ASCRS·ASOA Symposium & Congress

2014 APRIL 25-29 BOSTON

Marcella Salomão,, MD

e-Poster 7258

Rio de Janeiro Corneal Tomography and Biomechanics Study Group

Brazilian Study Group of Artificial Intelligence and Corneal Analysis

Thick Flap – related ectasia

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Introduction

- Progressive corneal ectasia, first reported in 1998 by Seiler, is a rare but very severe and widely recognized complication of laser in situ keratomileusis (LASIK).

- Pre- operative topographic abnormalities, low residual stromal bed thickness (RSB), thin corneas, young age, high myopia and multiple treatments have been reported to place an individual at increased risk for developing ectasia after LASIK.

- Although abnormal corneal topography appears to be the most important and best described preoperative risk factor, there are reports of post – LASIK ectasia in eyes with apparently normal topographies.

- The etiology of iatrogenic keratectasia is related to an insufficient RSB thickness; leading to a process of biomechanical failure of the corneal stroma, with inability to support unremitting stresses.

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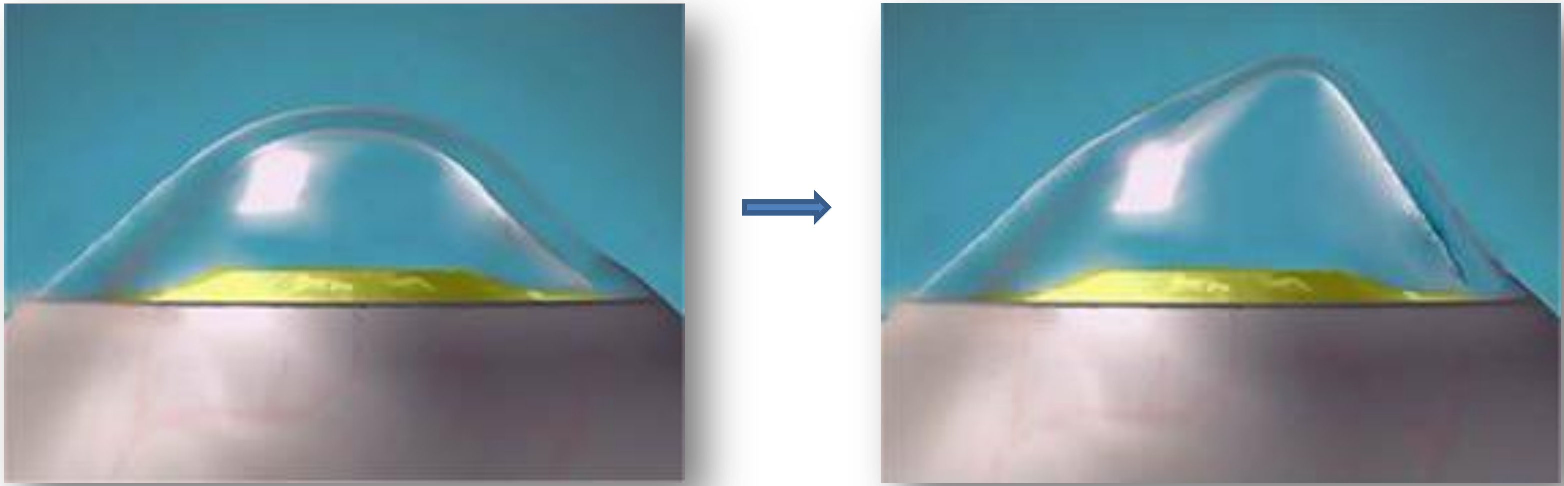
Introduction

- Possible causes of mysterious cases include underestimation of excimer laser ablation depth, error in measuring corneal thickness (i.e. divergence between central and true thinnest values), and underestimation of flap thickness.

- Flap architecture, thickness, diameter, and hinge length are important characteristics that influence the biomechanical impact on the cornea. Thus, appropriate surgical planning and controlling of such characteristics might reduce the risk of ectasia.

- It has been hypothesized that thick flaps cause post-operative ectasia.



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Purpose

- To describe a case series of post-LASIK ectasia related to thick lamellar cuts.

Methods

- Pre-operative and post-operative data of 7 eyes of 5 patients that developed post-LASIK ectasia attributable to thick mechanical microkeratome created flaps were analyzed.

