THERAPEUTIC CONTACT LENSES IN OCULAR SURFACE PATHOLOGY

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Keywords: contact therapeutic lenses, silicon hidrogel material

Abstract: Therapeutic contact lenses are special contact lenses worn for the treatment of corneal or anterior eye diseases and injuries. They are primarily used for pain relief and increase of comfort, assistance of wound healing, mechanical protection, maintenance of ocular surface hydration and as a vehicle for drug delivery. The use of plano or powered contact lenses may also preserve or enhance vision in injured eyes. The materials used for therapeutic contact lenses are hydrogels, silicone elastomers, collagen, and gas permeable polymers in the form of scleral lenses. Silicone hydrogel lenses, available since 1999 and approved for therapeutic use, became the first choice because of very high oxygen transmissibility, lower on-eye dehydration and good comfort and coverage of the eye surface.

Key words: therapeutic contact lenses, silicon-hidrogel materials

Cuvinte cheie: lentile de contact terapeutice, materiale silicon-hidrogel.


Key words: contact therapeutic lenses, silicon-hidrogel materials

The word „therapeutic” is coming from the greac therapeuein” = heal, treat.

Therapeutic contact lenses are special contact lenses used for the treatment of ocular surface diseases. The lenses are used in continuous wear modality, variable periods of time between days and months, years maybe, handling being performed by specialist only and are generally associated with topical medication.

Today practitioners may choose between more sophisticated materials (1) (with higher oxygen transmissibility –RGPs and silicon-hydrogels), improved lens designs and lens care and replacement options (2), things that lead to a greater success with therapeutic lenses in a wide range of anterior segment pathologies.

Contact lens types

Hidrogel lenses

Soft contact lenses have been preferred for therapeutic use because their soft and flexible nature and large variety of parameters that allow an simple and comfortable fit to any distorted ocular surface. As they have a permeable structure they maintain the concentration of topical associated drugs for longer periods of time with a less frequent instillation regime.(12)

There are a big number of hydrogels available, starting from the original Otto Wichterle’s formula - Polyhydroxyethylmethacrylat (p-HEMA) 38% water content- by adding different monomers: acid methacrylic (AM), N-vinyl pyrolidone (NVP), poly vinyl pyrolidone (PVP), poly vinyl alcohol (PVA) to improve oxygen permeability and biocompatibility.

According to the water content we have 3 groups in the European classification: Low water content 38-45%, Mid-water content 45-55% and High water content 67-80%.

Extra thin glyceryl methacrylate lenses (Crofilcon) are known to have a smaller rate of giant papillary conjunctivitis.(9)

Silicone elastomer lenses were used for their extremely high oxygen transmissibility and much less vascularisation, mostly in children afakia. The hydrophobic nature of the material induces heavy lipid deposits and they tend to stick to the ocular surface.

Silicone-Hidrogel materials

First models have been introduced in 1999 (Lotrafilcon A and Balafilcon A) and very soon they received FDA approval for therapeutic use for maximum 30 days of continuous wear. Advantages of this combination are: high permeability to oxygen , water and sodium, therefore a high oxygen supply to the cornea, as a result the hypoxic stress in overnight wear is dramatically reduced; flexibility; lower water content with a low dehydration during wear and a stable post lens tear film; good surface wettability achieved by surface treatment (by plasma coating or oxidation) and less deposits (some lipid, non-allergenic depositions).

There are still some disadvantages: limited parameters (relatively small diameter), concurrent medication should be
non-preserved, and risk of complications associated with extended wear (microbial keratitis, infiltrates).

**Rigid gas permeable lenses and scleral lenses and rings,** with high oxygen transmissibility, may be used for therapeutic purpose, in specific cases where we need prevention of simblepharon formation, maintenance of corneal hydration and on distorted corneas. The disadvantages are the initial discomfort and longer time for fitting.

**Collagen shields** may be also used as corneal bandage. They are made of bovine or porcine collagen, have a Dk/t equivalent of a 63% water soft lens, may be soaked in antibiotics, and they last for 12,24 or 72 hours, as they biodegrade on eye.

**Indications of Therapeutic Contact Lenses:**

**Medical diseases:**
- Conjunctival diseases:
  - pemphigus, Stevens Johnson syndrome
- Corneal diseases:
  - epithelial-superficial punctate keratitis, filamentary keratopathy, keratitis sicca, corneal abrasion, recurrent corneal erosion, corneo-conjunctival burns
  - stromal: profound corneal sterile ulcerations;
  - endothelial: aphakic/ pseudophakic bullous keratopathy, Fuchs’ endothelial dystrophy

**Surgical diseases:**
- small penetrating corneal wounds
- large corneal wounds without endoocular membrane issue until suture
- aphakic and pseudophakic bullous keratopathy;
- large filtration bulla after trabeculectomy with athalamia;
- corneal graft after alkali burns
- after photorefractive keratectomy for antialgic effect and restoration of binocularity

We are fitting the therapeutic lens to serve one main purpose, but the functions are generally associated:

1. **Pain relief**
   - Edemato-bullous keratopathy
   - Recurrent corneal erosions or corneal ulceration after corneal foreign body
   - Herpetic keratopathy
   - Corneo – conjunctival burns
2. **Improving corneal re-epithelization**
   - Recurrent corneal erosions
   - Exposure keratopathy
   - Corneal burns
   - Chronic corneal ulcerations
   - Neurotrophic keratopathy
3. **Tectonic effect**
   - Descemetocel after corneal ulceration
   - Corneal – and corneoscleral laceration without endoocular membrane issue
4. **Permitting binocular vision**
   - All cases

**Selection of therapeutic contact lens** should be made according to the specific disorder, oxygen transmissibility, parameter range, parameter stability, wettability of surface, lubricity, deposits ( non –ionic hidrogel and silicone hydrogel attract more lipids, build-up is linear in timp but do not induce allergies(14), modulus, costs.

**Fitting of the lens**

The lenses should be fitted with great care for good corneal coverage and mobility.

With intact epithelium or corneal oedema fit should be normal to loose, for good tear exchange. For pain relief or in cases where epithelium is not intact or topography is irregular, steep fit is better, achieved by increasing lens diameter or reducing the base curve of the lens. Edge design of soft lens has a major impact on mobility.

Fit should be assessed in 20 min and again in 60 min to unmask the dehydration effects.

**Figure no. 1: Fitting contact lenses**

**Instrumentation**

For therapeutic contact lens fit instrumentation is simple: slit-lamp (examination should be performed in diffuse or lower light intensity because of photophobia), dyes (Fluoresceine, rose bengal, lissamine green), Schirmer test, keratometer (measuremet of the fellow eye), topography (for RGPs). Anesthetics should be used only in small amounts.

**Figure no.2: Biomicroscop evaluation**

**Ocular Pathology where TCLs are used for reducing pain**

**Bulous Keratopathy**

Decompensation of the corneal endothelium in posterior corneal dystrophies or after surgery causes corneal oedema and epithelial bullae and painful erosions. Pain will be reduced by a steep fit of the therapeutic lens (4) The TCL wear may be continued indefinetely or just till penetrating keratoplasty, so the selected TCL should have a high oxygen transmissibility to reduce the risk of vascularisation.(5)

**Figure no.3: Bulous Keratopathy with amniotic membrane and LCT**
Thygeson superficial punctate keratitis
In severe cases, the TCL is used as a pressure patch, for relieving pain and foreign body sensation.

Filamentary keratitis
Filaments are common in severe dry eye cases but also after keratoplasty or vitrectomy in diabetics. For persistent cases, TCLs can be used, filaments are showing resolution in 4 days and dissappearance in 2 weeks, but they can recur. Patients should receive additional intense lubrication and be closely observed because of the higher risk of infection of this cases.

Ocular diseases where we can use TCLs for promoting wound healing
Recurrent corneal erosions
Figure no.4: Corneal erosions

This painful episodes of epithelial erosions occur most often after trauma (linear cuts, foreign bodies), in anterior membrane distrophies (10 %) or even spontaneously in cases with favorables factors like dry eye or diabetes. Disposable, steep and thick TCLs used for 2-6 month may help to formation of healthy strong adhesion between cells and epithelial basement membrane.

Persistent corneal epithelial defects
Persistent corneal epithelial defects after burns or neurotrophic keratopathies (viral infections in late stages, tumors, radiotherapy, vascular disesses in trigeminal area) can be managed by TCLs or collagen shields until new epithelium reattaches to the newly secreted basement membrane.

Herpes simplex
Herpes simplex is a contra indication for TCL use in acute stages but it can be fitted weeks later for persistent epithelial defects caused by toxicity of antiviral medication or neurotrophic keratitis (6)
Figure no.5 : Herpes Simplex

Neurotrophic keratopathy (palsies of n V, n VII)
As a cause of facial palsies or lid defects neurotrophic keratopathy may benefit by temporary TCL with intense lubrication.

C.I., 49 years old – LE: neurotrophic keratopathy stage 3 (corneal perforation), after recurrent herpetic keratitis.
The topic treatment consisted of nonsteroidian anti-inflammatories, antivirals, corneal trophics and therapeutic contact lens – no success.

It was necessary to apply a multistratified amniotic membrane to cover the perforation and other amniotic membrane transplant fixed with TCL.

Figure no. 7: neurotrophic keratopathy stage 3 (corneal perforation), after recurrent herpetic keratitis.

Ocular diseases where we can use TCLs for protection
Steven-Johnson syndrome may benefit from TCL use in late stages for preventing symblefaron formation and corneal protection. Sleral lenses, large (15-20mm) thick soft lenses or silicone materials are of choice.
Figure no.8: Dry eye

Lid deformities with exposure keratitis
Entropion, Trichiasys
Lid deformities with exposure keratitis, entropion and trichiasys may be managed by a TCL till surgical treatment is performed.
The patient from the image had an extended carcinoma on the whole face and the upper and lower lid – after many plastic surgical interventions becomes lagophtalmus with exposure keratophaty. Here we used TCL for optical and therapeutical purpose

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Keratoconus- piggy-back
In advanced cases of keratoconus, piggy-back system is an option because it helps to protect the sensitive apex of the cornea and to stabilise the RGP for a better vision.

Surgical conditions that may appear in cases of ocular trauma or surgical procedures

Chemical burns
TCL may inhibit the passage of certain proteolytic enzymes present in the tear film to the stroma, thus preventing the progressive ulcerative process.

For peripheral defect low water content soft lenses may stimulate vascular ingrowth and arrest the ulcerative process. (9) When the lids are also involved, a scleral lens is of choice.

In alkali burns - scleral lenses and very large soft lenses help prevent simblefaron in later stages. (10)

Trauma
In corneal abrasions TCLs may be user, instead of patch, for injuries over 4 mm in size.

Corneal lacerations, especially non-infected, limbal wounds have better recovery and less vascularisation when a steeper, big diameter and with high oxygen transmissibility contact lens is used. (8)

Corneal perforations may be easily sealed by using a TCL with or without cyano-acrylate glue, before or instead of sutures. In central injuries less astigmatism is induced.

Pterygium
After surgical removal of pterygium, TCL reduces pain, promotes corneal epithelisation and on long term may reduce the number and severity of recurrences by controlling the conjunctival progression towards cornea during healing.
Cataract surgery
First day post-surgery some unsutured small incisions may show positive Seidel. TCL may be used for few days to stop the leak ans seal the wound.. Figure no.17: Seidel sign+

Glaucoma
Excessive postoperative drainage of the bleb may benefit of large TCL (TD 16-20 mm) until the anterior chamber is completely restored Figure no.18: Excessive posoperative drainage of the bleb

Complications of therapeutic contact lenses
We should never forget that we fit TCL on an illness eye and we have to be much more precautions.

Complications of therapeutic contact lenses are the same as for all contact lenses: corneal edema, corneal vascularisation, corneal infiltrates, staining, deposits, giant papillary conjunctivitis, hypopyon, infection. Risk is even higher as lenses are used in extended wear modalities, topical steroids may be associated and immune system or the patients may be compromised (diabetes). Associated topical drugs should be preservative free or the lens should be discarded weekly, to avoid toxicity.

There are patient-related risks: severity of disease, dry eye, topical steroids, compliance, hygiene, general health, motivation and lens-related risks: hypoxia, deposition, mechanical insult, poor fit, extended wear that have to be taken into consideration when fitting and monitoring a TCL.(17)

CONCLUSIONS
TCLs are offering great benefits in the treatment of ocular surface pathology.
Soft lenses are preferred because of the large diameter, supple nature, low movement amplitude and enhanced comfort. Hydrogel lenses, however, dehydrate on the eye and the relatively low Dk may induce hypoxia, as therapeutic contact lenses are used in the continuous mode.
Silicone hydrogel lenses, available since 1999 and approved for therapeutic use, became the first choice because of very high oxygen transmissibility, lower on-eye dehydration and good comfort and coverage of the eye surface.

REFERENCES

ROMANIAN CONTACT LENS SOCIETY
ROMANIAN SOCIETY OF CORNEEA AND OCULAR SURFACE

AMT, vol II, nr.4, 2012, pag. 87
17. Schnider et al. A next generation silicone hydrogel lens for daily wear. OPTICIAN, 2004; 228: 5958
Ocular surface changes in facial nerve paralysis

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Abstract: The facial nerve is a mixed nerve, consisting of motor, sensitive, sensory and autonomic (parasympathetic) fibers; the Weisberg (VII) intermediate nerve is attached to, which is a sensitive nerve. It has the following functions: it provides taste sensitivity, mimic muscles innervation, sublingual and submaxillary salivary gland secretion, lacrimal gland secretion. Lagophthalmos is the difficulty or the complete lack of eyelid occlusion by affecting the orbicularis oculi muscle. It is usually unilateral, secondary to the peripheral damage of the VIIth nerve, Bell palsy or certain trauma.

Cuvinte cheie: nervul facial, lagofalme, keratopatie de expunere, implant grutate

Rezumat: Nervul facial este un nerv mixt, fiind format din fibre motorii, senzitive, senzoriale și vegetative (parasimpatic); are atașat nervul intermediar Weisberg (VII) care este un nerv sensitiv. Are următoarele funcții: asigură sensibilitatea gustativă, inervația musculaturii mimicii, secreția glandelor salivare sublinguale și submaxilare, secreția glandelor lacrimale. Lagofalmea reprezintă dificultatea sau lipsa completă a ocluziei palpebrale prin afectarea mușchiului orbicularis oculi. Este de obicei unilaterală, secundară afectării periferice a nervului VII, paraliziei Bell sau anor traumatisme.

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Figure no.1 Pthway of N. VII

The etiology of the facial nerve paresis

Extremely multiple and diverse causes may affect the facial nerve, depending on the topography of a possible injury; the most common causes are:

- The unilateral or bilateral facial damage by supranuclear lesion may be the expression of a stroke (ischemic or hemorrhagic), a primitive or secondary tumour, infection, or trauma;
- In the Cerebellopontine angle, the nerve may be affected in tumours (acoustic neuroma, meningioma, cholesteatoma), meningitis, infectious polynuropathy (syphilis, infectious mononucleosis), sarcoidosis;
- The damage to aqueduct supply occurs in tumours, trauma, accidentally in surgery, osteitis, facial paralysis “a frigore”;
- Extracranially, the nerve may be interested in the parotid or neighbourhood tumours or infections, rarely compressed by the application of forceps (obstetrical palsy);
- The VIIth bilateral damage may be congenital (Moebius syndrome) in sarcoidosis (Heerford syndrome), amyotrophic lateral sclerosis;
- Facial palsies also can occur in a number of diseases: cardiovascular (hypertension), metabolic diseases (diabetes, porphyria, uremia), cachectic states, muscle diseases.

Anatomical - pathological forms of facial paralysis:

- The lesion of the central facial paralysis is established supranuclearly and is clinically characterized by: limited motor deficit in the lower level of the face, it can be accompanied by hemiplegia, hemianesthetia, the electro-and non-electrodiagnostic tests are negative.
- The lesion of the peripheral facial paralysis is established neurally, radicually or truncally being characterized by: total motor deficit of the hemifascia by affecting the both terminal branches; it can be accompanied by hemiplegia (in pontine lesions). The electrical and the non-electrodiagnostic tests are disrupted.

“A frigore” facial paralysis has the following characteristics: It is the most common facial paralysis, with an incidence of 23 cases per 100,000 persons / year.

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It affects both genders.

Illnesses are more common in autumn and spring (after exposure to drafts). In facial paralysis “a frigore”, a non-suppurative inflammation occurs causing nerve swelling in the aqueduct visible on CT scan.

The disease is self-limited, the symptoms’ relief being observed within two to three weeks, without residual effects, but there are situations in which recovery is not complete. In a small percentage of cases, recurrences may occur, but rarely on the same side.(3)

Lagophthalmos is the difficulty or the complete lack of eyelid occlusion by affecting the orbicularis oculi muscle. It is usually unilateral, secondary to the peripheral damage of the VIIth nerve, Bell palsy or certain trauma.(3)

In paralytic lagophthalmos, palpebral fissure is half-closed and when the patient tries to close the eyes, the paralyzed upper eyelid drops by its weight, but it does not make a complete occlusion. The eyeball is deviated upwards and outside (the Bell mark).

**Figure no. 2. Ocular surface changes in facial nerve paralysis**

Due to the lowering of the orbicular muscle tone, the lower eyelid is slightly ectropionated and the lower lacrimal point is losing contact with the eyeball and lacrimation occurs. Because of the palpebral incoclusion that is more pronounced during sleep, the improperly wet cornea will dry, desepitelization may also occur and in some cases, corneal ulceration will occur in the lower third of the cornea (keratitis lagophthalmos).

This occurs earlier and is more severe when the lesion is located between the bridge and external geniculate ganglion, causing lacrimation disorder. The loss of corneal sensitivity shows a broad lesion of VII or VIII nerve with pressure on the trigeminal nerve, being a worse prognostic factor and requiring aggressive treatment.(4)

**Figure no. 3 Symptomatology in facial nerve paralysis**

The management of ocular surface changes in facial nerve paralysis

Over time, a variety of techniques have been used for the rehabilitation of the patients with facial nerve palsy. In all cases, the treatment should be individualized for each patient, taking into account the patient’s age, the degree of the occlusal deficit and the functional recovery perspective.

- If lagophthalmos has an easy form and if the functional recovery is anticipated, the treatment consists in the instillation of artificial tears during daytime, the use of eye ointments and covering the eye during the night in order to prevent the corneal damage, rooms properly wetted, or the application of therapeutic contact lenses.
- Where there is moderate lagophthalmos, a temporary blepharorrhaphy may be carried out in the external thirds of the palpebral fissure, which will be maintained until the orbicular motor recovery occurs. The disadvantage of this method consists in reducing the visual field, as well as an unaesthetic aspect. An alternative may be the injection of botulinum toxin in the upper eyelid muscle for the temporary ptosis induction.
- Persistent lagophthalmos with the impossibility of functional recovery and with exposure keratopathy requires in most cases a surgical approach.
- Currently, one of the most used methods for lagophthalmos correction is the implant of a weight (gold or platinum) in the upper eyelid. An additional eyelid weight will determine a better eyelid occlusion and an adequate corneal protection. The surgical technique is simple and gives optimal functional and aesthetic results.(5)

Clinical case (Images taken from the archives of the Ophthalmology Clinic of Sibiu)

The patient, R. I., 76 years old. “A frigore” facial nerve paresis in the right eye, exposure keratopathy (figures no. 4, 5, 6). In the right eye, the implantation of a gold plate has been carried out in the upper eyelid.

**Figure no. 4. Lagophthalmos in the right eye**

Due to the complete functional recovery of the orbicular muscle, we decided to remove the plate six months postoperatively.

**Figure no. 5. Gold plate implantation in the right eye**
Figure no. 6: Three months after the operation, the cornea is clear.

Figure no. 7: Complete epithelization.

A modern alternative to the surgically implanted plates is the external palpebral plates. They represent a quick and efficient treatment option due to the fact that the plate lowers the eyelid and allows a much easier blink reflex, ensuring continuous protection of the cornea and a stable tear film.

CONCLUSIONS

The neurological disorders cause significant motor, sensitive, sensorial and psycho-behavioural disabilities, making the patient, at least in a first stage, dependent to the specialized medical services, and afterwards of the social or family assistance.

Lagophthalmos is a serious complication of the facial nerve paralysis, extremely distressing for patients, both the aesthetic disorders and the eye problems brought about by the ocular surface irritation phenomena in variable percentages determined by the incomplete occlusion of the eyelids, having a strong impact on the quality of life and socio-professional integration.

The treatment of lagophthalmos and of exposure keratopathy should be individualized for each patient, a great variety of techniques being used to ensure eyelid function and ocular comfort.

REFERENCES

1. C. Zaharia - Nervii cranieni – date generale de anatomie, fiziologie si patologie, p132-140;2.
2. F. Stefanache –Neurologie clinica, pg 244-252
3. M. Dumitrache –Tratat de oftalmologie, pg 353-354
POSSIBILITY OF OCULAR SURFACE COVERAGE IN FACIAL NERVE PALSY BY IMPLANTING A WEIGHT IN THE UPPER EYELID

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Keywords: lagofalma, the weight implantation, facial nerve palsy

Abstract: One of the complications of facial nerve palsy of various etiologies (Bell’s palsy, vascular lesions, tumors, iatrogenic, trauma, infections, degenerative diseases) is lagophthalmos, defined as the inability to completely close the eyelids. The aim of this paper is to show the possibility of ocular surface coverage by implanting a weight in the upper eyelid in patients with persistent lagophthalmos, without the perspective of functional recovery. The aim of this paper is to show the possibility of ocular surface coverage by implanting a weight in the upper eyelid in patients with persistent lagophthalmos, without the perspective of functional recovery.

INTRODUCTION

One of the complications of facial nerve palsy of various etiologies (Bell’s palsy, vascular lesions, tumors, iatrogenic, trauma, infections, degenerative diseases) is lagophthalmos, defined as the inability to completely close the eyelids.

The inability to close the eyelids may lead to corneal problems such as epithelial defects, stromal thinning, exposure keratopathy, bacterial infection, perforation, leukemia. The first choice in treating lagophthalmos is conservative and symptomatic (eyedrops, ointments, taping and moisture chambers), but surgical intervention may be required for patients where medical therapy has failed or the facial palsy has no perspective of functional recovery.

The weight implantation has become the most commonly used technique for rehabilitation of the eye in patients with facial nerve palsy and it has been shown to effectively reduce lagophthalmos, protect the cornea and improve cosmetics, while having a low extrusion rate. Gold is the preferred material due to its color, specific gravity and tissue compatibility, but as an alternative, platinum weights should be used in patients with suspected gold allergy. In this procedure a gold weight was made preoperatively, the necessary weight being determined by posting layouts on the upper eyelid. It has been used a weight with 0.1 g more than minimum weight which determined the maximum eye closure. The gold weight insertion was made by a skin incision and dissection of the orbicularis muscle. It was fixated to the tarsus at 4-5 mm distance from the free edge of the upper eyelid, in the middle third of the eyelid. The tarsal gold plate was fixated using three absorbable sutures (fig. 1).

MATERIAL AND METHOD

We performed a gold weight implantation in fourteen patients with paralytic lagophthalmos, hospitalized in our clinic between 2006 - 2012. In eight cases the facial palsy was caused by tumors, in two cases by TCC and in four cases the facial palsy was idiopathic. In all cases, the choice of the value of the weight was made preoperatively, the necessary weight being determined by posting layouts on the upper eyelid. The gold weight was inserted in the upper eyelid to allow closure by the force of gravity. The presence of weights seems to contribute to the mimics and blinking of the eyelids which provides a better aesthetic appearance.

AIM

The aim of this paper is to show the possibility of ocular surface coverage by implanting a weight in the upper eyelid in patients with persistent lagophthalmos, without the perspective of functional recovery.

