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Original articles*

TRAUMATIC RUPTURES OF THE EYEBALL:  
CAUSES, PLACES OF OCCURRENCE AND  
AMAUROSIS AS A CONSEQUENCE OF THE  
RUPTURE

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TRAUMATSKE RUPTURE OČNE JABUČICE:  
UZROCI, MESTO NASTANKA I AMAUROZA  
KAO POSLEDICA RUPTURE

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*Abstract*

*Key words*

eye injuries, eyeball rupture,  
amaurosis

*Ključne reči*

povrede oka, ruptura očne jabučice,  
amauroza

**Introduction** - Traumatic ruptures belong to the group of open eyeball wounds caused by the effect of blunt force. They are the most serious eye injuries, and often end in significant or complete vision loss in the injured eye.

**Methods** - We analyzed patients with traumatic ruptures of the eyeball hospitalized at the Clinic of Eye Disease at the Clinical Center of Serbia in Belgrade over a period of 10 years (2000-2009). We used data from the Registry of patients hospitalized at the Clinic of Eye Disease. The following parameters were analyzed: age of the injured subjects, place and cause of injury, the way in which the injury occurred, and the frequency of amaurosis developed as a consequence of traumatic rupture of the eyeball.

**Results** - There was a total of 276 patients with a traumatic rupture of the eyeball in the analysed period, 194 (70,3%) of which were men: the ratio of men to women with rupture was 2,4:1. The highest percentage of injured males was in the third and fourth decade of life and amounted to 85,0%. Ruptures occurred most often with agriculturists with 30,1% injured, and then, in decreasing order, at home - 26,1%, at the workplace - 13,7%, in public places - 10,5%, on the street/road - 9,1%, in taverns/pubs - 6,2%, during sports/recreation - 3,2% and in miscellaneous places - 1,1%. Causes of eye injuries with a rupture were: wood - 21,7%, fall - 21,0%, fight - 16,3%, cow horn - 10,2%, traffic accident - 8,7%, injuries during work on different machines - 8,3%, during explosions - 3,6%, and in some other ways - 10,2%. These injuries ended in amaurosis in 220 (79,7%) out of 276 analysed patients with an eyeball rupture.

**Conclusion** - The ratio of injured men to women with an eyeball rupture is significantly more balanced than the ratio of those with mechanical injuries of the eye in a general sense. The reason for this is that most of those who sustained an eyeball rupture were performing agricultural labor or were at home, where women comprise a very high percentage. These two realms are where we should seek possibilities for preventing injuries and occurrence of ruptures.

*INTRODUCTION*

Traumatic ruptures belong to the group of open eyeball wounds, caused by the effect of blunt force /1/. They are the most serious eye injuries, and often end in vision loss or even loss of the eyeball itself due to damage and extrusion of the intraocular contents through the wound /2, 3, 4/. They occur at all ages, at different

places and can originate from different causes /5, 6, 7/. They most often occur by accident, but they can also happen during fights and very rarely they can be self-inflicted by psychotic patients.

## MATERIALS AND METHODS

In this study we analyzed patients with traumatic ruptures of the eyeball hospitalized at the Clinic of Eye Disease at the Clinical Center of Serbia in Belgrade over a period of 10 years (01. January 2000. to 31. December 2009.). We used data from the Registry of Hospitalised Patients and medical records from the Clinic of Eye Disease.

The parameters we analysed were: age of the injured subject, place and cause of injury, the way in which injury occurred, and the frequency of amaurosis developed as a consequence of traumatic rupture of the eyeball.

The primary goal of analyzing these parameters is to point out the risk factors to pay attention to in order to prevent eyeball rupture and its serious consequences on visual function.

## RESULTS

In the analysed 10-year period (2000-2009), a total of 3206 patients were hospitalized at the Clinic of Eye Disease, Clinical Center of Serbia in Belgrade for mechanical injuries of the eye. There were 276 patients

among them with a traumatic eyeball rupture, which is 8,6% compared to the total of patients hospitalized for mechanical injuries of the eye. There were 194 (70,3%) men and 82 (29,7%) women, so the ratio of injured men to women was 2,4:1. Eyeball ruptures occurred in all decades of life: the lowest percentage was in the first decade (4%), and the highest was in the eighth decade of life (22,5%), compared with the total of all ruptures (Figure 1). The percentage of injured men was the highest in the third and fourth decade and amounted to 85,0% in each.

