Open Globe Eye Injuries from Syrian Civil War

Suriye İç Savaşı'ndaki Açık Göz Küresi Yaralanmaları

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ABSTRACT Objective: To analyze the incidence and severity of open globe injuries among the Syrian anti-regime forces and Syrian civilians in Syrian Civil War. **Material and Methods:** Open globe injuries were retrospectively analyzed on 39 patients (43 eyes) hospitalized at Kilis State Hospital in Turkey, Department of Ophthalmology, between August 2012 and May 2013. Informed patient consents were obtained preoperatively. We reported the causes and localization of ocular injury, presence of the intraocular foreign body and the microsurgical treatment applied. **Results:** A total of 43 eyes of 39 patients were included in the study. The average age was 24.8 years, ranging from 4 to 50. Ten patients (25.6%) were <18 years old, and 29 patients (74.4%) were ≥ 18 years old. Four patients (10.2%) had bilateral eye injuries. While fragments of explosive devices (rockets, grenades) were responsible for 26 eye injuries (60.5%), gunshots were the cause of the 17 eye injuries (39.5%). Primary evisceration was performed on 4 eyes (9.3%), because of the destruction of the eye. **Conclusion:** Extraordinary presentations and subversive visual results are common in war-related open-globe injuries, and ocular injuries are much more severe than those held in civilian life. We think that surgical treatment urgently needs to be done in war-related open globe injuries and these patients can refer to advanced centers after surgical repairment. We consider that because the severity of ocular injuries was very high in our study, most of our patients had unfavorable visual outcomes in the remaining part of their lives, despite of immediate surgical treatment. Our study is the first clinical practice on open globe eye injuries during Syrian Civil War. In conclusion, we believe that we can draw attention to the tragedy that is going on in Syria as a result of the violent civil war.

Key Words: Corneal perforation; eye foreign bodies; eye ınjuries

ÖZET Amaç: Suriye İç Savaşı esnasında Suriyeli sivil ve rejim muhaliflerinde meydana gelen açık göz küresi yaralanmalarının, insidansının ve şiddetinin değerlendirilmesi. **Gereç ve Yöntemler:** Açık göz küresi yaralanması nedeniyle Ağustos 2012 ile Mayıs 2013 tarihleri arasında Kilis Devlet Hastanesi'nde yatırılarak tedavi edilen 39 hastanın 43 gözü retrospektif olarak incelendi. Ameliyat öncesi dönemde hastalardan aydınlatılmış onam alındı. Oküler yaralanmanın nedenleri ve lokalizasyonu, intraoküler yabancı cismin varlığı ve uygulanan mikrocerrahi tedavi bildirildi. **Bulgular:** Çalışmaya 39 hastanın 43 gözü dâhil edildi. Hastaların yaş ortalaması 24,8 yıl (4 ile 50 arasında) idi. On (%25,6) hasta 18 yaşının altında iken, 29 (%74,4) hasta 18 yaş ve üzerindeydi. Dört (%10,2) hastada her iki gözde yaralanma mevcuttu. 26 (%60,5) gözde yaralanmanın nedeni patlayıcı silah parçaları (roket, el bombası) iken, 17 (%39,5) gözde yaralanmanın sebebi ateşli silahlardı. Göz küresinin total harabiyetinden ötürü 4 (%9,3) göze primer evisserasyon operasyonu uygulandı. **Sonuç:** Savaşla ilişkili açık göz küresi yaralanmalarında, olağandışı durumlar ve yıkıcı görsel sonuçlar yaygın ve oküler yaralanmalar sivil hayatta gerçekleşenlerden çok daha şiddetlidir. Savaşla ilişkili açık göz küresi yaralanmalarında cerrahi tedavinin acil olarak yapılması gerektiğini ve bu hastaların cerrahi onarım uygulandıktan sonra ileri merkezlere yönlendirilmesinin uygun olduğunu düşünüyoruz. Çalışmamızdaki olgularda oküler yaralanmaların şiddeti çok yüksek olduğu için, acil cerrahi tedavi uygulamamıza rağmen, hastalarımızın büyük kısmının hayatlarının geri kalan kısmında düşük görsel sonuçları olduğunu düşünüyoruz. Çalışmamız Suriye İç Savaşı esnasında meydana gelen açık göz küresi yaralanmaları ile ilgili literatürdeki ilk klinik çalışmadır. Sonuç olarak çalışmamızla, iç savaş nedeniyle Suriye'de yaşanan trajediye dikkat çekebileceğimize inanıyoruz.

Anahtar Kelimeler: Korneal perforasyon; gözde yabancı cisimler; göz yaralanmaları

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The eyes involve 0.1 percent of the total body surface, but despite their insignificant size, their injuries are crucial because it results in loss of vision. Open globe injuries are a significant source of visual morbidity and blindness in the general population.[1-4] Because of the advancement in the warfare technology such as high-velocity projectiles and explosive weapons, the number of war-related eye injuries has increased.[5-7] Open globe injuries lead to permanent and significant visual morbidity, in spite of the remarkable development in their treatment.

