



# Evaluation of Epithelial Downgrowth Using Anterior Segment Optical Coherence Tomography: A Case Report

## Epitelyal İçe Büyümenin Ön Segment Optik Koherens Tomografi Kullanılarak Değerlendirilmesi: Olgu Sunumu

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### Summary

Epithelial downgrowth is a rare, sight-threatening complication which can develop following anterior segment surgeries with corneal incisions. However, due to translucent nature of epithelial membrane and diversity of clinical signs, epithelial downgrowth usually goes undiagnosed until its late stages. Use of anterior segment imaging techniques may be utilized to ease the diagnosis of cases with clinical suspicion of epithelial downgrowth. An 83-year-old male patient with a history of cataract surgery three years ago was clinically diagnosed as epithelial downgrowth, and argon laser photocoagulation was applied on the iris to confirm clinical suspect, but no bleaching was seen on the iris. Later on, anterior segment optical coherence tomography was performed to visualize the epithelial membrane and its relationship with anterior segment structures. Anterior segment optical coherence tomography was found to be useful for supporting the clinical suspicion in this case which could not be confirmed by argon laser application. (*Turk J Ophthalmol* 2013; 43: 474-6)

**Key Words:** Epithelial downgrowth, cataract surgery complications, anterior segment optical coherence tomography

### Özet

Epitelyal içe büyüme, kornea kesilerinden uygulanan ön segment cerrahilerinden sonra izlenebilen, ender rastlanan, görmeyi tehdit eden bir komplikasyondur. Ancak, epitelyal membranın yarı saydam olması ve klinik bulguların çeşitliliğinden dolayı, epitelyal içe büyüme tanısı genellikle hastalığın geç evrelerine kadar konulamaz. Ön segment görüntüleme teknikleri, klinik olarak epitelyal içe büyüme şüphesi mevcut vakalarda teşhisi kolaylaştırmak amacıyla kullanılabilir. Üç yıl önce katarakt cerrahisi geçirme hikayesi mevcut olan seksen üç yaşında erkek hastanın sağ gözüne klinik olarak epitelyal içe büyüme teşhisini kondu ve klinik şüpheyi doğrulamak amacıyla iris üzerine argon lazer fotokoagülasyon uygulandı, fakat iris üzerinde beyazlama izlenmedi. Sonrasında ön segment optik koherens tomografisi, epitelyal membranı ve epitelyal membranın ön segment yapıları ile ilişkisini görüntülemek için kullanıldı. Argon lazer uygulaması ile doğrulanamayan bu olguda, ön segment optik koherens tomografi, klinik şüphenin desteklenmesi açısından yararlı bulunmuştur. (*Turk J Ophthalmol* 2013; 43: 474-6)

**Anahtar Kelimeler:** Epitelyal içe büyüme, katarakt cerrahisi komplikasyonları, ön segment optik koherens tomografi

### Introduction

Epithelial downgrowth is an uncommon but serious complication which is characterized by cysts or translucent membranes (derived from ocular surface epithelial cells) covering the intraocular structures like corneal endothelium, iris surface, and ciliary body. Advances in microsurgical techniques provide less surgical trauma to ocular structures with self-sealing and faster healing wounds with a relatively low risk of epithelial cells migrating into the anterior chamber. Thus, with sutureless

phacoemulsification techniques, epithelial downgrowth has gradually found to be a much more rare complication after cataract surgery.<sup>1</sup> However, cases of epithelial downgrowth have been reported after a clear corneal phacoemulsification.<sup>1-5</sup> Herein, we describe a patient with advanced epithelial downgrowth seen after 2.5 years of a clear corneal phacoemulsification. This case report illustrated the use of anterior segment optical coherence tomography (ASOCT) to assess the relationship of epithelial membrane with anterior chamber structures.

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## Case Report

An 83-year-old man was referred to cornea department of our clinic for progressive decrease of vision in his right eye. The patient denied any pain or redness. Past history included hypertension for 15 years and recently diagnosed intracranial malignancy. His past ocular history included a phacoemulsification and a single-piece intraocular lens implantation three years ago in our clinics. Surgical note of the procedure revealed out that phacoemulsification was performed through a 2.8 mm main temporal clear-corneal incision and two side-port incisions for bimanual irrigation and aspiration. Additionally, it was noted that there was an intra-operative Descemet membrane detachment which was managed by viscoelastic injection. On postoperative day 1, cornea demonstrated corneal edema and anterior chamber was noted to be deep without any iris touch or incarceration and there was no aqueous leakage from the main incisions or side ports. Routine patient care including visits at day 3, 7 and 14 demonstrated a gradual decrease of corneal edema with an increase of uncorrected visual acuity up to 5/10 on the 14th day. At 1st-month and 3rd-month visits, best-corrected visual acuity (BCVA) was noted to be 8/10. However, the patient reported gradual decrease in his vision with an annoying glare 2 years after the surgery (starting from 6 months earlier to referral). On examination, BCVA was 1/10. On biomicroscopy, there was a semi-translucent membrane extending from the main incision and paracentesis incisions meeting in the central cornea, encroaching on the visual axis resembling epithelial downgrowth (Figure 1). Intraocular pressure (IOP) was measured to be 14 mmHg and 16 mmHg by applanation tonometry. Fundus examination after pupil dilation revealed symmetric cup-to-disc ratio of 0.3 in both eyes.