- The Ectasia Risk Score System (ERSS*) was calculated for each eye, based on pre-operative records.

- Flap and residual stromal bed thicknesses were measured by either Scheimpflug or Fourier Domain technology.

*** Randleman JB, Woodward M, Lynn MJ, Stulting RD. Risk assessment for ectasia after corneal refractive surgery. Ophthalmology. 2008 Jan;115(1):37-50.**

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Results

- All cases had preoperative screening tests indicating low risk of ectasia development, based on criteria by the Ectasia Risk Score System (ERSS*), including normal topography, residual stromal bed, corneal thickness, spherical equivalent and age.

ERSS	POINTS				
	4	3	2	1	0
Topography	Abnormal topography	INF steep/SRA	------------	ABT	Normal/SBT
RSB	< 240µ	240 to 259µ	260 to 279µ	280 to 299µ	≥ 300µ
Age	------------	18 to 21 years	22 to 25 years	26 to 29 years	≥ 30 years
CT	< 450µ	451 to 480µ	481 to 510µ	------------	≥ 510µ
MRSE	> -14D	> -12 to -14D	> -10 to -12D	> -8 to -10D	-8D or less

ABT = asymmetric bowtie; CT = corneal thickness; D = diopters; INF steep = inferior steepening pattern; MRSE = manifest refraction spherical equivalent; RBS = residual stromal bed thickness; SBT = symmetric bowtie; SRA = skewed radial axis.

- Both eyes of two patients and one eye of three patients developed post-LASIK ectasia due to thick flaps.

- Fellow eyes with stable outcomes had thinner flaps and residual stromal bed higher than 300 microns; while eyes that developed ectasia had residual stromal bed thinner than 300 microns.

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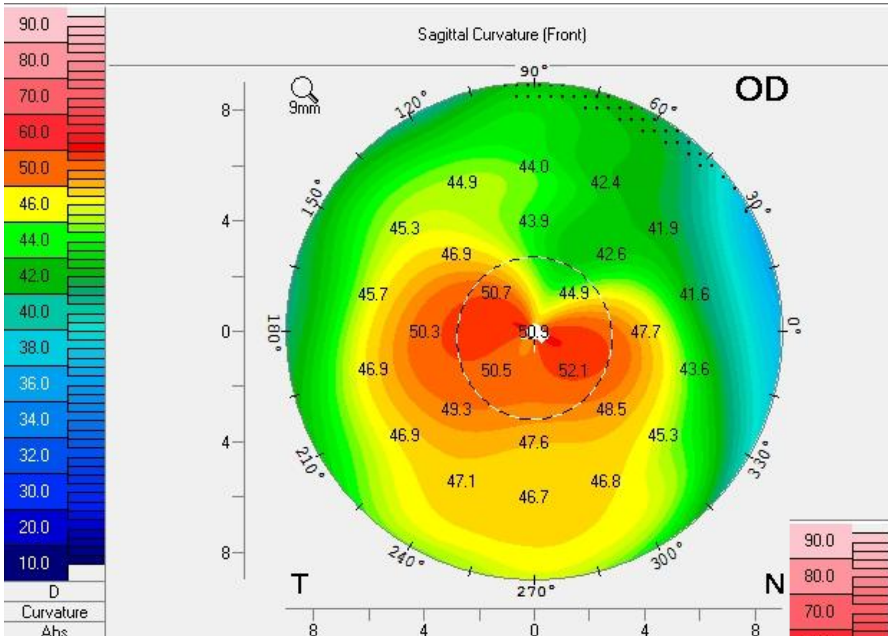
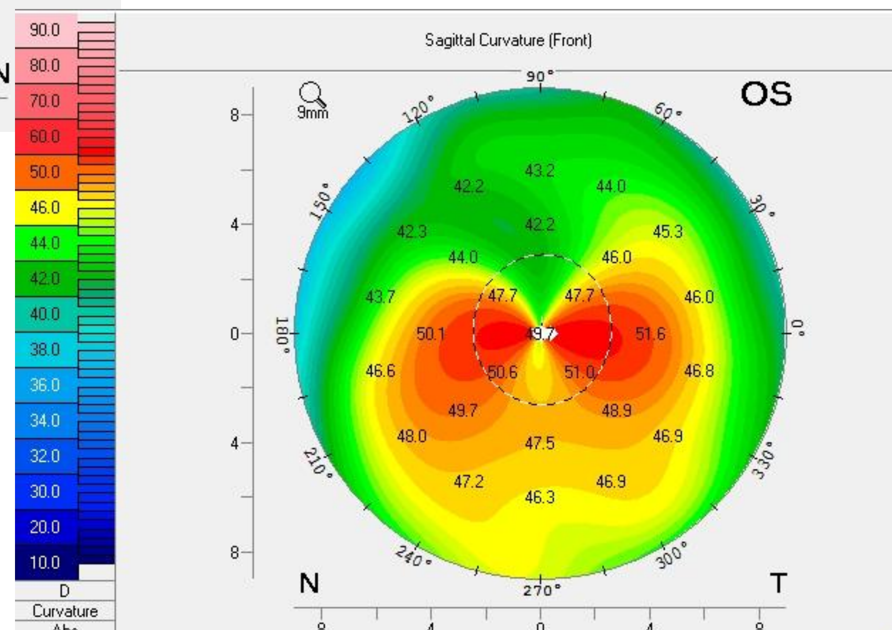
Results