Figure no.1: Insertion of the gold weight

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Five patients needed additional procedures to correct the ectropion (Duverger method) (fig. 2).

**Figure no.2: The correction of ectropion**

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**RESULTS**

In all cases we obtained optimal functional results and the reduction of the ocular surface irritation phenomena. The problem of exposure keratopathy was solved.

There were no intra- or postoperative complications.

Next we present some cases solved using this method

**Case I.**

Patient S.A., 42 years old - right facial nerve palsy (operated for acoustic neurinoma) (fig. 3, 4).

**Figure no. 3: RE- lagophthalmos/ exposure keratopathy.**

Preop: when the eyes are closed, the cornea of the right eye remains partial exposed

**Figure no. 4: RE: weight implant in the upper lid. Six months postop., the patient has a good lid occlusion, the cornea is clear, with complete epithelization and an aesthetic aspect.**

**Case II**

Patient C.N., 48 years old - right facial nerve palsy (endobase tumor, LE- choroidal metastases) (fig. 5, 6).

**Figure no. 5: Preop.:RE–lagophthalmos**

**Figure no. 6: RE: weight implant in the upper lid. 1 week POSTOP., the patient has a normal lid occlusion**

**Case III**

Patient V.I., 40 years old OS–facial nerv palsy (operated for meningioma); OS exposure keratopathy (fig. 7, 8).

**Figure no 7: Preop. OS lagophthalmos**

**Figure no. 8: OS – gold weight implant. OS – complete eyelid closure**

**Case IV**

Patient G.I., 53 years old. OS- exposure kerathopathy, corneal ulcer, paralytic ectropion lower eyelid, facial nerve palsy (acoustic neurinoma ) (fig. 9, 10)

**Figure no. 9: Preop. OS lagophthalmos**
Figure no. 10: 1st postop. day: OS- gold weight implant + ectropion correction

Case V
Patient R. I., 76 years old. OD facial nerve palsy “a frigore”, exposure keratophaty (fig. 11-13). Because of the complete functional recovery of the orbicularis muscle, we decided to explant the gold weight after 6 month

Figure no. 11: OD lagophthalmos

Figure no. 12: OD Gold weight implant

Figure no. 13: At 3 month POSTOP the cornea is clear, with complete epithelization

Discussions
The use of gold weight eyelid implants is certainly a desirable option for the treatment of patients suffering from lagophthalmos, but it is not always successful or may not give the desired aesthetic result due to the thickness of the prefabricated implants and the anatomical structures of the eye.

Adequate preoperative evaluation is necessary to determine optimum size, weight and position of the gold implant. The most common complications is due to use of inappropriate gold weights.

This technique provides dynamic closure of the eyelid with excellent protection of the ocular surface and good cosmetics. Lagophthalmos and exposure keratopathy is solved, the visual acuity got significantly improved without complications.

The important disadvantage of this method is that the correction mechanism is based on gravity, so there are situations when the eye does not close when the patient is in clinostatism.

Another disadvantage is that when closing the eye the gold plate contour can be observed.

Postoperative may occur a slight ptosis of the upper eyelid.

Sometimes the exteriorization of the plate through the skin may occur gradually over several months. In this case the implant is removed and reinserted after the postoperative healing of the eyelid.

Conclusions
The management of paralytic lagophthalmos by inserting a weight of gold is a safe, inexpensive and easily reproducible method, achieving a significant reduction of lagophthalmos and an optimal coverage of the ocular surface.

References
8. Tratat de oftalmologie. Cernea Paul, 2002, pg 216; 351
AMNIOTIC MEMBRANE: POSSIBILITIES FOR OCULAR SURFACE PROTECTION

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Keywords: amniotic membrane, pterygium, bullous keratopathy, corneo-conjunctival burns, exposure and neurotrophic keratopathy

Abstract: The amniotic membrane is a useful alternative in the management of many ocular conditions. The membrane can be used to serve either as a patch, when the membrane is removed after some time or is expected to fall off, or as a graft when the membrane is incorporated into the host tissue. This technique is repetitive and the costs are low.

Cuvinte cheie: membrană amnitotică umană, pterigion, keratopatie edemato-buloasă, arsuri corneo-conjunctivale, keratopatie de expunere, keratopatie neurotropică.

Rezumat: Membrana amniotică umană (MAU) reprezintă o alternativă foarte utilă în tratamentul multor afecţiuni oculare. Membrana amniotică se poate utiliza fie sub formă de petec/patch, atunci când se elimina după o anumită perioadă de timp, sau pe post de greșă atunci când se încorporează în țesutul gazdei. Tehnica aplicării MAU în scopul reconstrucţiei suprafeţei oculare este repetitivă și cu costuri relativ reduse.

INTRODUCTION

The amniotic membrane is a useful alternative in the management of many ocular conditions. Many inter and intra donor variations in the structure and function of the membrane have been demonstrated. Location in relation to the placenta, duration of pregnancy, parity, gravidity, onset of labor and even age and race of the donor are all vary. Studies have shown that preservation and processing can have profound effects on the membrane constituents. Fresh, and to some extent even preserved, membranes that have been tested twice carry a potential risk of spread of serious infections: hepatitis B, C, HIV, being so important to respect the immunological interval7,9,12.

Table no. 1: Indications for ocular surface reconstruction

<table>
<thead>
<tr>
<th>Indications</th>
<th>Repair method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limbal auto graft preferable in unilateral or asymmetric cases; limbal allograft reserved for bilateral cases</td>
<td>1. <strong>PATCH (OVERLAY)</strong>: the HAM is sutured at the episclera, circular above the epithelial or stromal defect, while the margins of the defect remain under the HAM.</td>
</tr>
<tr>
<td><strong>May be used in conjunction with limbal auto graft or allograft</strong></td>
<td>2. <strong>GRAFT (INLAY – one or more layers)</strong>: the HAM is sutured at the ulceration site and the corneal epithelium regenerates above it. HAM functions as a basement membrane, is integrated in the cornea and remains there for a few months. It is important for the epithelium to be removed around the ulceration and for the HAM to be sutured in the opaque stroma. If the ulceration is deep, the HAM may be applied in more layers, and we can suture only the one on top.</td>
</tr>
<tr>
<td><strong>Indicated for fornix reconstruction after cicatrization</strong></td>
<td>3. <strong>SANDWICH</strong>: combines the previous two techniques. This technique has a high success rate and a low recurrence incidence.</td>
</tr>
</tbody>
</table>

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Frequent postoperative follow-up is recommended. Use of antibiotics or antiviral before and after surgery is recommended\(^{10}\).

We used the HAM transplant in old corneo-conjunctival burns with simblefaron formation with good results.

**Figure no.1:** Old corneo-conjunctival burn

![Old corneo-conjunctival burn](image1)

**Figure no.2:** HAM transplant

![HAM transplant](image2)

**Figure no.3:** 14\(^{th}\) day postop

![14\(^{th}\) day postop](image3)

The patients with bulous keratopathy following cataract surgery by facoemulsification present with symptom like ocular pain, foreign body sensation, photophobia, tearing. After doing the HAM transplant these symptoms are reduced gradually, improving as well the results postkeratoplasty.

**Figure no.4:** LE: KEB

![LE: KEB](image4)

**Figure no.5:** 7 days post surgery-amniotic membrane transplant + TCL

![7 days post surgery-amniotic membrane transplant + TCL](image5)

**Figure no.6:** 10 days post surgery

![10 days post surgery](image6)

**Figure no.7:** OS Chimical burns with alkalis with MAU

![OS Chimical burns with alkalis with MAU](image7)

**Figure no.8:** OS Simblefaron

![OS Simblefaron](image8)

**Figure no.9:** Amniotic membrane

![Amniotic membrane](image9)
In some instances use of the membrane may be an option but not necessarily a better option? In parallel, ocular defense mechanisms must be corrected, including correction of lid abnormality, tarsorrhaphy, botulinum toxin injection, and/or punctal occlusion for neurotrophic and evaporative alterations of the ocular surface 5,7,8.

In large pterygiums and aggressive recurrences we thought necessary the HAM transplant together with a therapeutical contact lens after surgical excision of the pterygium.

The healing of the corneal wound was accelerated. This technique is repetitive and the costs are low. The transparency of the cornea and the aesthetic aspect of the eye are improved using this method, alone or associated with auto or allo graft of limbal stem cells (25-33% of the normal limb can maintain a healthy cornea) 5. Combined use of stem cells cultures for repopulation of corneal surface

REFERENCES
1. AAO External and Corneal Disease 2012 – p.358-389
8. Hontanilla Bernardo, Pamplona Spain, Departamendo de Cirurgia Plastica y Reparadora, Universidad Navarra, sept 2011
PUREVISION®2 HD FOR ASTIGMATISM - TORIC INNOVATION FOR EYE HEALTH

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Abstract: Astigmatic patients are some of our most demanding patients in the practices. Meanwhile, contact lens wearers committed to toric are continuously looking to improve their visual experience through better products. Now, you can give them consistently crisp, clear vision throughout the day with the new toric contact lenses PureVision®2 HD for Astigmatism from Bausch + Lomb.

Keywords: toric lenses, PureVision®2 HD for Astigmatism

Cuvinte cheie: lentile de contact torice, PureVision®2 HD pentru Astigmatism

Rezumat: Pacienții cu astigmatism sunt unii dintre cei mai solicitați pacienți în practica e zi cu zi. În aceleași timp, purtătorii dedicați de lentile torice sunt în permanență în căutarea produselor performante care să le îmbunătățească experiența vederii. Acum putem să oferim purtătorilor o vedere incredibil de clara și stabilă pe toata durata purtării cu noile lentile de contact torice PureVision®2 HD pentru Astigmatism de la Bausch + Lomb.

Throughout the history of contact lens design the challenge of meeting the needs of astigmatic individuals has been significant. It is important to continue to strive to meet those needs when we consider the population that requires this correction. It has been reported that approximately 37% to 45% of adults have 0.75D or more of astigmatism. With almost half of the population of contact lens wearers having significant astigmatism, the contact lens industry as a whole must continue to support the needs of this large group of patients.

In a survey of 201 astigmatic contact lens wearers, the symptoms most often cited while wearing current toric lenses included regularly or occasionally experiencing blurry/hazy vision, fluctuating vision, and distorted vision. Forty seven percent of subjects reported experiencing blurry or hazy vision, 37% reported fluctuating vision, and 32% reporting distorted vision. Additionally, 32% of toric patients reported experiencing glare and halos in low-light conditions. Product benefits of toric lenses (in the categories of vision, comfort, health and convenience) were presented to patients randomly in successive groups of four for ranking. The benefit of highest relative importance for a toric soft contact lens was that it should deliver consistently sharp vision all day. Attributes and performance of current toric lenses may limit the ability of patients to achieve consistently crisp, clear vision throughout the day. Patients are looking for contact lenses that offer uncompromised vision and stability without compromising comfort.

Design Attributes and Clinical Experience

Addressing the needs of astigmatic patients was the a primary goal when Bausch + Lomb designed PureVision®2 For Astigmatism with High Definition™ Optics. Three lens design attributes have been incorporated to work together and achieve exceptional toric lens performance: High Definition™ Optics, Auto-Align Design™, and ComfortMoist™ Technology.

High Definition™ Optics

Spherical aberration is the inability of the eye to focus light rays passing simultaneously through the center and the periphery of the eye. The retinal image appears blurred because the peripheral light rays are focused anterior to the retina (Figure 1).

Figure no 1: A lens with spherical aberration has different focal points for the light rays passing through the center and the periphery of the lens.

Spherical aberration can be a barrier to high-quality vision in low light, resulting in blurred vision, halos and glare. Bausch + Lomb lenses with High Definition™ Optics are designed to reduce the positive spherical aberration that is naturally occurring in the human eye to minimize halos and glare and bring all of the light rays to the same focal point to create clear, crisp vision all day – especially in low light. (Figure 2).

A conventional spherical contact lens does not consistently control spherical aberration across the power range. Spherical lens designs inherently demonstrate spherical aberration due to their highly curved spherical surfaces; negative spherical aberration for negative power lenses, and positive...
spherical aberration for positive power lenses, in proportion to their back vertex power. Aspheric Bausch + Lomb contact lenses with High Definition™ Optics are designed to reduce the inherent spherical aberration of the eye and reduce the spherical aberration induced by the contact lens on-eye.

Figure no 2. Bausch + Lomb lenses with High Definition Optics are designed to reduce the positive spherical aberration that is naturally occurring in the human eye and bring all of the light rays to the same focal point.

PureVision™ 2 HD For Astigmatism was designed with High Definition™ Optics to reduce spherical aberration in both the sphere and cylinder meridians, in quarter diopter steps across the power range, for clear, crisp vision all day – especially in low light. PureVision™ 2 HD For Astigmatism is the only silicone hydrogel toric soft contact lens that reduces spherical aberration on both the spherical and cylinder meridians of the lens. By controlling spherical aberration in both the sphere and cylinder meridians, PureVision™ 2 HD For Astigmatism corrects for not only astigmatism and spherical aberration, but also reduces secondary astigmatism.

Figure no 3: FAuto-Align Design™

The stability of a toric lens is governed by several forces. Those forces can be divided into static (which include surface tension of the tears, gravity, conformity of the lens, and lid pressure at the top and/or bottom of the lens) and dynamic forces (which include upper and lower eyelid movement and eye movement). To better understand how lenses behave on-eye, several experiments were undertaken to understand one of the main drivers of instability, blinking dynamics. Blinking is essential to maintenance of the ocular surface and occurs at a speed that is almost imperceptible. The main muscle drivers of the blink are the horizontally aligned obicularis oculi and the more vertically aligned levator palpebrae and Muler’s muscles. To capture the motion of these muscles, a high speed camera, capable of recording 300 frames per second was employed. The results showed that from initiation to completion of the natural blink, only 1 tenth of a second passes. In that time the upper lid has traveled approximately 7.5 mm down and 4.8 mm nasal. Interestingly, the lower lid has limited vertical motion, leaving the upper lid to be almost entirely responsible for rewetting the ocular surface through the blink mechanics. Understanding these dynamics helps design a lens which can work with the dynamic range of the eyelids.

When the eyelids close during a complete blink, there is a slight downward displacement of the lens and the lids typically meet at a point 1-2mm from the base of the lens. For a lens to effectively leverage these blink dynamics and maintain stable orientation, the toric stabilizing ballast should be designed with this in mind. By positioning the maximum ballast thickness low on the lens, the design can leverage the full motion of the upper lid while gaining support from the lower lid. Understanding eyelid movement during the blink and lens movement associated with eye and eyelid movement helped guide the development of the Auto-Align Design™ feature of PureVision® 2 HD For Astigmatism. This feature allows the lens to achieve stability and orientation while providing consistently crisp, clear vision throughout the day.

Various innovative techniques have been employed to create a stable contact lens including truncation, dual slab-off, peri ballast and prism ballast, to name a few, and there are multiple designs currently commercialized which are founded on these basic geometries. =The new PureVision™ 2 HD For Astigmatism lens is founded on solid understanding of contact lens stability techniques. Sophisticated lens design software and innovative manufacturing techniques have allowed Bausch + Lomb to develop a lens that uses the best aspects of prism and peri ballasting to create a hybrid ballasting system. =The design provides excellent stability for consistent vision, with repeatable orientation even with the blink and eye movement. Manufacturing sophistication has also come of age and is carefully sculpting the contours of these lenses to blend with and work with the eye.

To improve centration, PureVision™ 2 HD For Astigmatism was designed with a larger diameter compared to PureVision® Toric. PureVision™ 2 HD For Astigmatism was designed with a 14.5mm outer diameter and a base curve of 8.9mm. The larger diameter of PureVision™ 2 HD For Astigmatism offers more area to spread out the ballast design to reduce the maximum thickness compared to PureVision® Toric (Figure 3). This helps create a more comfortable wearing experience, while maintaining the same large optic zone as PureVision® Toric. The large optic zone (8.0mm for a -3.00-1.25×180 lens) also helps to reduce potential glare in low light conditions.

With optimized ballasting, a large lens diameter, and a large optic zone, PureVision™ 2 HD For Astigmatism minimizes lens mis-rotation to help ensure outstanding stability and vision throughout the day.

ComfortMoist™ Technology
ComfortMoist™ Technology has two key features: a thin lens design to provide a natural feel throughout the day and
a moisture-rich packaging solution to provide excellent comfort upon insertion. PureVision®2 HD For Astigmatism continues to use a thin rounded edge design from PureVision®2 HD sphere, to enable a smooth, gentle transition of the lid from the lens to the conjunctival. The new lens design also features reduced lens markings providing a more continuously smooth surface.

**Conclusion**

Vision and optical expertise remain fundamental in the development of new contact lens designs. Patients are looking for contact lenses that offer stable and consistent vision throughout the day without compromising comfort. The lens design of PureVision®2 HD For Astigmatism combines High Definition™ Optics, Auto-Align Design™, and ComfortMoist™ Technology to provide the clear, crisp vision all day without compromising comfort that patients desire.

**REFERENCES**

ARTIFICIAL TEARS – MECHANISM OF ACTION AND INDICATIONS IN OCULAR SURFACE PROTECTION

VALERIA COVILTIR, MARIA-CRISTINA MOGOS, MARILENA DANIELA DESLIU, SILVIA FUDULI, A.G. CIOABLA

Abstract: Dry eye syndrome remains one of the most widespread and underdiagnosed ophthalmic disorders, affecting 3% - 15% of the general population. The understanding of dry eye disease has advanced recently through increasing recognition that the etiology of the condition involves both tear evaporation and insufficient tear production, and that tear film instability and inflammation play roles in the various stages of the disease. Causative factors for dry eye syndrome include age, gender, environmental stressors, systemic medications with drying effects, postsurgical conditions and prolonged visual tasking. Dry eye is also associated with various systemic diseases. The management of dry eye involves various strategies and therapeutic approaches that address one or more ethiopathological components of the disease. The mainstay of therapy remain the artificial tears substitutes . In addition to being safe and effective, they improve both the subjective symptoms and the objective signs of dry eye, increasing the quality of life.

INTRODUCERE

Dry eye disease (DED) is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface” (Dry Eye Workshop – DEWS – report 2007) [1]. The prevalence varies between 3% - 15% in the general population (even 35% for people over 50 years)[1][2][3]. It has been well documented that women are twice as likely to develop DED and that the prevalence increases significantly with age, especially in postmenopausal women.[4][5][6][7] There are multiple factors that play a role in the mechanism of dry eye and they include age, environmental factors (air conditioning, low relative humidity, high wind velocity), occupational environment (low blink rate during extensive computer or microscope use), medications (antihistamines, beta-blockers, diuretics, anxiolytics, antidepressants, oral contraceptives), hormonal changes (low androgen levels), autoimmune diseases, contact lens wear, blepharitis, wide lid aperture (hyperthyroidism).

PHYSIOPATHOLOGY

DED is in fact a disorder of the tear film due to tear deficiency or excessive tear evaporation. There are two major mechanisms (Figure 1):

- tear hiperosmolality that determines distraction of the conjunctival epithelial cells and of the goblet cells and
- inflammation that determines release of inflammatory mediators into the tears.

Coating the outer surface of the cornea is a „pre-corneal tear film” which contains distinct lipid, aqueous and mucin layers. From the front to the back they are:

- Lipid layer:
  - it is the outmost layer
  - it is secreted by the meibomian glands
  - it decreases tears evaporation
- Aqueous layer:
  - it is the largest

Keywords: dry eye syndrome, tear film, inflammation, artificial tears substitutes

Cuvinte cheie: sindromul de ochi uscat, film lacrimal, inflamație, lacrimi artificial

Rezumat: Sindromul de ochi uscat rămâne una dintre cele mai răspândite și subdiagnosticate boli oftalmologice, afectând între 3% și 15% din populația generală. A demonstrat că instabilitatea filmului lacrimal și inflamația joacă roluri importante în diferite stadii ale boli, iar recunoașterea etiologiei ca fiind reprezentată atât de evaporația filmului lacrimal cât și de producția insuficientă a acestuia, a permis o mai bună înțelegere a sindromului de ochi uscat. Factorii de risc pentru ochiul uscat sunt reprezentați de vârstă, sex, factorii de mediu, administrarea de medicamente sistemică cu efect la nivelul filmului lacrimal, situații postoperatorii sau profesia. De asemenea sindromul de ochi uscat se poate asocia cu o multitudine de boli sistemice. Managementul ochiului uscat implică strategii terapeutice variate ce se adresează uneia sau mai multor componente etiopathogenice ale boli. Tratamentul de bază este reprezentat de administrarea de lacrimi artificiale, care, pe lângă faptul că prezintă siguranță și eficacitate crescută, amelioră simptomatologia subiectivă și semnele obiective ale ochiului uscat, cu îmbunătățirea calității vieții pacientului.
• it is secreted by the lacrimal glands
• it provides nutrition of the cornea (including antibodies)

Mucin layer:
• it is the innermost layer (in contact with the corneal epithelium)
• it is secreted by the goblet cells
• it provides lubrication and protection of the ocular surface

**Figure no. 1 – Mechanisms of dry eye**

The tear film has four main functions:
• maintenance of a smooth surface for optical clarity
• lubrication to facilitate eyelid blink
• the main supplier of oxygen and other nutrients to the cornea
• protection against ocular infection.

**CLASSIFICATION**

Etiological:
The DEWS report divided the DED into two major groups: aqueous deficient dry eye (ADDE) and evaporative dry eye (EDE). Aqueous deficiency can be subdivided into Sjögren’s syndrome dry eye and non-Sjögren’s dry eye. Evaporative dry eye may be secondary to intrinsic (abnormal lid function) or extrinsic (contact lens wear) factors.

Symptomatic:
• Mild – occasional symptoms (rare, subclinic)
• Moderate – permanent symptoms
• Severe – permanent symptoms with decreased quality of life

**SYMPTOMS**
The major symptoms associated with dry eye include:
• Eye discomfort (irritation, itching, a burning sensation)
• Sensitivity to light
• Redness
• Frequent blinking
• Difficulty in wearing contact lenses
• Watering eye (at the beginning it is reflex, tears are of low quality and instable on the ocular surface)

The intensity of these symptoms are affected by various environmental factors such as the air conditioning, low relative humidity, prolonged use of display terminals or high wind velocity.

**DIAGNOSIS**

Management of DED is based on careful clinical observation and accurate diagnosis of the underlying causative factors. A combination of various subjective and objective measurements is commonly used to determine the presence and severity of an individual’s dry eye [8].

Available tests study: (Table 1)
• Clinical history using a questionnaire such as the Ocular Surface Disease Index. This can quantify the frequency and severity of symptoms for each type of patient with DED
• Tear film stability (Tear Fluorescein Breakup Time-TF BUT, evaporation, lipidic layer anomalies)
• Ocular surface (staining, impression cytology)

Other modern methods for assessing dry-eye signs and symptoms were recently developed:
• Minitests – TearLab System used for measuring tear film osmolarity
• Impression cytology – collecting and analyzing corneal and conjunctival cells
• Interferometry – measures the thickness of the lipid layer
• Ocular protection index (OPI) – calculated by dividing TF BUT by inter-blink interval (IBI); it is accurate and reproducible, used to determine treatment efficacy (an OPI >1 suggests that the tear film remains intact until it can be replenished with a blink, whereas an OPI <1 indicates the ocular surface will be exposed for the time between the tear-film breakup and the blink).

