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Ultrasound biomicroscopic findings of blunt eye traumas

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SUMMARY

The purpose of this study was to evaluate the utility of ultrasound biomicroscopy in imaging eyes with blunt eye trauma. A retrospective review of 23 patients referred to the Department of Ophthalmology of Gulhane Military Medical Faculty, between August 2009 and April 2010 was performed. All patients underwent detailed ophthalmic and ultrasound biomicroscopic examination. Twenty three eyes of 23 patients were included in the study. Mean age was 32.18±9.66 (range: 20-63) years. The mean intraocular pressure in the affected eye was 20.36±3.54 mmHg. Etiological factors were as follows; playing accident (45.45%), work accident (36.36%), assault (9.09%) and traffic accident (9.09%). The most common findings detected on ultrasound biomicroscopy were hyphema (8 eyes, 34.7%), angle recession (8 eyes, 34.7%), zonular deficiency (4 eyes, 17.3%), iridodialysis (4 eyes, 17.3%), crystalline lens subluxation (2 eyes, 8.6%), peripheral anterior synechiae (2 eyes, 8.6%) and intraocular lens dislocation (1 eye, 4.3%). Of the 23 patients, 4 (17.3%) underwent one of the ophthalmic surgeries including cataract surgery, filtration surgery, iris repair and intraocular lens reposition. We conclude that besides its benefits in surgical planning, ultrasound biomicroscopy may have a special role in detecting anterior segment pathologies, which may not be identified on clinical examination.

Key words: *Blunt eye trauma, ultrasound biomicroscopy*

ÖZET

Kapalı göz travmalarında ultrasonik biyomikroskopi bulguları

Bu çalışmanın amacı, kapalı göz travmalarında ultrasonik biyomikroskopi bulgularının değerlendirilmesidir. Kliniğimizde kapalı göz travması nedeni ile Ağustos 2009 ile Nisan 2010 arasında takip edilen 23 hastanın kayıtları retrospektif olarak incelendi. Tüm olgulara detaylı oftalmolojik muayene ve ultrasonografik biyomikroskopi uygulandı. Yirmi üç olgunun 23 gözü değerlendirildi. Olguların ortalama yaşı 32.18±9.66 (sınır: 20 ile 63 arası) yıl idi. Etkilenen gözde ortalama göz içi basıncı 20.36±3.54 mmHg idi. Kapalı göz travmalarının etiyolojik incelemesinde %45.45 spor aktiviteleri, %36.36 iş yeri kazaları, %9.09 darp ve %9.09 trafik kazaları olarak saptandı. En sık ultrason biyomikroskopik bulgular sırası ile 8 gözde (%34.7) hifema, 8 gözde (%34.7) açı resesyonu, 4 gözde (%17.3) zonül hasarı, 4 gözde (%17.3) iridodiyaliz, 2 gözde (%8.6) kristalin lens subluksasyonu, 2 gözde (%8.6) periferal anteriyor sineşi ve 1 gözde (%4.3) göz içi lens dislokasyonu idi. Dört hastaya katarakt cerrahisi, filtran cerrahi, iris tamiri ve göz içi lens repozisyonunu içeren göz cerrahisi prosedürlerinden birisi uygulandı. Sonuç olarak cerrahi planlamadaki faydaları yanında ultrasonografik biyomikroskopi, klinik muayenede tespit edilemeyebilen ön segment bulgularının saptanmasında önemli bir yere sahip olabilir.

Anahtar kelimeler: *Kapalı göz travması, ultrasonografik biyomikroskopi*

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Introduction

Blunt eye trauma may occur in industrial accidents, sports injuries, domestic assault, violent crime, motor vehicle accidents, and concussive effects from high explosives. Transient or permanent vision loss can be seen due to sequelae of blunt eye trauma. However, evaluation of anterior segment pathologies by ophthalmic examination is often obscured by overlying optically opaque opacities, hypotonia and distorted anatomy (1). Ultrasound biomicroscopy (UBM) provides significant information about cornea, iridocorneal angle, iris, crystalline lens, zonules, intraocular foreign bodies and ciliary body. Ultrasound biomicroscopy systems are suitable also for imaging of lens implants, corneal diseases, glaucoma, cysts and tumors (2). Ultrasound biomicrocopy using higher frequencies (35-50 MHz) than those used in conventional ophthalmic B-scanners may reveal ocular pathologies up to the depth of 5 milimeter (3,4). In this study, we presented the UBM findings in eyes with blunt eye trauma.