Because of the civil war in Syria, numerous Syrian civilians and anti-regime forces were injured or killed by the regime forces from March 2011.[8-10] This study retrospectively analyzed the incidence, clinical characteristics and severity of open globe injuries, during Syrian Civil War among the Syrian anti-regime forces and Syrian civilians, presenting to the Department of Ophthalmology, Kilis State Hospital, Turkey. Kilis, which is the nearest province for people who need first aid and refuge after developing events in Syria, is located in the southeast part of Turkey. The effect of Syrian Civil War on open globe injuries among the Syrian anti-regime forces and Syrian civilians has never been investigated previously.

MATERIAL AND METHODS

The medical records of open globe war injuries presented to the Department of Ophthalmology, Kilis State Hospital between August 2012 and May 2013 were reviewed. Patients who died before being examined by an ophthalmologist and who transfered to the other hospitals because of the severe multisystem trauma and fatal conditions were excluded. Informed patient consents were obtained preoperatively. The records of all patients were reviewed to identify patient demographics (age, gender), the involved eye, mechanism of the injury (explosive or gunshot), the type of open globe injury, location of open globe injury, presenting visual acuity (VA) and the type of surgical treatment.

The type of injuries were classified according to the Birmingham Eye Trauma Terminology as rupture and laceration (penetrating, intraocular foreign body (IOFB), perforating). Location of the open globe injuries were defined according to the Ocular Trauma Classification Group.[11,12] Zone I injuries were confined to the cornea and limbus, Zone II involved the anterior 5 mm of the sclera, and Zone III injuries included full-thickness scleral defects > 5 mm posterior to the limbus.

Presenting VA was recorded with Snellen acuity charts, the anterior segment of the eye was examined. Direct graphy and computerized tomography were performed. Tetanus prophylaxis was applied to all of the patients before the surgical treatment.

We were able to perform immediate surgical treatments only in our clinic. All of the patients included in the study were operated in the first 24 hours after the ocular trauma. Surgical treatments were performed, depending on the type of injury. Corneal lacerations were repaired with 10.0 nylon sutures. Scleral lacerations were repaired with 7.0 vicryl sutures. Because of the inadequate conditions of our hospital and due to the overcapacity, most of the patients were discharged on the postoperative first day. Pars plana vitrectomy (PPV) could not be performed in our clinic and the patients that needed PPV were sent to Gaziantep after the primer reparation. The patients were treated by local and systemic antibiotics and corticosteroids after the surgical treatment.

In the case of life-threatening conditions, the eye treatment was postponed or performed concurrently with other procedures.

RESULTS

A total of 43 eyes of 39 patients were included in the study. The mean age was 24.8 years ranging from 4 to 50. Ten patients (25.6%) were <18 years old, and 29 patients (74.4%) were ≥18 years old. There were three little aged patients; 4, 7 and 8 years. There were five female patients (12.8%) and 34 males (87.2%).

Four patients (10.2%) had bilateral eye injuries. The incidence of left eye injuries was higher as compared to the right eye lesions (Table 1). Frag-

TABLE 1: Involved eyes.

	Right	Left	Both of the eyes
Number of eyes	15	20	8
Percentage (%)	34.9	46.5	18.6

FIGURE 1: Direct graphy showed that a huge mass shrapnel of explosive device.

ments of explosive devices (rockets, grenades) were responsible for 26 eyes (60.5%) and gunshot injuries were responsible for 17 eyes (39.5%) (Figure 1).

The type of open globe injury was laceration in 39 eyes (90.7%) [in 10 eyes (23.2%) penetrating, in 22 eyes (51.2%) IOFB, in 7 eyes (16.3%) perforating] and rupture in 4 eyes (9.3%) (Figure 2). The site of ocular trauma was Zone 1 in 13 eyes (30.2%), Zone 2 in 11 eyes (25.6%) and Zone 3 in 19 eyes (44.2%).

Baseline visual acuity range from no light perception to 0.5. Presenting VA is 0.5 in one eye (2.3%), 0.1 in one eye (2.3%), light perception to 0.02 in 26 eyes (60.5%), and no light perception in 15 eyes (34.9%). Primary evisceration was performed in 4 eyes (9.3%), because of the total destruction of the eye (Figure 3). Primary reparation of the eye was performed in 39 eyes (90.7%).