**Table no. 1 – Diagnostic tests**

<table>
<thead>
<tr>
<th>Diagnostic Tool</th>
<th>Details of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocular Surface Disease Index (OSDI) Questionnaire</td>
<td>• Standardized 12-item patient-reported outcomes (PRO) questionnaire</td>
</tr>
<tr>
<td></td>
<td>• Measures the level of discomfort and interference produced by DED on activities of daily living</td>
</tr>
<tr>
<td>Schirmer’s Test</td>
<td>• Measures change in tear volume (production) over a given period of time by the observed wetting of a standardized paper strip placed over the eyelid</td>
</tr>
<tr>
<td>Grading Ocular Surface Staining</td>
<td>• Assesses ocular surface changes associated with insufficient tear-film protection by staining the cornea and/or conjunctiva with a dye (lissamine green or Rose Bengal) and grading against standardized charts</td>
</tr>
<tr>
<td>Tear Break-Up Time (TIBUT)</td>
<td>• Measures tear stability by instilling fluorescein dye; if stability is perturbed (as in lipid or mucin deficiency), time to initial breakup of the tear film following a blink becomes more rapid (normal &gt;15 sec)</td>
</tr>
<tr>
<td>LIPCOF Score (Lid Parallel Conjunctival Folds)</td>
<td>• Examined at the slit lamp</td>
</tr>
<tr>
<td></td>
<td>• Evaluates the dryness of the conjunctiva</td>
</tr>
</tbody>
</table>

**TREATMENT**
The goals of treatment are to relieve the symptoms of dry eye, to improve the patient’s comfort, to return the ocular surface and tear film to the normal state and to prevent corneal damage whenever possible [1][9].
Treatment may range from patient education (modify the environmental factors, humidity control, avoid air conditioning, lowering the level of the computer) to artificial tears substitutes – the mainstay of therapy for mild to moderate cases, gels and ointments – for severe cases, anti-inflammatory agents and tetracyclines for chronic blepharitis or acne rosacea. Other possible recommendations include: substances for lacrimal secretion stimulation (colinergic agents, Diquafosol), autologous serum, systemic immunosuppressive agents (Cyclosporine) – in cases associated with autoimmune diseases, rich diet in essential fatty acids (omega 3), therapeutic contact lens (for corneal complications), punctal plugs or tarsorrhaphy.

There were formulated treatment recommendations based upon symptoms and clinical signs of DED that were divided into four categories (Table 2).[8]

### Table no. 2 – Treatment algorithm (based on DED severity)

<table>
<thead>
<tr>
<th>Severity of DED</th>
<th>Treatment recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mild to moderate symptoms with/witout mild to moderate conjunctival signs</td>
<td>Preserved/nonpreserved tear supplements</td>
</tr>
<tr>
<td></td>
<td>Environmental management</td>
</tr>
<tr>
<td></td>
<td>Manage associated allergies if present</td>
</tr>
<tr>
<td></td>
<td>Avoid systemic drugs contributing to DED</td>
</tr>
<tr>
<td>2. Moderate to severe symptoms</td>
<td>Unpreserved tear supplements</td>
</tr>
<tr>
<td>Tear film changes</td>
<td>Gels and ointments for prolonged contact</td>
</tr>
<tr>
<td>Mild corneal and conjunctival staining with visual signs</td>
<td>Nutrient support</td>
</tr>
<tr>
<td>Mild punctate epithelial keratitis</td>
<td>Topical steroids/ cyclosporine</td>
</tr>
<tr>
<td>3. Severe symptoms</td>
<td>Systemic therapy (tetracyclines)</td>
</tr>
<tr>
<td>Marked corneal punctate staining</td>
<td>Punctal plugs</td>
</tr>
<tr>
<td>Central corneal staining</td>
<td>Autologous serum</td>
</tr>
<tr>
<td>Filamentary keratitis</td>
<td></td>
</tr>
<tr>
<td>4. Very severe symptoms affecting the quality of life</td>
<td>Systemic anti-inflammatory therapy</td>
</tr>
<tr>
<td>Epithelial defects</td>
<td>Punctal cautery</td>
</tr>
<tr>
<td>Conjunctival scarring</td>
<td>Surgery (tarsorrhaphy)</td>
</tr>
</tbody>
</table>

**ARTIFICIAL TEARS**

**Definition:**
Tears supplements primarily replace the volume of the tears although they do not replace the other normal tears components that are necessary for a healthy ocular surface. They act as lubricants or mimic the electrolyte composition of human tears. An ideal lubricant should:

- have the ability to spread efficiently, quickly and evenly over the cornea
- have a system to enhance its retention time
- minimize friction between the upper eyelid and the cornea
- improve both the subjective symptoms and the objective signs of DED

**Clinical effect:**

- Lubricates the ocular surface
- They try to replace the deficit of tear film compounds
- Lower tear osmolarity
- Dilute and assure the wash-out of pro-inflammatory agents
- Prolong retention of the tears on the ocular surface

**Composition:**

### Preservatives

Rationale for including preservatives in artificial tear products:

- they inhibit growth of microbial contaminants in the bottle
- they prolong shelf-life by preventing biodegradation and maintaining drug potency
- they allow for a convenient and safe multi-dose container for patient use

As a result, many artificial tears substitutes contain preservatives such as surfactants (benzalkonium chloride – the most frequently used preservative), metals (sodium, mercury), ethylendiaminetetraacetic acid (EDTA), methylparaben, with an increased risk of adverse effects on the corneal surface and of hypersensitivity reactions. These risks increase with both the duration of use and the number of drops administered per day.

### Electrolytes

- Polyquad
- “disappearing preservatives” (they dissociate on contact with the eye surface) – oxychloro complex (Purite) – dissociate in Cl1 and water; sodium perborate – dissociate in water and oxygen.

Preservative-free products (unidose or multi-dose in special bottles called buffers) are utilised especially in patients with moderate to severe DED.

### Viscous agents

Their role is of decreasing the osmolarity and increasing the density of the tear film. Two of the most important electrolytes are potassium that maintain corneal thickness and bicarbonate that assist in maintaining normal epithelial ultrastructure and mucin layer and promote the recovery of epithelial barrier function.

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Sodium hyaluronate:
- concentration varies between 0.15-0.2%
- has an analgesic and anti-inflammatory effect and stimulates reepithelialisation
- it is the first choice in DED
- it can be used either alone, in unidose or multidose bottles, or in combination with aminocids and gingko biloba

Methylcellulose (Hydroxypropyl methyl cellulose-HPMC, Carboxymethyl cellulose-CMC):
- it is a lubricating polymer
- also used for gonioscopy and hard contact lens
- CMC replace and enhance the mucin layer of the tear film
- HPMC 0,3% requires frequent instillations
- used in greater concentrations (1%) causes visual blurring

Dextran 70:
- it is a poudre slightly soluble in water, unsolvable in alcohol
- it has a molecular weight of 70000 Da
- it can be used iv (increases the plasmatic volume)
- in drops it can be used alone or in combination with HPMC or glycerin

Chondroitin sulfate:
- drops with a concentration of 3%
- it has a molecular weight of 50000 Da
- it is used for corneal grafts conservation

Polyvinyl alcohol (PVA):
- increases tear retention time on the ocular surface
- used in combination with povidone or caromers

Caromers:
- they retain water

Polyvinypyrrolidone (Povidone 2%):
- drops with a higher viscosity than solutions, but lower viscosity comparing to gels

Hydroxypropyl-guar (HP-guar):
- it is a gelatinous agent
- it has a neutral pH
- in combinations (with Propylene glycol or Polyethylene glycol), it allows longer retention of the tear film and facilitates corneal epithelial repair by protecting the exposed cells

Osmotic agents:
In patients with dry eye tear film osmolarity has been found to be higher than in normal patients, creating a vicious circle, with increased release of inflammatory mediators. By adding agents that protect epithelial cells of dehydration (glycerin, erhyltriol, levocarnitine), artificial tears substitutes try to provide osmoprotection for the damaged cell surface.

Other agents:
N-acetil cystein 10%- is a mucolytic agent used in severe forms of keratoconjunctivitis sicca and filamentary keratitis

Mineral oils – add in reconstructing a continuous lipid layer and stabilize the tear film

Agents that stimulate mucin secretion – are currently under investigation (Disqualosol, Ecabet sodium, Rebamipide, 15-HETE)

Aminoacids (glycine, proline, lysine, leucine) – restore the corneal epithelium (participate in the desmosomes structure) and the corneal stroma (collagen IV)

Gingko Biloba extract – has an antioxidative effect, neutralizing free radicals responsible for corneo-conjunctival cells distruption. It also restores the corneal nerves endings after LASIK.

Utilisation:
- the severity of DED
- the mechanism of production of DED
- associated pathology
- personal experience

Suggestions for utilization:

Evaporative DED:
- artificial tears that stabilizes the tear film, with low frequency administration
- frequently associated with treatment of meibomian gland disfunction (lid hygiene, warm compress, gels)

Sjögren syndrome dry eye:
- cyclosporine A 0,05% is the main treatment
- agents with HP-guar, CMC that assures long-term comfort by osmoprotection

After refractive surgery:
- agents that contain sodium hyaluronate, preservative-free or combined with aminocids or gingko biloba

After cataract surgery:
- concomitant with antibiotic and anti-inflammatory agents or after one month

After penetrating keratoplasty:
- long-term (lifetime) administration
- agents that contain sodium hyaluronate – alone or combined

Chronic antiglaucomatous treatment:
- preservative-free artificial tears
- agents that can protect the conjunctiva for future surgical intervention

Epithelial defects:
- sodium hyaluronate
- agents that stabilizes the tear film, mucoadesives
- chondroitin sulfate – very effective for slow-healing epithelial defects

CONCLUSIONS
Current approaches to the management of dry eye disease reflect the multifactorial nature of this condition. Therapeutic strategies are designed to restore the natural tear film, protect the ocular surface and improve the patient’s ocular comfort and quality of life. We must pay attention to a careful case history of symptoms in conjunction with a variety of clinical signs to diagnose the condition and its severity. The symptoms are frequently underestimated, being difficult to diagnose (it can be confused with an allergic, bacterial or viral conjunctivitis).

Artificial tears substitutes remain the mainstay of dry eye therapy. The clinician needs to take into account the patient’s sensitivity to preservatives, frequency of use, condition of the cornea, increased risk of contamination with preservative-free products and cost. Although there are several marketed artificial tears available, there is no “universal” artificial tear substitute for the treatment of every patient.

REFERENCES

AMT, vol II, nr. 4, 2012, pag. 104
INTRODUCTION

Crosslinking is biochemical, enzymatic or photodynamic reaction natural or induce, characterized by covalent links binding intra and interhelicoidale that are responsible for increasing the tissue resistance. Corneal collagen crosslinking (CXL) is a parasurgical technique, minimal invasive that increases the stiffness and corneal stability. There are different kinds of crosslinking: enzymatic by lysyl-oxydaze (LOX) responsible of physiological or natural crosslinking, or by glucose-aldehyde responsible of crosslinking in diabetes mellitus; chemical using glutaraldehyde or formaldehyde; photochemical using ultraviolet (UVA) or ionizante radiation; photooxidative using riboflavine and UVA (1).

PURPOSE

The purpose of this paper is to presents classical methods “epi – off” and “epi – on”, indications and contraindications of these, the mechanism of CXL and the new methods that include decrease of time and enhanced the riboflavine diffusion in corneal stroma.

MATERIAL AND METHODS

The mechanism of photooxidative CXL: riboflavine activated by UVA with wavelength (λ) 370 nm emitte oxygen reactive species (ROS) in principal free radicals and less super oxide anions. ROS react with different protein molecules making covalent chemical links between amino groups of collagen fibrils. So, by the new inter and intrafibrillar links the cornea become more compact and resistance (2).

The roles of riboflavine are photosensibilizing agent and absorption of UVA (maximum for λ = 370 nm) for endothelial, lens, retinal protection. Dextran T500 maintains the corneal osmolarity at 400 mOsm/l for avoid corneal edema. The crosslinking effect is maxim in the first anterior 200 - 300 microns (μ) because UVA intensity decreases in the depth by riboflavine absorption (65% in the first 200 μ and 20-30% in the next 200 μ) (1).

Effects of CXL: increasing of the stiffening and the biomechanical resistance with 328.9%; increase of collagen fibrils diameter with 12.2% in the anterior stroma and with 4.6% in the posterior stroma, changing that were observed at elderly or diabetic by push effect of collagen fibrils that determine increasing of intermolecular space, termostability, decrease of corneal permeability for nutrients or drugs; biochemical effect; antimicrobial; increase of hidratation resistance; increase of enzymatic digestion resistance; apoptotic effect of keratocytes (2).

Progressive keratoconus, post-laser ectasia, pellucid marginal degeneration; bullous keratopathy; infectious keratitis unresponsive to treatment, decrease the risk of granulat/lattice dystrophy recurrence on corneal graft, ortokeratology are indications for CXL. Pregnancy, afakia, herpetic keratitis, radial keratotomy, corneal thickness < 380 μm, acute ocular infection are contraindication for CXL (2,3,4).

Keywords: crosslinking, keratoconus

Abstract: Corneal collagen crosslinking photooxidativ was introduced in 2003 as therapeutically method for increasing corneal biomechanical stability by binding new links between collagen fibrils using ultraviolet light and riboflavine as photosensibilizing agent. The authors show indications, contraindications, different technique with advantages and disadvantages, preoperatively investigations, complications of this therapeutically method. Besides standard technique of crosslinking “epi-off” or “epi-on” using hipo and/or isotonic riboflavine, it is also presented transepithelial technique by iontophoresis and new methods that include a higher irradiation energy and decrease of irradiation time.

Cuvinte cheie: crosslinking, keratoconus

Rezumat: Corneal collagen crosslinking-ul fotooxidativ a fost introdus în 2003 ca metodă terapeutică de creștere a stabilității biomecanice corneene prin formarea de noi legături între fibrele de colagen, să se reducă efectul de keratocities, iar fibrele de colagen să aibă un diametru mai mare, de obicei în pasarea de la stema anterioră, în comparație cu cele din stema posterioră. Creșterea stărilor biomecanice a corneei este maximă în primul plan anterior 200 – 300 microni (μ) deoarece intensitatea UVA se scade în adâncime prin absorbția riboflavinei (65% în primul 200 μ și 20-30% în următorul 200 μ) (1).

Effects of CXL: increasing of the stiffening and the biomechanical resistance with 328.9%; increase of collagen fibrils diameter with 12.2% in the anterior stroma and with 4.6% in the posterior stroma, changing that were observed at elderly or diabetic by push effect of collagen fibrils that determine increasing of intermolecular space, termostability, decrease of corneal permeability for nutrients or drugs; biochemical effect; antimicrobial; increase of hydration resistance; increase of enzymatic digestion resistance; apoptotic effect of keratocytes (2).

Progressive keratoconus, post-laser ectasia, pellucid marginal degeneration; bullous keratopathy; infectious keratitis unresponsive to treatment, decrease the risk of granulat/lattice dystrophy recurrence on corneal graft, orthokeratology are indications for CXL. Pregnancy, afakia, herpetic keratitis, radial keratotomy, corneal thickness < 380 μm, acute ocular infection are contraindication for CXL (2,3,4).

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AMT, vol II, nr. 4, 2012, pag. 106
**DISCUSSIONS**

Progression of keratoconus is determined by thinner corneal tissue and associated decrease in collagen fibrils arrangement, decrease of collagen fibrils stability (0.7 factor); The amount of collagen is the same as in health cornea; hydroxyprolina is dissolved twice greater amount by pepsin; enzymatic alteration: increase of lysosomal, proteolitic enzymes and decrease of protease inhibitors concentration (2,5). Progression criteria’s of keratoconus are: decrease of visual acuity with more 1 Snellen line, decrease of corneal thickness with more 20 μ and increase of corneal values on the highest refractive meridian.

CXL indication for keratoconus is: progression of disease, clear cornea, corneal thickness > 380 μ, no acute infections. Pre and postoperatively we have to perform the follow recorders: refraction, uncorrected and best corrected visual acuity, slit-lamp examination, intraocular pressure, corneal topography and topoaberyometry, pachymetry, corneal biomechanical analyze, ocular tomography, endothelial cells number (3,4). Intervention is performed after informed counsel of patient, in aesthetically condition and check UV device parameters using epi – off or epi – on technique.

"Epi-off" technique implied epithelial remove on 9 mm area (corneal epithelium represents a barrier against stromal diffusion of riboflavin due to molecular weight (376g/mol). Epithelium removal can be performed uniform, in grid pattern (for accelerate epithelial healing, but spectrophotometer analyze shows a significantly decrease and inhomogeneous riboflavin absorption) or with alcohol 20%. After that isotonic riboflavin 0.1% is instill if corneal thickness is higher than 400 μ, until stromal saturation checked using blue filter. UVA irradiation 3 mW/cm2 is performed during 30 minute (at every 5 minute it is instill riboflavin 0.1%). Postoperatively after corneal lavaj it applied a therapeutically contact lens, antibiotic, non-steroid anti-inflammatory and artificial tears until complete epithelium healing. For cases with corneal thickness under 400 μ, there are many techniques: corneal thickener with hypotonic riboflavin, epithelial removing guided by pachymetry or thicker film of riboflavin using metilcellulose. This technique showed efficiency and improving of visual acuity on long term, so is the first choice for progressive keratoconus under 26 years old and with corneal thickness >400 μ (3).

Complications of CXL are: delayed of epithelium healing, haze, glare, infection, ulceration, reactivate of herpes keratitis, destruction of sub basal nerve plexus, sterile infiltrate, melting, perforation, progression of disease(2).

Trans-epithelial “epi-on” technique was introduced to avoid corneal epithelium removal risks (infections, pain, decrease of visual acuity, delayed of epithelial healing, discomfort). For this technique we have to use substances that increase riboflavin diffusion (anesthetic, EDTA, benzalkonium chloride).

Iontophoresis is technique development for increasing riboflavin diffusion using electric champ with lower intensity. Molecules rate that pass tissues can be increase changing intensity or characteristic solution. Intensity of electric champ is 1 mA/min. 5 minute of iontophoresis determine a greater stromal imbibitions than 15 minutes of passive imbibitions. Studies show insignificantly improvement and incert stabilization in the first 12 months using this method witch is indicate specially for cases with corneal thickness under 400μ, due to no homogenous and superficially diffusion of riboflavin. So, in present the research are directional for using new riboflavin formula, decrease the time of procedure enhanced riboflavin solution (20 min, 10 min, 1.5 min) or iontophoresis (5 minute) and increase UVA power with decrease irradiation time (30mW/4min; 45mW/2min; 10mW/9min)(Caporossi – Lugano 2012).

**CONCLUSIONS**

Corneal collagen crosslinking is a standard procedure for ecstasies stabilization. Long term studies are necessary for demonstrate efficiency ans safety of new changes of therapeutically protocol above shortening time of procedure and increase of UVA intensity.

**REFERENCES**

1. Luciani G., Principles, technique and Instruments of the corneal collagen crosslinking using Riboflavin-UVA. Medical Direction of SoofItalia SIENA Eye Cross Project; 2006 chapter 4: 36-62
BIOMECHANICAL PARAMETERS IN SUSPECT OR CERT FORMS OF KERATOCONUS

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Abstract: The purpose of this paper is to analyze corneal biomechanical parameters using Ocular Response Analyzer for suspect or cert forms of keratoconus. This is a prospective, comparative study, which include 23 cases with suspect keratoconus, 55 cases with cert forms of keratoconus and 56 cases without corneal diseases. Corneal histeresis, corneal resistance factor and keratoconus match index were the parameters analyzed. The values of these biomechanical parameters were significantly decreased for patients with cert diagnosis of keratoconus comparative with suspect keratoconus or cases without corneal disease. The difference between corneal histeresis and corneal resistance factor is higher when the disease is advanced. The recorders give important information for corneal biomechanical study and diagnosis of keratoconus.

INTRODUCTION

The development of corneal surgical techniques and the postoperatively ectasia risk have determined actual researches for corneal biomechanical study. Ocular Response Analyser (ORA) represents a simple, fast, repeatable method that allows exploration of the corneal viscoelastic response, in vivo, using a bidirectional applanation process with calibrated air puff and an reflected infrared signals recording two pressures (1). The tissue response is dependent of the magnitude and the velocity of the application force. The cornea is a viscoelastic tissue characterized by static and dynamic resistance. The corneal resistance factor (CRF) recorder the corneal general static resistance and is calculated as a linear function of the two pressures associate with the applanation processes; the deformations is proportional to applied force. Corneal histeresis (CH) is related to the viscoelastic structure of the corneal tissue, records the dynamic resistance and is calculate by difference between that two pressure values at the two applanation processes(2). The biomechanical properties and the level of deformation influence the characteristic of ORA signals; the signal amplitude is direct proportional with the applanation area and the wider of signal is inverse proportional with the velocity. The Reichert new soft allow identification and follow - up keratoconus cases by recording waveform score, keratoconus probability index (KMP): normal, suspect, mild, moderate, severe; and keratoconus match index (KMI). For cases without corneal disease, the signals are higher, symmetric, with repeatable values and bilateral symmetry. For keratoconus the signals have small amplitude with multiple oscillations, asymmetric, without repeatability.

AIM

The aim of this paper is to analyze the parameters recording using ORA in suspect and cert forms of keratoconus.

MATERIAL AND METHOD

This is a prospective, comparative, observational study that includes three groups of cases: 1 – control group without corneal disease (56 of cases), 2 – suspect keratoconus group (23 of cases) and 3 – keratoconus group (55 of cases). Corneal histeresis, corneal resistance factor and KMI were the parameters analyzed. ORA recorders (4 consecutive measurements, the best measurement signals with the highest wavescore $>$3 were selected), slit-lamp examination, corneal topography, corneal thickness were the investigations performed in all cases. Cases with suspect forms of keratoconus present on topographic map inferior or superior area steepening, minor topographic asymmetry, and oblique cylinder greater than 1.5 dioptri (D). Keratoconus cases present a cert diagnostic and were classified using Kruemeich criteria (3).
RESULTS

The study includes cases with age between 15 to 37 years old with a mean age of 27.56 years. Using Krumeich classification were analyzed 7 cases with stadium I of keratoconus, 11 with stadium II, 27 with stadium III and 10 with stadium IV. The female gender was predominant for control cases (23 male/33 female), but in group 2 and 3 the male gender was predominant (19/4; respectively 34/21). The CH mean values recorded for suspect keratoconus 10.41 mmHg (7.6 – 11.7 mmHg) were lower comparatively with control group 11.53 mmHg (8.4 – 16.2 mmHg). Cases with keratoconus were recorded a mean value of CH more lower 8.5 mmHg (6.2 – 10.7 mmHg) (Figure no. 1).

Figure no. 1: CH comparative distribution

CRF was recorded for control group a mean value of 11.61 mmHg (8.1 – 16.9 mmHg), 10.02 mmHg (8 – 11.9 mmHg) for suspect forms of keratoconus and more lower for keratoconus group 7.37 mmHg (5.1 – 10.7 mmHg) (Figure no. 2).

Figure no. 2: CRF comparative distribution

It was observed that the difference between CH and CRF is higher than 1 for keratoconus cases (1.13) comparatively with 0.38 for suspect keratoconus or control cases (-0.08) (Figure no. 3). This difference is to higher when the stadium of keratoconus is more advanced (0.77 for stadium I, 1.03 for stadium II, 1.17 for stadium III and 1.4 for stadium IV).

Figure no. 3: CH – CRF

KMI mean value for cases with keratoconus is more lower (0.41) comparatively with 0.99 for suspect keratoconus forms and 1.099 for control cases. KMI value is lower when the disease is advanced (0.16 for cases with stadium IV, 0.36 for cases with stadium III, 0.65 for cases with stadium II and 0.62 for cases with stadium I) (Figure no. 4). Statistical analyze showed a positive correlation 0.58 between CH, CRF and corneal thickness, when corneal thickness is higher CH and CRF value are higher and a negative correlation (-0.36) between biomechanical parameters and the corneal values on the highest refractive meridian.

