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**ROLE OF OPTICAL COHERENCE TOMOGRAPHY IN EVALUATION  
OF PSEUDOPHAKIC CYSTOID MACULAR EDEMA (ON THE BASIS  
OF CLINICAL CASES)**

**PSEVDOPAKİK KISTOID MAKULA ÖDEMI KLİNİKASININ**

**DƏYƏRLƏNDİRİLMƏSİNDƏ OKULYAR KOHERENT**

**TOMOQRAMANIN ROLU (KLİNİK HALLAR ƏSASINDA)**

**РОЛЬ ОКУЛЯРНОЙ КОГЕРЕНТНОЙ ТОМОГРАММЫ (ОКТ) ПРИ**

**ОЦЕНКЕ КЛИНИКИ ПСЕВДОПАКИЧНОГО КИСТОИДНОГО**

**МОКУЛЯРНОГО ОТЁКА (КЛИНИЧЕСКИЕ СЛУЧАИ)**

*Summary. Pseudophakic cystoid macular edema (PCME) is one of the reasons that reduces the vision significantly after the cataract surgery. One of the modern non-invasive imaging detections and response in treatment for*

*pseudophakic cystoid macular edema is OCT. In this study, 2 clinical cases of PCME were described after the cataract surgery, the efficacy of OCT examination was evaluated before the treatment and the follow up examination after the treatment. Although the first clinical case did not have any risk factors, it was recorded that the second clinical case had a risk factor of diabetic retinopathy. In both of the cases OCT detected that the central retinal thickness was increased (in accordance with 400µm and 800 µm). In the first case only medical treatment, but in the second case medical treatment with i/v bevacizumab was injected. In both cases, in response to treatment, restoration of vision and the normalization of macular thickness was detected by OCT.*

*As a result, we believe that OCT plays a big role in evaluating the response treatment with local, oral and invasive benefit when is appropriate for PCME.*

**Key words:** *Pseudophakic cystoid macular edema, local, oral and intravitreal (invasive) treatment, OCT.*

**Abstrakt.** *Psevdofakik kistoid macula ödemi (PKMÖ) katarakta cərrahiyyəsi sonrası rast gəlinən və görməni ciddi azalda bilən səbəblərdən biridir. PKMÖ-nin aşkar olunmasında və müalicəyə cavabın dəyərləndirilməsində müasir qeyri-invaziv görüntüləmə üsullarından biri olan OKT olduqca yararlıdır. Bu tədqiqat işində katarakta əməliyyatı sonrası PKMÖ inkişaf etmiş 2 klinik hal təsvir olunmuş və müalicəyə cavabı və müalicənin təqib olunması sırasında OKT müayinəsinin təqib olunması sırasında OKT müayinəsinin effektivliyi dəyərləndirilmişdir. I klinik halda hər hansı bir risk amili olmadığı halda II klinik halda yanaşı diabet retinopatiyası olduğu risk amili kimi qeydə alınmışdır. Hər iki halda mərkəzi retina qalınlığının artmış olması (müvafiq olaraq 460 m və 800 m) OKT ilə müəyyən olundu. I halda yalnız yerli medikal müalicə, II halda isə yerli medikal müalicə ilə yanaşı i/v bevacizumab inyeksiya olundu. Hər iki halda müalicəyə cavab nəticəsi olaraq görmənin bərpası ilə bərabər makula qalınlığının normallaşması OKT ilə aşkar olundu.*

*Nəticə olaraq PKMÖ müalicəsində yerli, oral və lazım gəldikdə invaziv müalicənin yararlı olması və müalicəyə cavabın dəyərləndirilməsində OKT-nin rolunun böyük olmasını düşünürük.*