Eye injuries with eyeball rupture occurred in specific settings with the following frequencies: ruptures during agricultural labor – 30,1%, at home – 26,1%, at the workplace – 13,7%, in public places – 10,5%, on the street/road – 9,1%, in taverns/pubs – 6,2%, during sports/recreation – 3,2% and at some other places – 1,1%. These percentages were calculated by comparing all 276 patients with an eyeball rupture as well as each particular place where this injury occurred in respect to all places together. Figure 2 represents the distribution of eyeball ruptures, as well as amaurosis as a consequence of rupture depending on the place where the injury occurred. The whole column represents the percentage of ruptures that occurred at each of the particular places where an injury took place in respect to all places in general, in separate groups of 194 men and 82 women. The unshaded part of the column represents the percentage of ruptures that resulted in amaurosis, for each place where injury occurred and for each sex, separately.

The causes of eye injuries that led to eyeball ruptures were different with the following frequencies: wood – 21,7%, a fall – 21,0%, a fight – 16,3%, cow horn – 10,2%, a traffic accident – 8,7%, injuries during work on different machines – 8,3%, explosions – 3,6%, and other – 10,2%. These percentages are calculated in respect to a total of all ruptures occurring in both sexes compared to all causes of injury. Figure 3 represents the distribution of eyeball ruptures, and amaurosis as a consequence of those ruptures depending on the cause of origin. The whole column represents a percentage of ruptures resulting from each particular cause in respect to a total number of ruptures resulting in general in men as well as women. The unshaded part of the column represents the percentage of ruptures that ended in amaurosis for each cause in particular, separated for both sexes.

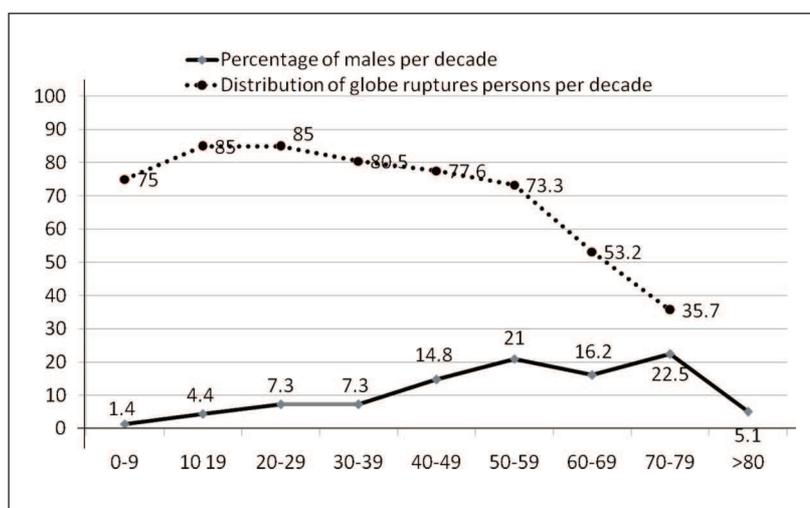


Figure 1. Distribution of eyeball ruptures by decades of life of the injured subjects

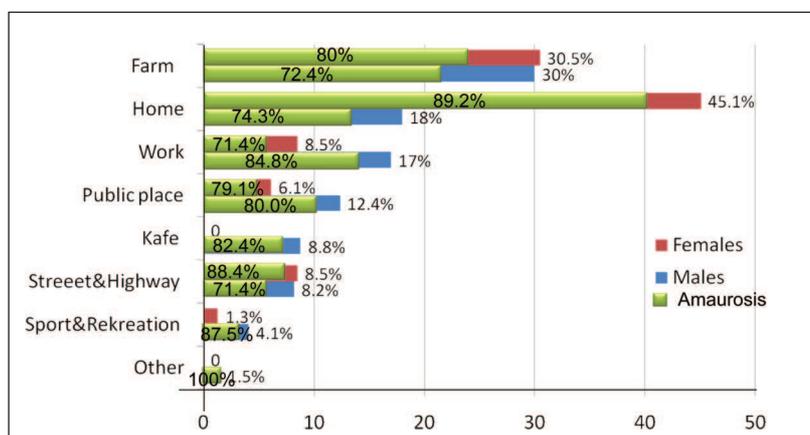


Figure 2. Distribution of eyeball ruptures and amaurosis in regard to the settings in which the injury occurred separated for men (n=194) and women (n=82).

