Corneal Topographic Changes in a Case of Limbal Conjunctival Carcinoma

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Purpose: To describe topographic changes in a case of limbal conjunctival carcinoma.

Methods: Corneal topography was performed before and 3 months after excision.

Results: Preoperative topography revealed a localized flattening (37.1 diopters [D]) adjacent to the tumor and extending to the corneal apex, causing a 3-diopter asymmetric with-the-rule astigmatism. Preoperative corneal curvature was abnormally flat in all hemimeridians (average 40.8 D). During surgical excision, no corneal infiltration was found. Three months later, the astigmatism was 0.3 D, and corneal curvature had increased to normal values in all hemimeridians (45.5 D in the tumor area; average of all hemimeridians 45.5 D). Corneal steepening after tumor excision measured by topography almost doubled that observed in refraction.

Conclusion: The similarity with the patterns induced by pterygia, the lack of corneal infiltration, and the complete reversal of astigmatism after excision support the theory that tear pooling at the tumor apex is responsible for secondary astigmatism and diffuse corneal flattening. However, the irregularity induced by the tumor may affect the precision of topographic measurements.

Key Words: conjunctival carcinoma, corneal topography, astigmatism

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The impact of limbal lesions on corneal topography is well known in the case of pterygia[1–7] and perilimbal dermoids[4] but has not been evaluated in the case of limbal tumors (MEDLINE search by http://www.pubmed.org. Accessed March 27, 2004).

We report a case of limbal conjunctival carcinoma in which induced astigmatism was evaluated by pre- and postoperative corneal topography.

PATIENTS AND METHODS

In July 2003, an 81-year-old man was referred to our center for redness and reduced vision in the left eye. On examination, the right eye had a best-corrected visual acuity (BCVA) of 20/20 with +1 D (diopter) sphere, and the left eye a BCVA of 20/25 with a refraction of +1.75 +3 × 80° D (both subjective and autorefractor data). In the right eye, a small nasal pterygium was observed. In the left eye, a papillary, nonkeratinized soft lesion measuring 3.4 × 4 mm covered the nasal limbus and extended by 3 mm over the nasal cornea. Submandibular and preauricular lymph nodes were normal.

The lesion was excised under topical anesthesia in August 2003. An easy cleavage was found on the cornea, where the Bowman layer appeared intact, whereas on the conjunctival side the tumor was removed with wide margins and leaving bare sclera. Cryotherapy was applied on the conjunctival margins as advocated.[8,9]

Histologic examination showed full-thickness atypia and loss of polarity, with initial invasion of the conjunctival substantia propria. A diagnosis of conjunctival squamous cell carcinoma was made.

Corneal topography (Keratograph® Oculus, Wetzlar, Germany) was performed before and 3 months after excision, when the conjunctiva and the corneal surface had healed.

RESULTS

Preoperative topography revealed a localized flattening (37.1 D) adjacent to the tumor and extending to the corneal apex on both axial and tangential maps (Fig. 1). The lesion caused an asymmetric with-the-rule astigmatism and a corresponding elevation on the height map. Preoperative corneal curvature was abnormally flat in all hemimeridians (average 40.8 D).

Two months after excision, the left eye had a BCVA of 20/20 with a +0.75 D sphere refraction. On corneal topography, the astigmatism was 0.3 D, and all keratometric readings had increased, including those in the 3 quadrants not occupied by the excised lesion (Fig. 2). The area previously covered by the tumor had become on topography 8.4 diopters steeper (45.5 D), and the whole central cornea (average of 4 hemimeridians) had become 4.7 D steeper (postoperative average of all hemimeridians 45.5 D); these data did not correlate with the 2.5-D spherical equivalent increase observed by refraction.

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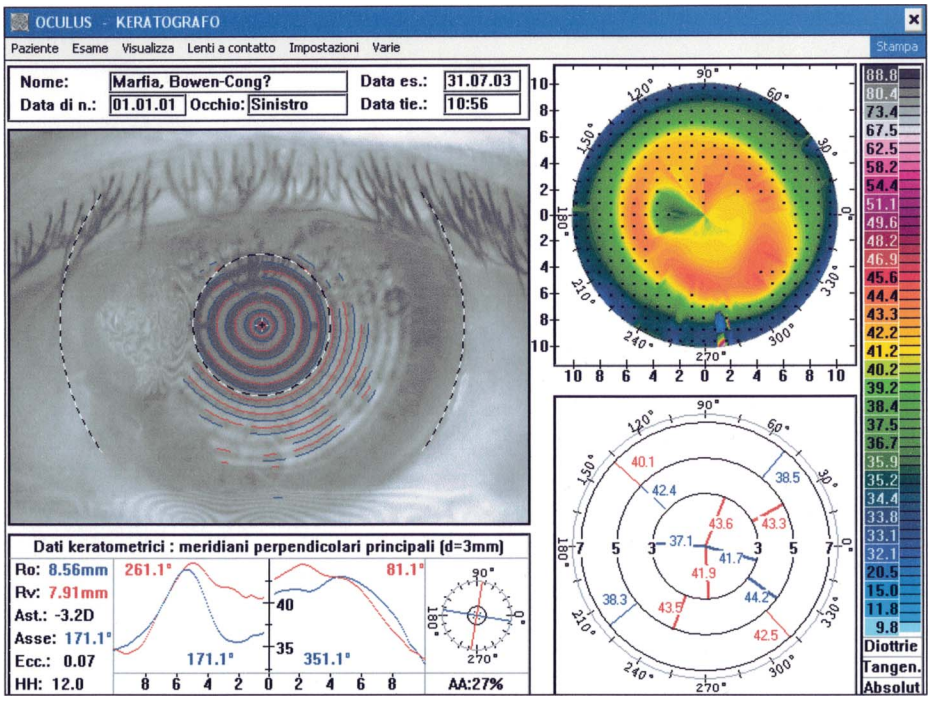