DISCUSSIONS

CH and CRF values recorded for keratoconus cases are decreased comparatively with suspect forms of keratoconus or cases without corneal diseases (1, 3). In keratoconus there is a decrease of the diameter and an alteration of the regular orthogonal arrangement of the collagen fibrils in the center of the cornea. The modifications are determined by alteration of proteoglycans and glucosaminoglycans structure and the decrease of proteoglycans in extracellular matrix that produce the decrease of the stromal interlamellar adhesions and the decrease of corneal resistance. The histological changes influence the corneal elastic response and precede morphologic deformations (1).

CONCLUSIONS

CH, CRF, KMI values are significantly decreased for keratoconus cases, especially when stadium of keratoconus is advanced. CRF value is more decrease comparatively with CH value, for keratoconus cases. The difference between CH and CRF higher than 1 and a lower value of CRF evidence the development keratoconus risk. ORA recorders give us additional information for corneal biomechanical study and diagnosis of keratoconus.

REFERENCES


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SURGICAL APPROACH IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA (POAG) AND CATARACT

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Abstract: Objective: Evaluation of postoperative outcome in patients with POAG and cataract following different surgical procedures. Methods: This was a prospective, observational study, with one year follow up, including patients with medically controlled POAG and with medically uncontrolled POAG. The last group was further divided in two subgroups: patients with mild/moderate glaucomatous damage and with severe glaucomatous damage. Patients underwent phacoemulsification, phacotrabeculectomy or trabeculectomy followed by phacoemulsification. Results: The population consisted of 101 patients. At one year follow-up, IOP was significantly reduced after phacoemulsification with 2.17+/−2.03 (p=3.4x10^−7), after phacotrabeculectomy with 5.25+/−2.37 (p=4.2x10^−4) and after trabeculectomy followed by phacoemulsification with 8.95+/−2.93 (p=7.82x10^−13). Number of glaucoma medications decreased significantly only after phacotrabeculectomy and trabeculectomy. Conclusions: IOP was lowered by all types of procedures. The need for medication was reduced at most after trabeculectomy followed by phacoemulsification. Phacoemulsification was followed by the least postoperative complications and visual rehabilitation was the quickest.

Keywords: cataract, POAG, IOP, phacoemulsification, trabeculectomy, phacotrabeculectomy.

INTRODUCTION

Primary open-angle glaucoma (POAG) and cataract often coexist in the same patient, the prevalence of each increasing with age. Both conditions are among the most common causes of vision loss. A considerable proportion of patients who are presenting for cataract or POAG symptoms cumulate in fact both conditions [1]. The management of coexistent cataract and glaucoma still represents a challenge for the clinician nowadays.

There are some characteristics of patients with coexisting cataract and glaucoma that should be noted: the crystalline lens plays a dominant role in various types of glaucoma [2], hypotensive drugs potentially influence the development of cataract [3,4], glaucoma surgery may be associated with increased risk of cataract worsening postoperatively [5], phacoemulsification has a complex and dynamic effect on IOP [6,7].

Cataract-induced vision loss is reversible, while glaucoma-induced vision loss cannot be reversed. Considering cataract a surgically curable condition while glaucomatous optic neuropathy is irreversible, the decision for the therapeutic approach is based mainly on the degree of glaucomatous damage rather than on the severity of cataract. For glaucoma staging, the eGSS (Enhanced Glaucoma Staging Severity) system [8] and POAG PPP AAO 2010 (Primary Open-Angle Glaucoma Preferred Practice Pattern, American Academy of Ophthalmology 2010) system [9] were used.

Accordingly, the severity of glaucoma damage can be divided in [10,11]:

- **Mild**: optic nerve abnormalities consistent with glaucoma and a normal visual field as tested with standard automated perimetry;
- **Moderate**: optic nerve abnormalities consistent with glaucoma and visual field abnormalities in one...
hemifield that are not within 5 degrees of fixation as tested with standard automated perimetry;

- **Severe:** optic nerve abnormalities consistent with glaucoma and visual field abnormalities in both hemifields and/or loss within 5 degrees of fixation in at least one hemifield, as tested with standard automated perimetry.

POAG PPP AAO 2010 system also describes:

1) medically controlled POAG as defined by controlled IOP in target range, stable optic nerve/retinal fiber layer status and stable visual fields,

2) medically uncontrolled POAG as characterized by IOP > target range, signs of progression, under topical treatment, on visual fields and optic nerve/retinal nerve fiber layer analysis.

The surgical options currently available are [12]:

1. Cataract extraction as unique procedure;
2. Staged surgical approach
3. Combined surgery of cataract and glaucoma at the same time.

**MATERIAL AND METHOD**

101 patients with significant cataract and open angle glaucoma were enrolled between January 2009 and August 2012, 35 diagnosed with medically controlled POAG and 66 with medically uncontrolled POAG. The last group was further divided in two subgroups: patients with mild/moderate glaucomatous damage (31 patients) and with severe glaucomatous damage (35 patients). Patients were followed-up for one year.

Every patient underwent a preoperative ophthalmic assessment which consisted in: best-corrected visual acuity, slit-lamp exam, applanation tonometry, pachimetry, gonioscopy, standard automated perimetry (Humphrey visual field). Postoperatively, the evaluation consisted in best-corrected visual acuity, applanation tonometry and visual field testing at one month, 6 months and 1 year.

The choice of surgery considered glaucoma severity, target IOP, ability to tolerate medication and patient age. Surgical options were cataract surgery alone (phacoemulsification), combined cataract and glaucoma surgery (phacotrabeculectomy) and trabeculectomy +/- 5-FU (5-FluoroUracil), followed after 4 to 11 months by phacoemulsification.

Statistical analysis was performed using SPSS software (version 18); statistical significance was considered for p value < 0.05.

**PATIENTS SELECTION**

For patient selection, we used the following inclusion criteria: symptomatic cataract, coexisting with open angle glaucoma, medically controlled or uncontrolled. The exclusion criteria were presence of additional ocular pathology, ie iritis or corneal endothelial dystrophy or patients with previous ocular surgery. Patients with diabetes mellitus or on treatment with oral steroids were also excluded.

**RESULTS**

The study included 101 patients divided in several groups (table 1). The first group with medically controlled POAG totaled 35 patients (35 eyes) with mean age of 74.3 years. The gender distribution for this group was 25.7% males and 74.3 % females. All the patients in this group underwent phacoemulsification. IOP was measured preoperatively and at one month, 6 months and one year postoperatively. IOP measured at one year follow-up was significantly reduced with 2.17 +/- 2.03 mmHg (p= 3.4 x 10^-3). IOP assessed postoperatively at one month was not significantly different from preoperative values; at 6 months after surgery though, it was significantly reduced, with similar values at one year follow-up. The average number of antiglaucomatous medication was also evaluated. Preoperatively, the average number was 1.46, while at one year follow-up it was 1.54. There was though no statistically significant difference between the two values (p = 0.446).

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<th>Table no 1: Patients distribution according to diagnosis and surgical procedure</th>
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The medically uncontrolled mild/moderate POAG group was made of 31 patients treated with phacoemulsification (23 patients) or phacotrabeculectomy (8 patients) as single procedures. The mean age for the phacoemulsification subgroup was 76.6 years, with gender distribution of 35% males and 65% females. The mean age for the phacotrabeculectomy subgroup was 77.6 years with gender distribution – 50 % males and 50 % females. For the phacoemulsification subgroup, the IOP measured at one year follow up was significantly reduced compared with the preoperative IOP (3.65 +/- 1.55 mmHg, p=1x10^-3). The decrease of intraocular pressure in the phacotrabeculectomy subgroup was also statistically significant at one year follow-up compared to the preoperative IOP (5.25 +/- 2.37 mmHg; p = 4.24 x 10^-4). The preoperative average number of topical medication per patient who underwent phacotrabeculectomy was 3.25, while at one year follow-up it was 1.37. For the phacotrabeculectomy subgroup the number of topical medication needed for glaucoma control decreased statistically significant for 58% of the patients.

The patients with medically uncontrolled severe POAG had two surgical options: phacotrabeculectomy + 5-FU (12 patients), or trabeculectomy +/- 5-FU as antimetabolite, followed after 4 to 11 months by phacoemulsification (23 patients). The mean age of the patients with severe POAG in the phacotrabeculectomy was 75.9 years with a gender distribution of 42% males and 58% females; IOP was significantly reduced after phacotrabeculectomy when analyzed at one year follow-up with 6.04 +/- 3.01 mmHg (p=2.8x10^-6). The average number of topical medications per patient with severe POAG was 3.25 preoperatively and 1.33 at one year follow-up. Concerning the last subgroup of the patients that underwent trabeculectomy followed by phacoemulsification at 4 – 11 months, the mean age was 71.7, with a gender distribution of 35% females and 65% males. IOP was significantly reduced after trabeculectomy and phacoemulsification performed separately with 8.95 +/- 4.93 mmHg (p=7.82x10^-13). The number of topical medication needed for glaucoma control decreased statistically significant at one year follow-up for 84% of patients (preoperative average number 2.43 and at one year follow-up 1.30). 5-FU was used for 40% of patients that underwent trabeculectomy, followed by phacoemulsification; IOP of patients treated with 5-FU decreased statistically significant only at 4 weeks follow-up, but lost it significance at 6 months follow-up.

The postoperative complications after phacoemulsification were: stromal and epithelial corneal oedema 8%, regressed at one month postoperatively, without
late complications. After phacotrabeculectomy, 37% of patients experienced immediate complications, flat anterior chamber, hyphema, postoperative inflammation; there were no late complications after this procedure. Immediate complications after trabeculectomy were diagnosed in 21.7% patients (choroidal effusion with hypotony, hypotony, hypophya), while 4.3% patients experienced late complications (failure of the filtering bleb). Phacoemulsification performed after trabeculectomy was followed by 8.6% immediate complications (mainly corneal edema) and 4.3% late complications (compromised bleb function).

DISCUSSIONS

Although glaucoma and cataracts are frequently found in the same patient, there is no unanimous consensus about the combined or staged surgical approach [13]. It is usually difficult to compare the results from different centers because of the great variability of surgical techniques and differences in reporting data, which makes the existence of information in the literature less reproducible and standardized. Although the combined surgical procedure could be a good surgical option because it addresses both conditions at the same time, it requires a skillful practitioner and also cumulates the burden of complications for the two procedures.

The phacoemulsification has some considerable advantages: cataract removal, improved visual acuity, quicker visual recovery, less postoperative care, and fewer short-term and long-term complications. It lowers IOP, but to lesser extent, being therefore unable to replace phacotrabeculectomy or trabeculectomy. Phacoemulsification as single procedure is best suited for patients with mild/moderate glaucoma, who tolerate medication well and have IOP within target range. The main risk of phacoemulsification is the possibility of postoperative IOP spikes [14].

Trabeculectomy reduce IOP constantly, fastest and most reliable [15]. Regarding the antimetabolite use, a recent study showed that there are no significant differences between 5-FU and Mitomycin C application in terms of IOP reduction in eyes undergoing primary trabeculectomy [16,17].

CONCLUSIONS

Surgical treatment effectively lowers IOP in patient with combined cataract and glaucoma. Our study demonstrated the efficacy of all type of procedures above mentioned; the need for topical antiglaucomatous treatment was reduced at most after trabeculectomy followed by phacoemulsification. Cataract extraction proved to be followed by the quickest recovery of the visual function and least rate of complications. Though, as already mentioned, it is not always very effective in lowering IOP, especially for patient with severe glaucoma.

As glaucoma is a chronic, potentially progressive disease that can lead to irreversible blindness, ophthalmologists should develop a treatment approach with emphasis based on the severity of glaucoma rather than on cataract alone [18]. Trabeculectomy remains an effective surgical choice, especially in glaucoma patients with severe disease who require a low and steady IOP. When carefully considered, the combination of cataract extraction with trabeculectomy is a valuable surgical option in the management of patients with coexisting glaucoma and cataract.

The level of intraocular pressure (IOP) and the degree of optic nerve damage should be the most important parameters when deciding the type of surgical treatment most appropriate for a particular patient [19]. The appropriate treatment should be tailored based on patient's characteristics and the target IOP to be achieved [20].

REFERENCES

THERAPEUTIC OPTIONS IN POSTOPERATIVE CORNEAL EDEMA

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Abstract: Endothelial decompression is defined as the impossibility of endothelium to perform the role of ion pump and the result is corneal edema with corneal hydration. The aim of the study is to highlight the therapeutic options for endothelial decompressions. We analyzed the cases who were presented in the Ophthalmology Clinic of Academic Emergency Hospital of Sibiu with corneal edema by endothelial cause. Edematous-keratopathy remains a feared postoperative complication. It depends on the surgical trauma and the state of the preoperative endothelium. TCL and amniotic membrane transplantation are therapeutic options which can improve the symptoms of edematous-bulbus keratopathy. Endothelial transplant remains the best option to solve edematous-bulbus keratopathy.

Keywords: postoperative corneal edema, therapeutic contact lens, amniotic membrane transplantation, corneal transplant

Cuvinte cheie: edem cornean postoperator, lentilă de contact terapeutică, transplant de membrană amniotică, transplant cornean


INTRODUCTION

The corneal surface has 1.3 square cm of the anterior pole. It is a transparent, avascular membrane with trigeminal sensitive innervations.

It is a spherocylindric lens of about + 43 Dioptries. Microscopically cornea has 5 layers:

1) Anterior epithelium, non-keratinized stratified squamous epithelium
2) Bowman layer, an acellular, fibrilar structure, crossed by nerves, does not regenerate.
3) Corneal stroma, represents 90% of the corneal thickness, formed of conjunctive fibrils
4) Descemet membrane, elastic, resistant, can regenerate
5) Endothelium, formed of one single layer of polygonal cells, does not regenerate. The number of cells decreases with age or after traumas and the free space will be occupies by enlarging the resting cells.

The endothelium provides the transparency of the cornea, controlling the level of hydration of it. 60% of the endothelial cells have a hexagonal shape. The shape and size of the cells, as the covering of the posterior surface of the cornea are important for the endothelial barrier.

After the age of 50 there is a significant decrease of the endothelial cell number.

The normal corneal hydration depends on the 2 functions of the endothelium: barrier and metabolic pump.

The corneal endothelium is built of one single cells layer. The cells cannot regenerate. Starting with the age of 20 the number of endothelial cells begin to decrease from 3000-4000 cells/square mm to 2500-2700 in the 80th.

The neighbor cells become larger in order to fill the free spaces.

The use of protective viscoelastic substances was an important step forward in protecting the endothelium.

Phacoemulsification brings additional risk factors for injuring the endothelium. The collapse of the anterior chamber during surgery contributes to accidental touch and injury of the endothelium.

The orientation of the phaco tip towards the cornea determines injuries of this. The phaco time, because of the action of the ultrasounds, is directed implicated in the injury of the endothelium.

The corneal edema after cataract surgery by phacoemulsification depends on: surgical trauma, preexisting endothelial lesions, chemical injury, presence of IOL, contact of the cornea with ocular tissues, Descemet detachment, foreign materials in AC, postoperative glaucoma, inflammation, contact with the vitreous.

Postoperative corneal edema can be reversible or irreversible, considering its gravity. Stromal edema is the result of endothelial failure.

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AMT, vol II, nr. 4, 2012, pag. 113
Classification:
- Reversible corneal edema:
  - Under 7 days
  - Under 30 days
- Irreversible corneal edema – edemato-bullous keratopathy

Causes of postoperative corneal edema:
- Surgical trauma
  - Instruments
  - IOL
  - BSS
  - Ultrasound
  - Nuclear fragments
  - Anterior surgeries
- Endothelium
  - Fuchs dystrophy
  - Low density of cells
- Chemical injury
  - Preservatives
  - Lavage substances on instruments
  - Antibiotics
  - Toxic agents
- Presence of IOL
- Contact of the cornea with ocular tissues
  - Low AC
  - Coroidian hemorrhage
- Descemet detachment
- Retention of foreign materials
- Postoperative glaucoma
- Inflammation
- Contact with vitreous

AIM
The aim of study is to highlight the therapeutic options for the postoperative corneal edema

MATERIAL AND METHOD
We analyzed 101 cases of corneal edema after EEC and phacoemulsification.
We found 68 cases of reversible edema under 7 days, 21 reversible edema under 30 days and 12 cases of edemato-bullous keratopathy.

DISCUSSIONS
The treatment of the corneal edema depends on its gravity.

In reversible edemas (observed first day postop) we used topical treatment with hypertonic solutions (NaCl 5%).

Because inflammation can induce a transient dysfunction of the endothelial pump, local treatment with SAI and NSAI solutions might be helpful.

In the cases of edema longer than 7 days we completed the topical treatment with hypotensor solutions (CAI, beta-blockers), in case of ocular hypertension, artificial tears, protective creams (Vitamin A). General treatment: acetazolamide, manitol.

In irreversible corneal edema, present at 3 month after surgery, the rehabilitation of visual acuity can be obtained only by keratoplasty. Before keratoplastics, concomitant with it or after an amniotic membrane can be applied on the ocular surface.

In all cases of KEB there was performed an amniotic membrane transplant fixated at the limbus with 10.0 sutures. On the membrane there was applied a therapeutic contact lens.

The use of amniotic membrane reduced significantly the symptoms.

The amniotic membrane was useful because it stimulates the reepithelisation. It is a biological tissue used as a graft for corneal or conjunctival reconstruction.

It contains collagen typ III, V, IV, VII, fibroectine, laminine, fibroblasts, other growth factors.

Properties of amniotic membrane:
- Stimulates the reepithelisation
- Anti-inflammatory effect
- Anti-infctious effect
- Immunomodulator effect
- Inhibits neo-vascularisation
- Stimulates the process of nervous regeneration.

Because the endothelium cannot regenerate the best solution remains to change it. For a long time perforating keratoplasty was the only option. Lately the endothelium transplant is about to become standard in endothelium pathology.

The advantages are: lower astigmatism, faster recovery, reduced risk of rejection.

Amniotic membrane and TCL are therapeutic options that improve the symptoms.

CONCLUSIONS
- KEB remains a feared complication of cataract surgery
- The gravity of the postoperative edema depends on the surgical trauma and on the state of the preoperative endothelium
- Topical treatment is sufficient in transient edemes
- In chronic edemas and KEB amniotic membrane transplant and TCL can improve the symptoms
- Corneal transplant remains the only option to solve KEB

BIBLIOGRAPHY
4. Lang G. K., Augenheilkunde, Georg Thieme Verlag, Stuttgart, 2004
5. Teodoru A., Complicațiile facoemulsificării, lucrare de doctorat, Universitatea “L. Blaga” Sibiu, 2009

AMT, vol II, nr. 4, 2012, pag. 114
LONG – TERM RESULTS OBTAINED AFTER CROSSLINKING FOR PATIENTS WITH KERATOCONUS

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Keywords: keratoconus, phohtooxidativ crosslinking

Abstract: The aim of this paper is to evaluate the results obtained for patients with keratoconus after phohtooxidativ crosslinking, method introduced for stopping the progression of the disease. This is a retrospective study which includes 45 of cases for was performed crosslinking using “epi-off” technique. After 5 years, it was observed significantly decrease of the cylindrical refraction with 1.64 dioptries and the corneal value on the highest refractive meridian with 1.79 dioptries. For these cases it was obtained stopping, stabilization and in some cases the improvement of monitoring parameters.

INTRODUCTION

Keratoconus is a progressive, bilateral, corneal dystrophy, characterized by thinning and corneal protrusion that determines decrease of visual acuity with negative effect for the quality of life (1). Collagen crosslinking phohtooxidativ is the therapeutically method used in present for stopping the evolution of keratoconus by additional covalent binding between collagen fibril’s with increasing of corneal resistance(1, 2, 3).

PURPOSE

This paper analyzes the results obtained at 5 years for patients with progressive keratoconus after crosslinking.

MATERIAL AND METHOD

This is a retrospective, observational study witch includes 45 cases (33 patients) with keratoconus. Corneal collagen crosslinking was performed when it was observed the progression of keratoconus, using standard technique “epi - off”, after all patients were received detailed description above the disease evolution, the therapeutically possibility, steps and effects of the treatment. Analyze of the results was performed subtracted postoperatively recorders to preoperative values. The intervention was performed for patients with progressive keratoconus, with corneal thickness > 400 microns (μ), without scars, infectious and degenerative corneal disease or refractive keratotomy. Corneal scars, akiaia, history of herptic keratitis, pregnancy or autoimmune disease are contraindication for performing crosslinking. The intervention was performed under aseptic conditions. After topical anesthesia the epithelium was removed uniform, mechanic on 9 mm area. During 30 minutes it was instilled riboflavin 0.1% with Dextran T500 20% for diffusion in corneal stroma checked by using blue light filter Irradiation with ultraviolet light (UVA), wave-length of 370 nm was performed during 30 minutes. In this time it was instill riboflavin 0.1% at every 5 minutes (4, 5, 6). Postoperatively, after corneal washing it was applied a therapeutically contact lens and it was instilled antibiotic, non-steroid and artificial tears until epithelium healing. After that it was instill steroids during two weeks. Refraction, uncorrected visual acuity, best corrected visual acuity, slit-lamp examination, corneal topography, corneal thicknesses were monitories pre and postoperatively (6).

RESULTS

Demographic dates of these 45 cases with progressive keratoconus showed a mean age of 25.57 years (range 16 to 40 years) and male gender preponderance (male/female - 20/25). Intervention was performed unilateral for 21 patients and bilateral for 12 patients. The stadium distribution of keratoconus cases using Krumpeich criteria’s was: 5 cases with stadium I, 16 cases with stadium II, 7 cases with stadium III and 17 cases with stadium IV. Slit-lamp examination evidences Fleischer ring at 24.44% of cases, Voght’s striae at 28.86% of cases and both signs at 46.66% of cases.

After 5 years, spherical refraction presents an insignificantly decrease by a preoperatively average of - 4.79 dioptries (D) to a postoperatively average of - 4.32D (±0.97). Cylindrical refraction presents a significantly decreasing by a mean preoperatively – 5.28D to -3.64D (±1.22) postoperatively. For 37.77% of cases cylinder refraction decrease with more 2 D, for 35.55% of cases this parameter remained stable (Figure no. 1). Spherical equivalent (ES) decrease by a mean of - 7.34 D to -

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6.05 D (±1.17). ES remained stable for 46.66% of cases and decrease with more 2D for 22.22% of cases.

**Figure no. 1: Change of cylinder refraction**

In average uncorrected visual acuity (UCVA) was improved with one Snellen line by 0.28 to 0.37(±0.1). Preoperatively uncorrected visual acuity was range 0.03 to 0.8, postoperatively 0.05 to 1. For 6 cases was obtained a maximal uncorrected visual acuity after crosslinking (Figure no. 2). Correction of visual acuity pre and postoperative it was obtained wearing rigid contact lenses in the majority of cases. The average of these parameters was 0.91.

**Figure no. 2: Improvement of UCVA**

Corneal values on the highest refractive meridian (Kmax) present a mean regression by 1.79 D by 52.15 D preoperatively to 50.36 D (±1.66) postoperatively. For 42.22% of cases this parameter regresses with more than 2 D and for 37.77% of cases remained stable (Figure no. 3). The mean of corneal thickness increasing was 6.03 μ by 446.08 μ to 452.11 μ (±5.97).

**DISCUSSIONS**

The results of this study performed at 5 years after crosslinking showed the efficiency of intervention as method for stopping the keratoconus progression, proved in the specialty literature (1, 6).

The increasing effect of corneal resistance is obtained by stiffening and new covalent links binding between collagen fibrils after free oxygen radicals emitted by riboflavin under UVA light action(2). Explication for visual acuity improvement in some cases is the astigmatism regression and decrease of corneal values on the highest refractive meridian by regularization and corneal appplanation (3, 4, 5,). The maxim effect is obtained in the first 300 μ of corneal stroma due to UVA absorption by riboflavin in this area (2, 3).

**REFERENCES**

SECONDARY GLAUCOMA OR JUVENILE GLAUCOMA?