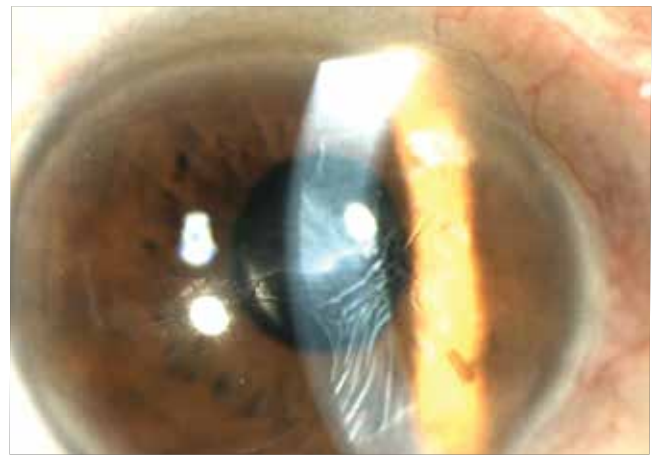
With clinical suspicion of epithelial downgrowth, argon laser photocoagulation was performed over anterior iris stroma to confirm diagnosis, but no bleaching was achieved in any of multiple shots targeting different parts of the iris. ASOCT was performed to evaluate the anterior segment structures. The imaging study was performed using anterior segment module of spectral domain optical coherence tomography (The RTVue-100; Optovue, Fremont, Calif., USA). Figure 2-A and Figure 2-B demonstrate cross-line images of 6 mm of the central cornea in horizontal and vertical planes, respectively. Evaluation of anterior chamber angle was also done to investigate whether epithelial membrane extends onto the iris or blocks the iridocorneal angle and was repeated in every clock hour. Figure 3 demonstrates an iridocorneal angle image at 9 o'clock position. Manual removal of downgrowth was not attempted due to probable inadvertent damage to the corneal endothelium. Our surgical plan included use of intracameral 5-fluorouracil (5-FU) to stop the progression of epithelial downgrowth<sup>6</sup> followed by removal of epithelial membrane and Descemet stripping automated endothelial keratoplasty. However, the patient rejected any treatment option due to recently diagnosed intracranial tumor and was

lost to follow-up. Examination of the left eye was uneventful and had a visual acuity of 8/10 with history of cataract surgery performed 3 years ago.

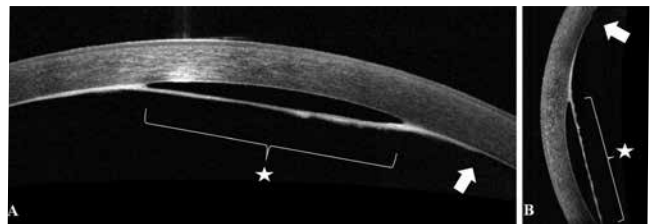
## Discussion

Clinically, epithelial downgrowth may appear in form of cysts or sheets covering any intraocular structure. Prognosis mostly depends on the type of downgrowth.<sup>1</sup> Epithelial cyst is quite different from the sheet-like forms of epithelial downgrowth. With well-defined borders, it is easier to diagnose cysts leading to earlier and more successful treatment by complete excision. On the other hand, the diagnosis of sheet-like or diffuse form of epithelial downgrowth is quite difficult, especially in the early stages of the disease, due to the fact that the sheet of cells can be almost transparent without any clinical symptoms. In addition, clinical signs may vary depending on the tissue on which ocular surface epithelium extends. Thus, epithelial downgrowth goes mostly unrecognized till late stages. Management of epithelial downgrowth is quite difficult when anterior chamber contains epithelial sheets and prognosis for recovery of useful vision is generally poor.

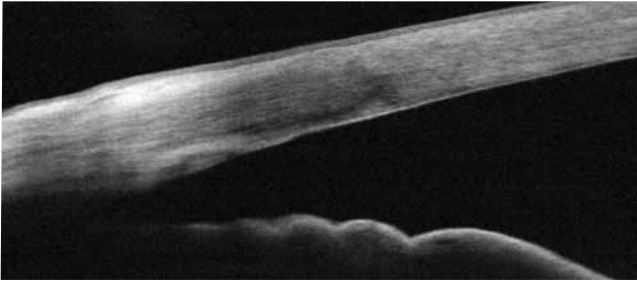
Most accurate method for the diagnosis of epithelial downgrowth is histopathologic analysis.<sup>1,7</sup> Definitive diagnosis



**Figure 1.** Anterior segment photography showing semi-translucent epithelial membrane encroaching the pupillary area



**Figure 2.** Anterior segment optical coherence tomography image demonstrating the epithelial membrane in horizontal (A) and vertical (B) planes. Epithelial membrane is firmly attached to the corneal endothelium. Epithelial membrane "bridge" in between is marked with white star (★). Arrows (⇔) show the point where the epithelial membrane stops and naked endothelium starts.



