
RESULTS. *All patients presented with closed-globe injury according to Kuhn et al's classification. All the cases were injured by bottle corks from sparkling wine: white in ten cases and red in three. Mean visual acuity at admission was 20/100 (range, hand motion to 20/20). The most frequent early injury was anterior chamber hyphema (84.6%), followed by corneal injury (62.2%), ocular hypertension (46.1%), lens subluxation (30.8%), traumatic cataract (23.1%), and post-traumatic retinal edema (23.1%). Mean final visual acuity was 20/25; the follow-up ranged from 3 to 29 months, averaging 16.1 months. Late complications were as follows: pupil motility anomalies (38.5%), traumatic cataract (30.8%), iridodialysis (15.4%), traumatic optic neuropathy (7.7%), post-traumatic glaucoma (7.7%), and traumatic maculopathy (15.4%). Surgical treatment was necessary in two cases (15.4%).*
CONCLUSIONS. *Bottle-cork eye injuries account for 10.8% of post-traumatic hospital admissions to our department. Most of them are due to sparkling white wine served at room temperature. There is no correlation between ocular injury and the eye-bottle distance or the type of cork. (Eur J Ophthalmol 2003; 13: 287-91)*

KEY WORDS. *Eye injury, Bottle-cork, Traumatic hyphema, Lens subluxation*

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INTRODUCTION

Bottle-cork injury to the eye can cause severe damage to the globe with secondary loss of visual acuity (1-4). When a blunt object's diameter is smaller than that of the orbital rime, as in the case of a bottle cork, the full impact of the shock wave is received by the globe, without any of it being absorbed by the orbital bony structures (5,6). If the cork strikes the eye at a high enough speed , there is distortion of the globe and intraocular pressure (IOP) is raised (2).

In the province of Modena, a particular type of sparkling wine is manufactured ("Lambrusco," well known throughout the world) that ferments, generating pressure inside the bottle that can cause the cork to be ejected like a cork from a champagne bottle when it is opened.

A previous case series report reviewed medical records of nine patients who were consecutively diagnosed with champagne-cork eye injury in four years (5). This retrospective study covered 13 patients who presented to our department because of bottle-cork blunt eye injury. We assessed the anatomic and functional consequences of the injury.

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METHODS

This retrospective study covered a consecutive series of 13 eyes of 13 patients admitted to the Modena and Reggio Emilia University Department of Ophthalmology between January 1999 and June 2001 diagnosed as having bottle-cork eye injury. There were seven men (53.85%) and six women (46.15%), aged from 20 to 85 years (mean, 48.38 ± 21.78 years). Two already had cataract and four had systemic hypertension. None had suffered previous ocular trauma.

The injured eye was the right one in 69.23% of cases and the left one in 30.77% of cases. For each patient, data were collected with regard to age, sex, dynamics of the traumatic situation, type of wine and cork, time of year when the injury occurred, visual acuity, results of slit-lamp and funduscopic examinations and applanation tonometry (at admission and during follow-up), and type of therapy.

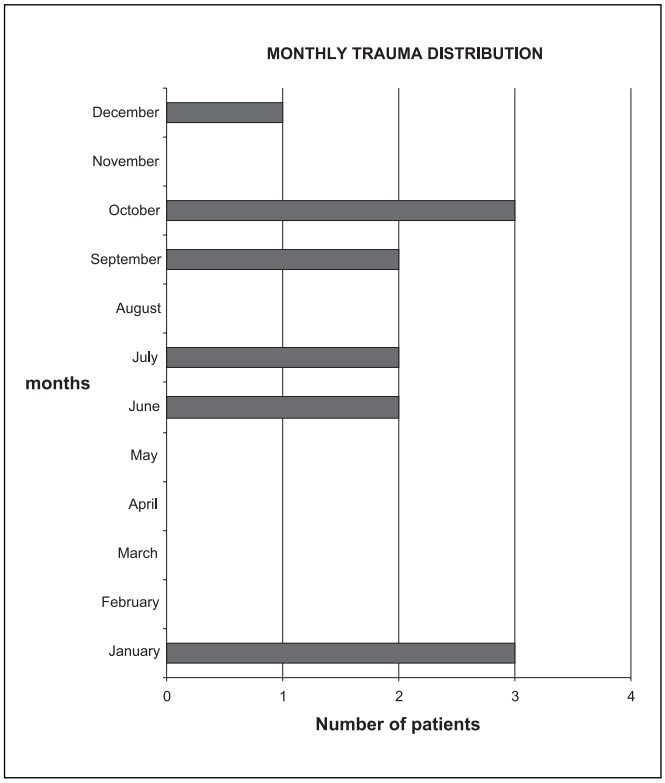

Fig. 1 - *Month-by-month distribution of bottle-cork eye injuries.*

RESULTS

Sparkling wine was involved in all cases: white in 76.92% and red in 23.08%. Six bottles were homemade wine (three white and three red).