CASE PRESENTATION

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Keywords: myopic astigmatism, LASEK, glaucoma

Abstract: It shows a young man case (27 years old) with myopic astigmatism, who wants refractive surgery to get rid of diopters. In 02.2008 was practiced BE Laser Excimer (Lasek technique). At 5 months postoperatively develop a first episode of intraocular hypertension (values of 30-32 mmHg), considered cortisone glaucoma, issued under specific treatment. At 4 month after this event, presents tension values of 30-35 mmHg BE. It was instituted anti glaucoma therapy, under which there are at present.

Cuvinte cheie: astigmatism miopic, LASEK, glaucom

Rezumat: Se prezinta cazul unui tânăr, de 27 ani, cu astigmatism miopic compus, cu miopie medie, care dorește o operație de chirurgie refractivă pentru a scăpa de dioptrii. În 02.2008 a fost practicată AO: Laser Excimer (tehnica LASEK). La 5 luni postoperator a dezvoltat un episod de hipertensiune intraoculară (valori de 30-32 mmHg), considerat glaucom cortizonic, reținut sub tratament specific. La 4 luni după acest eveniment, prezintă cu valori tensionale de 30-35 mmHg AO. S-a instituit tratament anti glaucomatos, sub care se află și în prezent.

INTRODUCTION

Definitions:
- Cortisone secondary glaucoma: topical, intravitreal as well as high dose and long-term systemic corticosteroid therapy induces changes in the trabecular extracellular material (glycoproteins) which leads to decreased outflow facility.
- Primary juvenile glaucoma: form of primary open-angle glaucoma, with unknown etiology and onset tenth to 35th year of life.

AIM

To submit attention a unusual case in ethiopathogenic terms.

MATERIAL AND METHOD

It shows a young man case with myopic astigmatism, who performed LASEK surgery in 02.2008, and his postoperative evolution until present (10.2012).

Historical:
- 11.2007- first presentation in our clinic: request optical correction with CL.
- 01.2008- he want to get rid of diopters
- 19.02.2008– have practiced Laser Excimer (LASEK technique) BE: intra- and postoperative immediate evolution was favourable

Preoperative:
- VA: RE - 1cc -3.5dsf/-1.25dcyl ax 100
  LE -0,9cc -3.75dsf/-1.25dcyl ax 90
- Refraction: RE: -3.75dsf/-2dcyl ax 101
  LE: -4dsf/-1dcyl ax 71
- Cycloplegia: RE: -3dsf/-2dcyl ax 101
  LE: -3,75dsf/-1dcyl ax 75

- Biomicroscopy: BA- normal aspect; AC- deep, free
- IOP- normal
- Pachymetry: RE: 491μ
  LE: 500μ
- Number of cells: RE: 2852
  LE: 2775
- Keratometry: RE:K1=7,53; K2=7,42; AWG=7,48
  LE: K1=7,56; K2=7,48; AWG:7,52
- Diameters – corneal: RE: 11,9 mm
  LE: 12mm
  - pupillary:RE: 5,1mm
  LE: 5,3mm
- Optic disc aspect-BE- normal limits for myopic eyes

Corneal topography

Figure no.1: RE corneal topography

Figure no.2: LE corneal topography
Postoperative:
- Treatment: week 1: AB+AINS, artificial tears
  weeks 2-3: Maxidex+ artificial tears
  weeks 4-5: Flumetol+ artificial tears
- Controls - at 1, 3 and 7 days: favorable evolution
  - at 1 month (24.03): it found fine corneal haze (OS>OD) and decide to continue treatment with Maxidex 2 more weeks and stopped that with decreasing doses
  VA RE-1 without correction;
  VA LE-0,3 without correction; BVAC:1 with correction
  - 1dfs/0,5d cyl ax 30
  IOP- normal
  - at 3 months (4.06): corneal edema; restart treatment with Maxidex for 3 more weeks
  VA RE-1 and LE 0,7 without correction ( 1 with OC)
  IOP- normal

29.07.2008:
VA : RE -1 without correction
LE - 0,9 without correction ( 1 with OC)

IOP- 30-32 mmHg
Anterior pole- LE: fine brown endothelial precipitates, punctiform; reflexive semi-midriasis
  - RE-normal aspect
It was instituted antiglaucoma therapy (fix combination P-B).
Examine at 1 month- IOP was in normal limits (16-17mmHg).
At the next control, IOP being in normal limits too, the treatment was stopped (09.2008)

11.2008:
The patient contact us by phone for:
- embarrassment, ocular discomfort
  - red eyes
  - slight decrease of vision,
    asking if restart cortisone treatment .
  It’s called emergency to control, without following any treatment
  21.01.2009:
VA: RE-1 without correction
LE- 1 with correction -1dfs

IOP RE: 30mmHg
IOP LE: 34mmHg
Anterior pole: BE -fine endothelial edema
  LE: brown punctiform endothelial precipitates, reflexive semi-midriasis (the same from 07.2008)
Gonioscopy: BE – open angle grade IV

OPTIC DISC: CDR – RE:0,4-0,5
  LE:0,7-0,8
It’s started antiglaucoma tripletherapy: IAC-B +P
At 1 month: IOP: 12-13 mmHg (under treatment)
Perimetry- 03.2009

RESULTS
Until 01.2011, IOP was variation between 12 and 30mmHg (by neglecting the treatment and the controls).
From 01.2011 until present, IOP was maintained between 13-16 mmHg under treatment:
RE: prostaglandin
LE: prostaglandin-β blocker (FC)
In present:
VA BE – 1 without correction
Refraction- RE:0/0,5d cyl ax 80
  LE: 0/0,5d cyl ax 20
BE IOP: 14-16 mmHg(under treatment)
  -adjusted: 17,5-19,5mmHg
Keratometry: RE: K1=8,02; K2=7,94; AVG=7,98
LE: K1=8,03; K2=8,01; AVG=8,02

Pachymetry: RE=427μ
LE=464μ

Number of cells: RE=2724
LE=2896

Optic nerve: CDR - RE: 0,5-0,6
- LE: 0,8

Perimetry 09.2012:

Figure no. 5: RE Perimetry

OCT 10.2012

Figure no. 7: OCT LE and RE

Figure no. 8: RE Pachimetry

Figure no. 9: LE Pachimetry
Cortisone secondary glaucoma: -therapeutic context, myopic patients are considered high- responders at cortisone
-similar situations (surgery, topical treatments) that favored the onset and simultaneous evolution of the disease to BE.
-anamnestic: stable values of the refraction
-no family history
-absence of clinical and paraclinical signs (performed)

Primary juvenile glaucoma:
- Age
- myopic astigmatism
- rapid evolution of perimetry defects
- bilaterality
- follow the same therapeutic scheme with the patients who had similar postoperative (LASEK) evolution

CONCLUSIONS
- However of de etiopathogenesis, the case is difficult like is the patient to-he understand very hard disease severity, reason for neglecting initial the treatment and the periodical controls, permanent monitoring, tonometry and perimetry, being very important.
- Maintaining of safe IOP value is the purpose of actual treatment. In present, the topical treatment is effective, but in the future (probably near) a laser procedure and/or surgery will be required.
- But the most important conclusion is that the patient’s visual future, especially of LE, is reserved

BIBLIOGRAPHY
PRELIMINARY RESULTS IN TRANSEPIHELIAL CORNEAL CROSINGLINING

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Keywords: Keratoconus, crosslinking, transepithelial, progression, corneal topography

Abstract: Keratoconus is a progressive disorder in which the structural changes in the corneal stroma lead to stromal thinning and a conical shape of the cornea. Transepithelial crosslinking represents an alternative to the classic therapy with its implicit disepithelialization prior to administration of the photosensitizing agent and ultraviolet irradiation. The aim of the study is to show the efficiency of this technique and to demonstrate its advantages. We studied 13 eyes treated in the Ophthalmology Clinic Sibiu. The patients were followed by corneal topography pre and post intervention. Transepithelial crosslinking using Ricrolin TE is an efficient technique in stabilizing the progression of keratoconus. This technique offers multiple advantages for the doctor and for the patient and it also represents a solution for the advanced cases of keratoconus.

Cuvinte cheie: Keratoconus, crosslinking, transepithelial, progresie, topografie corneană.

Rezumat: Keratoconusul este o afecțiune corneană progresivă în care modificările structurale de la nivelul stromei corneene duc la subțierea ei și la o formă conică a corneei. Crosslinking-ul transepitelial reprezintă o alternativă la terapia clasicea care presupune îndepărtarea epitelului cornean înaintea administrației agentului fotosensibilizant și expunerea la radiații ultraviolete. Scopul lucrării este de a arăta eficacitatea acestei tehnici și de a demonstra avantajele ei. Am lucrat în studiu un număr de 13 ochi tratați în cadrul Clinicii Oftalmologie Sibiu. Pacienții au fost urmăriți topografic și post intervenție. După analiza rezultatelor topografice am concluzionat că crosslinkingul transepitelial folosind Ricrolin TE este o tehnică eficientă în stabilizarea progresiei keratoconusului. Această alternativă terapeutică oferă multiple avantaje atât medicului cât și pacientului și reprezintă o soluție și pentru stadiile avansate de keratoconus.

INTRODUCTION

Keratoconus is a progressive disorder in which the cornea assumes a conical shape secondary to stromal thinning. Table no.1: Keratoconus stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Eccentric steepening. Induced myopia and/or astigmatism of &lt;= 5.00 D K-reading &lt;= 48.00 D Vogt’s lines, typical topography</td>
</tr>
<tr>
<td>II</td>
<td>Induced myopia and/or astigmatism &gt; 5.00 to &lt;= 8.00 D K-reading &lt;= 53.00 D Pachymetry &gt;= 400 µm</td>
</tr>
<tr>
<td>III</td>
<td>Induced myopia and/or astigmatism &gt; 8.00 to &lt;= 10.00 D K-reading &gt;= 53.00 D Pachymetry 200 to 400 µm</td>
</tr>
<tr>
<td>IV</td>
<td>Refraction not measurable K-reading &gt; 55.00 D Central scars Pachymetry &lt;= 200 µm</td>
</tr>
</tbody>
</table>

The typical onset of the disease is around puberty it shows a slow progression until the third or fourth decade of life, when it usually arrests. The disorder is bilateral in 85% of cases, asymmetric and more frequent in men. (1, 2) Keratoconus is divided into four stages, according to the values of induced myopia, k-readings, corneal pachymetry and clinical findings (table 1). (3)

There are two treatment objectives in this disease: stopping progression and restoring visual acuity. Transepithelial crosslinking (TE-CXL) is an innovative approach to the treatment of keratoconus and other corneal ectasias used for stopping progression. It is an alternative to the standard treatment protocol which involves the removal of the corneal epithelium before the Riboflavin application. (4, 5). The goal of the treatment is to halt progressive and irregular changes in corneal shape. (6, 7) The procedure involves using a harmless substance (riboflavin contained in Ricrolin TE) to create a chemical reaction within the corneal stroma. This reaction is triggered by low intensity UVA irradiation and results in the formation of high strength covalent bonds between the collagen fibres. As a consequence the collagen in the corneal stroma is reorganised in a more compacted way resulting in an increase in corneal biomechanical strength. (8, 9)
The aim of the study was to evaluate the early clinical effects of this technique in patients with progressive keratoconus as well as the eventual side-effects of this technique.

MATERIAL AND METHOD

This study is a retrospective one in which we studied 13 eyes of 9 patients with a history of progressive keratoconus. The patients were followed by corneal topography pre and post intervention in the Ophthalmology Clinic Sibiu. The procedure consisted of: Pilocarpine instillation 30 minutes prior to the irradiation. Ricrolin TE instillation one drop every two minutes for 30 minutes prior to the irradiation, topical anesthetic one drop every four minutes at the beginning and again just before irradiation, UVA irradiation for 30 minutes – 6 steps of 5 minutes, Ricrolin TE at the beginning of each step. After the procedure was finished a therapeutic contact lens (TCL) was applied in all cases, which was removed after 2-4 days, and the patient was instructed to use artificial tears.

RESULTS

9 out of the total of 13 eyes presented KC stage I or II with a cornea >400 microns, while 4 eyes presented KC stage III (figure 1).

Figure no.1: Keratoconus stages of the 13 eyes

The topography performed at four months post-treatment showed a slight decrease of mean K-readings in the majority of eyes, with a mean of 0.48 D. Out of the 13 eyes just one eye (stage III) showed KC progression with an increase of about 1 D in the mean K-readings (Figure 2).

Figure no 2: Evolution of mean K-readings at four months post-treatment

Regarding visual acuity (VA) we found no significant change after treatment. In order to restore VA, at four months post TE-CXL, seven eyes were fitted with RGP contact lenses, RK2 design and RK2 PG, thus increasing considerably the visual acuity.

None of the patients presented with any complication related to the procedure, except a slight hyperemia of the conjunctiva the day of the procedure. The TCL was removed 3-4 four days after the procedure in all cases.

CONCLUSIONS

Because 12 eyes showed a slight decrease of mean K readings at 4 months we conclude that TE-CXL may be an effective method to treat progressive KC. This procedure might be more effective when used in early stages of KC because the case that showed progression at four months was KC stage III. Although its efficacy remains to be determined in these cases, TE-CXL can be used safely also in special cases such as those with pachymetry < 400 microns.

TE-CXL is a safe method to treat KC, it is repeatable and it avoids the complications due to de-epithelisation. Thus the patients experienced no post-treatment pain and no deterioration of VA following the procedure.

Although the preliminary results seem promising, these cases need to be followed over a longer period of time (more than two years) in order to safely evaluate the technique’s efficiency.

REFERENCES

7. Refractive and topographic results of transepithelial crosslinking treatment in eyes with intacs; Ertan A., Karacal H; Cornea 2009 aug; 719-23
OSDI QUESTIONNAIRE ANALYSIS IN PATIENTS WITH SJÖGREN’S SYNDROME

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Keywords: Sjögren’s syndrome, OSDI questionnaire

Abstract: This paper presents the OSDI questionnaire’s results in patients with Sjögren's syndrome. Three groups of questions were analyzed separately: visual-related function, ocular symptoms, and environmental triggers. The data obtained were correlated with clinical signs assessed by a series of clinical tests (TBUT, Schirmer test, vital stains).

Cuvinte cheie: sindromul Sjögren, chestionarul OSDI

Rezumat: Lucrarea prezintă rezultatele obținute la chestionarul OSDI la pacienții cu sindrom Sjögren. Au fost analizate separat cele trei grupe de întrebări: legate de funcția vizuală, legate de simptomele oculare și cele legate de factorii de mediu. Datele obținute au fost corelate cu semnele clinice evaluate printr-o serie de teste clinice (TBUT, testul Schirmer, coloranții vitali).

INTRODUCTION

Sjögren’s syndrome (SS) is one of the major causes of dry eye. SS is an autoimmune disease characterized by the appearance of inflammatory cell infiltration in lacrimal and salivary glands responsible for oral and ocular dryness and the production of autoantibodies. To determine the severity of dry eye syndrome and the effectiveness of the treatment several questionnaires can be used. OSDI questionnaire (Ocular Surface Disease Index) assesses severity of dry eye symptoms, their frequency of occurrence and impact on visual-related function.

AIM

The paper’s aim is to determine the possible correlations between the severity of the symptomatology, assessed by OSDI questionnaire, and the clinical signs evaluated through a series of objective tests (TBUT, Schirmer test, vital dyes).

MATERIAL AND METHOD

We studied 61 patients with moderate and severe dry eye (1), diagnosed with Sjögren’s syndrome. The OSDI questionnaire was applied to them; the tear film (Schirmer I test, TBUT) and the ocular surface integrity (fluorescein staining) were evaluated.

OSDI questionnaire has 12 questions and includes three subscales: A- evaluation of the ocular discomfort (symptoms such as gritty or painful eyes, light sensitivity), B - the assessment of visual function (measures limitation in performance of current activities such as reading, computer use, driving), C – which evaluate the impact of environmental factors on dry eye (e.g., exposure to wind or air conditioning). The OSDI score was calculated based on the answers of the patients using the formula:

$$\text{OSDI score} = (A+B+C) \times 25/N$$

(N = number of questions answered) (2)

Schirmer test without anesthesia was performed by inserting a strip of filter paper into the inferior fornix for 5 minutes, and measuring the extent of wetting.

Tear film instability was assessed by measuring the tear film breakup time (TBUT). Fluorescein dye was instilled into the inferior fornix. Using the cobalt blue filter and the slit lamp biomicroscopy, the time required for the first area of tear film breakup after a complete blink was determined.

Oxford grading scheme was used to evaluate the corneo-conjunctival staining after instillation of fluorescein. The Oxford score includes six severity levels, from 0 to V, depending on the intensity of staining. (3)

RESULTS AND DISCUSSION

The results for OD (61 eyes) showed significant correlation between the OSDI A subscore and OSDI total score, and clinical tests values. A weaker correlation was obtained between OSDI subscore C and TBUT values. There was a lack of correlation between OSDI subscore B and clinical tests results. (Fig. 1,2,3)

Figure no. 1 Correlations: OSDI scores – Schirmer test OD
We obtained similar results for OS (60 eyes). (Fig. 4, 5, 6) According to the literature, OSDI score correlate well with TBUT, fluorescein staining, and less with Schirmer test values. (4) Our results showed a good correlation between OSDI score and both Schirmer test and fluorescein staining values. On the other hand, we didn’t found a good correlation between TBUT values and symptomatology, contrary to literature data. (5) Among the OSDI subscores, we found a better correlation between OSDI A subscore and clinical signs. (4)

CONCLUSIONS
Fluorescein staining and Schirmer test values correlate well with OSDI scores.
There is a better correlation between the OSDI total score and clinical signs.
We found a good correlation between objective clinical signs and patient symptoms (OSDI A), but a lack of correlation with visual-related function (OSDI B).

REFERENCES
2. allerganwww.dryeyezone.com/documents/osdi.pdf
3. www.academyofvisioncare.com
IMPROVEMENT OF CORNEAL SURFACE BY COMBINED PROCEDURE TOPOGRAPHY-GUIDED CROSS-LINKING IN KERATOCONUS

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Keywords: keratoconus, Topo-guided, Crosslinking

Abstract: Purpose: Considering cases in stages II-III of keratoconus treated by combined procedure Topo-guided-Crosslinking Methods: Analyzing topographies pre / postoperative (at 3 months), k values , the center, corneal elevation and functional visual acuity with / without correction Results: there was an improvement in terms of topographic elevations, in some cases with a slight decrease of spherical equivalent and best corrected visual acuity. Conclusions: It is a relatively new technique in the world (about 2 years old). Being the first approach at national level, we need minimum 2 years follow-up

AIM

To evaluate a series of patients diagnosed with keratoconus stage I-III, that underwent the Athens protocol: Topography-guided photorefractive keratectomy (PRK) followed by sequential corneal collagen cross-linking (CXL) in the same procedure.

MATERIAL AND METHOD

We analysed 6 cases of KC stage I-III, between 19-36 yrs. We performed Topoguided transepithelial PRK (wavelight Allegroto) immediately followed by mitomycin C 0.02%,20 sec (over the ablated tissue) and CXL 3mW/cm² x 30 min using 0.1% topical riboflavin sodium phosphate (no more than 50 microns ablation).

After we used topical antibiotics, anti-inflammatory (1-2 month) and CL (3-5 days).

We compared UCVA, BCVA, manifest refraction, spherical equivalent, keratometry, central corneal Pachymetry (US), corneal topography- anterior elevation (Oculus pentacam) and mean follow-up was 3 month (1.5-5 mnth).

Results: 1 case lost 2 lines (Snellen chart),2 cases were unchanged (UCVA), 3 cases gained UCVA, (2 cases 5-6 lines), 5 cases gained BCVA,BCVA- 18/20 in 1 case, 20/20 in 1 case.

Figure no. 1: UCVA pre and postoperatively

Figure no. 2: BCVA pre and postoperatively
Figure no.3: Km pre and postoperatively

Figure no.4: SE pre and postoperatively

Figure no.5: Front Elevation pre and postoperatively

Figure no.6: Pre and postoperative Corneal Topography, case 1

Figure no.7: Ablation profile - case 1

Figure no.8: Pre and postoperative Corneal Topography, case 2

Figure no.9: Ablation profile - case 2

Figure no.10: Pre and postoperative Corneal Topography, case 3
Figure no. 11: Ablation profile - case 3

Figure no. 12: Pre and postoperative Corneal Topography, case 4

Figure no. 13: Ablation profile - case 4

Figure no. 14: Pre and postoperative Corneal Topography, case 5

Figure no. 15: Ablation profile - case 5

Figure no. 16: Pre and postoperative Corneal Topography, case 6

Figure no. 17: Ablation profile - case 6
K values and spherical equivalence were slightly decreased in 5(K)/4(SE) cases. Anterior Elevation slightly decreased in all cases analyzed (3-27 microns). Pachymetry less/equal than it was calculated for ablation. Corneal haze grade 1-2 was observed in all cases at 1 month and reduced significantly with time. Topographic maps was improved in all 6 cases analyzed.

**CONCLUSIONS**

Combined TopoGuided PRK & CXL appear to be effective in management of keratoconus (stg I-III) patients. Predictability is difficult to assess at this moment.

The desired effect of CXL appears later than 3-6 months.
COMPARATIVE RESULTS IN A COMBINED PROCEDURE OF INTRASTROMAL CORNEAL RINGS IMPLANTATION AND CROSSSLINKING IN PATIENTS WITH KERATOCONUS

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Abstract: Purpose: to compare the effectiveness of combined procedures: intrastromal corneal ring implantation followed by crosslinking, with crosslinking followed by intrastromal corneal ring implantation, results based on refractometry, keratometry and function after 1 year from the procedures. Materials and methods: The study comprised 2 groups of patients with different stages of keratoconus, which met the eligibility criteria for intrastromal corneal ring segment implantation and corneal collagen crosslinking. Group 1 included patients (41 eyes) who underwent intrastromal corneal ring implantation followed by crosslinking and group 2 (30 eyes) included patients who underwent crosslinking first followed by intrastromal corneal ring implantation. Results: it was observed a decrease in K values about 1.5 D and refraction in group 1, compared to a decrease in K values about 1 D and refraction, in group 2. Recovery of visual acuity was higher in group 1 than group 2. Conclusions: the sequence of intrastromal corneal ring implantation followed by crosslinking proved to be more effective in reducing K values, spherical equivalent and cylinder compared with crosslinking followed by intrastromal corneal ring implantation.

Keywords: keratoconus, crosslinking, corneal ring

Cuvinte cheie: keratoconus, crosslinking, inele intracorneene

Rezumat: Scopul: de a compara eficiența procedeelor combine: inele intracorneene și crosslinking cu procedura inversă: crosslinking urmat de inele intracorneene, privind rezultatele refractometrice, keratometrice și funcționale după 1 an de la efectuarea procedurilor la pacienții cu keratoconus. Material și metodă: s-au luat în studiu un număr de 2 loturi de pacienți cu diferite stadii evolutive ale keratoconusului, care au întrunit criteriile de eligibilitate pentru tehnică crosslinking și inele intracorneene. Lotul 1 a cuprins pacienți (41 ochi) la care s-a efectuat inele intracorneene urmate de crosslinking, iar lotul 2 (30 ochi) a beneficiat inițial de crosslinking, urmat de inele intracorneene. Rezultate: s-au evidențiat reduceri ale K-urilor de ~1,5 D și ale refracției oculare în lotul 1, comparativ cu reduceri ale k-urilor de ~1 D și refracții oculare la lotul 2. Recuperarea acușății vizuale a fost superioară la lotul 1 comparativ cu lotul 2. Concluzii: succesiunea inele intracorneene urmate de crosslinking s-a dovedit a fi mai eficientă privind reducerea K-urilor, echivalentului sferic și cilindrilui comparativ cu efectuarea crosslinkingului urmat de inele intracorneene.