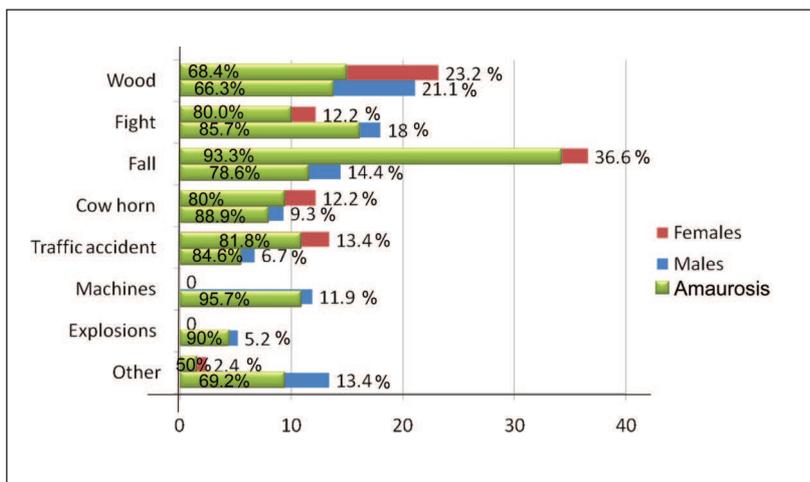


Figure 3. Distribution of eyeball ruptures and amauroses in regard to the cause separated for men (n=194) and women (n=82).

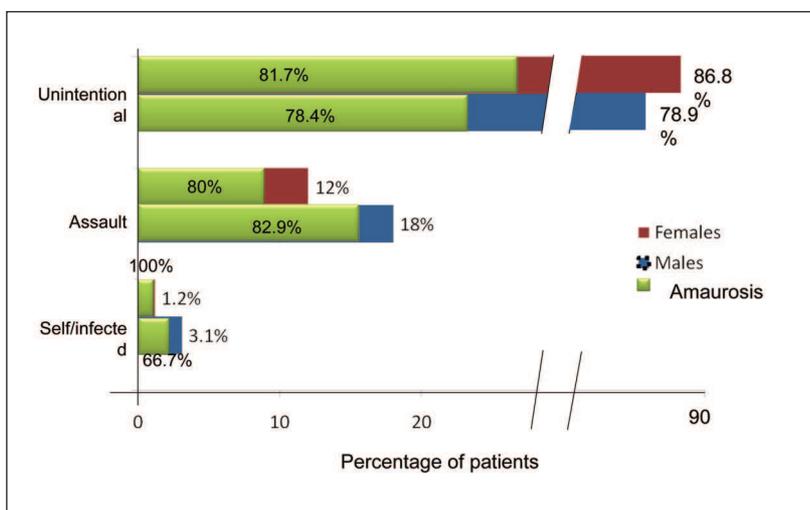


Figure 4. Mode of injury with eyeball rupture and amauroses separated for men (n=194) and women (n=82).

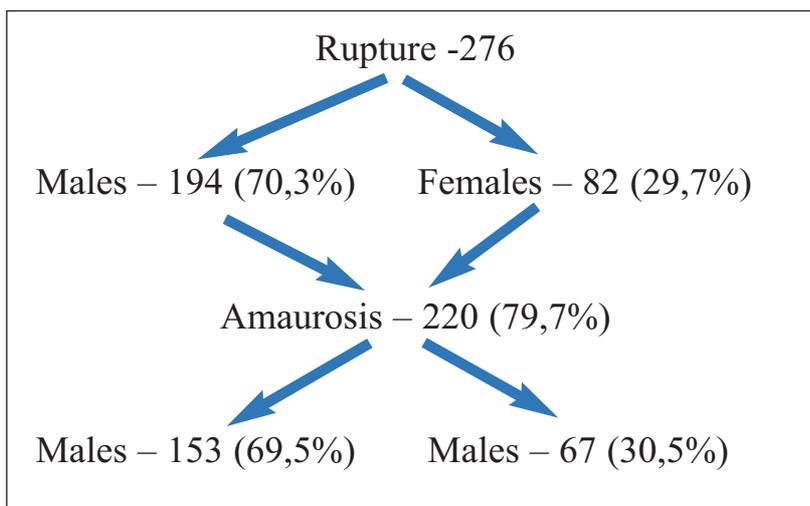


Figure 5. Absolute values and percentage of eyeball ruptures and amauroses in regard to the sex.

Traumatic eyeball ruptures were accidental in 81,2% of individuals, originated from a fight in 16,3%, and were self-inflicted in 2,5% of the cases. Figure 4 represents a percentage of modes of injuring the eye with an eyeball rupture, separated for sexes. Unshaded

parts of the column are amauroses for each of these three modes of injury for each sex separately.

From 276 analyzed patients with eyeball rupture, 220 (79,7%) of them had their injury end in amaurosis. In respect to sex, 153 (78,9%) from 194 men with eyeball injury ended with amaurosis, while in women's group from 82 women with eyeball rupture 67 (81,7%) ended with amaurosis (Figure 5).

### DISCUSSION

In the chapter Results and in the graphs there is detailed data about patients with eyeball rupture in respect to patient's age, setting of the injury, causes that led to a rupture and the way in which the injury occurred. Amauroses are especially highlighted, as they are the ultimate functional effect of the eyeball rupture related to the place of injuring as well as their cause.