**Figure 3.** Anterior segment optical coherence tomography image of the iridocorneal angle at 9 o'clock position

of epithelial downgrowth conventionally needs tissue sample by paracentesis and/or biopsy and subsequent histopathological analysis. However, it can only be performed after tissue biopsy and it is mostly used as conclusive confirmation of diagnosis in a retrospective manner. So the diagnosis of epithelial downgrowth is generally based on clinical suspicion. Use of argon laser photocoagulation to evaluate the involvement of iris surface has been a well-established method on the way to diagnose epithelial downgrowth.<sup>3</sup> It has been reported to be used to confirm clinical suspicion, especially before surgical intervention. But, its clinical value is limited if there is no involvement of iris.

However, in the last two decades, as technological advances in the imaging systems of the anterior segment provided better patient care, diagnosis methods for epithelial downgrowth also improved gradually. Confocal microscopy is a valuable tool providing non-invasive microscopic evaluation of the cornea and has been reported to confirm the diagnosis of epithelial downgrowth without the need of an invasive procedure.<sup>8,9</sup> Confocal microscopy may be considered as an indispensable tool for the diagnosis of epithelial downgrowth given the advantages of earlier diagnosis and enhanced treatment outcomes.

ASOCT is another non-invasive imaging device, which can be used to visualize pathological processes in anterior chamber. During the management of this case, ASOCT was helpful to raise clinical suspicion of epithelial downgrowth. ASOCT provided two main clinical aspects: relationship of sheet-like epithelial membrane with corneal endothelium and

assessment of the iridocorneal angle. Epithelial sheets were found to be in close relation with (mostly adherent to) the endothelium. ASOCT provided evaluation of cross-sectional images of the iridocorneal angle together with the iris surface.

In cases with epithelial downgrowth, IOP rise is a devastating complication resulting in refractory glaucoma. The cause of IOP rise is occlusion of the iridocorneal angle by peripheral anterior synechia or direct involvement of the trabecular meshwork by the epithelium. Therefore, in our case, ASOCT was used to evaluate the anterior chamber angle in every single clock hour.

We presented a case of epithelial downgrowth extending onto the corneal endothelium by demonstrating sheet-like epithelial cells using ASOCT. We think that the use of anterior segment imaging systems may help confirmation of clinical suspicion and diagnosis of epithelial downgrowth especially when argon laser photocoagulation is useless in similar cases without involvement of the iris surface.

## References

1. Vargas LG, Vroman DT, Solomon KD, et al. Epithelial downgrowth after clear cornea phacoemulsification: report of two cases and review of the literature. *Ophthalmology*. 2002;109:2331-5.
2. Tomlins PJ, Savant V, Quinlan M. Failure of intracameral fluorouracil to resolve an epithelial ingrowth following clear corneal cataract surgery. *J Cataract Refract Surg*. 2007;33:923-4.
3. Lee BL, Gatton DD, Weinreb RN. Epithelial downgrowth following phacoemulsification through a clear cornea. *Arch Ophthalmol*. 1999;117:283.
4. Knauf HP, Rowsey JJ, Margo CE. Cystic epithelial downgrowth following clear-corneal cataract extraction. *Arch Ophthalmol*. 1997;115:668-9.
5. Wallace EJ, Imrie F, Roxburgh S, Coleiro J, Ironside J. Epithelial downgrowth as a complication of toxic anterior segment syndrome. *J Cataract Refract Surg*. 2007;33:1976-7.
6. Lai MM, Haller JA. Resolution of epithelial ingrowth in a patient treated with 5-fluorouracil. *Am J Ophthalmol*. 2002;133:562-4.
7. Majmudar PA, Epstein RJ, Parent A, Raphtis EM, Grostern R, Torczynski E. Noninvasive diagnosis of epithelial downgrowth after penetrating keratoplasty using immunohistochemical analysis of resected corneal buttons. *Cornea*. 2006;25:727-33.
8. Forseto Ados S, dos Santos MS, Sampaio A, Mascaro V, Nose W. Diagnosis of epithelial ingrowth after penetrating keratoplasty with confocal microscopy. *Cornea*. 2006;25:1124-7.
9. Lenhart PD, Randleman JB, Grossniklaus HE, Stulting RD. Confocal microscopic diagnosis of epithelial downgrowth. *Cornea*. 2008;27:1138-41.