AIM

To compare the effectiveness of combined procedures: intrastromal corneal ring implantation followed by crosslinking, with crosslinking followed by intrastromal corneal ring implantation, results based on refractometry, keratometry and function after 1 year from the procedures.

MATERIAL AND METHOD

The study comprised 2 groups of patients with different stages of keratoconus. The 2 groups met the eligibility criteria for intrastromal corneal ring segment implantation and corneal collagen crosslinking.

Group 1 included eyes (41 eyes) who underwent Intrastromal corneal ring implantation followed by crosslinking

Group 2 (30 eyes) included patients who underwent crosslinking first followed by intrastromal corneal ring implantation.

The inclusion criteria were:

- patients between 15 – 54 years of age
- both genders
- diagnosed with keratoconus – stage 1,2,3,3/4
- average corneal thickness of at least 400µm
- transparent cornea
- intolerance of contact lenses

The exclusion criteria were:

- patients with an average corneal thickness lower than 400µm
- Vogt striae
- herpetic keratitis or/and other active ocular infection
- patients with severe dry eye or aphakia

The ocular exam included:

- uncorrected and best corrected visual acuity
- ocular refraction and keratometry
- slit lamp examination
- intraocular pressure measurement
- pachymetry
- corneal topography (Pentacam)
- endothelial corneal cell count

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The intracorneal ring implantation (ICR) technique begins with topical anesthesia followed by central corneal marking, corneal incision on the steepest meridian, stromal delamination, introduction of intrastromal rings and instillation of antibiotics and steroids.

The crosslinking (CXL) technique consisted in:
- Topical anesthesia with Benoxi– 3-4 drops, 15-20 min before CXL;
- removal of the corneal epithelium about a diameter of 9 mm and instillation of a drop of benoxi;
- instillation of riboflavin 0.1% every 3 min for 30 min before the irradiation;
- irradiation of the central deepithelialized cornea through the CMBX linker and instillation of riboflavin 0.1% every 3 min – 30 min;
- instillation of ofloxacin and indocolyr;
- therapeutic contact lens for 3–4 days after the procedure.

Follow up was after 24, 48, 72 and the patients were treated with instillation of antibiotics, steroids and artificial tears for 2,3 months. Check up was at 1, 3, 6, 12 months regarding the visual acuity, keratometric data, spherical equivalent and cylinder.

**RESULTS**

Regarding the sex distribution in our groups, in the first group the majority were male and in the second group the majority were female.

Most people were around 21–40 years old in both groups.

The most frequent stage of keratoconus was in II/III the first group (Fig.1), I/II and III in the second group (Fig.2).

**Figure no.1: Group 1(ICR+CXL) - Stage of keratoconus**

The difference between preop Spherical Equivalent (SE) and 12 months SE was 1.68 D in the first group. In the second group the difference between the two SE was 1.07 D. P value was statistically significant at 1 month in both groups. (p=0.0003) (Fig.3 and Fig.4)

**Figure no.3: Group 1(ICR+CXL) –Spherical Equivalent**

The difference between preop Cylinder (Cyl) and 12 months Cyl was 1.11 D in the first group (p=0.0001). In the second group the difference between the two Cyl was 0.91 D. P value was statistically significant at 3 months in the first group and at 6 months in second group (p=0.0036) (Fig.5 and Fig.6)

**Figure no.4: Group 2(CXL+ICR) Spherical Equivalent**

The difference between preop Keratometry (Km) and 12 months Km was 2.4 D in the first group (p=0.003). In the
second group the difference between the two Km was 1.2 D (p=0.017). P value was statistically significant at 6 months in both groups. (Fig 7 and Fig 8)

Figure no.7: Group 1 (ICR+CXL) - Keratometry

![Group 1 (ICR+CXL) - Keratometry](image)

Figure no.8: Group 2 (CXL+ICR) – Keratometry

![Group 2 (CXL+ICR) - Keratometry](image)

Regarding the uncorrected visual acuity (UCVA), P value at 12 months in the first group was statistically significant (p=0.0001264332), as in the second group (p=0.00569458). As we can see, the p value is more significant in the first group (Fig.9, Fig. 10, Fig.11 and Fig.12)

Figure no.9: Group 1 (ICR+CXL) Uncorrected Visual Acuity

![Group 1 (ICR+CXL) Uncorrected Visual Acuity](image)

Figure no.10: Group 2 (CXL+ICR) Uncorrected Visual Acuity

![Group 2 (CXL+ICR) Uncorrected Visual Acuity](image)

In the first group the majority gain 2 Snellen lines of UCVA (Fig.13) and in the second group they gain 0 and 1 Snellen lines of UCVA (Fig. 14).

Figure no.11: Group 1 (ICR+CXL) Uncorrected Visual Acuity

![Group 1 (ICR+CXL) Uncorrected Visual Acuity](image)

Figure no.12: Group 2 (CXL+ICR) Uncorrected Visual Acuity

![Group 2 (CXL+ICR) Uncorrected Visual Acuity](image)
Regarding the best corrected visual acuity (BCVA), P value at 12 months in the first group was statistically significant ($p=0.0000169758$), as in the second group ($p=0.00267655$). As we can see, the P value is more significant in the first group (Fig.15, Fig. 16, Fig.17 and Fig.18).

In the first group the majority gain 4 Snellen lines of BCVA (Fig.19) and in the second group they gain 2 and 4 Snellen lines of BCVA (Fig. 20).
Figure no.20: Group 2 (CXL+ICR) BCVA Snellen lines gain

DISCUSSIONS

Brian Bexler Wacheler [1] says that there is a statistically greater reduction in cylinder and K values in the Intacts with CXL group, compared with Intacts only group.

The increased effect in addition of CXL is caused by two facts: both procedures cause corneal flattening and the channel created for Intacs [2,3,4] insertion may result in localized pooling and concentration of the riboflavin around the Intacs segment.

Corneal collagen change after CXL increased overall biomechanical rigidity by 4.5 times and the placement of Ferrara rings may modify the pattern and distribution of collagen changes for the enhanced effect[5,9,10].

New collagen formation was observed round the Intacs formation; this new fibers may become thicker over time as CXL leads to collagen fiber thickening [6,7,8] that may contribute to a greater contracture and "pulling back" of the conus [11,12,13].

CONCLUSIONS

The sequence of Intrastromal corneal ring implantation followed by crosslinking proved to be more effective in reducing K values, spherical equivalent and cylinder compared with crosslinking followed by Intrastromal corneal ring implantation.

REFERENCES

7. Leibowitz, H.M. "Keratoconus." Corneal Disorders: Clinical Diagnosis and Management. Ch. 4. W.B. Saunders Co
KERASOFT 3 IN CORRECTION OF KERATOCONUS

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Keywords: keratoconus, Kerasoft

Abstract: to evaluate the indications, advantages and functional results of keratoconus correction with contact lens Kerasoft 3. Material and method: we studied 30 eyes of 15 patients with keratoconus different stages (I, II or III). The ocular exam before fitting consists: visual acuity with and without correction, ocular refraction, keratometry, corneal topography (Pentacam) and pachymetry. The choice of the contact lens depends on the stage of keratoconus. After 30 minutes with the contact lenses on the eye we checked the visual acuity, mobility of the lens, overrefraction and the comfort of the patient. Results: the majority of cases fitted with Kerasoft contact lenses were with keratoconus stage III/III. They were used in 10 eyes with keratoconus without any further treatments, in 10 eyes after crosslinking, in 4 eyes after intracorneal rings and in 6 eyes after crosslinking and intracorneal rings. The visual acuity with the contact lens was much better comparative with the visual acuity corrected by glasses (p<0.0351). It was maximum in 16 eyes, between 0.4-0.7 in 10 eyes and in 4 eyes between 0.2-0.4. Conclusion: Kerasoft 3 represents a modality to correct the visual acuity in keratoconus patients. The advantages offered by this lens are: short time of fitting, comfort and superior visual outcomes comparing with glasses correction.

Cuvinte cheie: keratoconus, Kerasoft

Rezumat: Scopul lucrării: de a evalua indicațiile, avantajele și rezultatele funcționale în ceea ce privește corecția keratoconusului cu lentile de contact Kerasoft 3. Material și Metod: am studiat 30 de ochi de la 15 pacienți cu keratoconus în stadii diferite (I, II sau III). Examenul ocular înaintea utilizării lentililor a constat în: acuitate vizuală cu și fără corecție, refracție oculară, keratometrie, topografie corneeană (Pentacam) și pachimetrie. Alegerea lentililor de contact s-a făcut în funcție de stadiul keratoconusului. După 30 de minute de la aplicarea lentililor de contact am verificat acuitatea vizuală, mobilitatea lentililor, overrefraction și confortul pacientului. Rezultate: majoritatea cazurilor tratate cu lentile de contact Kerasoft 3 aparțineau stadiilor II/III de keratoconus. Acestea au fost utilizate în 10 cazuri la pacienți diagnosticăți cu keratoconus fără alte tratamente anterioare, la 10 cazuri după crosslinking, la 4 cazuri după implantarea de inele intracorneene și la 6 cazuri după crosslinking și inele intracorneene. Acuitatea vizuală cu lentile de contact a fost mult mai bună comparativ cu acuitatea vizuală aeriană (p<0,0351). A fost maximă în 16 cazuri, între 0,4-0,7 în 10 cazuri și în 4 cazuri între 0,2-0,4. Concluzii: Kerasoft 3 reprezintă o modalitate de corecție a acuității vizuale la pacienții diagnozați cu keratoconus. Avantajele oferite de aceste lentile sunt: perioadă scurtă de acomodare, confort și acuitate vizuală superioră comparativ cu cea aeriană.

AIM

To evaluate the indications, fitting, advantages and functional results of correction of keratoconus with Kerasoft 3 contact lenses.

MATERIAL AND METHOD

We studied 30 eyes from 18 patients diagnosed with keratoconus in different stages of evolution. Ocular exam consisted in:
- visual acuity (VA) without and with the optimal correction,
- ocular refraction and keratometry,
- corneal topography (Pentacam),
- pachymetry (Optical, Ultrasound).

Steps in choosing the proper CL for trial: keratometry, stage of keratoconus:
- Early (7-7,4 mm): -2D or plano, Rc 8,6, diameter 14,5;
- Moderate (6,6-7 mm): -6/-4D, Rc 8,4, diameter 14,5;
- Advanced (6,2-6,6 mm): -10/-8D, Rc 8,2, diameter 14,5;
- Very advanced (>6,2 mm): -14/-12D, Rc 8, diameter 14,5.

After 30 minutes with the contact lens on the eye, rechecking: VA, contact lens mobility, comfort. After 3 months of wearing contact lenses, reevaluation (VA, overrefraction, mobility, comfort), prescription of the final contact lens

 Evaluated parameters were: age, gender, fitting cases concording the keratoconus stages, associated treatments (Cross-linking).

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linking, Ferrara rings), VA with CL correction comparative with the glasses correction.

RESULTS

1. According the age, we observed a predominant age between 21-30 years. (Fig.1).

Figure no. 1: Cases repartition concord the age

2. We observed in our case a predominance of males (22 eyes) than women (8 eyes). (Fig. 2)

Figure no.2: Gender distribution

3. Regarding the stage of keratoconus, the most frequent stages were II/III (19 eyes). (Fig. 3)

Figure no.3: Stage of Keratoconus

The treatment of keratoconus consisted in crosslinking in 6 cases, implantation Ferrara rings in one case, and in 4 cases both procedures were applied. The remaining 16 eyes have not undergone any kind of therapy, (Fig. 4).

Figure no.4: Types of treatment

5. Best corrected visual acuity with LC Kerasoft 3 was significantly better than best corrected visual acuity with glasses. (P <0.0351). (Fig. 5)

Figure no.5: VA before and after using CL

We will present some cases:

I. First one, the case of S.D., male, 30 years old, psychologist, caucasian

Reason for ophthalmological assessment was decreased VA at distance with his glasses.

History: At 20 years old, the first correction (BE: -0.75 D) Later on the correction included cylinder. His last correction was: RE:-1.25 / -1.25 x 45° LE:-1.75 / -1.50 x 125°.

VA RE: 0.9 – 1.0 w.c -2.75 / -1.75 x 45° VA LE: 0.6 – 0.7 w.c.-2.75/-2.00 x 130°. Slit lamp examination BE: clear cornea, normal anterior segment Fundus examination BE normal, IOP RE:18 mmHg, LE:17 mmHg. Refraction with cycloplegia RE:-2.25-1.73x 43°, LE: -3 -2x137°, without cycloplegia RE: -2.75/-2x 46°, LE:-3.50/-2.50x131°, keratometric measurements RE:7.62 26° 7.09 116°, LE:7.33147° 6.8 57°. Corneal topography revealed keratoconus stage I BE (Fig.6 and Fig. 7).

Figure no. 6:- Oculus Pentacam RE
The positive diagnostic was BE: Early Keratoconus (1st. Degree) and the differential diagnostic was made with congenital myopic astigmatism (corneal topography) and other corneal ectasia.

Management - options included glasses correction (not very satisfied), Silicone-Hydrogel Contact Lens correction, Cross-Linking UV-riboflavin, intracorneal rings.

We used a pair of lenses with Silicone-Hydrogel CL: VA RE = 0.8 VA LE = 0.7 – 0.8 (KERASOFT TM 3 trial lenses - 2D 8.6 mm 14.5 mm) and we obtained good mobility, very good comfort and no bubbles. After 3 months of wear (to allow the lens to settle → to ensure Rc is correct), with the Silicone-Hydrogel CL:

VA RE: 0.8 VA LE: 0.7 – 0.8, Over refraction RE:
+0,25 -1 x 38° LE: 0.00 -1,50 x138°, VA RE:1 plus cyl – 0,75 x 40°, VA LE: 1 plus cyl – 1.50 x 140°. Once the over refraction is established → final order: RE: 8,60/14.50/-2.0 -0.75x 40° LE:8,60/14.50/-2.00 -1.50x 140°, VA RE:1, VA LE:1.

2. Case 2: L.I., male, 37 years old, driver, Caucasian. Reason for ophthalmological assessment: decreased VA at distance with his glasses.


History: at 25 years old, the first correction (unknown). Later on the correction included cylinder. His last correction was: RE: -0.50 LE: -3.00/2.50 x 170°. VA RE: 1.0 w.c.-0.50, VA LE: 0.6 w.c.-2.00/2.50 x 170°. Slit lamp examination BE: clear cornea, normal anterior segment Fundus examination BE: normal, IOP RE:18 mmHg, LE:17 mmHg. Refraction with cycloplegia RE:-0.75 -0.75x147°, LE:-2.50-3.25x 75°, without cycloplegia RE:-0.75 , -0.75 147°,

LE: -3.00 -3.75 x75°, keratometric measurements RE: 7,42 141° 7,33 51°, LE:6,71 167° 7,08 77°.

Conical topography revealed keratoconus RE: Early Keratoconus (1st. degree), LE: 2nd stage Keratoconus. (Fig. 8, Fig. 9).

Figure no. 7:- Oculus Pentacam LE

Figure no. 8 Oculus Pentacam RE

Positive diagnosis was RE: Differentiel diagnosis was made with congenital myopic astigmatism (corneal topography) and other corneal ectasia.

Management options included glasses correction (not very satisfied), Silicone-Hydrogel Contact Lens correction, Cross-Linking UV-riboflavin, intracorneal rings. We used a pair of lenses with Silicone-Hydrogel CL: VA RE = 0.8 VA LE=0.7 – 0.8 (KERASOFT TM 3 trial lenses - 2D 6 mm 14.5 mm) and we obtained good mobility, very good comfort and no bubbles. After 3 months of wear (to allow the lens to settle → to ensure Rc is correct), with the Silicone-Hydrogel CL: VA RE = 0.8 VA LE = 0.7 – 0.8, refraction LE = +0.75/-1.25x5°, VA LE: 1. Once the over refraction is established → final order: RE:8,6/14.50/-2.00 -0.75 x40°, LE:8,60/14.50/-2.00 -1.50x 140°, VA RE:1, VA LE: 1.

3. The last case 3: G.A. male, 21 years old, student, Caucasian. Reason for ophthalmological assessment: decreased VA at distance with his glasses.

History: At 16 years old, the first correction (unknown). Later on the correction included cylinder. His last correction was: RE: -3.00/-2.50x 50 °, LE:-6.00/-3.00x150 °. VA RE 0.5 w.c.-3.00/2.50 x50°, VA LE 0.3 w.c.-6.00/-3.00 x 150°. Slit lamp examination BE: clear cornea, normal anterior segment. Fundus examination BE: normal, IOP RE:18 mmHg, LE:17 mmHg. Refraction with cycloplegia RE:-3.50-2.75x 47°, LE: -6.00 -3.00x150°, without cycloplegia RE:-3.75-3.00x47°, LE: -6.25 x 3.00 150° keratometric measurements RE:7,09 40° 6,67 130°, LE: 6.85 155° 6,40 65°. Conical topography revealed BE: 2nd Stage Keratoconus. (Fig. 10, Fig. 11)

Figure no.10:- Oculus Pentacam RE

Figure no.11:- Oculus Pentacam LE

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(corneal topography) and other corneal ectasia. Management - options included glasses correction (not very satisfied), hard CL intolerance, Silicone-Hydrogel Contact Lens correction, Cross-Linking UV-riboflavin, intracorneal rings.

We used a pair of lenses with Silicone-Hydrogel CL: VA RE = 0.8 VA LE = 0.7–0.8 (KERASOFT TM 3 trial lenses-2D 8.6 mm 14.5 mm) and we obtained good mobility, very good comfort and no bubbles.

DISCUSSIONS

CL Keralens indications in Keratoconus stage I, II, III [1,2,3], hard CL intolerance[4,5,6], after Cross linking[16,17] and Ferrara rings[12,13,14,15]. Caracteristics of Keralens are: Silicon Hidrogel, 74% water content, DK 60 x 10^{-11}, large dioptre spectrum, 3 monthly wear.

Advantages are: simple fitting, excellent comfort, very good tolerance, good mobility.[7,8,9,10,11].

1. Kerasoft 3 SiH CL provides many of the benefits of RGP lenses, (avoiding RGP’s discomfort and allergic reactions), along with excellent comfort, visual acuity, high oxygen permeability and longer wearing times.

2. This new SiH CL offers a solution regarding the mechanical stress of the cornea, a major contributing factor to keratoconus.

3. The SiH Kerasoft 3 provides a very important opportunity for ophthalmologists to overcome the many difficulties of fitting keratoconus.

REFERENCES

INTRODUCTION

PureVision Toric Contact Lenses for Astigmatism lenses deliver clear, stable vision – blink after blink. AerGel process - makes PureVision Toric lenses exceptionally healthy- allows natural levels of oxygen to reach your eyes. The lens is made from the revolutionary Silicone Hydrogel material Balafilcon A used in the Purevision spherical lens and uses the patented AerGel process. They provide aily.up to 30 days of continuous wear.

AIM

The purpose is to evaluate the efficacy, comfort and visual outcomes in astigmatism correction with Pure Vision Soft Contact Toric Lenses

MATERIAL AND METHOD

The study group consisted of 32 eyes, from 21 patients with different types and degrees of astigmatism. The steps for fitting contact lenses include evaluation of visual acuity with and without correction, ocular refraction and keratometry, Slit Lamp examination of anterior segment of the eye, examination of the fundus, evaluation of the tear film, motility, rotation of the contact lenses, comfort and visual acuity after fitting.

RESULTS

All the patients were fitted with PureVision Toric contact lenses. Patients were instructed to put and withdraw the contact lenses. Follow up was at one week and 6 weeks after fitting, regarding the VA, motility, stability and comfort.

Figure no.1:- Age distribution

All the patients were fitted with PureVision Toric contact lenses. Patients were instructed to put and withdraw the contact lenses. Follow up was at one week and 6 weeks after fitting, regarding the VA, motility, stability and comfort.

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Keywords: astigmatism, PureVision

Abstract: Purpose: to evaluate the efficacy, comfort and visual outcomes in astigmatism correction with PureVision soft contact toric lenses. Material and method: we studied a number of 30 patients with astigmatism (myopic and hyperopic) of different degrees who were fitted with PureVision soft contact toric lenses. We checked the visual acuity, mobility and comfort of the contact lenses after fitting. Results: in 45% of cases we prescribed the contact lenses for astigmatism between 0.75-1 D, in 30% for astigmatism between 1-1.5 D, 14% in astigmatism between 1.5-2 D, and in 11% for astigmatism above 2 D. We obtained maximum visual acuity in low astigmatism and a 0.8-0.9 visual acuity in higher astigmatism. In all cases the patients declared very good comfort and healthy eyes. Conclusions: PureVision soft contact toric lenses represents a suitable solution in correction of different types and degrees of astigmatism.

Cuvinte cheie: astigmatism, PureVision Toric

Rezumat: Scopul lucrării: de a evalua eficacitatea, confortul și acuitatea vizuală după corecția astigmatismului cu lentile de contact moi, torice PureVision. Material și Metodă: am luat în studiu un număr de 30 pacienți cu astigmatism (miopic și hipermetropic) de diferite grade, care au fost tratați cu lentile de contact torice PureVision. Am analizat acuitatea vizuală, mobilitatea și confortul lentilelor de contact după acomodare. Rezultate: în 45% din cazuri am prescris lentilele de contact pentru astigmatismul cuprins între 0,75-1 D, în 30% pentru astigmatismul cuprins între 1-1,5 D, 14% în astigmatismul între 1,5-2 D și în 11% pentru astigmatismul peste 2 D. Am obținut acuitate vizuală maximă în astigmatismul mic și acuitate vizuală de 0,8-0,9 în astigmatismul mare. În toate cazurile pacienții au descris un foarte bun confort. Concluzii: lentilele de contact moi torice PureVision reprezintă o soluție întemeiată în corecția diferitelor tipuri și grade ale astigmatismului.
The group of patients consisted predominantly in women (Fig. 2).

Figure no. 2: Gender distribution

Patients had all types of astigmatism, compound myopic astigmatism predominantly (14 eyes) (Fig. 3)

Figure no.3: Types of astigmatism

Regarding the degree of astigmatism, astigmatism of 0.75 to 1 D predominated (15 eyes), followed by 1-2D

Figure no.4: Astigmatism degree

Most patients presented oblique axis astigmatism (72%) (Fig 5)

Figure no. 5: Types of astigmatism concord the declination of axis

Patients fitted with PureVision presented comfort in 94% cases (Fig. 6).

Figure no. 6: PureVision Comfort

Best corrected visual acuity with contact lenses was better than best corrected visual acuity with glasses (p <0.047) (Fig. 7).

Figure no.7: Visual acuity

DISCUSSIONS
Our group prevailed correction of myopic astigmatism with CL and most frequently adapted astigmatism degree was 75 to 1 D. Reindel et al [1] frequently adapts lenses for astigmatism of 1.25 D toric.

Visual acuity with correction of contact lenses was statistically significant superior to that with air correction.

VA is least affected by non-standard conditions [2].

CONCLUSIONS
Pure Vision Toric contact lenses represents a suitable solution in correction of different degree astigmatism. This type of contact lenses provide a good comfort and visual acuity.

REFERENCES
1. Fitting and Vision Characteristics of Two Silicone Hydrogel Torics-By Bill Reindel, OD, MS, & Gary Orsborn, OD, MS, FAAO
2. Toric lens orientation and visual acuity in non-standard conditions-Roberta McIlraith, Graeme Young *, Chris Hunt-Visioncare Research Ltd., Craven House, West Street, Farnham, Surrey GU9 7EN, UK
STEM CELLS TREATMENT

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Keywords: Stem cells, transplantation, ocular surface

Abstract: Presenting ways to protect the ocular surface by stem cells transplantation. Focusing on stem cells harvest, operatory procedures, evolution

Cuvinte cheie: celule stem, transplant, suprafata conreana

Rezumat: Se vor prezenta modalitatile de protectie a suprafetei oculare prin transplant de celule stem. Se va pune accent pe modalitatile de recoltare, timpii operatorii, cat si pe modalitatile evolutive.