CASE 1- Ectasia OU





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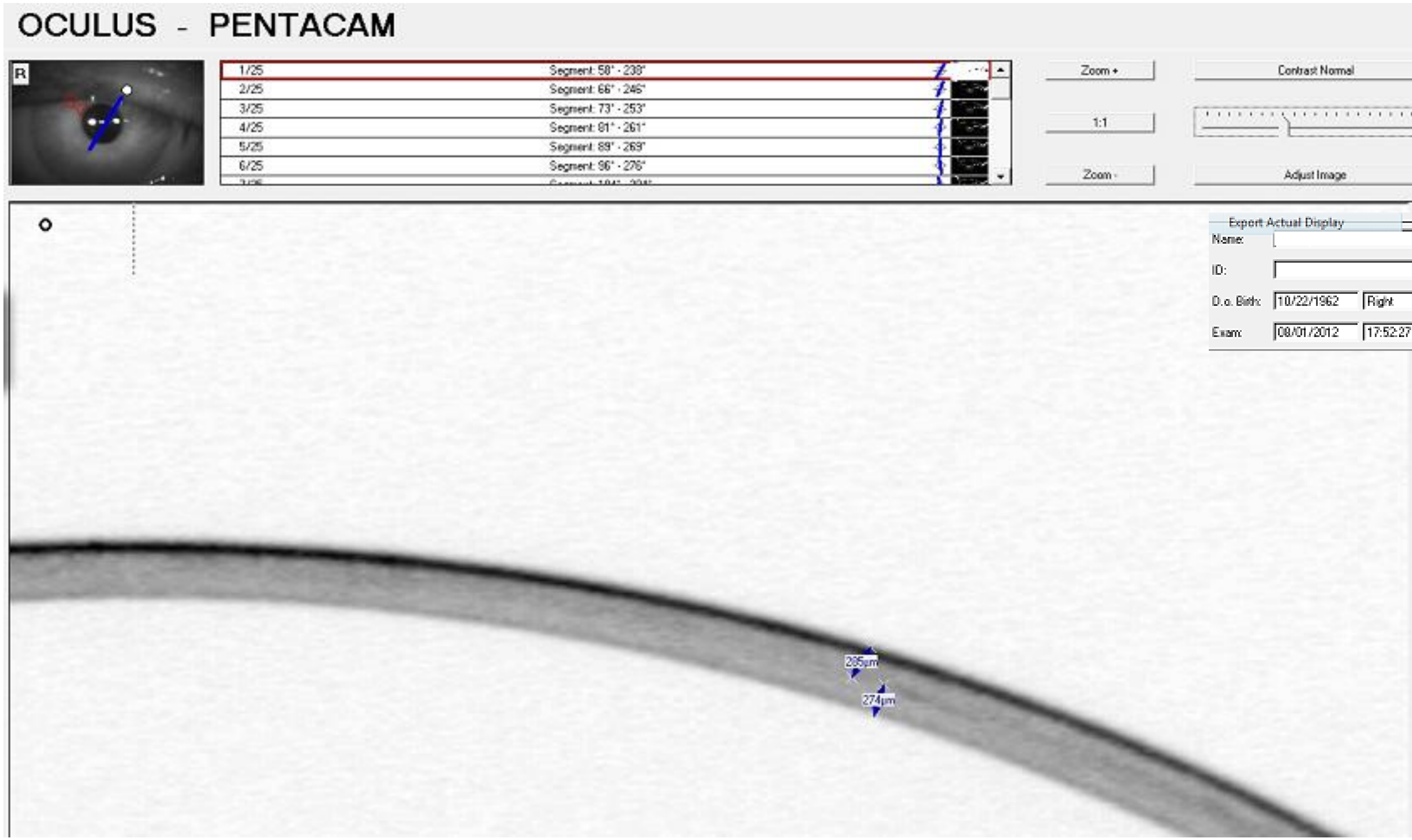