**Açar sözləri:** *Pseudofakik kistoid makula ödem, yerli, oral və intravitreal (invasiv) müalicə. OKT*

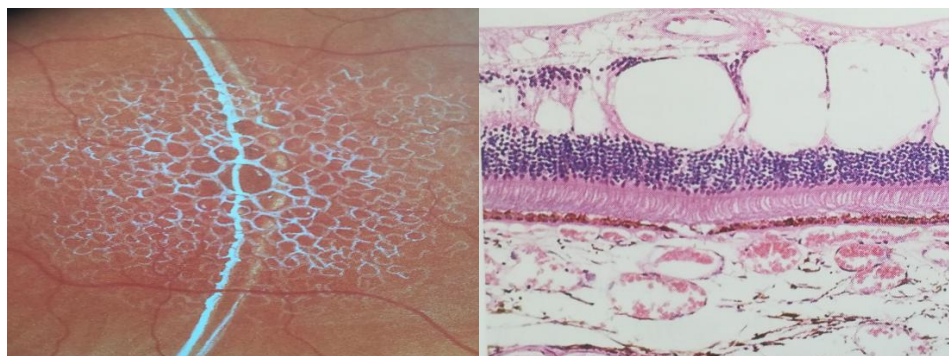
**Аннотация.** *Псевдофакичный кистозный макулярный отёк (ПКМО) один из серьёзных осложнений встречаемых после хирургии катаракты который приводит значительному ухудшению зрения. OKT не инвазивный метод обследования-очень ценный для раннего выявления PKMO и оценки эффективности лечения.*

*В это исследование включены 2 клинических случая с PKMO развившиеся после хирургии катаракты. Течение патологических изменений и эффективность лечения были контролированы OKT. В 1-м клиническом случае факторы риска не были обнаружены, во 2-ом случае была отмечена диабетическая ретинопатия. В обоих случаях OKT обнаружила значительное повышение центральной макулярной толщины ( ЦМТ), соответственно 460 мкм и 800 мкм.*

*В 1-ом случае была применена местная медикаментозная терапия, а во 2-ом случае наряду с медикаментозным лечением введён и/в бевацизумаб. В обоих случаях наряду с повышением зрения OKT выявила снижение ЦМТ до нормальных величин. Как результат можно отметить ценную роль OKT для раннего выявления и динамического наблюдения PKMO, а также для оценки ответа на применяемое локальное и и/в лечение.*

**Ключевые слова:** *псевдофакичный кистозный макулярный отёк, локальное и интравитреальное лечение, OKT.*

*Cystoid macular edema is the result of the collection of retinal fluid in the perifoveal zone (inner and outer nuclear layers) and the formation of fluid-filled cystic changes Fig.1, 2 [1; 2].*



**Fig. 1. (J.J. Kanski, 2007)**

**Fig. 2. (J.J.Kanski 2007)**

One of the complications of the cystoid macular edema that is seen mostly after the cataract surgery is called pseudophakic cystoid macular edema (PCME). For the first time this complication after the cataract surgery was described by Irvine in 1953 and later by Gass [3] due to description of cystoid macular edema by fluorescein angiography [4], so the pseudophakic cystoid macular edema was called the Irvine-Gass syndrome.

In literature the frequency of pseudophakic cystoid macular edema is between 1-30% [5]. This indicator can be affected by many factors such as the experience of the surgeon, characteristics of each clinical condition, type of surgery, accompanying systemic diseases and eye diseases, and complications occurring during the surgery.

The incidence of PCME is more seen after the intracapsular extraction of the lens [6] and less likely to be followed by phacoemulsification (Phaco) and extracapsular extraction of the lens (ECCE) [7], but angiographic PCME after ECCE compared to after Phaco surgery has been reported to be less common [8].

Without risk factors and complications after the cataract surgery, the clinical significance of PCME is seen between 1-2% [5].

Modern imaging techniques such as ocular coherent tomography (OCT) and fluorescein fundus angiography (FFA) play a big role in finding the PCME. Thus, the incidence of PCME in OCT studies have been reported to be 41% and 20-30% in FFA studies [9].

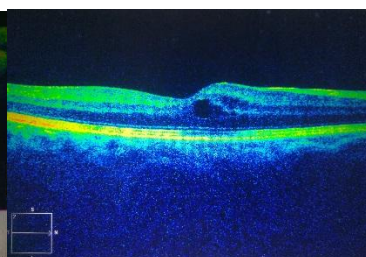
**Purpose.** To investigate the role of OCT in the diagnosis of pseudophakic cystoid macular edema after the cataract surgery and treatment response based on the findings we encountered in our clinic.

