

*Case Report*

FOUR YEARS FOLLOW UP OF STABLE ULTRATHIN NON ECTATIC CORNEA:  
A CASE REPORT

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**Abstract**

*In this report, we presented a 33-year-old male patient complained of decrease vision of both eyes due to bilateral refractive error. The uncorrected visual acuity (UCVA) in the right eye was 0.06 with best corrected visual acuity (BCVA) to 1 (in decimal) by a refraction of -2.50Ds -2.75Dc x15, while the UCVA in the left eye was 0.05 with best corrected visual acuity (BCVA) to 0.8 by a refraction of -4.75 Ds -2.50Dc x64. Corneal tomographic analysis was done for both eyes by Orbscan and showed normal corneal tomography with symmetrical bowtie but the thinnest pachymetry was very low. Both Orbscan examination and Scheimpflug based Oculus tomography were performed as a follow up for 4 years duration and the results show stable parameters. Evaluation of corneal biomechanical properties was done after one year using corneal visualization Scheimpflug technology (CST) with suspicious results which mainly explained by this extremely low corneal pachymetry with the same stable results after 3 years duration of follow up.*

**Keywords:** *Ultrathin cornea, Corneal tomography, Orbscan ilz, Corneal biomechanics, Corvis.*

**1. Introduction**

Scheimpflug tomography has become a widely performed technique for anterior segment imaging because it gives a lot of information as regards corneal thickness and back surface properties [1-3]. Corneal ectasias such as keratoconus are characterized by remarkable corneal stromal thinning and multiple breaks in the Bowman layer. These changes in the corneal

structure may lead to localized biomechanical decompensation resulting in changes of corneal geometric characters and irregular astigmatism [4-6]. In this case report, we presented four years follow up duration of a case of extreme corneal thinning with normal Scheimpflug tomography findings and stable corneal biomechanical properties.

**2. Case Report**

A male patient of 33-year-old presented to the outpatient clinic of the Nourelain

Center for Lasik and Corneal Surgeries, Tanta, Egypt. He complained of defective

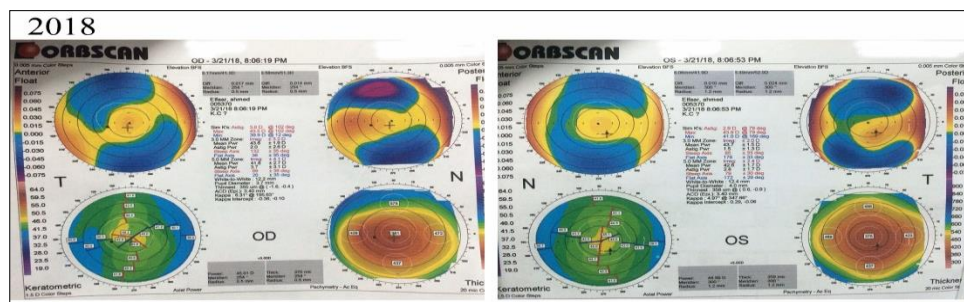
vision of both eyes due to bilateral refractive error. The uncorrected visual acuity (UCVA) in the right eye (RE) was 0.06 with best corrected visual acuity (BCVA) to 1 (in decimal) by a refraction of -2.50Ds -2.75Dc x15, while the UCVA in the left eye (LE) was 0.05 with best corrected visual acuity (BCVA) to 0.8 by a refraction of -4.75 Ds -2.50Dc x64. Slit-lamp examination (RM-8900, TOPCON, Japan) of the anterior segment showed no abnormality with bilateral normal corneal diameter (mm), normal scleral color, clear corneal stroma and no corneal scars or endothelial abnormalities. No iris abnormalities or lens opacifications were detected. The intraocular pressure and fundus examination were performed for the patient and all of them were free. There was no positive family history of ectatic corneal changes or associated skeletal deformities. The patient sought refractive laser surgery in our center. Corneal tomography was performed for both eyes by slit scanning Orbscan IIz (Bausch & Lomb, Rochester, NY) and the patient was diagnosed as normal corneal tomography with symmetrical bowtie but the thinnest pachymetry were very low. The thinnest pachymetry was 355  $\mu\text{m}$  and 358  $\mu\text{m}$  in right and left eyes. The average keratometry were within normal range in right eye was 42.94 D