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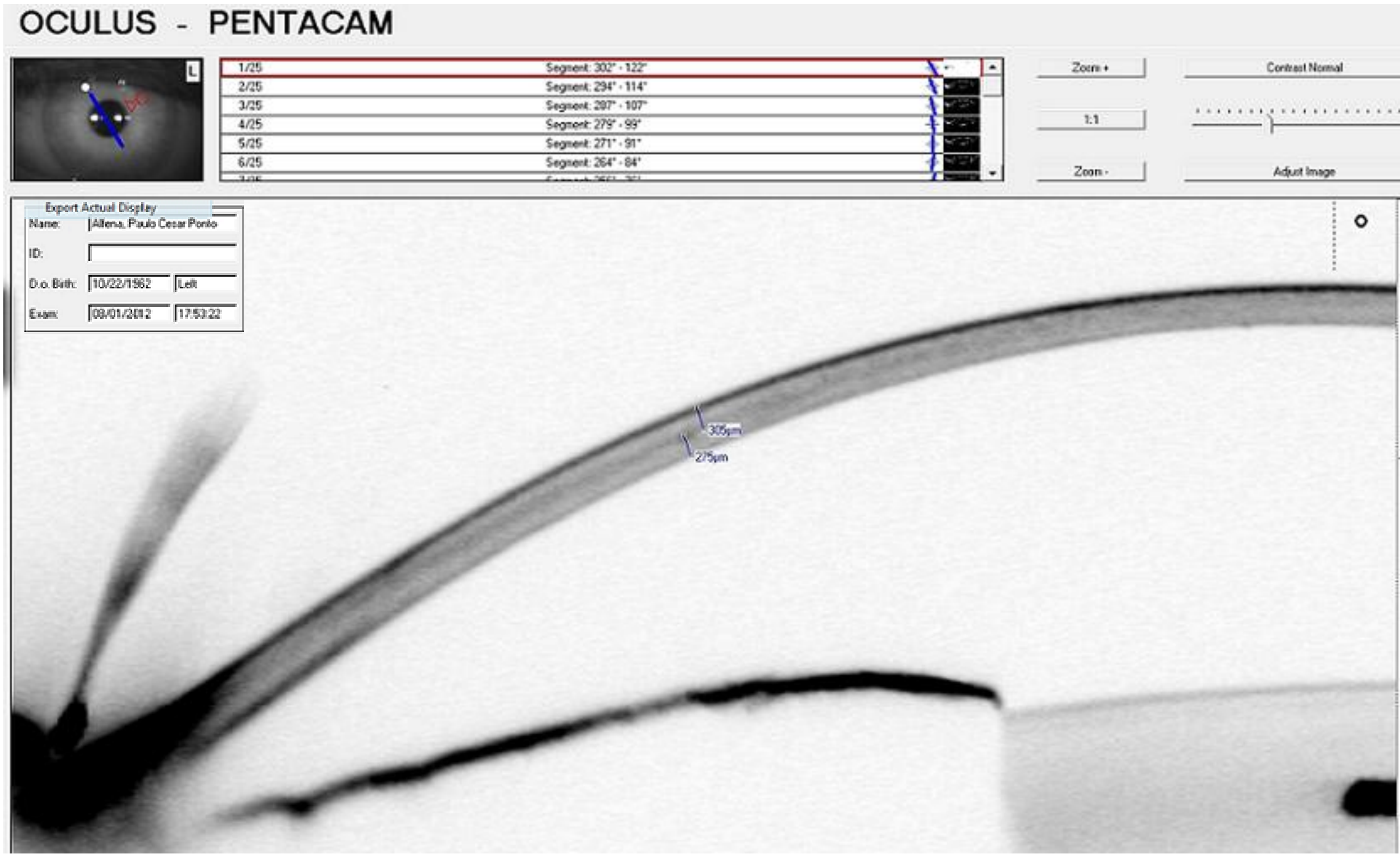

