Macular Thickening in Eyes with Anterior Uveitis

Ön Üveitli Gözlerde Maküler Kalınlaşma

Veysi ÖNER[1], Kemal TÜRKYILMAZ[1], Ayşegül KÜÇÜKALİ TÜRKYILMAZ[2], Berrak ŞEKERYAPAN[1], Mustafa DURMUŞ[1]

ABSTRACT

Purpose: To investigate pre- and post-treatment macular and peripapillary nerve fiber layer (RNFL) changes in eyes with acute anterior uveitis (AU) by optical coherence tomography (OCT).

Materials and Methods: Seventeen eyes of 17 patients with AU (uveitic eyes) and unaffected fellow (control) eyes of these patients were enrolled to the study. Peripapillary RNFL, optic nerve head, and macular scans were performed using Cirrus HD OCT. OCT measurements were performed at baseline (before starting treatment) and two months after the remission for each subject.

Results: The mean age of the patients was 32.0±12.3 years. Uveitic eyes had significantly higher central subfield thickness (CST) values than healthy fellow control eyes (p=0.010). CST decreased significantly after the treatment compared with baseline (p=0.001) in the uveitic eyes, whereas there was no significant difference between pre- and post-treatment CST values of healthy fellow control eyes.

Conclusions: We have shown that eyes with AU had higher CST than healthy fellow eyes in Cirrus HD OCT. OCT devices may be useful for noninvasive evaluation of microscopic macular changes that are not yet obvious in a standard clinical examination.

Key Words: Anterior uveitis, macular thickening, optical coherence tomography.

ÖZ

Amaç: Ön üveitli gözlerin tedavi öncesi ve sonrası maküler ve peripapiller retinal sinir lifi tabakası (RSLT) değişikliklerinin optik koherens tomografi (OKT) ile araştırılması.

Gereç ve Yöntem: On yedi ön üveitli hastanın üveitli gözleri ile sağlıklı diğer gözleri (kontrol) çalışmaya dâhil edildi. Tedavi öncesi ve remisyon sonrası 2. ay peripapiller RSLT, optik sinir başı ve maküler ölçümler Cirrus HD OKT kullanılarak yapıldı.

Bulgular: Hastaların yaş ortalaması 32.0±12.3 idi. Üveitli gözler sağlıklı control gözlerine göre anlamlı olarak daha yüksek santral subfield kalınlık (CST) değerlerine sahipti (p=0.010). Üveitli gözlerde CST tedavi sonrası anlamlı derecede düşerken, sağlıklı control gözlerde tedavi öncesi ve sonrası CST değerleri arasında fark yoktu.

Sonuçlar: Bu çalışmada Cirrus HD OKT ile yapılan ölçümlerde ön üveitli gözlerin sağlıklı kontrol gözlere göre anlamlı derecede yüksek CST değerlerine sahip olduğunu gösterdik. OKT cihazları ön üveitli gözlerde klinik muayene ile tespit edilemeyen mikroskopik değişikliklerin invaziv olmayan yöntemle saptanması için kullanılabilir.

Anahtar Kelimeler: Ön üveit, maküler kalınlaşma, optik koherens tomografi.

1- M.D. Asistant Professor, Recep Tayyip Erdogan University Facuty of Medicine, Department of Ophthalmology, Rize/TURKEY
ONER V., veysioner@gmail.com
TURKYILMAZ K., kemalturkyilmaz@hotmail.com
SEKERYAPAN B., berraksekeryapan@hotmail.com
DURMUS M., mudurmus@yahoo.com
2- M.D. Asistant Professor, Recep Tayyip Erdogan University Facuty of Medicine, Department of Physical Medicine and Rehabilitation, Rize/TURKEY
KUCUKALİ YILMAZ A., aysegulkucukali@hotmail.com

Geliş Tarihi - Received: 26.11.2012
Kabul Tarihi - Accepted: 03.04.2013
Ret-Vit 2013;21:193-196

