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Paintball – gra, która może doprowadzić do utraty widzenia

Streszczenie

Wstep. Około 13% wszystkich urazów narządu wzroku stanowią urazy związane z uprawianiem sportu. W ostatnich latach znacząco wzrosła częstość występowania poważnych uszkodzeń struktur oka i utraty widzenia będących wynikiem urazu w czasie gry w paintball.

Cel. Celem pracy było przedstawienie 3 przypadków chorych z urazem związanym z grą w paintball.

Materiał i metody. 3 chorych (2 mężczyzn – 17 i 46 letni i 1 kobieta – 38 letnia) leczonych w Klinice Okulistyki w Lublinie w 2010 r. W dwóch przypadkach urazu doznali uczestnicy gry, podczas chwilowego usunięcia koniecznych zabezpieczeń, a w trzecim przypadku poszkodowana osoba była widzem, który opuścił wyznaczone dla widowni miejsce. Okres obserwacji wynosił od 3 tygodni do 4 miesięcy. Ostrość wzroku, przy przyjęciu do Kliniki, była bardzo niska i wynosiła od liczenie palców przed okiem do liczenie palców przed okiem z odległości 1,5 metra. Obniżenie ostrości wzroku najczęściej związane było z ciężkim uszkodzeniem siatkówki. W jednym przypadku doszło do odwarstwienie siatkówki, a w dwóch zdiagnozowano otwór w plamce. Dodatkowo u wszystkich chorych obserwowano wylew krwi do ciała szklistego. U jednego chorego zastosowano leczenie operacyjne, witrektomię przez *pars plana*. U wszystkich chorych po leczeniu doszło do poprawy stanu klinicznego, natomiast niewielkiej poprawy funkcjonalnej.

Wnioski. Tępy uraz oka pociskiem używanym do gry w paintball może prowadzić do poważnego uszkodzenia narządu wzroku i potencjalnej utraty widzenia. Wzrastająca liczba urazów związanych z tym sportem wymaga szerszej dyskusji społecznej, zarówno jeśli chodzi o zagrożenie urazem prowadzącym do ślepoty oka jak i aspektu moralnego gry, która polega na strzelaniu do siebie, a, w której często uczestniczy młodzież szkolna.

Słowa kluczowe: paintball, uraz gałki ocznej, otwór w plamce.

Paintball – a game leading to serious visual disorders

Abstract

Introduction. About 13% of all ocular traumas are sport-related injuries. Recently, there has been an increase in serious paintball-related injuries of the eye and a related loss of vision.

Aim. The aim of our study was to present cases with paintball-related ocular trauma.

Materiał and methods. Three patients (2 males – 17 and 46 yrs, and 1 female – 38 yrs) were admitted to the Department of Ophthalmology in Lublin in 2010. In two of the cases the injury occurred while playing paintball without the required protection gear. The third patient was a viewer who, at one point, left the safe place reserved for the spectators. The follow-up of the patients lasted from 3 weeks to 4 months. Visual acuity was very poor, ranging from CF to 0.02, and was, undoubtedly, related to a severe retinal injury. In one of the cases a retinal detachment was observed and, in two of the cases, a macular hole was diagnosed. The examination revealed vitreous hemorrhage in all the patients. In one of the cases a *pars plana* vitrectomy was performed. In all the cases the clinical condition improved after the treatment. However, there was little improvement in the patients' functionality.

Conclusions. A blunt trauma caused during a paintball game may lead to a serious ocular injury and a potential loss of vision. Because of the increase in the number of trauma cases occurring in paintball players, a public debate is necessary. The emerging problems are not only related to the sight-threatening injuries, but also to the participation of young people in activities which are based on direct shooting at each other.

Key words: paintball, eye injury, macular hole.

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INTRODUCTION

Ocular injuries sustained during paintball have been reported since the introduction of the game in the early 1980s. The paintball apparatus (gun) was adopted from the military, where it was used for a combat-simulating training. Today, paintball is an increasingly popular sport with an estimated ten million players annually in the United States alone [1].

