

Sequential Management of Keratoconus Treatment

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ABSTRACT

The authors describe three cases of patients with bilateral keratoconus. The clinical evolution, tomographic features and the different therapeutic options selected in accordance with the evolution of the disease over the course of 10 years of follow-up are discussed. A periodic follow-up of patients with keratoconus allows planning the most appropriate therapy according to the evolutionary stage of the disease.

Keywords: Keratoconus, Surgical treatment, Follow-up.

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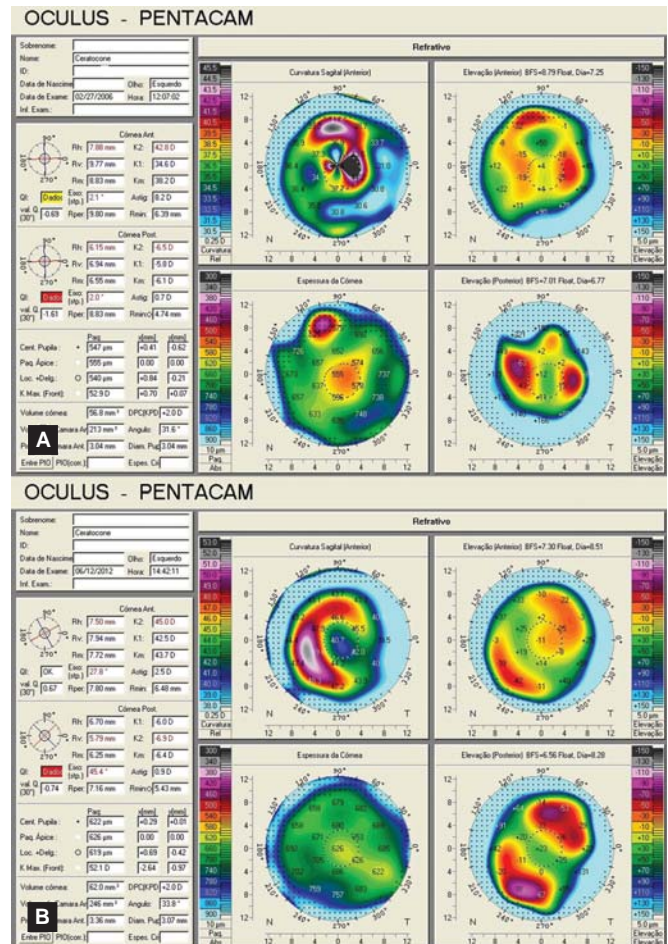
INTRODUCTION

Keratoconus (KC) is a noninflammatory corneal ectasia, usually bilateral and asymmetric, with progressive corneal thinning and steepening that induces an irregular astigmatism and decreased visual acuity (VA). The symptoms are highly variable and depend on the stage of progression. At the beginning of the disease, there may be no symptoms, but later there is a significant distortion of vision, accompanied by profound visual loss.^{1,2} KC treatment depends on its stage. In the initial stage, glasses correct astigmatism satisfactorily, but as the disease progresses vision is best corrected by contact lenses which promote keratic flattening.³ When contact lenses are no longer effective or poorly tolerated, there are surgical alternatives such as intracorneal ring segments, corneal collagen crosslinking (CXL) or corneal transplant.⁴⁻⁹

CASE REPORTS

Case 1

Twenty-five years old male was first observed in 2002 due to blurred vision. Best corrected visual acuity (BCVA) was 20/20 OD and lower than 20/400 OS. Ophthalmologic and tomographic examination diagnosed a grade I KC in OD and grade IV KC in OS, according to the Amsler classification. At this time a penetrating keratoplasty was performed in OS. Seven years later OS BCVA was 20/200 (+5.00 × 60°). Intracorneal ring segments implantation was performed, resulting in BCVA of 20/30 (-0.50 -300 × 120°), which remained stable until the last visit (Figs 1 and 2). In the right eye, there was a clinical and tomographic KC



Figs 1A and B: OS—Oculus Pentacam® keratometric, elevation and pachymetric maps. A—2006; B—2012