Yazışma Adresi / Correspondence Adress: M.D. Asistant Professor, Veysi ONER
Recep Tayyip Erdogan University Facuty of Medicine, Department of Ophthalmology, Rize/TURKEY

Phone: +90 464 213 04 91
E-Mail: veysioner@gmail.com

INTRODUCTION

Anterior uveitis (AU) are a group of inflammatory disorders primary involving the iris and/or the anterior ciliary body of the eye.[1,2] Presence of cells and flare in the anterior chamber is the characteristic of classic acute AU. Additionally, posterior synechiae, fibrin, and hypopyon are sometimes observed in the severe cases. Macular edema has been reported in 4%-9% of cases.[3] Macular edema causes macular thickening (MT) with or without cystoid gap formation.[4,5] MT may be seen in patients with AU even in eyes without posterior segment disease, and it may or may not correspond to visual acuity or the grade of anterior chamber inflammation.[6-8] It may be noticed and objectively measured by the optical coherence tomography (OCT) even in subclinical cases.[9,10] In the present study, we aimed to investigate pre- and post-treatment macular and peripapillary nerve fiber layer (RNFL) changes in eyes with acute AU by spectral-domain OCT.

MATERIALS AND METHODS

Seventeen eyes of 17 patients with AU (uveitic eyes) and unaffected fellow (control) eyes of these patients were enrolled to the study. AU was diagnosed as the presence of signs of intraocular inflammation such as inflammatory cells in the anterior chamber, keratic precipitates, cilliar injection, and myosis, with normal funduscopic examination. Subjects who had bilateral AU, glaucoma or diagnosed diabetes, a history of an intraocular surgery, and media opacities were excluded. All patients were informed about the study procedure and they consented to participate. The study was carried out according to the tenets of the Declaration of Helsinki and was approved by the local ethics committee.

All patients underwent a standart ophthalmological examination, including determination of visual acuity (by Snellen charts), measurement of intraocular pressure (by Goldmann applanation tonometry), slit-lamp examination, and fundoscopy with dilated pupils. Temporal, nasal, inferior, and superior quadrants peripapillary RNFL thicknesses, average peripapillary RNFL thickness, disc area (DA), rim area (RA), central subfield thickness (CST), cube volume (CV), and cube average thickness (CAT) were measured by the same blinded investigator using Cirrus HD spectral-domain OCT (Carl Zeiss Meditec, Dublin, CA). Scans with signal strengths lower than 7 were excluded from the study. OCT measurements were performed at baseline (before starting treatment) and two months after the remission for each subject. All patients were treated with dexamethasone 0.1% eye drops and mydriatics according to the severity of their AU.

None of patients received systemic treatment in addition to eye drops. Treatment was tapered down slowly after all clinical signs of AU went into remission.

Statistical Analysis

Statistical analysis was performed using SPSS version 16.0. The distributions of variables have been checked with Kolmogorov-Smirnov test. The Wilcoxon test was used to compare the OCT parameters of the groups. Statistical significance was set at $p<0.05$.

RESULTS

The mean age of the patients was 32.0±12.3 (ranging from 18 to 63) years. There were 9 males and 8 females. The mean visual acuity was 0.9±0.6 in the uveitic eyes and 1.0 in the healthy fellow control eyes.

Table 1: *The OCT parameters of the patients before starting the treatment (mean±SD).*

	Uveitic eyes (n=17)	Fellow eyes (n=17)	P
CST (µm)	260.9±13.9	246.0±15.6	0.010
CV (mm^3)	9.4±1.0	9.1±0.5	0.167
CAT (µm)	283.3±9.3	277.5±20.2	0.692
DA (mm^2)	1.9±0.3	1.8±0.2	0.185
RA (mm^2)	1.3±0.1	1.5±0.2	0.389
Peripapillary RNFL thickness (µm)			
Average	98.7±7.7	95.2±10.3	0.262
Temporal quadrant	67.4±9.5	68.2±8.6	0.986
Superior quadrant	121.9±18.2	114.2±15.5	0.822
Nasal quadrant	80.0±8.3	74.4±12.5	0.088
Inferior quadrant	124.8±10.0	124.4±20.1	0.972

CAV; Cube Average Thickness, CST; Central Subfield Thickness, CV; Cube Volume, DA; Disc Area, OCT; Optical Coherence Tomography RA; Rim Area, RNFL; Retinal Nerve Fiber Layer.