In the discussion we emphasize several facts of major importance. Rupture happened at all ages but where relatively most frequent in the eighth decade of life. Injuries at home were most often occurred due to a fall, much more often in women than in men and in most situations ended with amaurosis. In 17 patients in whom the rupture ended in amaurosis it was also the only functional eye, so they were left completely blind. In 3 patients there was a simultaneous traumatic rupture in both eyes that ended in blindness – in one case it was a consequence of a traffic accident, in the second it was a self-inflicted injury of a psychotic person who tried to gouge out both of his eyes with his fingers, and in the third case rupture of both eyeballs with bilateral amaurosis occurred as a result of an injury caused by a car tire bursting while it was inflated at the automobile service shop.

### CONCLUSION

In the conclusion we can state that the eyeball ruptures were extremely serious injuries regarding the ultimate visual function. Even with the advances in microsurgery and modern methods for treating injuries of the eye, in 80% of the cases ruptures ended in amaurosis. For that reason it is especially significant to prevent the occurrence of injuries in each place and every situation.

## Apstrakt

**Uvod** Traumatske rupture pripadaju grupi otvorenih povreda očne jabučice, izazvane dejstvom tupe sile. To su najozbiljnije povrede oka koje se često završavaju znatnim smanjenjem ili potpunim gubitkom vida na povređenom oku.

**Metode** Analizirani su pacijenti sa traumatskom rupturom očne jabučice, lečeni hospitalno na Klinici za očne bolesti, Kliničkog centra Srbije u Beogradu u periodu od 10 godina (2000-2009). Korišćeni su podaci Registra hospitalizovanih bolesnika Klinike za očne bolesti. Analizirani su sledeći parametri: godine starosti povređenih, mesto i uzrok povređivanja, način nastajanja povrede, učestalost nastajanja amauroze kao posledice traumatske rupture očne jabučice.

**Rezultat** U analiziranom periodu je bilo ukupno 276 pacijenata sa traumatskom rupturom očne jabučice. Muškaraca je bilo 194 (70,3%), tako da je odnos muškaraca sa rupturom prema ženama bio 2,4:1. Najviši procenat povređenih muškaraca je bio u trećoj i četvrtoj deceniji života i iznosio je 85,0%. Rupture su se najčešće dešavale kod poljoprivrednika – 30,1%, a onda u kući – 26,1%, na radnom mestu – 13,7%, na javnom mestu – 10,5%, na ulici/putu – 9,1%, u kafani – 6,2%, pri sportu/rekreaciji – 3,2% i na nekom drugom mestu – 1,1%. Uzroci povređivanja oka sa rupturom su bili: drvo – 21,7%, pad – 21,0%, tuča – 16,3%, rog krave – 10,2%, saobraćajna nesreća – 8,7%, povreda pri radu na različitim mašinama – 8,3%, pri eksplozijama – 3,6%, i na neki drugi način – 10,2%.

Od analiziranih 276 pacijenat sa rupturom očne jabučice, kod 220 (79,7%) se ta povreda završila amurozom

**Zaključak** Odnos povređenih muškaraca i žena sa rupturom očne jabučice znatno je uravnoteženiji nego što je to kod mehaničkih povreda oka u ukupnom smislu. Razlog za to je veliki broj povreda sa rupturom očne jabučice pri obavljanju poljoprivrednih radova i u kući gde žene učestvuju sa veoma visokim procentom. Tu i treba tražiti mogućnosti za prevenciju povreda i nastanka ruptura.

## REFERENCES

1. Kuhn F. Trauma By Blunt Object: Ruptures. In Kuhn F (ed) Ocular Traumatology. Springer. Berlin Heidelberg New York Tokio. 2008; pp 359-370.
2. De Juan E, Sternberg P, Michels R. Penetrating ocular injuries: types of injuries and visual Results. Ophthalmology 1983;90:1318-1322
3. Elder M, Stack R. Globe rupture following penetrating keratoplasty: How often, why, and what can we do to prevent it? Cornea 2004;23:776-780
4. Viestenz A, Schrader W, Küchle M, Walter S, Behrens-Baumann W. Management of a ruptured globe, Ophthalmology 2008;105:1163-1175 (in German)
5. Yaya G, Serengbe BG, Gaudeuille A. Ocular injuries in children aged 0-15 years: epidemiological and clinical aspects at the Bangui National Teaching Hospital. J Fr Ophthalmol 2005;28:708-712 (in French)
6. Wenzel M, Aral H. Indirect traumatic rupture of the globe without conjunctival injury. Klin Monatsbl Augenheilkd 2003;220:35-38 (in German)
7. Koo L, Kapadia MK, Singh RP, Sheridan R, Hatton MP. Gender differences in etiology and outcome of open globe injuries. J Trauma 2005;59:175-178