The paintball pellets are covered with a latex or a gelatin shell. They are filled with a non-toxic gelatinous substance made of polyethylene glycol, water, glycerin, titanium oxide, pigment dyes and are 14-17 mm [2,3] in diameter, weighing approximately 3 g [4]. They are usually fired from a gas powered gun and are capable of achieving a mean speed of 145 m/s (comparatively, a 0.38 caliber handgun fires at 260 m/s).

As paintballs are designed to rupture at contact, they rarely cause a penetrating injury. Instead, they cause considerable ocular damage through a mechanical deformation of the globe, and, specifically, an anterior-posterior compression and an equatorial expansion [5]. Due to the small size of a paintball, the periorbital structures provide no protection.

There were safety standards introduced in 1987 concerning the use of protective goggles or other eye protecting gear, which was aimed at securing eye protection during this kind of sport.

Despite the protective eye gear and the efforts to increase the public awareness of paintball-related injuries, the incidence of eye injuries has increased over time. This is supposedly due to the increased popularity and availability of paintball in non-commercial settings and without proper supervision.

The purpose of this study is to evaluate the characteristics and ocular effects of paintball related injuries, which have been dealt with in the Department of Ophthalmology in Lublin in 2010. The follow-up was 1 to 3 months.

MATERIAL AND METHODS

Case I (CŁ 17 yrs)

The patient was admitted to the Department of Ophthalmology in Lublin after a one-day hospitalization in the district ophthalmology department in Krasnystaw, with the following diagnosis: injury of the right eye (RE), vitreous haemorrhage RE and a suspicion of retinal detachment RE. According to the patient's declaration, the eye was injured while playing paintball at a holiday camp. The clinical examination revealed: visual acuity (VA) RE = counting fingers with a correct light perceptron, an intraocular pressure (IOP) = 15 mmHg, and in the anterior segment, a diffused blood in the anterior chamber, iris dialysis (Fig.1), vitreous haemorrhage, retinal oedema, focal pre- and intraretinal haemorrhages. In addition, a full-thickness macular hole was confirmed in the spectral optical coherent tomography (SOCT) (Fig.2, 3). After a pharmacological treatment, the clinical state of the eye improved – a vitreous haemorrhage resorption and a macular hole closure were observed. At the end of hospitalization the RE best correction visual acuity (BCVA) = 0.3, IOP = 20mmHg. A three-months-long follow-up was conducted, and, at the end of it BCVA reached 0.25, Sn = 1.25, IOP = 12 mmHg. There were also vitreous floaters and a macular pigment epithelium disturbance (Fig.4). The SOCT examination revealed retinal thinning in the macular area, with a loss of photoreceptors and a decrease of the outer nuclear layer (Fig. 5).

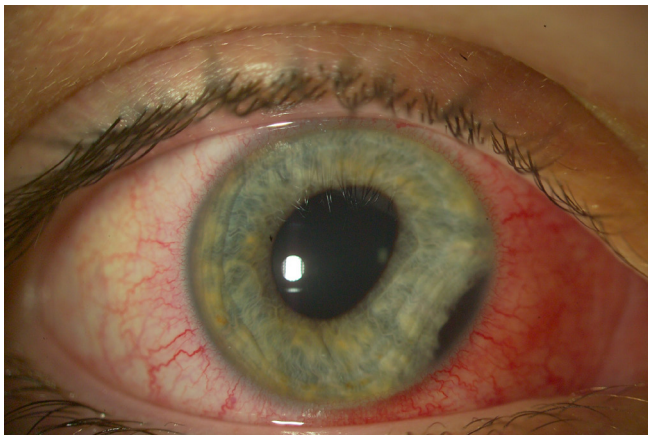

FIGURE 1. Case I: anterior segment 2 days after the injury: iris dialysis.

FIGURE 2. Case I: posterior pole 2 days after the injury: macular hole, intraretinal haemorrhages.