Material and Methods

From August 2009 through April 2010, a total of 23 UBM studies were performed in patients with blunt eye trauma at the Department of Ophthalmology of Gulhane Military Medical Faculty. Information obtained from the patients was medical records including age, gender, ophthalmic examination and results of ocular imaging studies. Ethical guidelines of the Declaration of Helsinki were followed throughout and the study was approved by the Ethical Committee of Gulhane Military Medical Academy Review Board. Ultrasound biomicroscopy was performed using the OTI scan ophthalmic ultrasound (Ophthmic Tecnologies Inc,. Toronto, Canada). Under topical anesthesia, a polymethyl methacrylate (PMMA) eyecup was positioned between the lids and filled with sterile ringer lactate solution for acoustic

coupling. Using a fixation target for the unaffected eye, scanning was performed with placing the probe 2-3 mm away from the ocular surface while patient in the supine position.

Results

Twenty three eyes of 23 patients with blunt eye trauma were included in this study. Mean patient age was 32.18±9.66 (range: 20-63) years. Four (17.3%) patients were female and 19 (82.7%) were male. The mean intraocular pressure (IOP) in the affected eye was 20.36±3.54 mmHg. The leading cause was playing accident (45.45%). And the following causes were work accident (36.36%), assault (9.09%) and traffic accident (9.09%), respectively. The most common findings detected on UBM were hyphema (8 eyes, 34.7%), angle recession (8 eyes, 34.7%), zonular deficiency (4 eyes, 17.3%), iridodialysis (4 eyes, 17.3%), lens subluxation (2 eyes, 8.6%), peripheral anterior synechiae (PAS) (2 eyes, 8.6%), and intraocular lens dislocation (1 eye, 4.3%) (Table I). Medical treatment was sufficient in most of the patients, and surgical treatment was applied to a lesser extent. Of the 23 patients, surgical procedures were performed in 4 (17.3%) patients. In first case, phacoemulsification with intraocular lens (IOL) in the capsular bag was performed because damage to zonules was localized. Remaining procedures were trabeculectomy surgery for uncontrolled IOP elevation, iridodialysis repair for severely distorted pupilla and reposition of iris claw IOL in an eye with pseudoexfoliation.

Discussion

Corneal scarring, cataract or hyphema may obscure the visual axis and complicate the examination of anterior segment pathologies in blunt eye traumas. UBM provides valuable informations about the treatment decision of the traumatized eye. UBM can demonstrate the rupture of the lens capsule, lens displacement, iridodialysis, cyclodialysis, zonular defects, angle recession, scleral laceration, and intraocular foreign bodies (2,5). In blunt eye traumas, mostly reported UBM findings were zonular deficiency, angle recession and iridodialysis (1,5,6). Our results were in consistent with these reports. The management of zonular deficiency varies in accordance with its extension. In the worst scenario, rupture of the zonular fibers can cause dislocation of the lens into the anterior chamber and such cases must be regarded as emergency in terms of secondary glaucoma. In our study, of the 4 (17.3%) eyes with zonular deficiency one patient had cataract surgery for posterior subcapsular cataract associated with zonular deficiency less than 90°, and others were followed without complication (Figure 1). In pseudophakic cases dislocation of IOL can also cause IOP elevation and needs to be evaluated for early surgery. We had one case with iris claw IOL dislocated posteriorly due to blunt eye trauma. He was 63 years old and previously had an uneventful posteriorly fixated iris claw IOL implantation. His slit lamp examination revealed iridodonesis with manifest pseudoexfoliation and UBM examination showed that one of the IOL haptics has been posteriorly dislocated (Figure 2).

Iridodialysis may cause double pupil effect, monocular diplopia, glare and photophobia. Surgical repair may be considered in cases of large iridodyalisis or in the presence of monocular diplopia. In our study, of the 4 eyes with iridodialysis one had a severely distorted pupilla causing diplopia and underwent iris repair with 9/0 nylon suture attached to the sclera. UBM scan must alert the ophthalmologist that iridodialysis can be an indicator of trabecular meshwork damage and cause IOP elevation. We did not encounter resistant IOP elevation in patients with iridodialysis as well as in patients with PAS. Unexplained hypotony, cyclitic membranes and traumatic cyclodialysis cleft can be diagnosed by UBM (7-10). Cyclodialysis was reported in 4.5-4.8% in previous reports due to blunt

Table I. The most common ultrasound biomicroscopic findings of 23 eyes with blunt eye trauma

Ultrasound biomicroscopic findings	*Number of eye*	*%*
Hyphema	8	34.7
Angle recession	8	34.7
Zonular deficiency	4	17.3
Iridodialysis	4	17.3
Lens subluxation	2	8.6
Peripheral anterior synechiae	2	8.6
Intraocular lens dislocation	1	4.3