DISCUSSION

Today, ocular trauma is an important yet preventable cause of predominantly monocular visual morbidity and blindness in the World.[13] There has been an increase in the proportion of war-related ocular injuries from less than 2 percent up to the Second World War: between 2 and 3 percent up to the Korean War, and between 5 and 7 percent in the three Arab-Israeli conflicts, attributed to urban and tank warfare.[6,14] A combination of further urbanization of warfare and increased explosive weapon power with relatively poor ocular protection showed a further increase to 13 percent in Operation Desert Storm in 1991.[14,15]

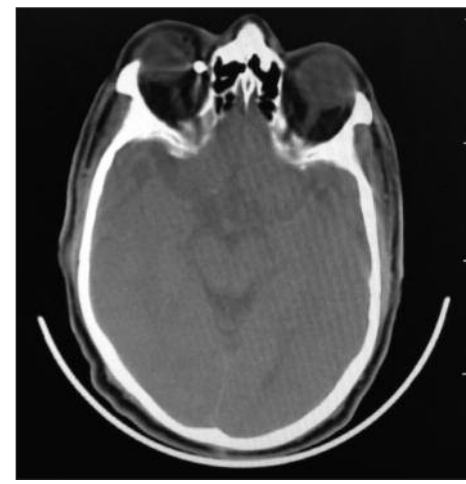

FIGURE 2: Computorized tomography showed that a perforating open globe injury and intraorbital foreign body.

FIGURE 3: A total destruction of the eye.
(See color figure at http://www.turkiyeklinikleri.com/journal/oftalmoloji-dergisi/1300-0365/)

Zeren et al. reported that thirty one multisystemic gunshot injuries during Syrian Civil War, and six of the injuries (19.4%) were localized to the eye zone. In their study, the mean age was 30.54 years, and all of the cases were male.[9] Çelikel et al. published postmortem examination and autopsy reports of 186 deaths during Syrian Civil War.[10] In their study, the mean age was 30.6 years, and males (91.4%) were more than females (8.6%). These findings showed that war injuries occurred predominantly among young males during Syrian Civil War. In our study males were affected more than females and constituted 87.2% of patients. The mean age of our patients was 24.8 years and adults were affected more than children. Consistent with previously published studies ocular war injuries occurred predominantly among young males.[16-18]

Usually ocular injuries are unilateral in peacetime conditions but war-related ocular injuries are bilateral in 15-25% patients.[1,2] Similarly with previously reported studies four patients (10.2%) had bilateral eye injuries in our study.[7]

Because of the contemporary warfare technology the causes and ways of war-related ocular injuries have changed. Explosive devices are responsible for over 95% injuries. Our results are similar to these studies.[2,7,19,20] In our study, fragments of explosive devices (rockets, grenades) were responsible for 60.5%, less than previously reported studies. Previously reported case about open globe eye injury in Syrian Civil War was gunshot injury.[8] Zeren et al. reported that six ocular gunshot injuries during Syrian Civil War.[9] We considered that shootings were generally targeted to the eye region. Because of the pieces of explosive devices, IOFBs cause 42%-53% of open globe injuries in wartime that is much higher than in peacetime conditions.[2,7,13,18] Consistent with previously published studies, we detected IOFBs in 22 eyes (51.2%).

Final visual results were related with the type of injury, location of the injury, presenting VA and presence of IOFB.[7,12,17,18,20,21] Initial VA on admission better than 0.1 and injuries isolated to the anterior segment (Zone 1) were associated with favorable postoperative VA. In our study, most of the injuries was Zone 3 (44.2%) and initial VA is worse than 0.1 in 41 eyes (95.4%). We did not have postoperative VA and ophthalmologic examination records. We predicted that most of the patients had unfavorable visual results and lost their visual function because of the combat ocular trauma. According to the previously reported studies, there was a decreasing rate of enucleation/evisceration: 20% in the Vietnam War, 18% in the Operation Desert Storm, and less than 13% in the conflict in Iraq.[22-24] Consistent with the recent studies the rate of primary eviscerations was 9.3% in our study.[7,16]

There are several limitations of this study. Lack of postoperative period records limits our comparisons. In addition, we could not divide patients into groups whether they are civilians or anti-regime forces because of the lack of information. As a result of the using of explosive devices and firearms in civil areas rather than battlefields, unarmed innocent Syrian civilians and Syrian anti-regime forces, predominantly young people were injured.

Extraordinary presentations and subversive visual results are common in war-related open-globe injuries, and ocular injuries are much more severe than those held in civilian life. We think that surgical treatment urgently needs to be done in war-related open globe injuries and these patients can refer to advanced centers after surgical repairment. We consider that because the severity of ocular injuries was very high in our study, most of our patients had unfavorable visual outcomes in the remaining part of their lives, despite of immediate surgical treatment. Loss of vision lead to loss of career, significant lifestyle changes and disfigurement. Our study is the first clinical study about open globe eye injuries from Syrian Civil War. In conclusion, we believe that we can draw attention to the tragedy that is going on in Syria as a result of the civil war. We are the witnesses of heartless side of the war, and we want to write this down in the history.

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