### **Clinical Case 1**

A 68-year-old patient (woman) was admitted to our clinic with a complaint of poor vision in the right eye and upon evaluation of ophthalmic examination, Vis OD was 0.09 in the right eye and Vis OS was 0.6 in the left eye. Patient was diagnosed with immature age-related cataract in the right eye and phacoemulsification of the cataract was performed with no complications and intraocular artificial lens (IOL) was implanted. There was no somatic or ocular risk factor that could have detected a cystoid macular edema in the patient previously. First day after the surgery: Vis OD was 0.9. Patient was prescribed topical prednisolone acetate drop: 1 drop 6 times a day, Moxifloxacin 1 drop 6 times a day, Diclofenac sodium 1 drop 3 times a day and after 4 weeks the drops were lowered in dosage and were no longer used. 6 weeks after the surgery the patient was admitted back to our clinic with a complaint of decreased vision and the vision in the right eye decreased to 0.1. Upon examination, cornea was transparent, anterior chamber and anterior vitreous were stable and artificial IOL was in capsular bag, but some less noticeable opacities in posterior vitreous (USE), loss of macular reflex on ophthalmoscopy of the retina, not very noticeable intraretinal cysts and subretinal fluid was found on OCT. Thickness of macula was found to be 356 $\mu$ m (Figure 3,4,5), taking into account available signs and clinical picture, it was diagnosed with pseudophakic cystoid macular edema.



**Fig. 3**



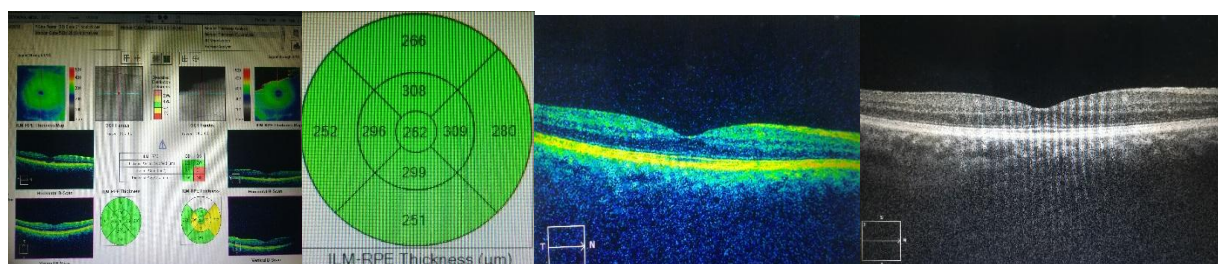
**Fig. 4**



**Fig. 5**

Again, prednisolone acetate 1 drop 4 times a day, Nevanac 1 drop 4 times a day for the right eye, and oral carbonicanhydrase inhibitor (Diacarb 0.5mg) (and/or systemic acetazolamide 2 x 125) was prescribed.

The patient was called back after a 2-week break. During this visit, the visual acuity in the right eye was slightly up (Vis OD=0.2) and due to the fact that on fundus examination there was a lack of macular reflex a subtenon kenalog injection was done. The next time during the control period, there was a marked increase in vision: 4 weeks after the injection, the visual acuity in the right eye increased to 0.6. The reflex of macula was seen clearly, and most importantly OCT examination revealed correct foveal contours and decreased in macular thickness (Figure 6, 7, 8, 9).



**Fig. 6**

**Fig. 7**

**Fig. 8**

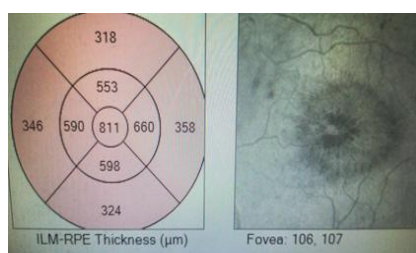
**Fig. 9**

### **Clinical Case 2.**

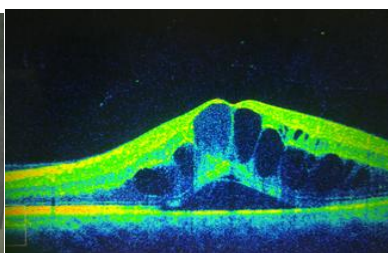
A 62-year-old male was admitted to our clinic with a complaint of poor vision in both of his eyes. When he was admitted: Vis OD=0.2 with no correction, and Vis OS=0.04 with no correction, and he was diagnosed with cataract for both eyes. Patient is diabetic for a long time now.