Table 2: *Post-treatment OCT parameters of the patients (mean±SD).*

	Uveitic eyes (n=17)	Fellow eyes (n=17)	P
CST (µm)	244.1±16.3	242.8±20.6	0.683
CV (mm^3)	9.6±0.6	9.4±0.5	0.469
CAT (µm)	285.0±11.4	280.0±11.0	0.228
DA (mm^2)	2.1±0.4	1.9±0.3	0.438
RA (mm^2)	1.5±0.4	1.4±0.2	0.448
Peripapillary RNFL thickness (µm)			
Average	94.1±11.7	93.9±8.3	0.863
Temporal quadrant	65.2±10.1	64.0±10.4	0.617
Superior quadrant	117.1±22.5	118.2±16.3	0.823
Nasal quadrant	76.0±6.5	71.4±9.9	0.112
Inferior quadrant	117.2±23.7	122.4±16.5	0.221

CAV; Cube Average Thickness, CST; Central Subfield Thickness, CV; Cube Volume, DA; Disc Area, OCT; Optical Coherence Tomography RA; Rim Area, RNFL; Retinal Nerve Fiber Layer.

Seven patients were found to have the antigen HLA-B27 and the rest of patients had idiopathic AU.

Table 1 shows pre-treatment OCT parameters of the patients. Uveitic eyes had significantly higher CST values than healthy fellow control eyes (p=0.010). However, uveitic and healthy fellow eyes were similar regarding CV, CAT, DA, RA, average RNFL thickness, and RNFL thicknesses of all four quadrants (all p>0.05).

CST decreased significantly after the treatment compared with baseline (p=0.001) in the uveitic eyes, whereas there was no significant difference between pre- and post-treatment CST values of healthy fellow control eyes. Table 2 demonstrates post-treatment OCT parameters of the patients.

There were no significant differences between the uveitic and healthy fellow control eyes concerning CST, CV, CAT, DA, RA, average RNFL thickness, and RNFL thicknesses of all four quadrants (all p>0.05).

DISCUSSION

The present study has shown that eyes with AU had higher CST values than healthy fellow eyes by spectral-domain OCT. In addition, it has been found that CST decreased significantly after the treatment compared with baseline in the uveitic eyes.

In accordance with our study, MT has been previously found in eyes with AU[9] and in AU with a broader range of inflammation severity.[6] Trail et al.,[9] by using time-domain OCT, have revealed that eyes with unilateral moderate-to-severe anterior uveitis had MT.

In another study using time-domain OCT, Castellano et al.,[6] have shown that retinal thickening was strongly associated with iridocyclitis and decreased after treatment.

In our study, we used spectral-domain OCT which supplies higher resolution and faster scan rate compared with time-domain instruments.[11]

In a recent study, Shulman et al.,[12] demonstrated that eyes with acute AU had thicker macula and thicker peripapillary RNFL than healthy fellow eyes. In our study, there was no significant difference between the peripapillary RNFL thicknesses of uveitic and healthy control fellow eyes. The difference between this previous study and our study might be caused by different study populations or different OCT devices.

The study population of the previous study included patients with idiopathic uveitis, ankylosing spondylitis, Crohn's disease, reactive arthritis, and HLA-B27 uveitis whereas our study population included only idiaopathic and HLA-B27 uveitis. In addition, we used spectral-domain OCT whereas the previous study used time domain OCT.

There are several previous studies which have found increased retinal thickness after uneventful phacoemulsification and intraocular lens implantation.[13,14] The results of these previous studies support our results by showing even relatively mild ocular inflammation might result in some degree of blood-retinal barrier interruption and retinal edema.