The types of cork were as follows: one plastic stopper with protective metal wire, three plastic stoppers without wire, three corks with metal wire, two corks, and four metal crown caps.

Just under a third (30.77%) of the cases took place in winter, 15.38% in spring, 23.08% in summer, and 30.77% in autumn (Fig. 1).

All injuries were closed-globe injuries according to Kuhn et al classification (7). This specifies that the eye wall (made up of the rigid structure of the sclera

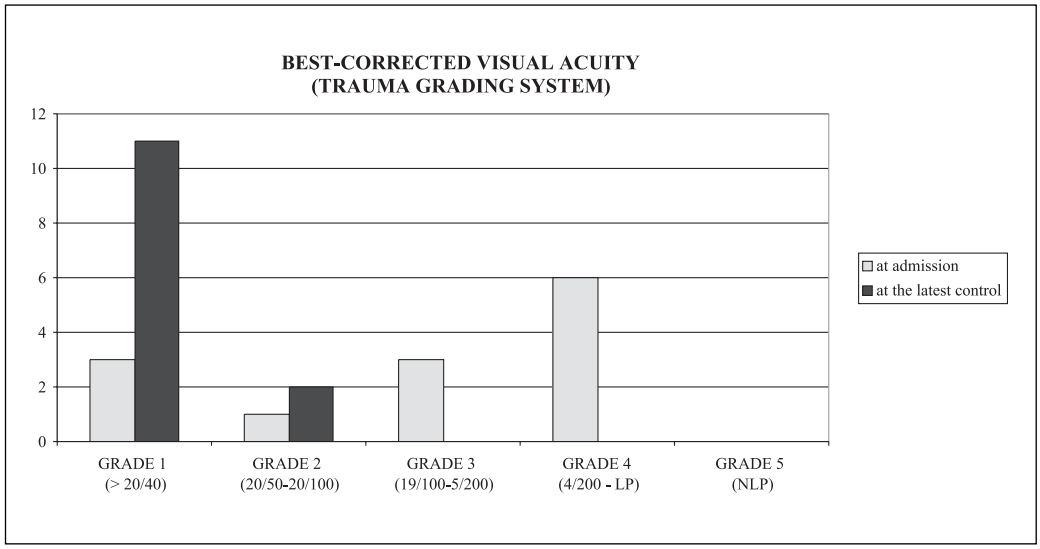

Fig. 2 - *Visual acuity of patients based on the trauma grading system at admission and the last follow-up. LP, light perception; NLP, no light perception.*

and the cornea) has no full-thickness wound and comprises both cases without scleral or corneal wounds (contusion) and those with a partial-thickness wound (lamellar laceration).

Mean best-corrected visual acuity (BCVA) at admission was 20/100, distributed as follows based on the trauma grading system classification (8) (Fig. 2): 23.08% grade 1, 7.69% grade 2, 23.08% grade 3, 46.15% grade 4; there were no grade 5 patients.

Data on anterior and posterior segment and ocular adnexae at admission are summarized in Table I. The largest group was hyphema, nearly half had corneal edema and folds in Descemet membrane, just under a quarter each had corneal abrasion, iridodialysis, traumatic cataract, lens subluxation, and there was one with lens dislocation.

Funduscopic examination was not possible in 61.53% of cases because of cloudiness of the dioptric media (diffuse corneal edema in 15.38% of cases, massive hyphema in 23.07%, traumatic cataract in 15.38%, vitreous hemorrhage in 7.65%); three presented with Berlin edema.

IOP was collected at admission by applanation tonometry and was distributed as follows: 53.85% <20 mmHg, 30.77% 20 to 28 mmHg, 15.38% 40 to 48 mmHg.

TABLE I - EYE INJURIES AT ADMISSION

Clinical features	Patients													Total (%)
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Hyphema	X	X	X	X		X	X	X	X	X		X	X	11(84.62)
Corneal edema	X	X				X	X		X			X		6 (46.15)
Ocular hypertension	X	X		X		X					X	X		6 (46.15)
Corneal abrasion			X	X			X							3 (23.07)
Iridodialysis	X							X	X					3 (23.07)
Lens subluxation	X				X							X		3 (23.07)
Cataract	X							X				X		3 (23.07)
Berlin edema					X			X	X					2 (15.38)
Eyelid edema									X			X		1 (7.69)
Lens dislocation in AC		X												
Visual acuity	HM	HM	20/20	12/200	20/30	20/200	20/40	HM	20/50	HM	5/200	HM	HM	