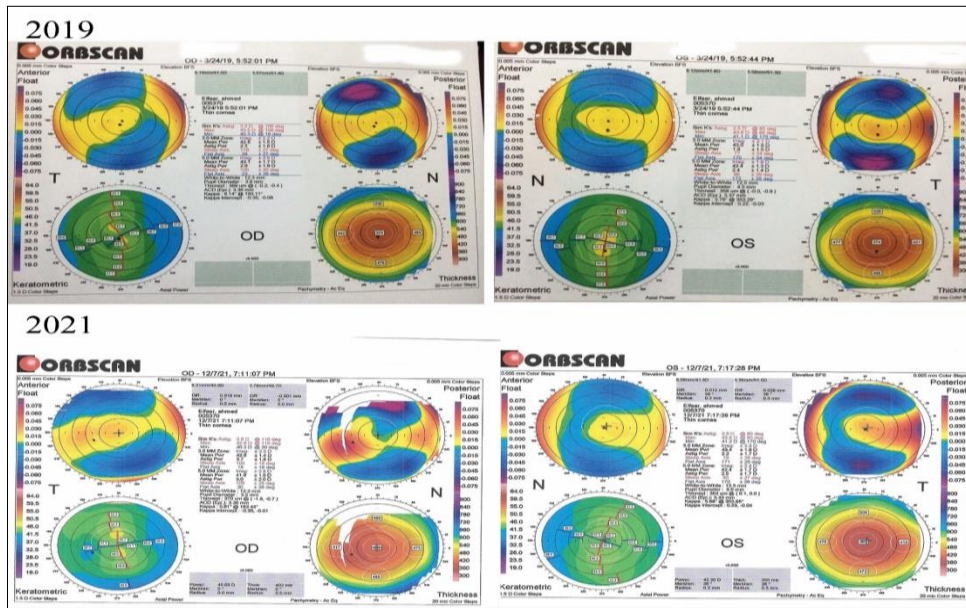
and in left eye was 42.97 D together with normal Both front and back elevations in both eyes. We decided to follow up of the patient for 1 year by Orbscan IIz was to exclude any possibility for progression for such extremely thin cornea with the results was the same. We performed another corneal tomographic examination by another Scheimpflug based tomography device (Oculus Inc., Wetzlar, Germany), which showed the same results of the previous device. Despite of normal corneal tomography, we decided to do bilateral corneal biomechanical assessment after one year due to this very low corneal thickness. Evaluation of corneal biomechanical properties was done by the use of corneal visualization Scheimpflug technology (CST) (Oculus Optikgeräte GmbH, Wetzlar, Germany) and showed suspicious results which mainly explained by this extremely low corneal pachymetry. Theses previous was published in a case report by the same authors at the time of first presentation [7]. The patient was advised not to be subjected to refractive laser corneal surgery with prescription of glasses and long term follow up for four years, tab. (1) summarizes the corneal topographic and corneal biomechanical properties follow up data for four years which shows stable results with no progression, fig. (1 & 2).