Considering that the pupil of the right eye was not dilating very well before the surgery, Diclofenac sodium was prescribed 1 drop 3 times a day; phacoemulsification surgery with no complication was performed and IOL was implanted in the right eye together. First day after the surgery, visual acuity for the left eye was 0.8. Patient was prescribed topical prednisolone acetate drop: 1 drop 6 times a day, Moxifloxacin: 1 drop 6 times a day, Diclofenac sodium: 1 drop 3 times a day. 3 weeks after the surgery, the visual functions remained stable

and the prescribed eye drops were reduced. However, the 4th week after the surgery, patient noticed that his vision in the left eye was decreased, so he came back to our clinic once again. This time, patient's left eye's visual acuity was 0.08, transparent cornea, intraocular fluid and vitreous stable, pupillary reaction to the light was alive, IOL was in capsular bag. Fundus examination revealed significant macular edema and loss of foveal reflex. OCT examination showed intraretinal cysts, collection of subretinal fluid and increased macular thickness (811 $\mu$ m) (Figure 10, 11, 12).



**Fig. 10**

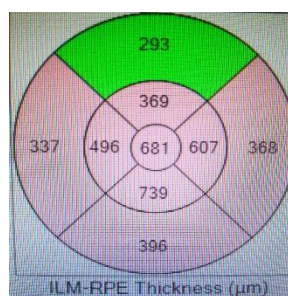


**Fig. 11**

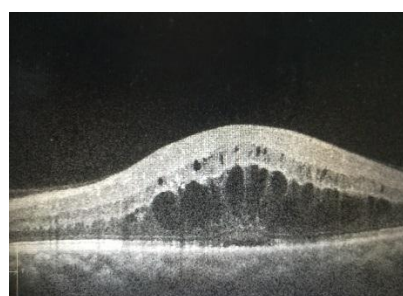


**Fig. 12**

Local prednisolone acetate 1 drop 6 times a day, Diclofenac sodium 1 drop 4 times a day, Diacarb 0.5mg 3 times, was prescribed and subtenon triamcinolon (kenalog) was injected. After 2 weeks: although vision improved to 0.2 in the left eye, there was no significant change in macular thickness and it was decided to continue for control. 8 weeks' postop examination, vision in the left eye the same and little bit reduction in the central macular thickness on OCT examination (Figure 13, 14).



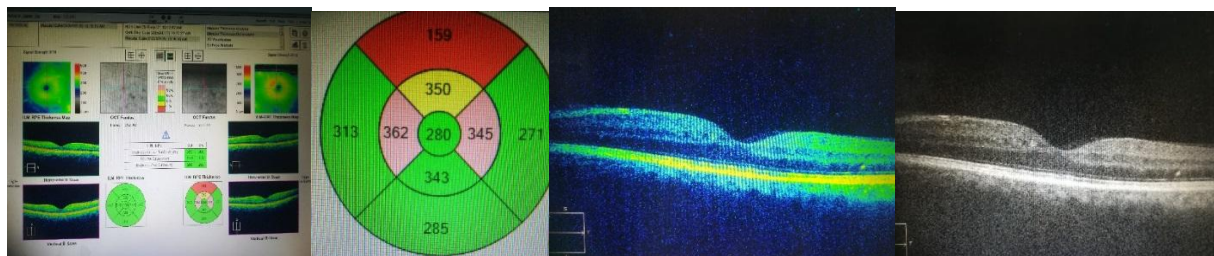
**Fig. 13**



**Fig. 14**



Intravitreal bevacizumab was injected into the patient's left eye and 2 weeks after the i/v injection on examination, the visual acuity increased to 0.7 and there was a decrease in macular thickness (Figure 15, 16, 17, 18).