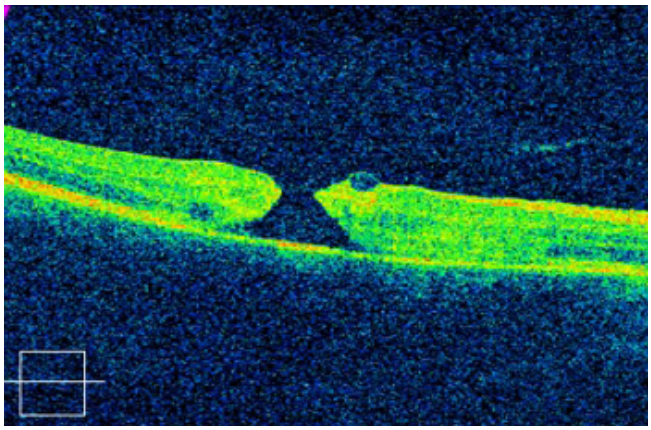

FIGURE 3. Case I: SOCT - 2 days after the injury: full-thickness macular hole

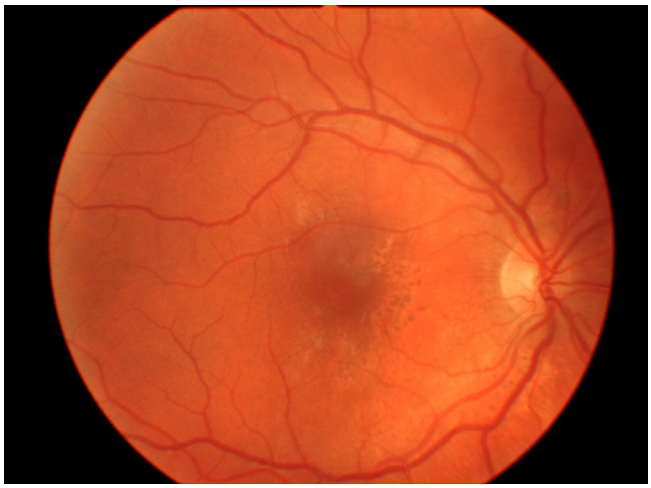

FIGURE 4. Case I: posterior pole 2 months after the injury: macular pigment epithelium disturbance.

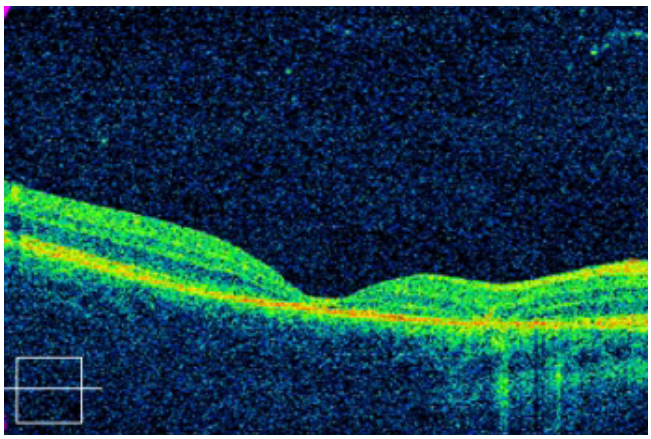

FIGURE 5. Case I: 2 months after the injury: SOCT examination revealed retinal thinning in macular area with a loss of photoreceptors and a decrease of the outer nuclear layer. Macular hole is closured.

Case II (ŚS 46 yrs)

The patient was injured during a paintball game and was admitted to the hospital in Zamość with the following diagnosis: left eye (LE) injury, secondary glaucoma LE (LE IOP = 32mmHg) and retinal detachment LE. Baseline VA was 0.02 without the correct light perception. After 7 days the patient was transferred to the Department of Ophthalmology in Lublin. A diffused blood in the anterior chamber was observed in a slit-lamp examination, as well as a vitreous haemorrhage and a retinal detachment confirmed by an ultrasound technique (USG). Pars plana vitrectomy, sclera buckling and internal limiting membrane in the macular region were performed ten days after the trauma was sustained. The air was used as an intraocular tamponade. The retina did not reattach completely, therefore, a vitreoretinal surgery was conducted three more times, with a retinotomy, a vitreoretinal proliferation removal, an endotamponade with silicone oil, a secondary cataract removal and an intraocular lens implantation. A macular hole was diagnosed intraoperatively (Fig. 6, 7)

Final VA LE = 0.02 without the correct light perceptron, IOP = 20mmHg, the retina being attached (Fig. 8, 9).