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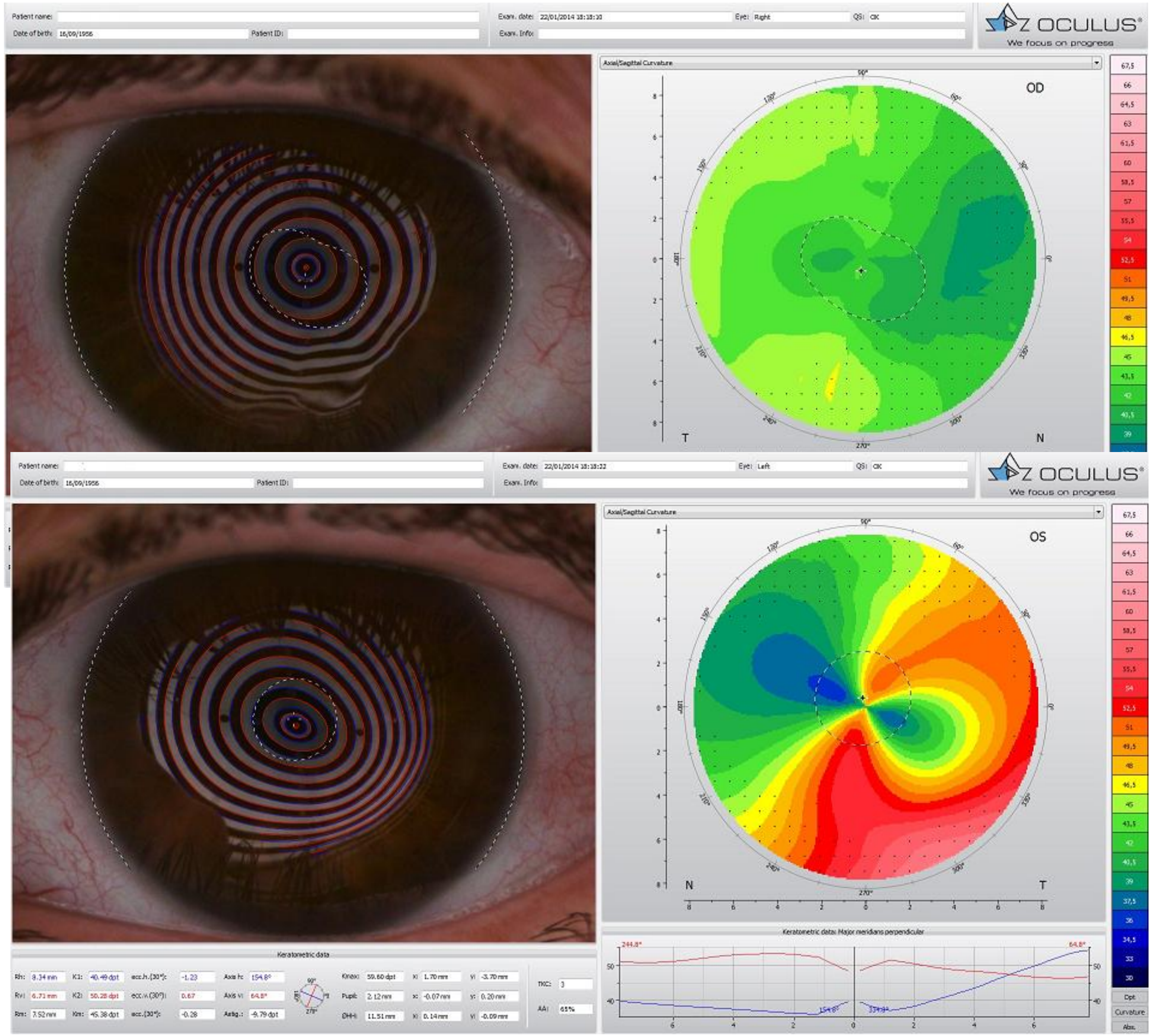
Results

