

Is Anterior Chamber Depth a Predictor of Previous Trauma in Cataract Patients?

Katarakt Hastalarında Ön Kamara Derinliği Geçirilmiş Bir Travmanın Habercisi Olabilir mi?

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Original Article

Klinik Çalışma

ABSTRACT

Purpose: To investigate the differences in the anterior chamber depth (ACD) between cataract patients with and without a trauma history.

Material and Methods: The study was carried out in the 1st Ophthalmology Clinic of Atatürk Education and Research Hospital. All patients had undergone complete ophthalmologic examination preoperatively including measurement of visual acuity, slit-lamp examination, funduscopy, intraocular pressure measurement with applanation tonometer, A and B mode ocular ultrasonography. A-scan ultrasound examination was performed to measure the anterior chamber depth and total axial length. Patients with mature cataracts, angle recession, pseudoexfoliation, axial myopia, angle closure glaucoma, or zonular weakness were excluded from the study.

Results: There were 29 cases in the group with trauma history and 35 cases in the control group (Mean age: 56.8 ± 15.9 years and 53.1 ± 18.1 years in the trauma group and in the control groups respectively, $p=0.184$). Mean ACD measurements of eyes in the control group (3.22 ± 0.36 mm) was less than that of the eyes in the group with history of trauma (3.46 ± 0.55 mm), although it was not statistically significant ($p=0.052$).

Interpretation: Measurements of increased anterior chamber depth in cataract patients may be a clue of an implicit traumatic cataract in the absence of a trauma history. Surgical plans taking into consideration this possibility may prevent some unpredictable events in such cases.

Key Words: Trauma, anterior chamber depth, cataract.

ÖZ

Amaç: Travma öyküsü olan ve olmayan katarakt hastalarında ön kamara derinliği farklarının karşılaştırılması.

Gereç ve Yöntem: Çalışma, Ankara Atatürk Eğitim ve Araştırma Hastanesi I. Göz Kliniği'nde yürütülmüştür. Tüm hastalarda cerrahi öncesi görme keskinliği değerlendirilmiş, biyomikroskopik ön ve arka segment muayenesi, Aplanasyon tonometresi ile göziçi basıncı ölçümü, A ve B mod oküler ultrasonlar yapılmıştır. Ön kamara derinliği (ÖKD) ve total aksiyal uzunluk A-scan ultrasonla ölçülmüştür. Matür kataraktı, açılı resesyonu, psödoeksfolyasyonu, aksiyal miyopi, açılı kapanması glokomu yada zonüler zayıflığı olan hastalar çalışma kapsamına alınmamıştır.

Bulgular: Travma grubunda 29, kontrol grubunda 35 olgu (ortalama yaş travma ve kontrol grubunda sırasıyla 56.8 ± 15.9 ve 53.1 ± 18.1 yıl, $p: 0.184$) bulunmaktaydı. Kontrol grubunda ortalama ÖKD ölçümleri (3.22 ± 0.36 mm) istatistiksel olarak anlamlı bulunmamakla birlikte travma öyküsü bulunan gruba (3.46 ± 0.55 mm) göre daha düşüktü ($p:0.052$).

Tartışma: Katarakt hastalarında ÖKD'nin ölçülmesi, travma öyküsü bulunmayan hastalarda geçirilmiş bir travmanın işareti olabilir. Bu olasılığın göz önüne alındığı cerrahi planlar beklenmedik sonuçları önleyebilir.

Anahtar Kelimeler: Travma, ön kamara derinliği, katarakt.

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INTRODUCTION

Traumatic cataract is a difficult type of cataract to handle both for the patient and for the ophthalmologist.¹ It is important for the public because frequently it affects young adults with resultant social effects on a large scale.² Clinically, extent of traumatic lesion and its bilaterality, difficulties related to correction of aphakia, and vitreo-retinal complications in the long term are some of the challenging considerations for these patients. Some difficulties posed by traumatic cataract for the ophthalmologist include variable clinical presentations³, management of each case specifically in its unique conditions⁴, and necessity of handling both anterior and posterior chamber surgery competently.⁵⁻⁶

Traumatic cataracts are easy to diagnose especially if the patients are examined in a short time after the injury. However, the diagnosis of traumatic cataract may be difficult and delayed especially if there are only some unremarkable findings related to trauma. In such cases failure to make a correct diagnosis and thus to prepare an effective surgical plan preoperatively causes ophthalmologist to experience surgical surprises and possible unexpected results. For this reason a thorough preoperative questioning of every cataract patient about any ophthalmological traumatic event is necessary. However, even taking a thorough history may not be enough to elucidate such diagnosis. For this reason, more objective criterias are needed to arouse clinical suspicion even though all the findings are within normal limits.