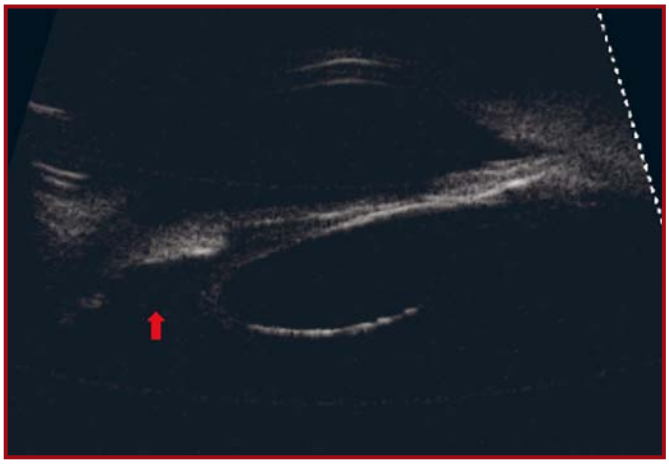

Figure 1. An ultrasound biomicroscopic image of a patient with lens subluxation and missing zonules (red arrow)

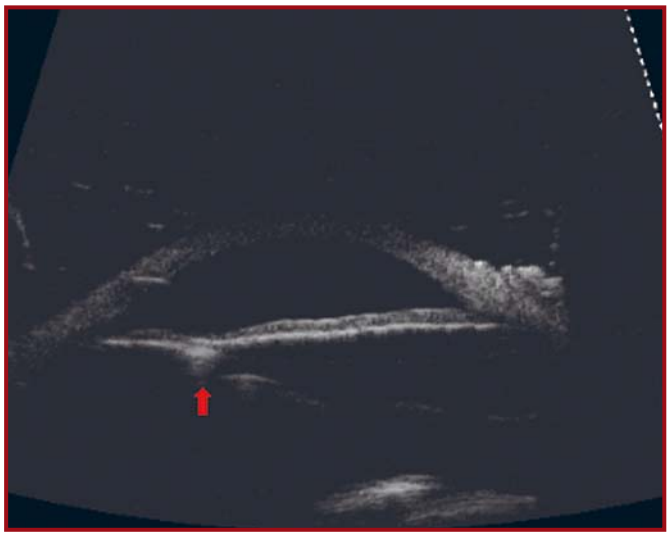

Figure 2. An ultrasound biomicroscopic image showing dislocation of an iris claw IOL and its attachment to iris with one haptic (red arrow)

eye traumas (1,11,12). UBM provides information about the location and the size of cyclodialysis cleft, while gonioscopy shows anterior face of ciliary cleft. We did not note cyclodialysis in any of the cases. It is probably due to our limited number of patients.

Although we did not detect any case with an intraocular foreign body, the role of the UBM in detection of suspicious foreign bodies embedded in anterior segment structures must be considered by examiners. Glaucoma after closed globe injury is a serious complication that many cases are diagnosed lately as having irreversible visual field loss (13,14). We had one case with angle recession up to 270° and we could not control IOP elevation medically during follow-up and he underwent filtration surgery before developing glaucoma related visual field loss (Figure 3).

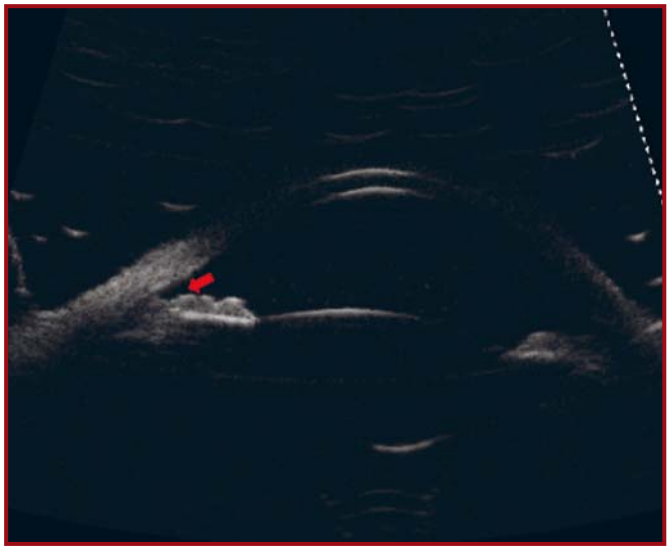

Figure 3. An ultrasound biomicroscopic image showing angle recession (red arrow)

UBM is especially superior to the other methods in terms of assessing structural damage to the zonules and ciliary body due to trauma. As a diagnostic tool, UBM is a safe and noninvasive technique that should be performed in all cases of blunt eye trauma in the initial evaluation. This easily applicable diagnostic method allows evaluation of occult anterior ocular structures with infinite details. In conclusion, besides its benefits in surgical planning UBM examinations provide detailed informations in conditions where anterior segment structures can not be observed.

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