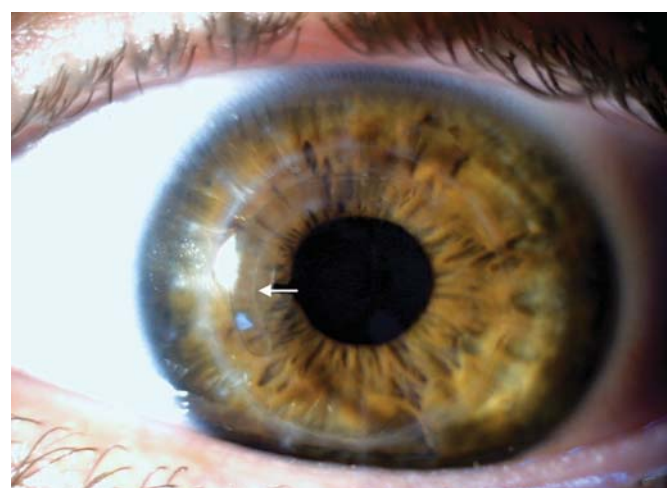
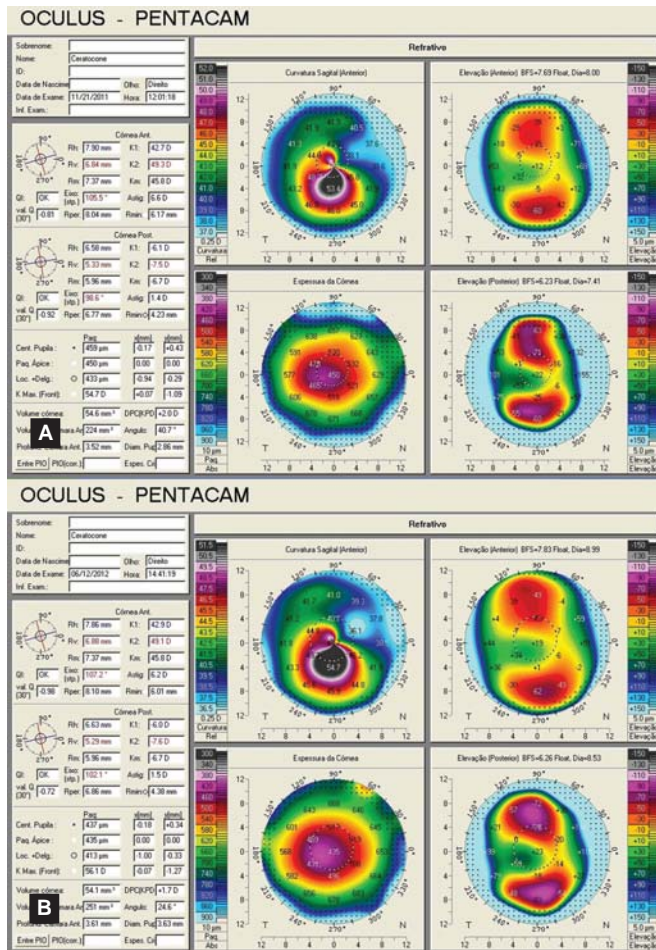


Fig. 2: Corneal biomicroscopy of OS, after corneal transplant and intracorneal ring segment implantation (arrow)

progression (Fig. 3A). CXL was performed and resulted in BCVA of 20/30 with stabilization of disease progression. BCVA remained stable 6 months after the treatment (Fig. 3B).



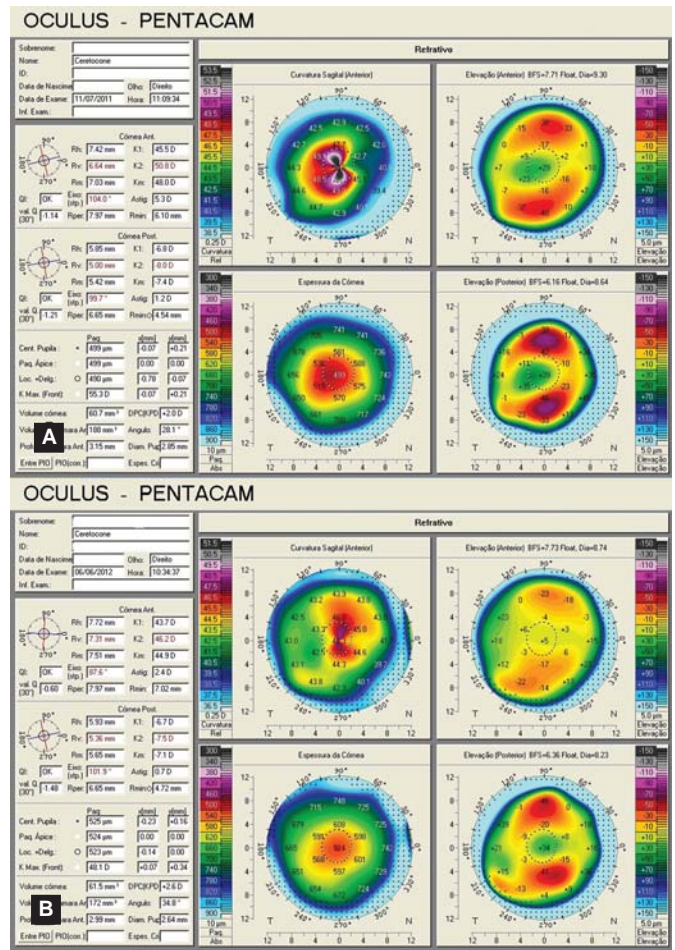
Figs 3A and B: OD—Oculus Pentacam® keratometric, elevation and pachymetric maps. A—before CXL; B—6 months after CXL