Therefore the aim of this study was to compare the anterior chamber depth (ACD) measurements in cataract patients with and without a trauma history and to answer the question whether ACD measurements may provide one of these objective criterias in the evaluation Of traumatic cataracts.

MATERIALS AND METHODS

Patients with a diagnosis of cataract accepted in the 1st Ophthalmology clinic of Ataturk Education and Research Hospital between March 2005 and August 2006 were included in this prospective study. Cataract patients with a history of ocular trauma were included into the traumatic cataract group. The trauma reported by the patients were all mild blunt traumas with only slight effects on lens without posterior segment or corneal complications. The eyes affected by the trauma were involved in the study. The fellow eye had no significant cataract and was completely healthy in all of the patients. The control group included patients with no history of ocular trauma. Patients with mature cataracts, angle recession, pseudoexfoliation, axial myopia, angle closure glaucoma, or zonular weakness were excluded from the study.

The study was approved by the ethics committee of the hospital and informed consent was obtained from all of the patients. All patients underwent complete ophthal-

mologic examination with measurement of visual acuity, slit-lamp examination, fundoscopy, intraocular pressure measurement with applanation tonometer, A mode and B mode ocular ultrasonography. Preoperative A-scan ultrasound (EchoScan US-3000, Nidek, Tokyo, Japan) examination was done after medical pupillary dilation and cycloplegia with phenylephrine 2.5% and tropicamide 0.5%, one drop from each applied 1 hour before ultrasound examination to eliminate effects of accommodation on ACD measurements. The measurements were performed by the same examiner masked to patient's group under the same conditions and the same contact technique with the patient in supine position, and both the anterior chamber depth and the total axial length were measured.

Statistical analysis was performed by NCSS statistical software. The differences between ACD measurements in the control and the traumatic cataract groups were tested using Student's t-test. The distribution of frequencies of ACD measurements more than 3.5 mm and 3.75 mm in the two groups was assessed with Fisher's exact test. P values less than 0.05 were considered significant.

RESULTS

A total of 64 patients were enrolled in this study. There were 29 cases in the group with trauma history (group I) and 35 cases in the control group (group II). Mean age was 53.1 ± 11.8 years (min 25 years-max 85 years) in group I and it was 56.7 ± 15.9 years (min 30 years-max 91 years) in group II. The difference was not statistically significant ($p=0.184$). The angle was open in all eyes (more than grade III according to Schaffer's classification).

There was no significant difference in axial length (AL) measurements between the eyes in group I (mean, 23.11 ± 0.84 mm; min 21.83 mm-max 26.64 mm) and the eyes in group II (mean, 23.53 ± 1.18 mm; min 21.43 mm-max 24.78 mm) ($p=0.112$).

Mean keratometry values were 43.64 ± 1.46 D (min 40.12 D and max 46.50 D) in group I and 43.21 ± 1.35 D (min 40.25 D and max 46.75 D) in group II. The difference between groups was not significant ($p=0.982$).

Mean anterior chamber depth (ACD) measurement of eyes in group II (mean, 3.22 ± 0.36 mm; min 2.38 mm-max 4.19 mm) was less than that of eyes in group I

Table: The mean keratometry, axial length (AL) and anterior chamber depth (ACD) values of eyes with history of trauma (group I) and the eyes in the control group (group II) and the p values for the differences between the two groups.

	Group I	Group II	p
Keratometry (D)	43.64 ± 1.46	43.21 ± 1.35	0.982
AL (mm)	23.11 ± 0.84	23.53 ± 1.18	0.112
ACD (mm)	3.46 ± 0.55	3.22 ± 0.36	0.052

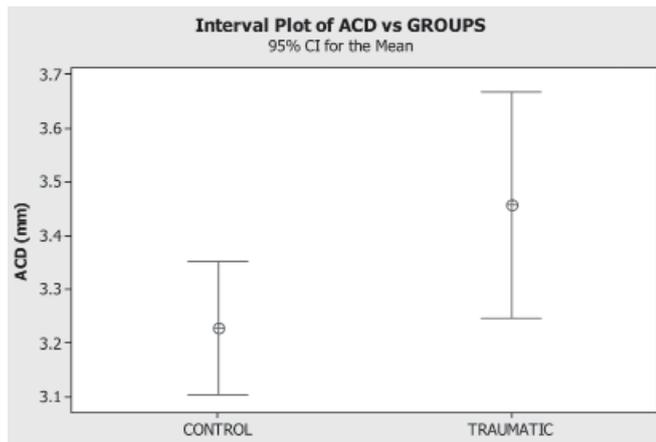


Figure: The distribution of ACD measurements in the group with trauma history and the control group.

