

Case report

## Airbag induced corneal ectasia

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### Abstract

**Purpose:** To report a case of airbag induced corneal ectasia.

**Methods:** Case report.

**Results:** A patient 3 years post-LASIK developed bilateral corneal ectasia worse in the right eye following airbag deployment in a road traffic accident. At last follow up, best corrected vision was 20/40 with  $-4.00/-4.00 \times 25$  in the right eye and 20/25 with  $-1.25/-0.50 \times 135$  in the left eye.

**Conclusions:** This is a rare presentation of trauma induced ectasia in a patient post-LASIK. It is possible that reduction in biomechanical integrity of the cornea from prior refractive surgery contributed to this presentation.

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**Keywords:** Airbag; Corneal ectasia; LASIK

### 1. Introduction

Airbag deployment has been reported to cause a range of ocular injuries with variable effects on vision [1–3]. We present a case of airbag induced corneal ectasia in a patient who had previous LASIK. To the best of our knowledge, this is the first reported case in the literature.

### 2. Case report

A 29-year-old male presented with bilateral reduced vision 3 days following a road traffic accident. He was the driver of the vehicle and was not wearing a seat belt. The collision occurred at a speed of approximately 40 km/h with deployment of the frontal airbag.

He had bilateral LASIK performed elsewhere 3 years ago. Prior to LASIK, best spectacle corrected vision (BSCVA) was 20/30 with  $-7.25/-1.50 \times 30$  in the right eye and 20/25 with  $-6.75/-1.25 \times 180$  in the left eye. Pre-operative ultrasonic corneal pachymetry was 555

and 550  $\mu\text{m}$  in the right and left eyes, respectively. There was no record of the operative details and no reported post-operative problems. Apart from mild right amblyopia, there was no other ocular or medical history of note.

On examination, there was bilateral eyelid bruising and swelling but no other facial injury of note. The patient was able to open the eyelids spontaneously. Uncorrected visual acuity (UCVA) in the right eye was 20/200 and BSCVA was 20/50 with  $-6.00/-3.00 \times 40$ . In the left eye, UCVA was 20/70 and BSCVA was 20/50 with  $-1.50/-0.75 \times 120$ .

Anterior segment examination was unremarkable with intact flaps. Dilated retinal examination was unremarkable in the right eye but revealed a small macula haemorrhage in the left eye.

Orbscan IIz topography (Bauch & Lomb, Rochester, New York, USA) revealed bilateral inferior steepening which was marked in the right eye (Fig. 1). Ultrasonic central corneal pachymetry was 377 and 392  $\mu\text{m}$  in the right and left eyes, respectively.

Two weeks later, the macular haemorrhage had resolved and UCVA was 20/70 in the right and 20/32 in the left. Best spectacle corrected visual acuity was 20/50 with

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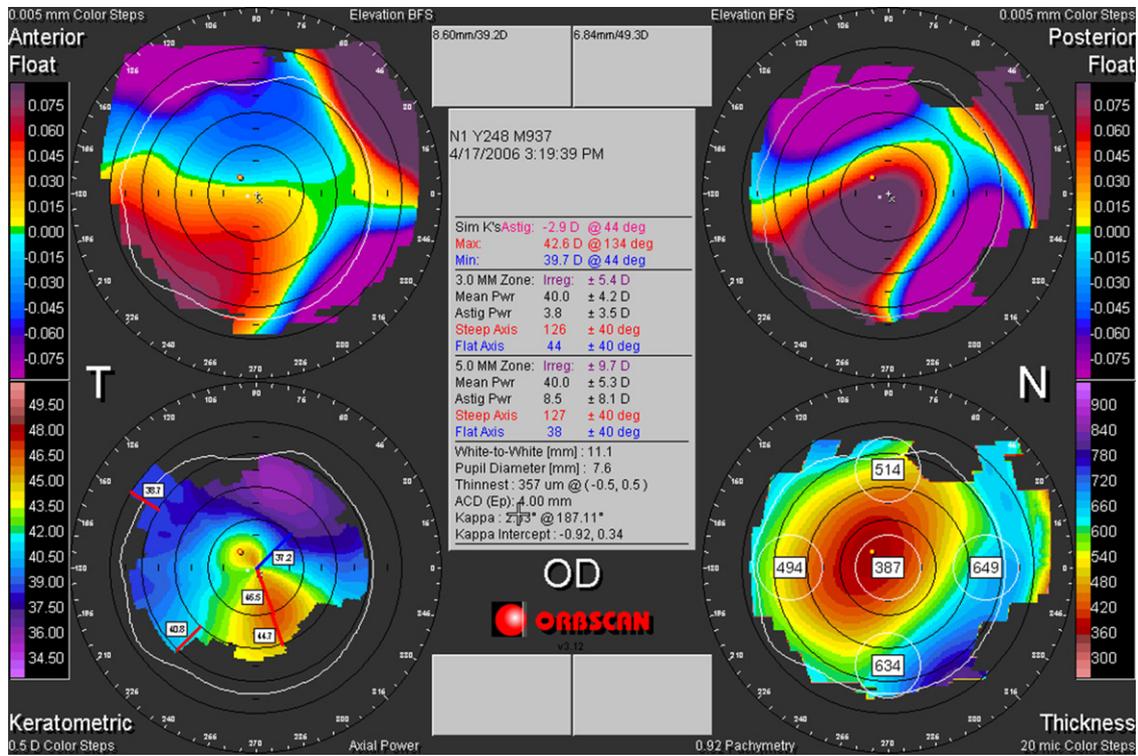


Fig. 1. Corneal topography of the right eye showing marked inferior steepening.