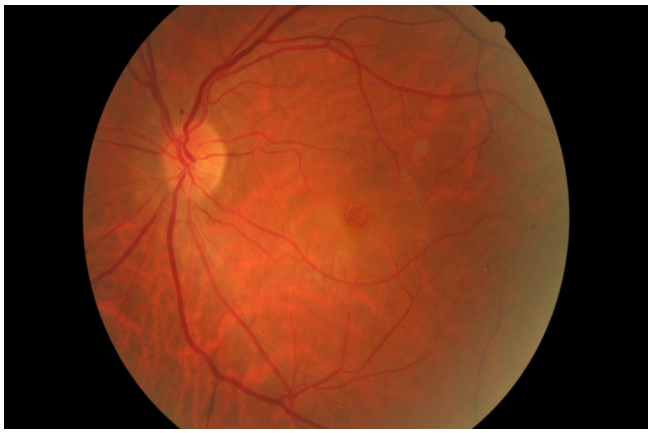

FIGURE 6. Case II: posterior pole 2 months after the injury: macular hole.

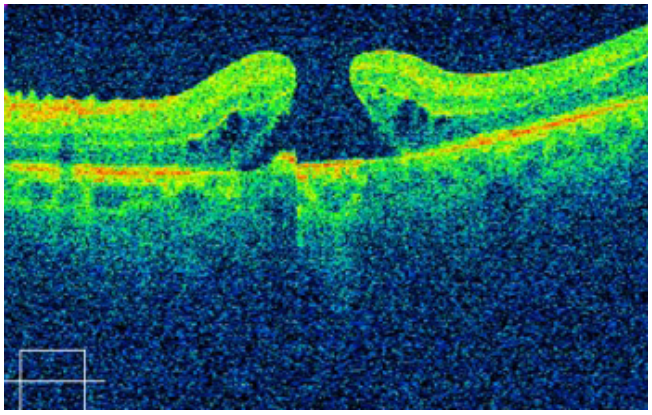

FIGURE 7. Case II: SOCT – 2 months after the injury: full-thickness macular hole.

FIGURE 8. Case II: posterior pole 3 months after the injury: retina is reattached.

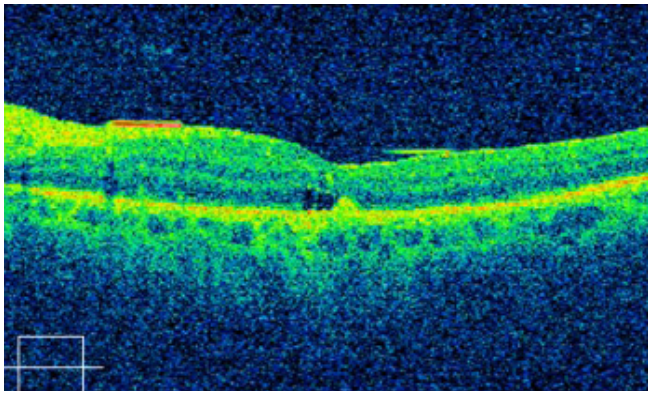

FIGURE 9. Case II: SOCT – 3 months after the injury: full-thickness macular hole is closured.