CASE 2- OD stable, ectasia OS



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Results

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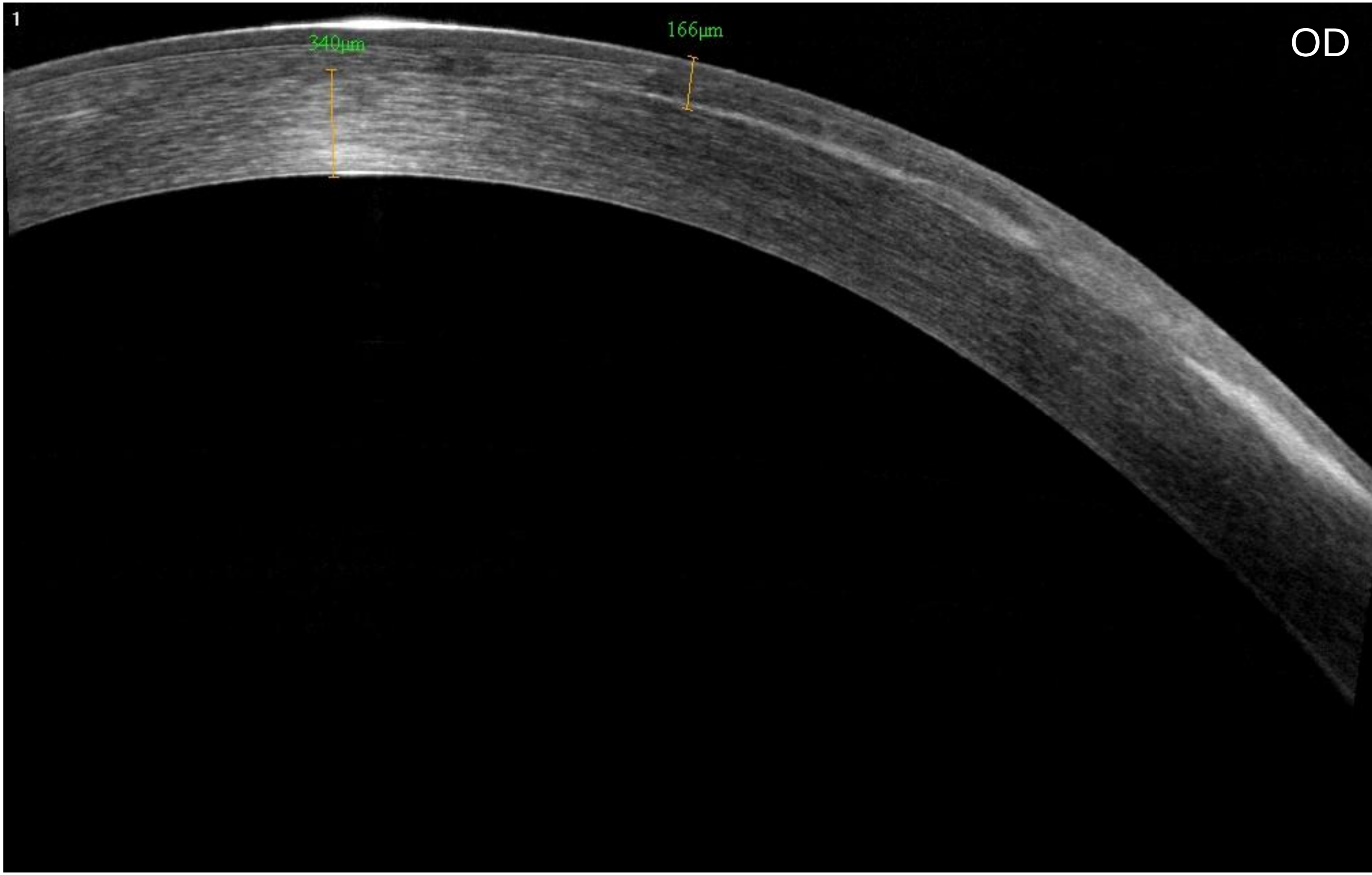
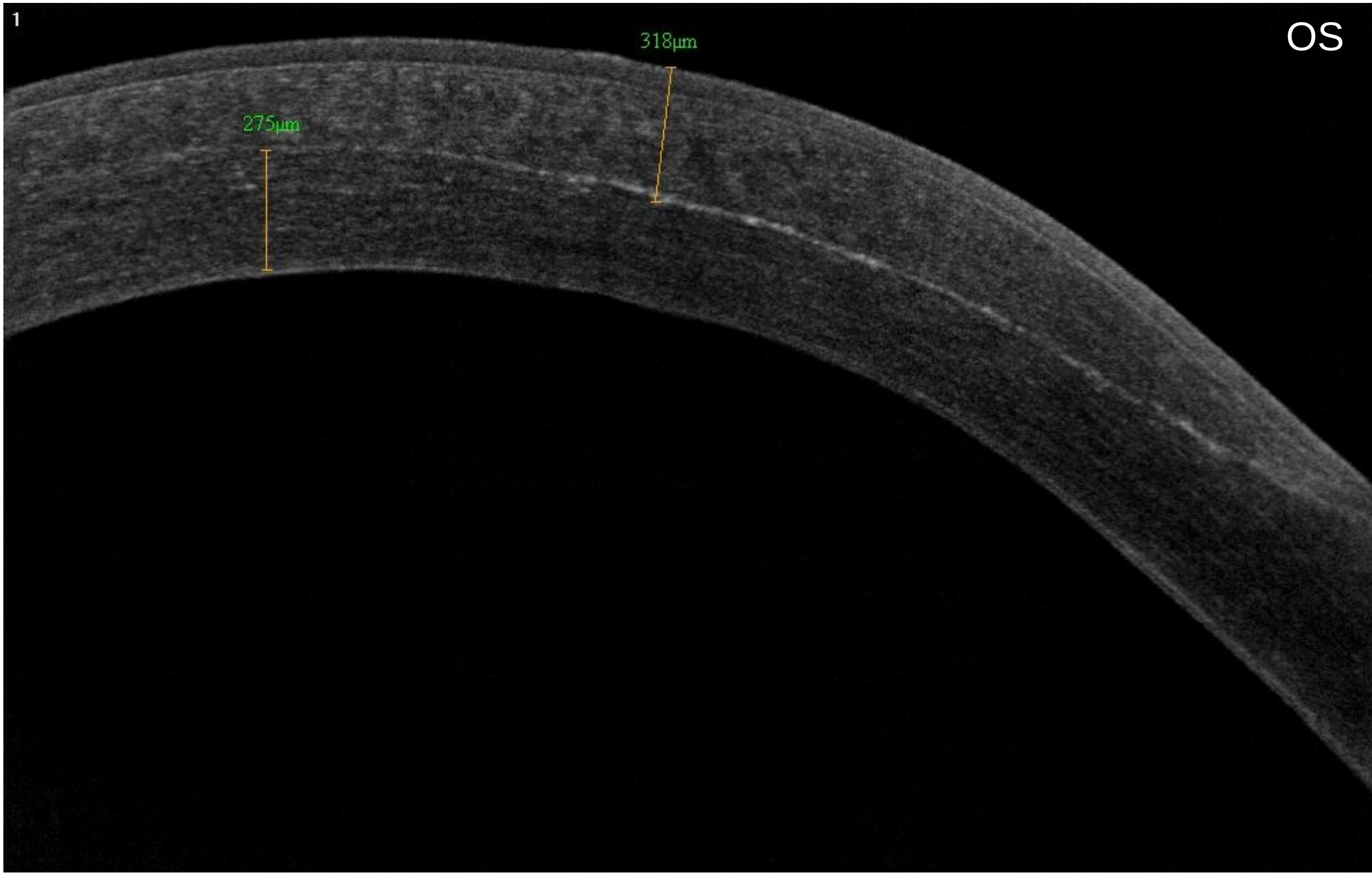


Results

CASE 2- OD stable, ectasia OS



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Conclusion

- Although uncommon, iatrogenic post-LASIK ectasia frightens every refractive surgeon.

- We believe that there are basically 2 mechanisms involved in the pathophysiology of ectasia:

Preoperative abnormally weak innate biomechanical properties of the patient's cornea	The amount of biomechanical weakening caused by the procedure

- Thus, any cornea may undergo biomechanical failure and develop ectasia; either on account of a risky cornea or of a risky procedure.

- Lamellar cut plays a major role in the biomechanical weakening impact of LASIK.

- Biomechanical failure may occur due to thick flaps in eyes with no identifiable preoperative abnormalities or with low risk factors.