Case 2

Thirty-five years old female was first observed in 2003 with complaints of decreased vision. BCVA was 20/25 (-0.75) OD. OS had intolerance to contact lenses and VA lower than 20/400. Ophthalmologic and tomographic examination diagnosed a grade I KC in OD and a grade IV KC in OS, according to the Amsler classification. In 2005 the patient underwent a penetrating keratoplasty in OS. Six years later, the patient had clinical and tomographic criteria of KC progression in OD; VA was 20/50 and could achieve BCVA of 20/30 (-1.75), but did not tolerate the contact lens needed. A CXL was performed in OD, which achieved clinical stabilization with tomographic improvement of the disease (Figs 4A and B). In June 2012, nearly 1 year after the treatment, BCVA OD was 20/30 (-1.75) and BCVA OS 20/25 (-1.00 -2.00 × 60°).

Case 3

Twenty-two years old female was first observed in 2002 for reduced VA in OD. BCVA was lower than 20/400 in OD and of 20/20 in OS. The eye examination and



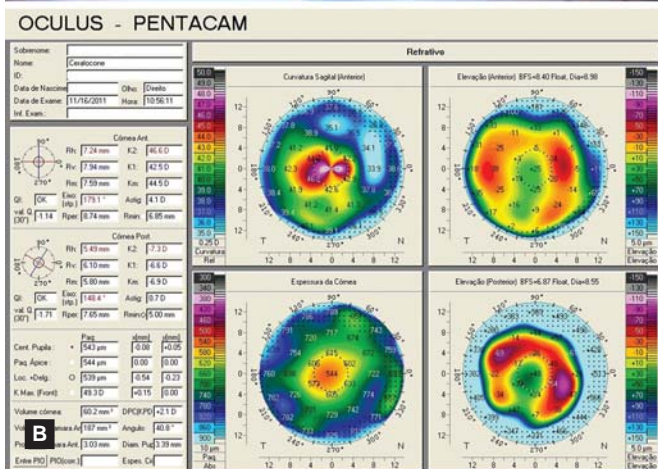
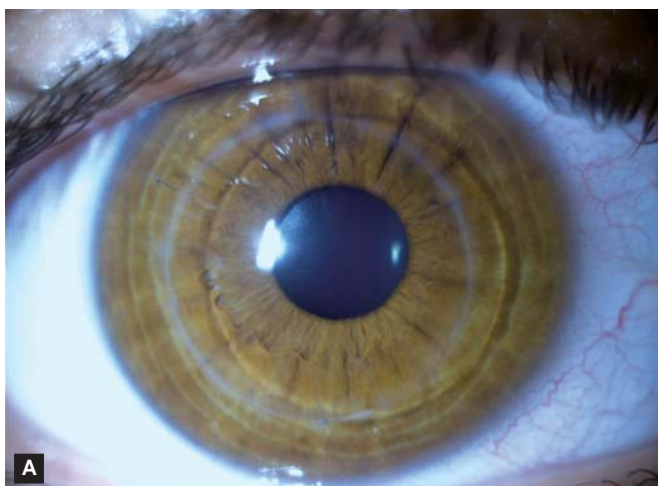
Figs 4A and B: OD—Oculus Pentacam® keratometric, elevation and pachymetric maps. A—2011; B—2012

tomographic study led to the diagnosis of grade IV KC in OD and grade I KC in OS, according to the Amsler classification. In 2003, OD underwent a penetrating keratoplasty. Six months later, the patient attained a BCVA of 20/20 (-3.75 × 90°) which remained stable until the last visit in 2012 (Figs 5A and B). In 2006 the patient complained of reduced VA in OS, with intolerance to contact lenses (Fig. 6A). Intracorneal ring segments were placed in OS, with clinical, tomographic, and VA of 20/20 (-1.25) stable until now (Fig. 6B).