Definition

In the adult organism, many tissues undergo rapid and continuous cell turnover. These tissues which include simple and stratified epithelium must repopulate and simultaneously maintain the integrity of the tissue. Stem cells are as any cells with a high capacity for self renewal extending through adult life[1]

Frequency is estimated from 0.5% or less to 10% of the total cell population [2,3]. The cornea forms part of the ocular surface of the eye.

Structure of the eye: epithelium which forms 10% of the corneal thickness; composed of

1. basal cells, wing cells and squamos cells; its role is to absorb nutrients and oxygen and to protect the eye;
2. Bowman layer (acellular zone of the anterior stroma), located just beneath the basement membrane;
3. stroma, which forms 90% of the corneal thickness; this is avascular and contains: glycosaminoglycans and proteoglycans, water, collagens interspersed with keratocytes or fibroblasts;
4. Descemet membrane is the basement membrane of the endothelium and its role is to pump excess water out of the stroma, maintaining the corneal transparency;

Only cells which are in contact with the basement membrane have the ability for mitotic cell division. Cells which are displaced into the suprabasal layer become postmitotic and loose their capability for cell division[4,5].The proliferation of basal cells-controversial (2 theories):origin of corneal epithelium cell proliferation is derived from the adjacent conjunctiva by conjunctival transdifferentiations[4,5,6] and origin of corneal epithelium cell proliferation depends on corneal stem cells in the limbal basal epithelium [4,5,6]

How does the stem cells perpetuates

Little is known about the mechanism that help maintain and perpetuate the stem cells in the limbus. It has to be considered the extrinsic and intrinsic properties.

A) Extrinsic properties are characteristics of the environment surrounding the stem cells. Maintainence of “stemness” by extrinsic properties is explained by a model proposed by Scofield(1983)[13], which quotes that stem cells exist in an
optimal "niche " that promotes the maintainece of stem cells in an undifferentiated condition.
After the division only 1 cell (daughter) can reenter the niche, the other differentiate and becomes transient amplifying cells (TA).
Figure no.2: The “niche" cell

In an alternative model, following division of the stem cell, the daughter cells can either reenter the stem cell niche or enter a less niche that allows the cell to remain undifferentiated and retain a stem-like characteristics like following division. These cells can enter the differentiation pathways or remain in an undifferentiated stem-like state:Cells leaving the “niche" have the capability to divide.
Figure no.3: TA cell

Does the limbus contain a stem cell niche?
If the limbus contains stem cell niche, then the structure is different from the central cornea
Limbal zone
Presence of blood vessels provide nutrition of the limbus and interaction with blood citokine[15]. Proximity of blood vessels is characteristic of stem cells. The structure of basement membrane, pegs of the stoma extending upwords[16]. The anchoring fibrils present here extended from the basement membrane and intersect with other anchoring fibrils extending through the stromal pegs, which form a niche promoting the adherence of the limbal basal cells, protecting them from phisical injury. Central cornea- is not present.
Limbal basement membrane is composed of type IV collagen[16]. There is an antibody AE-27 [16]: bound central corneal basement membrane strongly, weakly conjunctiva, limbus heterogeneously. Limbal basal membrane can express K3 (differentiation marker), building AE-27 at high level. At cornel level this is not seen.
B) Intrinsec properties

Limbal cells proliferate faster in culture [16]. Growth factors and calcium ions affect the cell types differently[16]. Limbal epithelium is more resistant in tumor promoters[16]. Transplant of limbal epithelial cells resulted in growth of a limbus-like epithelium[16]. Contain high levels of several proteins as metabolic enzymes(£ enolase), cytochrome oxidase, Na/K-ATPase, carbonic anhidrase[16]. Limbal cells may be more metabolic intermediate filaments, like vimentin, Keratin 19[16]. They may be responsible for the anchorage of the stem cell into a certain environment.
The importance of corneal stem cells for the regeneration of the corneal epithelium
Location of the stem cells in limbal basal epithelium, meaning regeneration of the corneal epithelium is dependent on the integrity of the limbus.
Pros: the original corneal phenotype can’t be maintained in the absence of stem cells from the limbus; the original phenotype of corneal epithelium can be reconstituted by surgical transplantation of limbal stem cells.
A. Wound healing in the absence of corneal stem cells

Investigated by a series of experiments: Tseng-scol [5,6] summarized that in the presence of corneal stem cells within an uninjured limbal epithelium, corneal epithelium regenerates despite repeated small central wounds, even if the total corneal epithelium is removed. In the partial absence of limbal corneal stem cells (limbal deficiency), the remaining stem and transient amplifying cells can maintain the corneal epithelium under physiological circumstances and also regenerate the central corneal epithelium.

Chen and colab, [6] says that the removal of the TA cells in eyes with partial limbal deficiency develop delayed wound healing, vascularisation, expression of a conjunctival phenotype. TA cells are important for the maintance and regeneration of the corneal epithelium, even in the absence of stem cells. Remaining stem cells could not regenerate enough TA cells to reconstitute the corneal epithelium. There is a loss of the limbal barrier against the ingrowth of conjunctival epithelium on the surface of the cornea.
B. Transplantation of corneal stem cells

Kenyon and Tseng[4,5,6] say that original corneal phenotype could be reconstituted by the transplantation of healthy corneal stem cells; based on the concept that a simultaneous loss of corneal stem and TA cells causes alteration of the corneal phenotype.

Tsai and colab,[4,5,6] quote that it was made a simultaneous removal of limbal and corneal epithelium, which leads to conjunctivalisation and neovascularisation and limbal transplantation.

Regulation of corneal stem and transient amplifying cells.

Conversion of stem cells in TA cells is supported by serum factors: retinoic acid. Amplification of TA cells is promoted by epidermal growth factor (EGF), acidic and basic fibroblast growth factor 1 a; b FGF), nerve growth factor (MGF), Ca.

Amplification of TA cells is inhibited by retinoic acid and transforming growth factor beta (TGFβ3).

Ocular surface disorders causd by multifunctional ar absence of corneal stem cells

The human corneal stem cells are located only in the basal limbal epithelium.
Pros: investigation of cellular differentiation, human basal limbal epithelium laks the expression of differentiation related Keratins(K3). The corneal phenotype after simultaneous loss of the corneal and limbal epithelium can be reconstituted by

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transplantation of limbal stem cells[4,5,6]. The neoplasm of the corneal epithelium always originates from the limbal epithelium [4,5,6].

Etiology of insufficiency of the limbal epithelium

Primary: absence of external factors as injuries, mechanical damages, pharmaceutical drugs. Aniridia (irregular and cloudy epithelium, corneal vascularisation); impression citology: Ingrowth of conjunctival epithelium [4,5,6], irregular + clear epithelium-traverse by blood vessels.

Secondary: chemical and termical burns, limbal epithelial damage and ischemia of the limbal vessels with ↑ permeability, influx of leucocytes in the epithelium and stroma, with alteration of the regulation of cellular proliferation and differentiation [4,5,6] and invasion of conjunctival epithelium.

Contact lens wearer (CL related epithelial dysfunction (CLRD)[5]): corneal vascularisation, epithelial abnormalities + irregularities.

Limbal surgery: excision of limbus for tumors, excision of pterigium, cryosurgery for cilliary body; Sd. Steven-Johnson.

Clinical features:

- Symptoms that may appear: decreased vision, photophobia, tearing, blepharospasm, recurrent episodes of pain, chronic inflammation.

- Signs (slit lamp examination): a dull and irregular reflex of epithelial reflex, the deep layers of the epithelium and anterior stroma contains blood vessels + area of opacification, ingrowth of thickened fibrovascular pannus and calcification (in severe absence of corneal epithelial stem cells).

- Treatment of deficiency of stem cells

Types of stem cells used for treatments: allogenic stem cells-derived from a genetically different donor within the same species[4], antologous mesenchymal stem cells-(derived from the patient prior to use in various treatment) [14], xenogenic stem cells (derived from different species and used for research purpose)[12]

Historical data about transplantation of stem cells

- 2003- successfully transplantation of corneal stem cells:-into damaged eyes to restore vision; it were used sheets of retinal cells from aborted fetuses[12].
- 2005- Queen Victoria Hospital Sussex England (Dr. Daye)-restored vision with this technique at 44 eyes [11]; they used adult stem cells from the patient, a relative or even a cadaver.
- 2009- University of Pittsburg Medical Center: stem cells collected from human corneas can restore transparency without provoking a rejection response[14]
- Jan 2012: -Dr. Stephen Swartz from UCLA Stem Eye Institute: Two women who were legally blind from macular degeneration. There were noted improvements of vision after retinal injection of human embryonic stem cells[10].

Purpose: To reconstruct the ocular surface following disorders caused by limbal insufficiency. Is based on the stem cell model Kenyon and Tseng. They further modified the technique of conjunctival transplantation to include the limbal epithelium. Therefore the surgical procedure of limbal transplantation results in transfer of limbal epithelium containing long living corneal stem cells.

Steps of the surgery:

- Autologues transplantation with removal of fibrovascular tissue and altered epithelium from least down to bare sclera; preparation of limbal graft from donor (superficial keratectomy) in the periphery of the cornea, extending into the sclera. The graft has 2 strips of tissue, each measuring about 4 clock-hours (for autograft); in allografts- a ring graft containing 360° of limbal tissue can be prepared from the donor eye. It is necessary to include a sufficient portion of limbal stroma in the graft. From this ring of limbal tissue TA cells are generated which migrate onto the denuded corneal surface of the host. After transplantation of host’s, cornea will be permanently covered by epithelium from the donor.

Figure no.4: Autologous transplant

Figure no. 5: Autologous transplant scheme

Figure no.6: Cornea after stem cell transplantation
CONCLUSIONS

1. Although several antibodies have been developed, neither stem cells, TA cells nor postmitotic cells can currently be differentiated.

2. Little is known about regulation of the self renewal of stem cells and their resistance to differentiation inducing agents.

3. An increasing number of cytokines are currently being studied and investigation of various cell types might eventually enable the identification of an environmental niche which governs the regulation of stem cells.

4. The identification of factors which prevent the differentiation of stem cells and allows their amplification is important for a conservative treatment of ocular surface disorders, due to stem cells loss or dysfunction. All these factors promote the differentiation of either stem cells or TA cells and therefore cannot be used for the treatment of limbal insufficiency.

5. Unilateral limbal insufficiency can be successfully reabilitated by limbal autografts.

6. It is to be hoped that the enhancement of our basic knowledge concerning stem cell perpetuation might eventually allow us to expand single stem cells in culture and to use them for the reconstitution of the ocular surface.[4,5,6]

REFERENCES


CORNEAL TOPOGRAPHIC CHANGES IN PATIENTS DIAGNOSED WITH KERATOCONUS AND TREATED WITH BOTH CROSSLINKING AND IMPLANTATION OF INTRACORNEAL RINGS

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Keywords: keratoconus, crosslinking, intracorneal rings, corneal topography

Abstract: Purpose: To compare corneal topography performed before crosslinking and implantation of intracorneal rings, with the one made after one year of treatment, including keratometric results, astigmatism, corneal thickness, corneal front and back elevation. Material and Methods: We studied a group of 30 eyes diagnosed with keratoconus in different stages of evolution, which underwent crosslinking and implantation of intracorneal rings (about 4-6 month after Crosslinking). Results: They showed decreased in keratometric value, astigmatism, maintenance of corneal thickness, flattening corneal front and back elevation. Conclusions: combined procedures, crosslinking and implantation of intracorneal rings, showed improvements in corneal topography in terms of k values, astigmatism, corneal thickness and flattening of corneal front and back elevation

Cuvinte cheie: keratoconus, crosslinking, inele intracorneene, topografie corneeană

Rezumat: Scopul: de a compara topografia corneeană efectuată înainte de crosslinking și implantarea de inele intracorneene, cu cea efectuată la un an după tratament, respectiv rezultatele keratometrice, ale astigmatismului, grosimii corneene, elevației corneei anterioare și posterioare. Material și Metodă: S-a luat în studiu un lot de 30 de ochi diagnosticați cu keratoconus în diferite stadii de evoluție, care au beneficiat de tehnică crosslinking și implantarea de inele intracorneene (la aproximativ 4-6 luni de la efectuarea crosslinkingului). Rezultate: S-au evidențiat scăderi ale valorilor keratometrice, ale astigmatismului, menținerea grosimii corneene, aplatizarea elevației corneei anterioare și posterioare. Concluzii: Tehnicile disparate crosslinking și implantarea de inele intracorneene au dovedit a imbunătăți topografia corneeană din punct de vedere al k-urilor, astigmatismului, grosimii corneene și al ectației corneee cu ameliorare consecutiva a reliefului feței anterioare corneei.

AIM

The purpose is to compare corneal topography performed before crosslinking and implantation of intracorneal rings, with the one made after one year of treatment, including keratometric results, astigmatism, corneal thickness, corneal front and back elevation

MATERIAL AND METHOD

The group of study included 30 eyes, diagnosed keratoconus in different stages, treated with both crosslinking and intracorneal rings implantation (4-6 months after crosslinking).

The inclusion criteria were patients between 19 – 42 years, males and females, diagnosed with keratoconus stage I, II, III, with corneal thickness above 400µm and transparent cornea.

Exclusion criteria were corneal thickness under 400µm, Vogt striae, herpetic keratitis or other active ocular infections, dry eye syndrome, afachia.

The ocular exam included uncorrected and best corrected visual acuity, ocular refraction and keratometry, slit lamp examination, intraocular pressure measurement, pachymetry, corneal topography (Pentacam), endothelial corneal cell count.

Crosslinking (CXL) technique consists of: topical anesthesia with Benoxi – 3-4 drops, 15-20min before CCL; removal of the corneal epithelium about a diameter of 9mm and instillation of a drop of benoxi; instillation of riboflavin 0,1% every 3 min for 30min before the irradiation; irradiation of the central deepithelized cornea through the CMBX linker and instillation of riboflavin 0,1% every 3min – 30min; instillation of ATB and steroids; therapeutic contact lenses for 3-4 days after the procedure.

Implantation of intracorneal rings (ICR) technique consists of topical anesthesia, marking the center of cornea, incision of the steeper meridian, delamination, ICR implantation and instillation of antibiotics and steroids.

Follow up was made after 24, 48, 72h.

Patients were treated with instillation of antibiotics, steroids and artificial tears for 2.3 months.

Check up was at 1, 3, 6, 12 months regarding the visual acuity, keratometry data, spherical equivalent and cylinder.

RESULTS

The majority aged between 21 and 40 years (70%).

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In the cases studied, the patients were of both sexes (Fig. 2).

Depending on the staging of keratoconus, most patients were in stage I/II, III (Fig. 3).

Regarding the keratometric values, the difference between the K values preoperative and postoperative at 12 months was 1.2 D. The results of statistical processing are statistically significant at 12 months ($p < 0.017$) compared to those of 1 month ($p < 0.534$), 3 months ($p < 0.428$), 6 months ($p < 0.048$) (Figure 4).

The difference between preoperative and postoperative cylinder values at 12 months was 0.91 D and $p$ is statistically significant at 12 months ($p < 0.003654$) (Fig. 5).

Corneal thickness has not undergone significant changes (Fig. 7)

Regarding the anterior elevation detected on topography, there is a reduction at 12 months postoperatively compared with preoperative values ($p < 0.05$) (Fig. 8).

The posterior elevation was the same at 12 months ($p>0.05$)(Fig.9)
Regarding the visual acuity without correction were recovered between 1 and 5 Snellen lines in 21 cases, and in 9 cases remained stationary (Fig. 10).

**Figure no. 10- Snellen gain- UCVA**

Speaking of best corrected visual acuity in 30 cases improved by 2 Snellen lines even 6 Snellen lines(fig.11).

**Figure no. 11:- AVCC Recovery**

**DISCUSSIONS**

Principle of CXL is the photopolimerisation of the stromal fibrillar tissue, in order to increased their stiffness and resistance to the keratectasia, through the combined action of the photosensibilising substance (riboflavin – B2) with the irradiation of the UV light performed with an illuminator in a solid state of UVA kind.[1,2]

It’s advantages are that is a parasurgical procedure, provokes a slow down of the Keratoconus progression[3], prevents or delays the need of corneal transplant[4].

Principle of ICR is to produce a prismatic effect (directs reflected light away from the visual pathways because of its triangular cross section)[5]. Intacs or ICRS elements taking space and modify the arch length of the front curve of a cornea, by a mechanic action, corneal flattening from the periphery to the center[6] and a the refractive action, change in the focal length of the eye, without loosing the physiologic non-sphericity of the cornea.[6,7]

The literature [15] show that this procedure reduces keratometric values the same as our study at 12 months postoperatively.

Purpose of ICR is flattening, recentrering and visual gain; convert contact lens intolerant patients to contact lens tolerant[8] and to prevent the need for corneal transplant[9]. Advantages of ICR are that this is a mini-invasive surgical technique, reversible, well tolerated, in association with CCL increase the stability and corneal resistance, has a refractive effect with increasing VA [10].

Intraoperative complications that may appear: accidental perforation of the cornea, too superficial placement of the rings, postoperative, peripheral corneal haze[11], sediments in the intrastromal channels incision area, gelatinous opacity, corneal infections, melting, migration and extrusion of intrastromal rings.

1) A study [12] showed that ICR + CXL had greater reduction in cylinder and ICR keratometrie than ICR alone.
2) Another study [13] concluded that preoperative UCVA was 1.11 logMAR, 0.75 logMAR after CXL p = 0.03, 0.23, after 6 months of implantation ICR p < 0.001, in our case, p = 0.005; BCVA at one year was 0.05 and 0.002 in our study.
3) Kilic’s study [14] argues that the UCVA and BCVA had a p-value <0.05, SE decreased by 2.5 D - in our case 07D; cylinder decreased by 2 D in our case with 0, 91D , K to 4.51 D, and in our case to 1.2 D.

**CONCLUSIONS**

Combined procedures, crosslinking and implantation of intracorneal rings, showed improvements in corneal topography in terms of k values, astigmatism, spherical equivalent and flattening of corneal front elevation

The effects of ICR implantation can be more predictable using the Femto Second Laser to perform the tunnels.

**REFERENCES**


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13. Corneal Collagen Cross-Linking Before Ferrara Intrastromal Corneal Ring Implantation for the Treatment of Progressive Keratoconus-Henriquez, Maria A. MD*; Izquierdo, Luis Jr MD, MMed*; Bernilla, Cesar MD*; McCarthy, Martin MD

INTRODUCTION
Phacoemulsification has become a routine practice for cataract extraction in most of the world.

With the availability of foldable lens implants, the incision in cataract surgery has developed from the scleral incision to the clear corneal incision. Therefore, the cataract surgery through phacoemulsification through a clear corneal incision, has become the main method of approach, due to the lack of bleeding, fast access and easy recovery.

AIM
To evaluate a lot of cases operated of cataract through the method of phacoemulsification, in terms of induced astigmatism, of etiologic factors incriminated in its production, methods of prevention and treatment.

MATERIAL AND METHOD
A retrospective study was performed on a group of 232 patients who underwent cataract surgery by phacoemulsification and foldable lens implantation in 2009-2011, at Optilens Clinic, Cluj-Napoca.

The surgical approach was made through clear corneal incision with different dimensions, of 2.75 mm, 2.2 mm and 1.8 mm. The localizations of the incisions were different: superior, supero-temporal, and supero-nasal.

The parameters included in the study were: age, clinical type of cataract, corneal incision size, pre-existing ATG, ATG surgery, postoperative spherical equivalent.

Preoperative assessment included:
- visual acuity => without correction/with correction
- slit lamp examination of the anterior pole
- fundus examination
- intraocular pressure measurement through the method of aplanometrics
- determination of ocular refraction with a Topcon autorefractometer
- keratometrics with Topcon auto-kerato-refractometer
- ocular biometrics which was made with ultrasonics (contact and immersion) and optic (IOL Master).
- the IOL target calculus was made was performed using the following formulas, depending on the length of the anterior-posterior axis of the eyeball:
  - <22 mm -> HQ
  - 22 mm - 24mm -> HQ, Holladay, SRK-T
  - >22 mm -> SRK-T
- the postoperative refractive target was of 0,00 -> ±0,50 diopters

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- the written consent of the patient was also obtained

POSTOPERATIVE EVALUATION included:
- visual acuity without correction/with correction
- ocular refraction with Topcon auto-keratometer

INCLUSION CRITERIA
- presenile and senile cataract diagnosis
- age between 40 and 90 years

EXCLUSION CRITERIA
- other pre-existing eye disorders or contemporary to the operation
- other ocular surgery history
- ocular trauma
- intraoperative or extraoperative complications

THE FOLLOW-UP PERIOD was of 6-8 weeks postoperative, enough time period for this type of surgery, in terms of anatomical and functional ocular rehabilitation.

RESULTS
Most of the cases were within the age range of 71-80 years, and the least were within the age range of 40-50 years.

Figure no. 1: Patient’s distributions according to age

The clinical forms of cataract were: cortical (39.65 %), nuclear (31.47 %) and posterior subcapsular (28.88 %).

Figure no.2: Patient’s distributions according to cataract’s localisations

Preoperative astigmatism was analyzed in terms of magnitude, representing three groups, as shown in the table below.

Figure no.3: Astigmatism’s distributions according to preoperatively astigmatism

The preoperative astigmatism values prevailed between 0,00 -> ±0,75 diopters (72,41%). The least values were the ones higher than 2,00 diopters (2,59%).

In terms of the clinical form of preoperative astigmatism, distribution of cases was as follows.

Figure no.4: Astigmatism’s distributions according to the form of astigmatism

Most preoperative astigmatisms were the ones against the rule (61,64 %).

There was made a distribution of cases according to the size of the incision. Group incisions of 2,2 mm and 2,75 mm included an almost equal number of cases (40,09 % and 41,81%), while the 1,8 mm incision group was significantly lower (8,10 %)

Figure no. 5: Distributions of the incisions

Most cases of postoperative astigmatism ranged from 0,00 -> ±0,75 diopters (70,69 %), while in the case of preoperative astigmatism these values were at a rate of 72,41 %.

The number of astigmatisms with values higher than 2,00 diopters also dropped (1,29 % postoperatively compared with preoperative 2,59 %). The number of astigmatisms with values between ± 1,00 -> ± 2,00 diopters has slightly increased (28,02 % postoperatively, compared with 25 % preoperatively).

Figure no.6. Astigmatism’s distributions according to preoperatively astigmatism according to their type
Most were postoperative astigmatisms were against the rule (60.34 %), a value almost equal to that of the against the rule preoperative astigmatism (61.64 %)

**Figure no.7:** Distributions of postoperative astigmatism

Most postoperative values of the postoperative spherical equivalent ranged between 0,00 -> ± 0,75 diopters.

**Figure no.8:** Distribution of spherical equivalent

The analysis of the astigmatic effect depending on the size incision If the case of the 1,8 mm incision there was a reduction in the amount of postoperative astigmatism values (22,25) compared to the value of preoperative astigmatism (28,25).

**Table no. 1:** Analysys of the preoperative and postoperative astigmatism for incisions of 1,8mm

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER OF CASES</th>
<th>SUM</th>
<th>AVERAGE</th>
<th>VARIATION</th>
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</thead>
<tbody>
<tr>
<td>PREOP. ATG</td>
<td>42</td>
<td>21.25</td>
<td>0,6726</td>
<td>0,2973</td>
</tr>
<tr>
<td>POSTOP. ATG</td>
<td>42</td>
<td>21.25</td>
<td>0,6307</td>
<td>0,2818</td>
</tr>
</tbody>
</table>

**Figure no. 9:** Preoperative and postoperative astigmatism for incisions of 1,8mm

In the case of the 2,2 mm incision the sum of postoperative astigmatism values (70,05) was also lower than the sum of preoperative astigmatism values (81,75).

