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**MODERN METHODS OF MORPHOLOGICAL
DIAGNOSIS AND SURGICAL TREATMENT OF THE
KERATOCONUS**

PH. D. THESIS

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SUMMARY

The keratoconus is a progressive ected dystrophy of the cornea, which compromises optimal vision both by modifying the curvature radius - at the same time with the progressive deformation of the cornea, and by diminishing its transparency by central corneal opacities that appear in the advanced stages of the disease. The treatment of the keratoconus presupposes the development of new techniques, non-invasive or minimally invasive techniques, in order to avoid or postpone the perforating keratoplasty (corneal transplant), which represents the radical treatment of the disease.

This paper is structured into two parts: the first part is theoretical; the second one comprises the practical aspects and personal research. The theoretical part contains data from medical literature regarding the keratoconus and modern methods of diagnosis and treatment. The personal research part contains two clinical studies.

The first study is an interventional prospective clinical study of the cross-linking of the corneal collagen with riboflavin and UVA radiations (CCL) on patients with progressive keratoconus. *The main objective* of the study is the analysis of this modern method of treatment from the point of view of postoperative results, with the purpose of assessing the capacity of the surgical operation to stop the evolution of progressive keratoconus. Apart from this, we have also intended the observation of general characteristics of the patients in the study group, the effects of the CCL on certain pre-operatively established parameters, the connections between these parameters, the observation of results on stages of evolution of the keratoconus and on age groups, as well as possible side-effects and complications of the surgical operation. *Material and method.* There were 97 patients (120 eyes) included in the study, all suffering from progressive keratoconus, who were treated with CCL at the Optilens Clinic in Cluj Napoca. The cases were successively included in the study, following the criteria of inclusion and exclusion, with a two-year period of post-operative observation. *Methods of study.* The patients included in the study pre-operatively underwent a complete eye examination; the parameters that were examined were the following: visual acuity without correction (VAW/C), visual acuity with correction (VAWC), the biomicroscopical aspect (BM), spherical refraction (Sph), cylindrical refraction (Cyl), spherical equivalent (SE), intraocular pressure (IOP), density of endothelial cells (DEC), pachymetry, maximal corneal diopters (Kmax), minimal (Kmin) and medium (Kmed).

The pre-operative examinations were repeated after 1, 3, 6, 12 and 24 months post-operatively and the data were collected transversely. We have included the patients in four groups according to the Amsler-Krumeich scale, and in seven age groups in order to analyse the effects of CCL treatment on one group at a time. *The results* have shown that after the CCL technique the parameters of the refraction and the topographic keratometry improve significantly, 12 months post-operatively and the effect is present 24 months post-operatively. Visual acuity (both with and without correction) has slightly improved (on average with 1 Snellen line) for most of the patients (about 2/3 of the patients). There were no intra- or post-operative complications. In conclusion it could be said that this minimally invasive technique can stop the evolution of the keratoconus for a period of observation of two years, at all stages of evolution and at all ages, slightly improving vision for most of the patients and with no complications, if the safety parameters of the method are followed.

Our second study is a retrospective longitudinal study, with *the purpose* of assessing the functional, refractive and kerometric results of the treatment, using the combined method: intrastromal corneal rings and the cross-linking of corneal collagen (ICRS+CCL) and their comparison with the results obtained following the insertion of intrastromal corneal rings (ICRS) for patients with keratoconus. *Material and method.* There were 80 cases included in the study (two groups of 40 cases), patients with keratoconus treated at the Optilens Clinic in Cluj-Napoca: 40 cases treated with the combined method (group A) and 40 cases treated only with ICRS (group B). *Data collection* was performed in a passive, retrospective way, using the medical records of the patients treated at the Optilens Clinic. The values of the targeted parameters were recorded (functional parameters, refraction and keratometry parameters) before treatment and at the end of the observation period (minimum 12 months). *Results.* By combining the implant of intracorneal rings (CCL) all parameters show improved postoperative values, superior to those obtained following the implant of rings without CCL, the difference being significant only with regard to the visual acuity with correction. *Conclusions.* The combination of the two methods of treatment is, in our opinion, both synergical – a significant improvement of visual acuity with correction, and complementary – the beneficial effect that the rings have on vision, on refraction and the values of keratometry which are stabilised and slightly emphasised by the combination with CCL.

Key words: keratoconus, corneal topography, surgical treatment, cross-linking, corneal collagen, riboflavin, UVA radiations, intrastromal corneal rings, combined treatment.