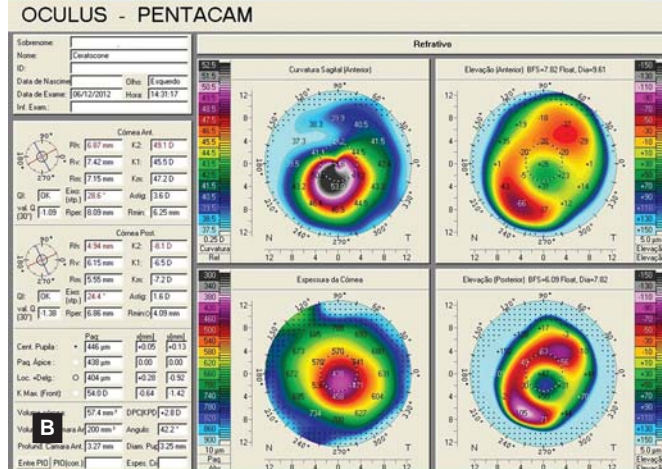
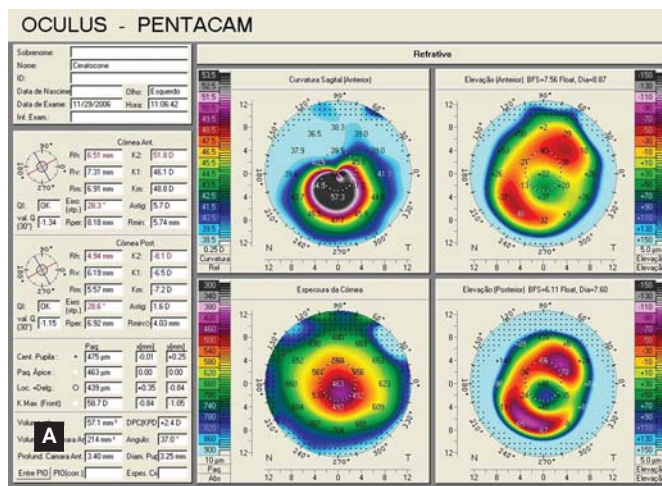
DISCUSSION

KC is the most common corneal dystrophy. It is a process of progressive corneal thinning that causes irregular astigmatism. Most cases are bilateral, but usually one eye is more severely affected.^{1,2}

Patients with KC usually present in their twenties, with complaints of progressive blurred and distorted vision, secondary to high myopia and astigmatism. Retinoscopy usually shows a ‘scissoring’ of the red reflex. Rizzuti sign, Fleischer ring or Vogt lines can also be found. In advanced



Figs 5A and B: OD—Corneal biomicroscopy (A) and oculus Pentacam® keratometric, elevation and pachymetric maps (B) after corneal transplant



Figs 6A and B: OS—Oculus Pentacam® keratometric, elevation and pachymetric maps. A—before surgery; B—5 years after intracorneal ring segments implantation

KC, corneal protrusion can cause angulation of the lower eyelid (Munson sign).¹⁰

For evaluation purposes, corneal tomography is a valuable tool to diagnose subclinical KC as well as to track the disease progression.

Reduced VA due to KC can initially be treated with glasses. However, contact lenses often provide better vision, by promoting flattening of the cornea and obliteration of the irregular astigmatism. There are several types of contact lenses and the goal is always to provide the best possible VA with maximum comfort.³

Patients intolerant to contact lenses have several surgical alternatives and the choice should be made on an individual basis, in order to perform the most appropriate therapy for each case. When the central cornea is clear they can benefit with intracorneal ring segments placement to correct the irregular astigmatism.^{4,5}

CXL is a promising approach for treating KC, which is based on the combined use of the photosensitizer drug riboflavin and 370 nm UVA light. CXL is the only available treatment directed to the KC pathophysiology, to

‘normalize’ the biomechanical and structural stromal instability.⁶⁻⁸

When corneal scarring involving the visual axis or a progressive thinning of the cornea is present, penetrating or lamellar keratoplasty may be the preferred choice.¹⁰

All three patients presented initially a KC in different evolutive stages and with variable VA. During the follow-up there was a progression of the disease, with reduction of VA according to the level of corneal involvements and eventually intolerance to contact lenses. Consequently, the different treatments available were performed in a temporal sequence appropriate to the stage of the disease and patient complaints.

CONCLUSION

Periodic follow-up of patients with KC is important, since it is a progressive ectasia which requires regular and thorough assessment of corneal health. Regular monitoring allows the most appropriate therapy directed to the stage of the disease as well as the characteristics of each case.

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