(mean, 3.46 ± 0.55 mm; min 2.37 mm-max 4.43 mm), although it was not statistically significant ($p=0.052$) (Figure). The mean AL, ACD and keratometry values are summarized in table. The ACD measurements were higher in cases in group I. When cases having ACD measurement more than 3.5 mm were analysed, it was observed that 10 cases (35%) were in group I whereas 11 cases (31%) were in group II. The difference between two groups was not statistically significant ($p=0.502$). With further analysis when cases having ACD measurement more than 3.75 mm were analysed, the difference between the groups became more apparent. There were 9 cases (32%) in group I and 4 cases (12.5%) in group II. However difference between the two groups was still statistically insignificant ($p=0.052$).

DISCUSSION

Traumatic cataract poses some important risks in preoperative and postoperative period. The diagnosis may be difficult to make if no apparent signs of trauma is observed. Sometimes even a trauma history is neglected by the patient and the doctor if no significant ophthalmological finding is present. Decreased suspicion level and ignorance in these cases may yield peroperative and postoperative surprises. Operation of traumatic cataracts necessitates some different approaches other than routine cataract surgery. Developing objective criteria to diagnose traumatic cataracts may raise a level of suspicion and thus may lead to a more detailed examination and special evaluation of these cases.

The ACD measurements may show changes due to the method of measurement and also due to the individual patient characteristics like age.⁷⁻⁸ ACD can be measured by different methods. ACD measurements with different A-scans may also give some inconsistent results.⁹ In our study, mean of ACD measurements of eyes in the control group (mean, 3.22 ± 0.36 mm, min 2.38 mm-max 4.19 mm) was significantly less than that of eyes in the group with history of trauma (mean, 3.46 ± 0.55 mm, min 2.37 mm-max 4.43 mm). We could not find reports

in the literature concerning overall dimensions of eyes with traumatic cataract to compare our results but, measurements obtained from cataract patients without history of trauma seem to be consistent with the other reports.⁷⁻⁸

Shufelt et al reported decrease in ACD with increase in age.¹⁰ In our study mean age was 56.7 ± 15.9 years in the trauma group and it was 53.1 ± 11.8 years in the control group and there was no significant difference between groups. There was no significant difference in terms of axial length measurements between eyes in the trauma group (mean, 23.51 ± 1.18 mm; min 21.83 mm-max 26.64 mm) and eyes in the control group (mean, 23.11 ± 0.84 mm; min 21.43 mm-max 24.78 mm) ($p=0.112$). These results showed that two groups had similar axial lengths and it also might be interpreted that these two groups had similar ocular dimensions and the difference between ACD measurements were not due to ocular dimension changes.

After an ocular trauma many possible changes occur in the anterior segment of the eye. Especially damage to iris insertion and possible angle recession may increase ACD. Also another possible factor is the zonular weakness and the laxity caused by trauma on zonules. Weakening of the zonular support and subsequent laxity of the lens allows lens movement which may cause pathological consequences ranging from subclinical lens dislocation to significant phacodonesis. In advanced cases zonular fibres may separate from their attachments to the ciliary body and lens and this may produce a characteristic inferior displacement of the lens.¹¹ Many reports have described increased rate of intraoperative complications such as zonular dialysis and vitreous loss during cataract extraction in eyes with damaged zonular integrity.¹²⁻¹⁸

In this study an answer to the question of a probable threshold level of ACD indicating traumatic cataract was also searched. When the cases having ACD measurements more than 3.5 mm were analysed it was shown that 10 cases (35%) were in the trauma group and 11 cases (31%) were in the control group. With further analysis when cases having ACD measurement more than 3.75 mm were analysed the difference between groups became more apparent. There were 9 cases (31%) in the trauma group and 4 cases (11%) in the control group. When groups were analysed with regard to frequency of cases having ACD measurements more than 3.75 mm, statistical analysis showed that p value was 0.052. Especially ACD measurements more than 3.75 mm may indicate a higher probability of a traumatic cataract.

Although the results of our study have failed to show a clear cut difference in ACD measurements between the control group and the traumatic cataract group, statistical analysis showed a p value of 0.052 which was very close to the limit of statistical significance. Further clinical studies with larger cohorts are required to elucidate role of the ACD measurements in traumatic cataract cases.

An important drawback of this is the lack of detailed knowledge data about the angle, the distance between lens and iris. This should be evaluated with ultrasonic biomicroscopy in future studies.

In conclusion, measurements of anterior chamber depth more than 3.75 mm in cataract patients may be a clue of an implicit traumatic cataract, and should alert the surgeon in the absence of a trauma history. In such cases, surgical plans taking into consideration this possibility may prevent an unpredictable outcome.

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