



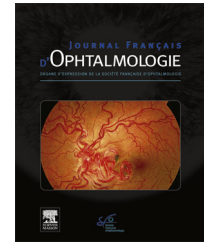
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ORIGINAL ARTICLE

Results at 7 years after cross-linking procedure in keratoconic patients[☆]

Les résultats à 7 ans après la procédure de réticulation chez les patients atteints de kératocône

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KEYWORDS

Corneal cross-linking;
Decrease;
Keratometry;
Spherical equivalent;
Cylinder

Summary

Purpose. – Long-term evaluation of functional results based on visual acuity, keratometry, spherical equivalent and refractive cylinder in patients with progressive keratoconus treated with corneal collagen cross-linking (CXL).

Materials and methods. – We studied a group of 114 eyes of 91 consecutive patients treated from 2006 to 2009 by ‘‘Epi-off type’’ CXL. In the preoperative period, all patients had a complete ophthalmologic examination. The inclusion criteria were: patients aged 15 to 54 years, with various stages of keratoconus, with a corneal thickness of at least 400 μm at the thinnest point. The exclusion criteria were: patients with a corneal thickness of less than 400 μm at the thinnest point, with Vogt’s striae or herpetic keratitis, dry eye syndrome or aphakia. The patients were then followed at 1, 3 and 6 months, and then every year between 1 and 7 years postoperatively. **Results.** – There was a decrease in the minimum K and maximum K , respectively 1.6 and 2.0, at 7 years postop. ($P < 0.05$). The cylinder decreased from -4.45 D to -3.50 D at 7 years postop ($P < 0.05$). The spherical equivalent decreased by 1.66 D at 7 years ($P < 0.05$). Uncorrected visual acuity increased from an average of 0.78 to 0.679 log MAR ($P < 0.05$) at 7 years postop. The best-corrected visual acuity increased from a mean of 0.64 to 0.52 log Mar ($P < 0.05$) at 7 years postop.

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MOTS CLÉS

Réticulation
cornéenne ;
Diminution ;
Kératométrie ;
Équivalent
sphérique ;
Cylindre

Conclusions. – The results of CXL were stable at 7 years in all patients, consisting of reduction of keratometric values and refraction, and improvement in visual acuity.

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Résumé

Objectif. – Évaluer sur le long terme les résultats fonctionnels, basés sur l'acuité visuelle, la kératométrie, l'équivalent sphérique et le cylindrique réfractif, chez les patients porteurs d'un kératocône évolutif traités par la photo-réticulation du collagène cornéen (CXL).

Matériel et méthode. – Nous avons étudié un groupe de 114 yeux de 91 patients consécutifs traités de 2006 à 2009 par CXL de type « Epi-off ». En préopératoire, tous les patients avaient bénéficié d'un examen ophtalmologique complet. Les critères d'inclusion étaient : patients âgés de 15 à 54 ans, présentant différents stades de kératocône et dont l'épaisseur de la cornée était d'au moins 400 μm au point le plus fin. Les critères d'exclusion étaient les suivants : les patients ayant une épaisseur de la cornée de moins de 400 μm au point le plus fin, présentant des stries de Vogt ou une kératite herpétique, un syndrome de l'œil sec ou une aphakie. Les patients ont ensuite été suivis à 1, 3 et 6 mois, puis tous les ans entre 1 et 7 ans postopératoire.

Resultats. – Il fut observé une baisse du K minimum et du K maximal, respectivement de 1.6 et de 2.0, à 7 ans postopératoire ($p < 0,05$). Le cylindre avait diminué de -4.45 D à -3.50 D à 7 ans postopératoire ($p < 0,05$). L'équivalent sphérique était abaissé de 1,66 D à 7 ans ($p < 0,05$). L'acuité visuelle non corrigée avait augmenté, d'une moyenne de 0,78 à 0,679 log MAR ($p < 0,05$) à 7 ans postopératoire. La meilleure acuité visuelle corrigée avait augmenté d'une moyenne de 0,64 à 0,52 log Mar ($p < 0,05$) à 7 ans postopératoire.

Conclusions. – Les résultats du CXL furent stables à 7 ans chez tous les patients, consistant en la réduction des valeurs kératométriques, de la réfraction et en l'amélioration de l'acuité visuelle.

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Introduction

Keratoconus (KCN) is a progressive degenerative disease of the cornea, usually bilateral, but most of times asymmetric [1]. In most of the cases, it affects young patients, and an early age of onset is a negative prognostic factor for corneal transplantation [2]. There are several treatment options available, depending on the stage of KCN.

A major breakthrough in blocking the progression of the ectasia is the corneal collagen cross-linking procedure with riboflavin and ultraviolet A (UVA) light [3,4].

Corneal collagen cross-linking (CXL) means photo polymerization of the stromal fibrillar tissue, in order to increase their stiffness and resistance to the corneal ectasia, through the combined action of the photosensitizing substance (riboflavin-B2) with the irradiation of the ultraviolet A light (UVA), performed with an illuminator in a solid state of UVA kind.

The final effect of CXL technique is the strengthening of the cornea and the goal of CXL is to slow down or arrest the progression of keratoconus avoiding, or at least delaying the necessity of keratoplasty.

In cases of KCN where the patient can correct visual acuity and the corneal thickness allows it, the procedure can be combined with intra-stromal ring implantation in

order to flatten the corneal apex, reduce sphericity and also strengthen the cornea.

We chose to apply the transepithelial "epi-off" procedure because the riboflavin penetrates the cornea at about 300 microns when the "epi-on" technique penetrates only at about 150 microns.

Paper purpose

To evaluate functional results based on K measurements, spherical and cylinder equivalent at patients with keratoconus treated with cross-linking, at 1, 3 and 6 months and at 1, 2, 3, 4, 5, 6 and 7 years after the procedure.

Material and method

We conducted a retrospective study on a group of 114 eyes from 91 patients, diagnosed with different stages of keratoconus and treated from 2006 to 2009 with "epi-off" cross-linking technique at OPTILENS (now OCULENS) Ophthalmology Clinic in Cluj-Napoca, Romania. All the cases were followed-up at 1,3 and 6 months and at 1,2,3,4,5,6 and 7 years.

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