FIGURE 1. Preoperative corneal topography in a conjunctival limbal carcinoma of the left eye on the nasal side. The tangential map shows a wedge-shaped flattened area adjacent to the tumor, causing an irregular with-the-rule astigmatism. All keratometric readings are abnormally low.

DISCUSSION

The conjunctival carcinoma in this report caused an asymmetric with-the-rule astigmatism that was almost completely reversed by surgical excision. Moreover, preoperative overall corneal curvature was abnormally flat.

Corneal steepening after tumor excision measured by topography almost doubled that observed in subjective and objective refraction. The large irregularity induced by the tumor might have affected the precision of topographic measurements.

In a previous article, a recurrent conjunctival limbal carcinoma was treated by excision and phototherapeutic keratectomy, resulting in a normal prolate cornea.[10] However, preoperative corneal topography was not possible because of excessive distortion.

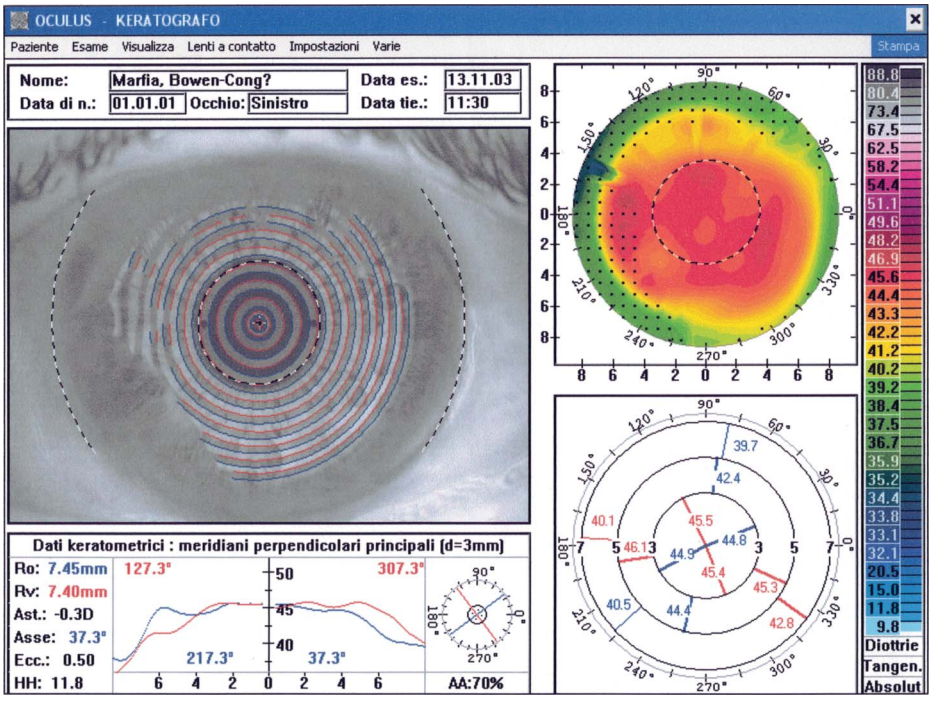

FIGURE 2. Postoperative corneal topography in a conjunctival limbal carcinoma of the left eye. On the tangential map, the astigmatism has regressed to 0.3 diopter, and keratometric readings returned to average values.

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Our data correlate well with the topographic changes induced by pterygium and limbal dermoids,[1–7] consisting of an overall corneal flattening and a similar with-the-rule astigmatism, which entity is proportional to the extension of the lesion. In pterygia, the topographic changes are mainly caused by accumulation of lacrimal fluid at the pterygium apex rather than by fibrovascular adhesion[7] and are reversed by excision or even by simple drying, although wider lesions may produce permanent changes.[3] In our case, no corneal infiltration was found, and therefore, a complete astigmatism reversal was possible. The mechanism of tear fluid accumulation is also responsible for an artifactual overall corneal flattening, observed both in pterygia and in our case of limbal carcinoma.

The observation that pterygia extending more than 2.5 mm onto the cornea induce irregular astigmatism and decreased BCVA[11] correlates well with our case, in which a 3-mm-height induced irregular astigmatism and a 20/25 BCVA.

The present is the first report of topographic changes induced by a limbal carcinoma. The similarity with the patterns induced by pterygia, the lack of corneal infiltration, and the complete reversal after excision support the theory that tear fluid pooling is responsible for secondary astigmatism and diffuse corneal flattening.

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