Case III (LE 38 yrs)

A young woman was admitted to the Department of Ophthalmology in Lublin with an injury to her LE, which occurred while observing a paintball game. A vitreous haemorrhage, subretinal blood spots, choroidal breaks (Fig. 10) and a full-thickness macular hole with an area of retinal detachment were diagnosed (Fig. 11). Baseline VA LE = 0.02, IOP = 20 mmHg. After three days of observation the patient left the clinic. One month later, during a follow-up examination, VA of her left eye did not change, IOP = 18 mmHg, the vitreous haemorrhage was absorbed and retina was reattached, with choroidoretinal scars forming in the area of the choroidal breaks (Fig. 12,13).

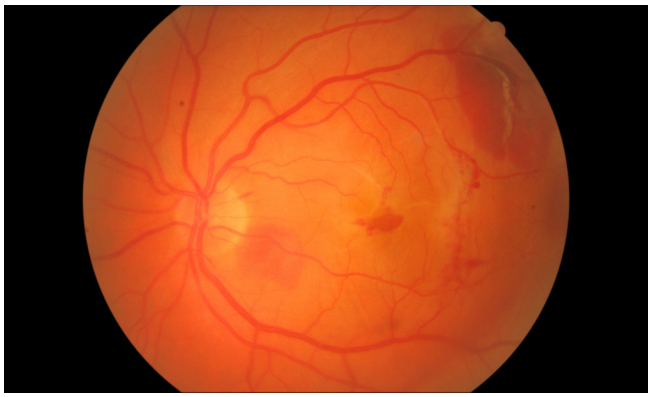

FIGURE 10. Case III: posterior pole in the day of the injury: macular hole, local retina deteachment, subretinal haemorrhages, choroidal breakes.

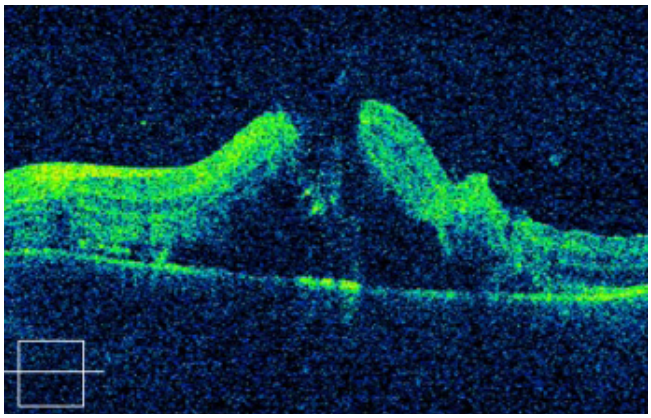

FIGURE 11. Case III: SOCT – in the day of the injury: macular hole, local retina deteachment.

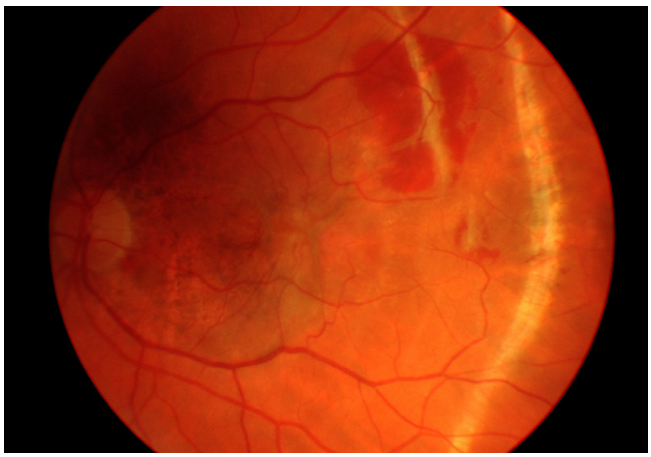

FIGURE 12. Case III: posterior pole 1 month after the injury: retina is reattached with choroidoretinal scars forming.