**Table 1:** Corneal topographic and corneal biomechanical properties follow up data for four years

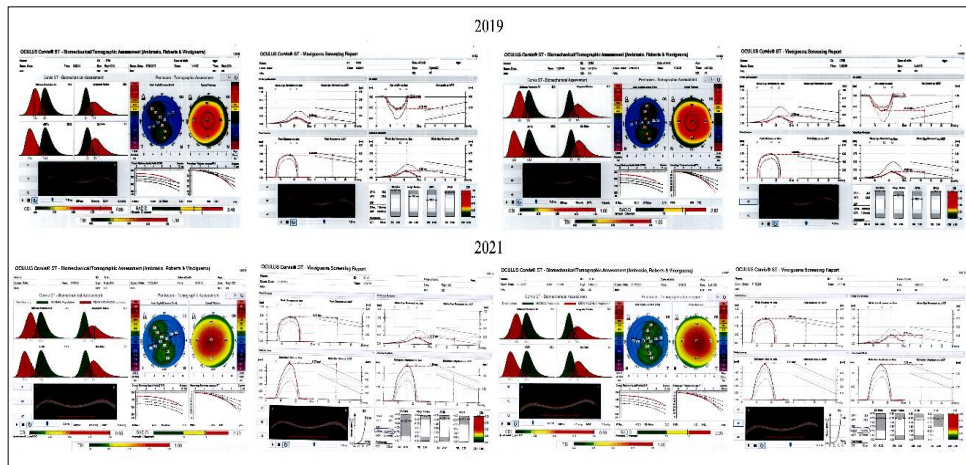
		UCVA in decimal	BCVA in decimal	Sphere Ds	Cylinder Dc	Thinnest Pachymetry (in microns)	Mean Keratometry	Kmax	Back elevation in microns	Front elevation in microns	ART max	CBI	TBI
2018	Rt	0.06	1.00	-2.50	-2.75	355	42.94	44.5	5	9	-----	----	----
	Lt	0.05	0.8	-4.75	-2.50	358	42.97	45.1	6	10	-----	----	----
2019	Rt	0.06	1.00	-2.50	-2.50	369	41.9	44.7	5	9	393.5	0.85	1.00
	Lt	0.05	0.8	-4.50	-2.50	358	42.35	45.2	6	8	338.5	1.00	1.00
2021	Rt	0.06	1.00	-2.50	-2.50	370	41.55	44.9	6	9	254	0.99	1.00
	Lt	0.05	0.9	-4.50	-2.25	354	42.5	45.2	7	9	232	0.99	1.00

\* Maximum Ambrosio relational thickness, \*\* Corvis biomechanical index \*\*\* Tomographic biomechanical index





**Figure 1:** Corneal topographic follow up data for four years



**Figure 2:** Corneal biomechanical properties follow up data for four years

### 3. Discussion

In addition to the well-known clinical signs of corneal ectasia, pachymetry-tomography-examination are crucial in diagnosing and in the follow-up in patients of keratoconus [8]. The Orbscan slit-scanning topography has been used in several conditions, including in management of ophthalmic and systematic disorders [9,10]. The recent diagnostic tools for keratoconus includes Scheimpflug imaging, anterior segment optical coherence tomography, as well as biomechanical properties measurements, aimed to differentiate suspect cases from

normal corneas [11,12]. To our knowledge, it is the first reported case of long term follows up markedly thin cornea (The thinnest pachymetry was 355  $\mu\text{m}$  in right eye and 358  $\mu\text{m}$  in left eye) in the first presentation with no detected ectatic changes by corneal tomography. All Orbscan corneal tomographic parameters for our case were within normal range except this extreme bilateral corneal thinning. As regards the bowtie (in Orbscan and Oculus Scheimpflug based tomography device) they were symmetrical especially in the



absence of skewing or angulation. These topographic results were stable for three years of follow up. Multiple factors affect the corneal biomechanical properties such as hydration, viscosity, elasticity and the thickness of corneal stroma [13]. Corneal biomechanical evaluation was performed for corneal visualization Scheimpflug technology which uses high-speed Scheimpflug camera to evaluate entire response of cornea deformation to an air puff and analyses the data by software (Corvis\_ST\_1.2r1126) that included the Corvis Biomechanical Index which is a very predictive tool in the diagnosis of corneal ectasia. Our results showed high CBI (>0.50) which is the cutoff point with 98.4% specificity and 100% sensitivity as reported previously in a study of by Vinciguerra R et al. [14]. The tomographic/ biomechanical index (TBI) is a recent parameter developed by Ambrósio and his colleagues combining

parameters based on tomography data from the Pentacam (OCULUS Optikgeräte GmbH; Wetzlar, Germany) and biomechanical assessment from the Corvis ST. Our results showed high TBI (>0.79) which is the cutoff point with 100% sensitivity for detecting clinical ectasia and 100% specificity, as well [15]. Ambrosio relational thickness (ART Max) was also reported in this case which is one of the most valuable combined indices as a tomographic relational thickness. It had statistically better diagnostic value than single-point values which rely on the symmetrical change in corneal pachymetry in different points to identify early ectatic changes [16]. Evaluation of corneal biomechanical properties showed suspicious results which mainly explained by this extremely low corneal pachymetry with the same stable results after 3 years duration of follow up.

#### 4. Conclusion

*The long term follow up of this rare case of ultrathin cornea shows normal clinical and tomographic features. Biomechanical properties evaluation in this case showed suspicious but stable results which mainly explained by this extremely low corneal pachymetry.*

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