**Table no.2:** Analysys of the preoperative and postoperative astigmatism for incisions of 2,2mm

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER CASES</th>
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<th>VARIATION</th>
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<tr>
<td>PREOP. ATG</td>
<td>97</td>
<td>61,75</td>
<td>0,4427</td>
<td>0,2792</td>
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<tr>
<td>POSTOP. ATG</td>
<td>97</td>
<td>71,5</td>
<td>1,7286</td>
<td>0,2395</td>
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</tbody>
</table>

**Figure no.10:** Preoperative and postoperative astigmatism for incisions of 2,2mm

In the case of the 2,75 mm incision the sum of postoperative astigmatism values (72,75) was higher than the preoperative astigmatism values (60,05).

**Table no. 3:** Analysys of the preoperative and postoperative astigmatism for incisions of 2,2mm

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER CASES</th>
<th>OF SM</th>
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<th>VARIATION</th>
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</thead>
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<tr>
<td>PREOP. ATG</td>
<td>93</td>
<td>66,5</td>
<td>0,6501</td>
<td>0,2301</td>
</tr>
<tr>
<td>POSTOP. ATG</td>
<td>93</td>
<td>72,75</td>
<td>0,7822</td>
<td>0,2524</td>
</tr>
</tbody>
</table>

**Figure no.11:** Analysys of the preoperative and postoperative astigmatism for incisions of 2,75mm

**DISCUSSIONS**

An analysis of the magnitude of the postoperative astigmatism compared with the preoperative one did not show a major change, most of the values were included in the range of 0,00 -> ± 0,75 diopters in both situations. The number of astigmatisms in the range ± 1,00 -> ± 2,00 diopters slightly increased, but decreased the number of the ones higher than 2,00 diopters.

Regarding the clinical type of astigmatism, both preoperative and postoperative ones, the predominant one was...
the against the rule astigmatism (61.64 % and 60.34 %). Some researchers believe that the myopic against the rule astigmatism gives an uncorrected visual acuity closer to the corrected one, in comparison to the one according to the rule \([1]\). 

Analyzing the refractive change depending of the size of the incision, resulted the fact that in the case of the 1.8 mm and 2.2 mm incisions, the sum of the postoperative astigmatism values decreased from the sum of preoperative ones. Both the micro incision of 1.8 mm and the mini incision of 2.2 mm are almost equal in the optical preservation of the cornea after surgery. Another explanation is that some incisions were made on more refringent corneal meridian, with the purpose of its flattening, in the cases where the preexistent astigmatism was higher than 1.00 diopters.

The different effect of small corneal incisions by their location can be useful, depending on pre-existing astigmatism. Tejedor et al. showed that temporal incisions are recommended for negligible pre-existing astigmatism, while the upper nasal incisions are preferred when steep axes are located at approximately 180° and 90° \([2]\).

In the case of 2.75 mm incisions, the refractive change was more obvious, in the sense of increasing the amount of postoperative astigmatism values compared to preoperative one. Incision size has the greatest impact on optical aberrations induced by surgery and smaller incisions produce minimal corneal aberrations, with a better optical quality.

There are lots of benefits of using a small incision, such as faster wound healing and less induced corneal distortion \([3,4,5]\).

Although the size of incisions were low (<3 mm) and some of their locations aimed to reduce pre-existing astigmatism, it was found that there is a residual astigmatism, most of it against the rule of about 0.50 to 0.75 diopters.

These results are consistent with the data described in the literature by Masket et al. They showed that there are individual variations in the corneal healing, like for example, in special cases, the steepening could increase itself along the incision meridian \([5]\). The limits of accuracy and predictability of the postoperative results can be explained thus by these findings. According to Dunne et al., a residual astigmatism of about 0.50 diopters could be present in 66 % to 83 % of the cases \([6]\).

**CONCLUSIONS**

Small incisions, in clear cornea minimizes the corneal damage and the postoperative complications. These types of incisions also reduce the time required for visual rehabilitation, restore the patient’s independence, allowing him to go back to work faster. Multiple postoperative examinations are also eliminated.

Lately, there are some options for modeling the postoperative astigmatism during cataract surgery. It is the so-called incision surgery, which aims to reduce preoperative astigmatism.

Although most severe preexisting astigmatisms require additional interventions (limbic relaxing incisions, radial keratotomy lately toric artificial lens implants), astigmatisms with low values or moderate ones can be corrected or improved by changing the incision parameters.

**REFERENCES**


OCULAR SURFACE PROTECTION METHOD IN A CASE OF GIANT EPITHELIOMA – UPPER EYELID

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Keywords: basal cell epithelioma, upper eyelid, tarsocconjunctival flap

Abstract: We present the case of a patient with relapse of the basal cell epithelioma at the level of the upper eyelid. We present the surgical technique used to reconstruct the upper eyelid using the lower eyelid.

Rezumat: Se prezintă cazul unei paciențe care prezintă o recidivă de epiteliom bazocelular la nivelul pleoapei superioare. Se prezintă tehnica de rezolvare cu reconstrucția pleoapei superioare din pleoapă inferioară

INTRODUCERE

Basal cell epithelioma is the most common malignant eyelid tumor, occurring in approximately 90% of cases. Generally, it has a slow growing rate, with local invasion and metastasis are very rare (less than 0.1%).

The exact etiology is unknown, but it is well known the relations between basal cell epithelioma and ultraviolet radiation that causes damage to the pilosebaceous follicle and pluripotent cells.

Chronic exposure to sunlight is the most common cause of tumour occurrence, particularly in the areas of skin covered with hair. Also, the risk increases when certain genetic and environmental factors are associated.

Among the most common genetic factors involved, we mention: people with light coloured skin, with blue or green eyes, blond or redhead persons.

Statistically, males are twice more affected than females, and this is probably explained by the longer exposure to sunlight.

Certain precancerous conditions can cause basal cell epithelioma transformation. These include:

- Xeroderma pigmentosum is a disease with autosomal recessive transmission, characterized by hypersensitivity to sunlight causing the epitheliomatous evolution of some preexisting lesions. The cause is the lack of an endonuclease, bringing about a disruption in the DNA suppression.
- Nevoid basal-Gorlin-Goltz syndrome is a condition with autosomal dominant transmission, characterized by congenital abnormalities extended at the level of eyes, face, skeleton and central nervous system.

Clinically, the basal cell epithelioma presents several aspects (pearly epithelioma, ulcerated epithelioma, ulcus rodens, epithelioma plan scar, epithelioma terebrant), this variety of clinical forms being explained in part by the fact that lesions in different stages of evolution can dress different aspects.

A clinical feature important to note is the presence of the epitheliomatous pearls, some small round, gray prominences surrounding the central lesion.

Basal cell epithelioma can usually be diagnosed by a simple biopsy and it is fairly easy to treat, especially when found in an early stage.

Treatment options are numerous and include: curettage and cautery, surgical excision, photodynamic therapy, cryotherapy, radiotherapy or laser treatment.

CASE REPORT

In august 2011, the patient C.M., aged 72 years old, came to the Ophthalmology Clinic within the Clinical County Emergency Hospital of Sibiu for a tumour in the left upper eyelid.

From the medical history, the following are noticed: upper eyelid basal cell epithelioma operated in 2007, HTN, IHD. Regarding the disease history, the current illness began about two years before, the tumour slowly growing in size, causing a moderate visual acuity decrease in the last months.

The ophthalmologic examination highlighted: right eye visual acuity (RE-VA)=2/3cc, visual acuity left eye (LE-VA)=1/3cc, intraocular pressure right eye (RE-IOP) = 33mmHg, intraocular pressure left eye (LE-IOP) = 40mmHg.

On the slit lamp examination, a tumour formation is observed occupying the middle third of the upper eyelid with dimensions of approximately 25/15mm, the anterior and posterior pole of the eye having a normal appearance.

Following anamnesis and the clinical ophthalmic examination, the following diagnosis is reached: upper eyelid basal cell epithelioma, operated, relapsed, intraocular hypertension, HTN, IHD.
We resort to the surgical intervention with local anesthesia, practicing the excision of the tumour formation. The excised part is sent to the histopathology department confirming later on the diagnosis of basal cell epithelioma.

For the upper eyelid reconstruction, the tarsocconjunctival flap technique was used. It was made from the lower eyelid, superiorly tractioned and anchored at the remaining transconjunctival tissue of the upper eyelid. At the upper side, a cutaneous flap was created from the upper eyelid, the skin being undermined and moved down and sutured at the level of the lower eyelid margin.

The intra- and postoperative evolution was favourable, the 10-day postoperative appearance may be observed in figure no. 1.

**Figure no. 1.** Upper eyelid reconstruction - tarsocconjunctival flap technique, 10-day postoperative appearance

Six weeks later, the patient is readmitted for the intervention of separating the eyelids. A horizontal incision was performed in the transconjunctival flap on the demarcation line of both eyelids. At the upper eyelid, conjunctiva was sutured to the skin, thus achieving the eyelid edge, and at the level of the lower eyelid, the remaining conjunctiva was sutured (figures no. 2,3).

**Figure no. 2.** Six-week postoperative appearance

Following eyelid separation surgery, the occurrence of the lower lid entropion, situation requiring a new surgical intervention for the correction of the entropion that was performed 7 days later within the same admission (figures 4,5).

**Figure no. 4.** Lower lid entropion

**Figure no. 5.** Operated entropion – seven-day postoperative aspect

The patient came for check up five weeks postoperatively accusing a discrete decrease of the visual acuity. The ophthalmologic examination reveals a cortico-nuclear

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Cataract in evolution (figure no. 6) for which surgery has been performed in June 2012, practicing the phacoemulsification with implantation of artificial lens in the posterior chamber. The evolution was favorable, the visual acuity improved from 1/15 preoperatively to 1/3 immediately postoperatively.

Figure no. 6. Cortico-nuclear cataract

In order to maintain the superior lacrimal canaliculi, it seems that the medial incision within the excision of epithelioma went through the tumour tissue, which is why in august 2012, 11 months after the first intervention, the patient presents for another relapse of the tumour. It is located in the internal third of the upper eyelid, near the inner angle measuring approximately 0.5 cm in diameter (figure no. 7).

Figure no. 7. Upper eyelid basal cell epithelioma relapse

Surgery is performed, practicing the tumour excision, the intra- and postoperative evolution being favourable (figure no. 8).

Figure no. 8. Second day postoperative aspect

At the two-week check up after the surgery, the ophthalmologic examination highlighted: RE-VA = 2/3cc, RE-IOP = 21mmHg, LE-IOP = 15mmHg, surgical wound clean, sutured, in course of healing (figure no. 9).

Figure no. 9. Two-week postoperative aspect

The prognosis is favourable, even in the case of those two relapses occurred, the basal cell epithelioma having only a local extension; metastases are exceptional. If necessary, the combination of radiotherapy and/or chemotherapy to surgery can lead to healing.

REFERENCES
EYE PROTECTION AGAINST UV RADIATION

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Abstract: Exposure to UV radiation is proved to be an all-day and year-round hazard, enhanced by different environmental factors and also eye and orbit shape features. There is no evidence of a beneficial effect from UV on the eyes (as is Vitamin D synthesis in skin), but there are certain eye diseases related to ultraviolet chronic exposure like pterygium, cataract and macular degeneration. Studies have confirmed nasal predisposition of pinguecula, pterygium and cortical cataract that seem to be associated to the peripheral focusing effect (corneal curvature concentrates the light coming from unshaded temporal side) but also the effect of UV protection on macular pigment and accommodation. Wearing hats, wrap-around quality sunglasses and UV blocking contact lenses since childhood may lower the life-long exposure to direct and reflected UV light. Early and frequent education of our patients on the importance and options of ocular UV protection are mandatory for preventing the common associated diseases.

Keywords: UV radiation, ophthalmohelioze

Cuvinte cheie: radiaţia UV, oftalmohelioze

Rezumat: Exponerea la radiaţia UV este un fenomen prezent pe întreaga durată a anului şi a zilei, amplificat de anumite factori de mediu şi de particularităţile de formă a suprafeţei oculare şi a orbitei. Nu există dovezi ale unui efect benefic al ultraviolelor asupra ochiului (cum este la nivelul pielei sinteza de vitamină D), dar sunt anumite boli oculare legate de exposarea cronica la radiaţia UV: pterygionul, cataracta şi degenerescenţa maculară. Studiile au confirmat predispoziţia de apariţie în zona nazală a pingueculei, pterygionului şi a cataractei corticale, fiind legată de efectul de focuseare a luminii periferice (curbura corneei concentrează razele de lumină din zona temporală a orbitei, mai puţin umbrită) dar şi efectele protecţiei împotriva razelor UV asupra pigmentului macular şi a acomodaţiei. Purtarea pălăriilor, a ochelarilor de soare cu lentile de calitate şi acoperire completă a zonei orbitare şi a lentelor de contact cu filtru UV încă din copilărie poate diminue expunerea cronica la radiaţia UV directă şi reflectată. Educaţia precoce şi frecventă a pacienţilor privitor la importanţa protecţiei oculare UV şi la modalităţile existente sunt necesare pentru prevenirea afecţiunilor asociate acestei expuneri.

Ocular overexposure to UV radiation

The sun is the main source of the invisible, short wave length radiation called UV (ultraviolet), but there are also other sources of UV light in our environment: Fluorescent Lights, Sun Beds, Germicidal Lamps, Welders Arc, Lasers in UV Spectrum (Excimer Laser), Visual Display Units (VDU).

The UV spectrum is divided in three parts, according to penetration and biological effect:

- The UVC (100 – 280 nm) were known to be absorbed before reaching the Earth's surface, but since 1969, because of the Global Ozone Depletion (Industrial Emissions & CFCs) there is a 4-9% increase in UVR Reaching the Earth.
- The UVB (280 – 315 nm) may directly damage the DNA, produce protein alterations and cell death, being responsible for sunburns, skin cancer, photokeratitis, photconjunctivitis, pterygium, pinguecula and cortical cataracts.
- The UVA (315 – 400 nm) generates hydroxyl and oxygen radicals, induce indirect damage DNA and is visible by skin tanning, not erythema and that explains why their levels are not detected by the SPF (sun protection factor) tests. Cronic exposure contributes to the skin aging process and cancer and may affect all eye layers, including retina (1)

Ophthalmohelioze (Diseases caused by the sun) prove to have a direct correlation with the dose of radiation and time of exposure.

Exposure of the eye to UV radiation is depending on: altitude, latitude, weather conditions, time of day, type of activity and facial structure. (2)

Geographic Location

There are maps that try to estimate the amount of UV that reaches the Earth’s surface based on factors, such as ozone and cloud cover. The southern hemisphere receives much more UV irradiance than the northern half of the earth, but even in the United States, there are no areas with low levels of exposure. (3)

The maximum body exposure is considered to be in the middle of the day, with the sunshine coming on the shortest path, but the orbit shape is responsible for a different situation of the eyes. A study was conducted on the Kanazawa Medical University campus in Japan in 2006, with tiny UV sensors that were incorporated into eyes of a mannequin model. UVB rays were measured from sunrise to sunset on two different days:

- On September 21, when the length of day and night were equal, UVB intensity was highest around 9:00 a.m. and between 2:00 and 3:00 p.m.

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On November 21, when the solar angle was moving toward its most extreme winter position, peak exposure occurred near the middle of the day.

These findings suggest that we need to encourage appropriate UV protection throughout the year, not just during the sun-filled days of summer.(4)

Further measurements confirmed that exposure occurs at unlikely times. During spring, summer and fall, ocular UV exposure is greatest during early morning and late afternoon, nearly double that of mid-morning and early afternoon and that the UV index (0-10), based on skin erythema dose is therefore invalid for eye risk. (5)

At higher altitudes there are more UV rays in the atmosphere, but terrain reflectance is actually a more critical determinant of ocular UV exposure. Snow is the best natural reflector. It can reflect as much as 94% of incoming UVB rays. The ocean typically reflects 5% to 8% and snow-free land reflects only 2% to 4% of incoming UVB rays. (6) In urban areas there are also artificial surfaces with high reflectance: concrete, asphalt.

The shape of the orbit and eye surface makes the reflected light particularly dangerous. The anterior eye acts like a side-on lens and actually focuses and intensifies peripheral light from the temporal side onto the lens and the nasal limbus. Professor Coroneo was the first to describe the Peripheral Light-Focusing Effect, and his measurements of the light beam that comes from the temporal side showed it is refracted, focused and concentrated up to 20 times more on the nasal conjunctiva and up to 5 times more on the nasal portion of the lens, therefore UVR may affect the stem cells of the limbus, lens equator and eyelid margin.(7,8)

The Threat of Overexposure
The threat to our eyes from UV radiation is greater now than ever before, due to different factors: greater lifetime exposure, depletion of ozone, longer life expectancy, more time outdoors (since new studies have showed a beneficial effect on myopia control!) and poor compliance with UV protective measures.(9,10)

The eye has natural UV protection by being located deep in the orbit, shadowed by eyebrows, lashes & lids and having physical responses like squinting and miosis, tear film reflection and absorption of UV.

UV Absorption by the Eye
Most of the UV light has a wavelength-related absorption in the cornea, aqueous and lens, as a protection for the retina.

For wavelengths less than 280nm the cornea absorbs 100% of the light. For 300nm it absorbs 92% whilst 6% is absorbed by aqueous and 2% by lens. The lens has major absorption of UVA which is implicated in the aetiology of cataract.(11)

Young patients are particularly vulnerable to UV because they have larger pupils (12), their lenses are clearer (75% of UV radiation is transmitted to the retina by the lenses of children under the age of 10, compared to 10% transmittance for those older than 25), also they tend to spend more time outdoors than adults, so they’re exposed to more UV radiation and few children wear adequate eye protection (sunglasses) (13,14).

Sign of early sun damage in the nasal area were also discovered by ultraviolet fluorescence photography starting with the group of 9-11 years of age (29%). In the 12-15 years the lesions were much more frequent (81%) and already visible at simple eye examination (33%).(15)

Unfortunately sun protection is not constantly being used because of personal factors, like awareness and concern for UV exposure, most of it being limited to summer.

The ocular damage
Radiant UV energy is readily absorbed by nucleic acids, proteins and other molecules within cells. Most of this energy dissipates, but the remainder can structurally alter molecules. In turn, a damaged molecule may react with other molecules within the cell. Some specific cellular consequences of UV exposure that have been documented include point mutations of DNA, denaturation of proteins and cell death.(16)

Ophthalmohelioses
The pathogenesis of a large number of ocular conditions can be attributed at least in part to UV exposure. These conditions have been grouped and named the “ophthalmohelioses” from the Greek “ophthalmos” (eye) and “helios” (sun) to collectively refer to diseases of the eye caused by sunlight. (17)

The ophthalmohelioses have a negative impact on both quality of life and cost of health care. For example, the depletion of the ozone layer is estimated to result in $30,000 more cataract surgeries over the next 10 to 20 years at an approximate cost of $2.8 billion.(18)

The UV Effects on the Eye can be acute or chronic and can be classified by location(19,20):

LIDS: Sunburn, Erythema, Elastosis, Photosensitivity reactions, Cicatrical ectropion, Basal Cell Carcinoma (BCC) Squamous Cell Carcinoma (SCC), Solar Keratosis, Melanoma

CORNEA:
UV Keratoconjunctivitis - Acute response to above-threshold dose (30 seconds), characterized by epithelial cell death, decreased visual acuity, intense lacrimation, blefarospasm, significant pain, sand-in-the-eye sensation followed by reepithelization within 36 to 72 hours.

Chronic low doses may induce degenerative corneal conditions, like: climatic droplet keratopathy, spheroidal degeneration, neoplasms, endothelial polymegathism and polymorphism, decrease of oxygen uptake.(21)

CONJUNCTIVA:
Chronic UVR exposure has a strong correlation with pinguecula, pterygium, conjunctival melanoma.

LENS:
UV exposure is considered a major risk factor for cataract development and has been linked to the early onset of cortical and nuclear cataracts. Although the correlation between UV and cataract have been experimentally well established, the exact role of UV in the natural development of the condition is not well understood. There are many ways UV can affect the lens and potentially induce cataract. Some postulated mechanisms include: reduction in ascorbate levels in anterior chamber, changes to photosensitive amino-acids in lens proteins, formation of reactive toxic oxidants. (22,23)

MACULA
As there is some UV light that still reaches retina (4% in young eyes due to less 3-hydroxykynurenine) there may appear photochemical damage by proton and electron transfer that may play some part in the chronic tissue damage that leads to age-related macular degeneration (AMD). (24)

Antibiotics, nonsteroidal anti-inflammatory and psychotapeutic agents, herbal medicines may act as photosensitisers if excited by UVA.

Some animal experiments with short wavelength light showed lesions similar to AMD (25)
A recent retrospective analysis of 5 year UV protection showed a higher level of macular pigment optical density, which has previously been linked to less AMD. (26)

**Protecting the eyes**

UV Protection can be provided by wearing of hats, umbrellas, UV-blocking sunglasses and UV-blocking contact lenses.

Spectacles cover the eye and the delicate tissues around it but UV protection can be limited by material type (Crown glass: < 300nm, Photochromatic glass Light: < 350nm, Dark: < 380nm, CR39: < 350nm, Polycarbonate: < 380nm), coating (Non anti reflective - 4-8% reflected UV, AR-coated - 25% size, shape, and wearing position (when the sunglasses were moved 6 mm from the forehead, the UV light reaching the eyes ranged from 3.7 to 44.8 per cent). (27)

Two Campaigns conducted in 2012 showed also that 55% per year of adults lose or break their sunglasses and 27% do not wear sunglasses at all (Vision Council of America), 47% of people do not consider UV protection to be important for sunglasses purchase and only 17% of the parents give sunglasses together with sunscreen to their children (American Optometric Association).

The use of a UV-blocking contact lens, can block the peripheral focusing effect and protect the limbus, the nasal conjunctiva and the interior structures of the eye (7), but most patients are not aware that the amount of UV protection varies among contact lenses. Class 1 blockers must absorb at least 90% UVA and 99% UVB; class 2 blockers must absorb at least 70% UVA and 95% UVB. In some experiments, Class 1 contact lenses completely protected in vitro epithelial cell cultures and human donor crystalline lens from UV radiation induced damage (28, 29) and the same protective effect on cornea and lens was observed in vivo studies on rabbits (30).

The best protection against UV damage is provided by a combination of items, for all day, all year round: quality sunglasses (wraparound or goggle-style), broad-brimmed hat and UV-blocking contact lenses (for patients requiring refractive correction).

**CONCLUSIONS**

There are several messages that need to be communicated to patients about the risks of ocular UV exposure:

- No known benefits of UV ocular exposure
- There is NO safe level of UV exposure for the eyes.
- UV damage is cumulative and can lead to eye disease.
- Keeping eyes clear and healthy requires protection from infancy on.
- UV protection for the eyes is as important as sunscreen for the skin.
- UV protection must be used every time outside, regardless of the season or weather.
- Full UV protection is provided by a combination of items

**REFERENCES**

3. European Space Agency: protecting the environment.

http://www.esa.int/esaCP/ASE2UZ9K0Y_C_Protecting_0.html. 2007
17. Coroneo M. Sun, eye, the ophthalmohelioses and the contact lens. Eye Health Advisor, a magazine of Johnson & Johnson Vision Care, January 2006.
30. Giblin F et al. A class I (Senofilcon A) soft contact lens presents UVB-induced ocular effects, including cataract, in the rabbit in vivo. IOVS. 2011;52:3667-3775.