**Fig. 15**

**Fig. 16**

**Fig. 17**

**Fig. 18**

As of right now, Diclofenac sodium is continued to the left eye 1 drop 3 times a day and the patient is kept under the supervision.

### **Discussion**

PCME is thought to be one of the significant complications that may result in a decrease of vision 4-6 months after the surgery [10]. Even without systemic and ocular risk factors, this complication can occur after a cataract surgery [5]. Decrease in vision is a result of the development of edema in fovea. It is believed that CME develops in the fovea as a result of high metabolic activity of fovea, and that the foveal avascular zone and internal limiting membrane (ILM) of retina are thin [11].

The inflammatory mediators especially the prostaglandins are important in the etiopathogenesis of PCME [12].

It is believed that, due to increased inflammatory mediators, the breakdown of blood-anterior chamber fluid and blood-retinal barrier, and increased vascular permeability stimulates the mechanism of CME pathogenesis [9].

There are literature informations about a role of diabetes, uveitis, retinal vein occlusion and epiretinal membrane, the use of prostaglandin analogues, choroidal tumors, systemic and ocular risk factors such as aging, in the development of PCME [13]. Vitreous liquification, pre-displacement, vitreous loss during the surgery [14], posterior capsular tear [15], the inflammation due to

intraocular lens (IOL) always touching the iris [16], can also play a role in development of PCME.

The diagnostics of PCME is associated with decreased vision along with fundus examination (loss of foveal reflex). FFA and OCT examinations also play a big role. On the FFA there is a perifoveal leakage in the early phases and characteristic of petaloid-flower-image in late phases [17] (Figure 19).



**Fig. 19**

OCT is a special method [9] to detect thickening in macula and cysts in the outer strand, but also a very valuable method that allows you to monitor and control the correction of macular edema. One of the patients that we observed had only OCT examination and treatment dynamics was monitored with OCT image and clinical picture. The other patient had an OCT examination and FFA was used for the diagnosis. It should be noted that, the development of PCME in the first patient corresponds to the 6<sup>th</sup> week of postop period and 4<sup>th</sup> week for the second patient. In both patients, there was a macular thickening on OCT examination (respectively 356 and 811 $\mu$ m) with typical cystic gaps, and in the second patient typical angiographic image was detected on FFA. PCME in the second patient was seen earlier and thickness of the macula on the OCT examination can be correlated with the relevant risk factor that the patient had diabetes mellitus for a long term.

There is extensive information in the literature about the use of non-steroidal anti-inflammatory drugs in the treatment of PCME, local periocular oral

steroids, intravitreal administration, the use of oral carbohydrase inhibitors, and the use VEGF drugs in recent years [18; 19; 20; 21].

After the surgery, both of the patients received steroid and non-steroidal anti-inflammatory drugs locally. Because there was a good visual acuity and no risk factors in the first patient, both of the drugs were discontinued after 4 weeks.

In the second patient, CME has developed continuing the use of these drugs. For both patients, oral carboantihydrase inhibitor was added in addition to continuation of NSAID and steroids.

The first patient received a subtenon kenalog injection 2 weeks after the treatment (8 weeks after surgery) and 4 weeks after injection OCT revealed redusing of macular thickness. The second patient received subtenon kenalog injection 4 weeks after the surgery. Although the vision increased in the second patient 8 weeks postoperatively, there was still no reduction of thickness of the macula on the OCT examination so, intravitreal injection of bevacizumab was done.

After 2 weeks, the vision in the right eye increased to the level it was the first day after the surgery and a significant decrease in macular thickness (280 $\mu$ m, Fig.16) was seen on the OCT examination.

Thus, PCME both risky and risk-free can also occur after non-traumatic cataract surgery. To overcome this complication, the use of long-term local steroids, NSAIDs and oral carboanhydrases inhibitors were very effective, which was also reflected in literature. A particular aspect is that, to assess the treatment dynamics particularly in measuring macular thickness and evaluating the reverse rate of PCME, the OCT examination as noninvasive method plays a big role.

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