Macular edema is a rare complication of typical acute AU.[15-17] However, in the current study we have displayed that eyes with AU had MT, even when cystoid changes were not observed.

We believe that the pathogenesis of the macular changes we found is similar to that of uveitic cystoid macular edema. Clinically evident cystoid macular edema might reflect the severe end of a spectrum of macular changes that commonly arise in patients with intraocular inflammation.

In conclusion, we have shown that eyes with AU had higher CST than healthy fellow eyes in Cirrus HD spectral-domain OCT. Spectral-domain OCT devices may be useful for noninvasive evaluation of microscopic macular changes that are not yet obvious in a standard clinical examination.

REFERENCES/KAYNAKLAR

1. Hooper C, McCluskey P. Intraocular inflammation: Its causes and investigations. Curr Allergy Asthma Rep 2008;8:331-8.
2. Jabs DA, Nussenblatt RB, Rosenbaum JT. Standardization of uveitis nomenclature for reporting clinical data. Results of the first international workshop. Am J Ophthalmol 2005;140:509-16.
3. Rothova A, van Veenedaal WG, Linssen A, et al. Clinical features of acute anterior uveitis. Am J Ophthalmol 1987;103:137-45.
4. Iannetti L, Accorinti M, Liverani M, et al. Optical coherence tomography for classification and clinical evaluation of macular edema in patients with uveitis. Ocul Immunol Inflamm 2008;16:155-60.
5. Markomichelakis NN, Halkiadakis I, Pantelia E, et al. Patterns of macular edema in patients with uveitis: Qualitative and quantitative assessment using optical coherence tomography. Ophthalmology 2004;111:946-53.
6. Castellano CG, Stinnett SS, Mettu PS, et al. Retinal thickening in iridocyclitis. Am J Ophthalmol 2009;148:341-9.
7. Akduman L. Can we be more objective in determining the response to treatment in uveitis patients aside from recording anterior chamber reaction? Ocul Immunol Inflamm 2009;17:265-6.
8. Ducos de Lahitte G, Terrada C, Tran TH, et al. Maculopathy in uveitis of juvenile idiopathic arthritis: An optical coherence tomography study. Br J Ophthalmol 2008;92:64-9.
9. Traill A, Stawell R, Hall A, et al. Macular thickening in acute anterior uveitis. Ophthalmology 2007;114:402.
10. Brown JC, Solomon SD, Bressler SB, et al. Detection of diabetic foveal edema: Contact lens biomicroscopy compared with optical coherence tomography. Arch Ophthalmol 2004;122:330-5.
11. Rao HL, Babu JG, Addepalli UK, et al. Retinal nerve fiber layer and macular inner retina measurements by spectral domain optical coherence tomograph in Indian eyes with early glaucoma. Eye (Lond) 2012;26:133-9.
12. Shulman S, Goldenberg D, Habot-Wilner Z, et al. Optical coherence tomography characteristics of eyes with acute anterior uveitis. Isr Med Assoc J 2012;14:543-6.
13. Georgopoulos GT, Papaconstantinou D, Niskopoulou M, et al. Foveal thickness after phacoemulsification as measured by optical coherence tomography. Clin Ophthalmol 2008;2:817-20.
14. Kim SJ, Bressler NM. Optical coherence tomography and cataract surgery. Curr Opin Ophthalmol 2009;20:46-51.
15. Rothova A, van Veenedaal WG, Linssen A, et al. Clinical features of acute anterior uveitis. Am J Ophthalmol 1987;103:137-45.
16. Uy HS, Christen WG, Foster CS. HLA-B27-associated uveitis and cystoid macular edema. Ocul Immunol Inflamm 2001;9:177-83.
17. Rodriguez A, Akova YA, Pedroza-Seres, et al. Posterior segment ocular manifestations in patients with HLA-B27-associated uveitis. Ophthalmology 1994;101:1267-74.