HM = Hand motion; AC = Anterior chamber

TABLE II - EYE INJURIES AT THE LAST FOLLOW-UP

Clinical features	Patients													Total (%)
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Pupil motility anomalies			X		X	X		X		X				5 (38.46)
Cataract	X					X		X				X		4 (30.77)
Iridodialysis									X	X				2 (15.38)
Optic neuropathy	X											X		2 (15.38)
Maculopathy	X	X												2 (15.38)
Surgical aphakia		X												1 (7.69)
Ocular hypertension												X		1 (7.69)
Visual acuity	20/30	20/50	20/20	20/20	20/20	20/20	20/20	20/25	20/20	20/20	20/20	20/50	20/20	

While in hospital, 11 patients received only medical treatment; and two required surgery. All patients were treated with topical steroids and antibiotics. Atropine and systemic antifibrinolytic agents (tranexamic acid) were necessary in 11 patients with hyphema. Six patients with ocular hypertension received systemic therapy with carbonic anhydrase inhibitors as well as topical β-blockers. Three patients with traumatic retinal edema were treated with systemic steroids.

In one case surgery was required because of lens dislocation in the anterior chamber and in another because of traumatic lens subluxation and complete opacification. Surgery was done respectively six months and four days after injury. In both cases phacoemulsification and lens extraction were done through the limbus, followed by anterior vitrectomy and intraocular lens implantation with scleral fixation (according to Lewis' technique) (9).

The follow-up periods varied between 3 and 29 months, averaging 16.08 months. Final BCVA at the last follow-up according to the trauma grading system was distributed as shown in Figure 2: 84.62% grade 1 and 15.38% grade 2; there were no grades 3, 4, or 5 patients.

At the last follow-up 23.08% of cases did not have any sequelae; Table II lists the clinical features, particularly concerning anterior chamber structures.

Funduscopic examination was negative in 69.23% of cases; in the remaining patients, it revealed traumatic optic neuropathy (pale optic disk with diffuse reduction of retinal sensitivity in the visual field) in 7.69% of cases, optic neuropathy secondary to traumatic ocular hypertension (optic disk excavation with glaucoma-type visual field defect) in 7.69% of cases, and traumatic maculopathy with internal limiting membrane shrinkage in 15.38% of cases.

At the last follow-up visit, IOP on applanation tonometry ranged from 12 to 22 mmHg (mean 14 ± 2.91); it was <20 mmHg in 12/13 cases (92.31%), of whom only one required topical β-blockers. In the other patient, IOP was 22 mmHg without therapy.

DISCUSSION

Wine bottle-cork injury is among the most common diagnoses at admission for ocular trauma in our department, with an incidence of 10.83% of all eye injuries that required hospitalization between January 1999 and June 2001. The incidence seems to be higher in regions with large-scale production and sales of sparkling wine (10). This type of wine has chemical and physical characteristics inducing fermentation inside the bottle, and the resulting rise in pressure can be high enough to push out the cork at a speed of about 15 m/sec (55 km/h) (11). The pressure inside the bottle increases in direct proportion to the storage temperature, especially for white wine, and the grade of effervescence, mostly shortly after the wine has been bottled. In our series, this kind of eye injury seemed more frequent between September and December-the period when wine is bottled.

We did not find any real differences between homemade and factory-made wines in terms of number of eye injuries. We also considered the position of the bottle at the time of injury, and found it was upright in all cases. Most injuries (76.92%) were due to sparkling white wine served at room temperature; in fact, pressure in the bottle, as we stated above, rises with temperature.

This study showed that the most serious early injury after bottle-cork eye trauma is hyphema, followed by ocular hypertension and corneal edema; four patients had traumatic lens dislocation. The most common late sequela was pupil motility anomalies, which did not cause visual impairment or discomfort. Four patients had traumatic cataract, which was present at the time of admission in three cases; in the fourth it developed three months after injury. Late funduscopic sequelae occurred in 30.77% of cases, and included traumatic optic neuropathy, optic neuropathy secondary to traumatic ocular hypertension, and severe traumatic maculopathy. Immediately after injury, ocular hypertension was present in six patients (two because of lens subluxation, two because of massive hyphema, and two because of angular recession), only one of whom required continued local therapy for glaucoma. Two cases had final BCVA less than 20/60, due to traumatic maculopathy in one case and traumatic cataract in the other.

This series highlights the need, in Italy as in other countries (12), for safe legislation regarding wine, bottle, and stopper production as well as for measures to prevent bottle-cork eye injury. It is essential to enlist the aid of press when advertising the product; and notes on the bottle labels may also prove useful.

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