-6.50/-2.75 × 40 in the right eye and 20/25 with -1.50/-0.75 × 120 in the left.

Five months later, UCVA had reduced to count fingers in the right eye and BSCVA was 20/40 with -4.00/

-4.00 × 25. Uncorrected visual acuity in the left eye was 20/40 and BSCVA was 20/25 with -1.25/-0.50 × 135.

Repeat topography showed worsening inferior steepening in the right eye (Fig. 2) but the left eye remained stable.

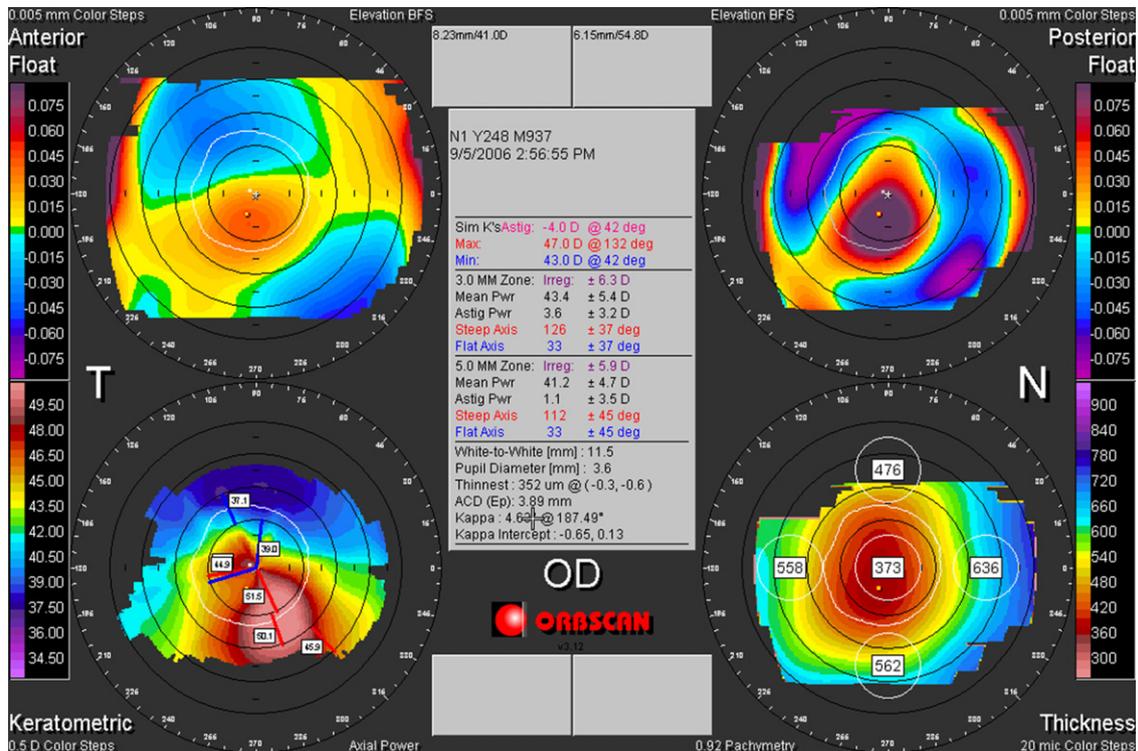


Fig. 2. Corneal topography of the right eye showing increase in inferior steepening 5-months post-trauma.

The patient was not keen on any surgical intervention and is managing with a rigid contact lens in the right eye and a soft contact lens in the left.

### 3. Discussion

Airbags have been reported to cause ocular injury, from mild corneal abrasions to open globes [1–3]. There have been reports of air bag induced flap dislocation or folds in patients who have had previous LASIK [4,5] but no reports of airbag induced corneal ectasia, either in post-refractive or virgin corneas.

Post-LASIK ectasia per se is a recognised and feared complication of refractive surgery and can occur in the absence of recognized pre-operative risk factors [6,7].

Our patient had a large ablation in both eyes. Using the pre-operative corneal pachymetry and assuming a flap thickness of 160  $\mu\text{m}$ , the calculated residual stromal bed would be 270  $\mu\text{m}$  in the right and 281  $\mu\text{m}$  in the left eye. Both residual stromal beds were therefore close to, but not below the widely accepted 250  $\mu\text{m}$  limit. However, ectasia has been reported in cases where this limit has been respected indicating that there are other factors involved and that we do not fully understand the underlying pathophysiology [5,6]. Ultrasonic central corneal thickness post-trauma was 377 and 392  $\mu\text{m}$  in the right and left eyes, respectively. Assuming a flap thickness of 160  $\mu\text{m}$ , the residual stromal bed would be 217  $\mu\text{m}$  in the right and 232  $\mu\text{m}$  in the left eye. This is significantly lower than the 250  $\mu\text{m}$  limit especially in the right eye. This may explain why the symptoms were worse in the right eye compared to the left and may also indicate that a sub-clinical ectasia process was already occurring prior to the airbag injury.

Devices are being developed to measure biomechanical properties of the cornea and there have been reports demonstrating decreased biomechanical integrity post-LASIK [8–10]. Uchio et al. [11] studied airbag injury on post-PRK eyes compared to normal eyes using a simulation model of a human eye. The results suggested that severe ocular trauma was more likely to occur in post-PRK eyes compared to normal eyes at high impact velocities. It is

possible that because of LASIK induced compromise of corneal structural integrity, the airbag trauma was enough to induce or expose ectasia in our patient.

It is hoped that individualised pre- and post-operative corneal biomechanical assessment in the future will increase our understanding of post-refractive ectasia in any setting, trauma or otherwise [12].

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