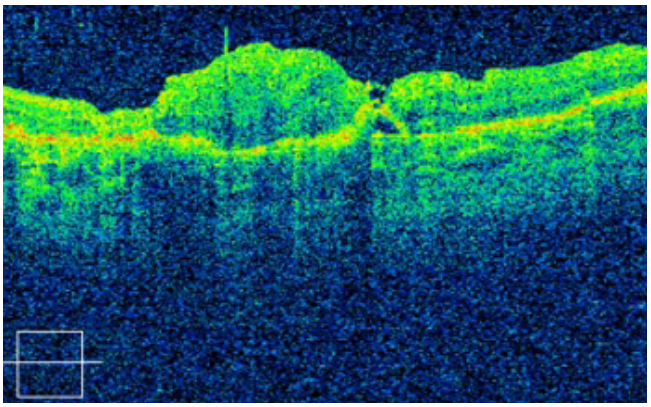

FIGURE 13. Case III: SOCT – 1 month after the injury: macular hole is closured with disorders in all retinal layers.

All patients are still undergoing follow-ups at our Department.

DISCUSSION

The first case of ocular trauma from a paintball injury was reported in 1985 by Easterbrook and Pashby [6]. Later, as paintball moved from commercialized playing fields into unsupervised locations, articles demonstrated an increasing incidence of eye trauma occurring at unsupervised settings [7].

In 2009 Pahk analyzed a series of 205 paintball-related ocular trauma cases. The data were obtained between 1985 and 2005 [8].

The most common paintball related traumas described in his work were corneal abrasion, hyphema, lentocular damage, vitreous haemorrhage and some retinal lesions. The rupture of the eyeball was rarely diagnosed.

During our work, we observed a vitreous haemorrhage, a macular hole and a later posttraumatic maculopathy in all the cases. Unlike in our observations, there were no posttraumatic macular holes mentioned in Pahk's analysis.

All the described retinal lesions are related to the process of eye deformation from a paintball trauma. During the injury, there is, most probably, an anterior-posterior compression and equatorial expansion [5].

In the Pahk's report, young men represented the most common demographic group to pose a severe social problem. The age ranged from 6 to 51, with an average age of 18.6. The final visual acuity in a significant number of examinees (78 of 188 patients, or 41%) was 0.1 or worse, making the patients legally blind. In our work, the final visual acuity was from 0.02 to 0.25.

The next problem was that most of the injuries occurred during informal games, accidents or assaults. Only 21% of the documented injuries occurred during a regulated play, 41% during informal backyard games, 38% were the result of an accidental discharge of the paintball gun or an assault. Our work shows that the injured people were not actively participating in a paintball game. In two of the cases the injuries occurred after the game had ended and, in the third case, the injured person was an observer. Out of the 177 injured people acknowledged in literature, whose eye protection status was reported, only nine players (5%) were known to be wearing their eye protective gear at the time

of the injury. In cases when the eye protection was worn, the injuries usually occurred after the goggles were momentarily removed or knocked off during play. Most common reason for removing the goggles was a decreased vision due to fogging or paint splattering. Therefore, it becomes clear that the injury can occur despite the eye protection.

The standards for the eye gear were provided in 1997 by the ASTM (American Society for Testing and Materials) and include a 2.5 mm thick polycarbonate, no-fogging lenses that are resistant to shattering at velocities up to 90m/s. This considerably reduced the incidence of eye injuries in the following years [9].

CONCLUSIONS

To sum up, paintball-related ocular injuries may result in a severe ocular damage and a loss of vision. Common findings, as presented in our study, include hyphenate, lenticular damage, vitreous haemorrhage and posterior segment lesion in the form of a macular hole or a retinal detachment.

Approximately 40% of the injured became legally blind in the involved eye, with final visual acuities of 20/200 or worse. Most injuries occur in unsupervised settings and without proper eye protection. The lack of supervision and carelessness make the risk for ocular injury more significant and less preventable. Improved safety features of the paintball equipment, along with a continued education on proper eye protection, may reduce the incidence of severe ocular injuries.

A public debate is essential due to the increase in trauma cases occurring among paintball players. The emerging problems are related especially to the moral aspects of young people's participation in such activities. Apart from psychological, social and economic consequences of severe ocular injury, people should be aware of the ethical side of the game that requires shooting directly at each other.

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