

TREATMENT OF CORNEAL DISEASES USING MAGNETIC-INTRARED LASER THERAPEUTIC OPHTHALMIC DEVICE RIKTA-03 (OFT)

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The cornea is an external eye membrane which is most prone to trauma. The cornea may be affected by environmental, mechanical and chemical factors in daily life and in a production setting. The high rate of corneal diseases and injuries warrants the search for new pathogenetically relevant interventions. Wounds and burns of the cornea have been reported to make a 38 to 70 percent proportion in the total incidence of eye wounds and injuries (Gundorova, 1986; Kasparov, 1994). Their outcomes and sequelae in turn account for 12 percent of cases of one-eye and 38 percent of two-eye blindness (Reddy et al., 1994).

Inflammatory corneal diseases (keratitis) remain a main cause of corneal blindness (Maichuk, 2000).

The increasing reliance on knife and laser refraction surgery raises a pressing need for postoperative therapies improving corneal nutrition and regeneration.

According to the World Health Organization, corneal diseases are the fourth most common cause of visual disability. There are 1.4 millions of blind children and five millions of children with impaired vision in the world. Twenty-two percent of severe visual disorders associated with corneal disease occur in childhood. Corneal diseases make a proportion of 12.9 to 13.7 percent in the nosologic pattern of visual disability (Libman, 1986).

Available methods of corneal disease therapy do not invariably meet clinical demands. Increasing attention has been recently given to laser therapy of eye diseases. The compact size of lasers, their therapeutic effectiveness, bactericidal properties and simplicity of use in combination with pharmacologic and physical therapy are attractive advantages of this treatment modality.

To evaluate the efficacy of the ophthalmic version of the magnetic-infrared laser therapeutic device RIKTA-03 (OFT) in treatment of corneal diseases, an experimental study has been carried out in 10 chinchilla rabbits. The rabbits were divided into experimental group 1 in which RIKTA was used, experimental group 2 treated by a scanning helium-neon laser and control group 3 in which standard therapy used instillations of a 0.25 percent levomycetin solution and applications of tetracycline ointment.

The rabbits were immobilized and the third eyelid was resected under 0.5 percent dicaine anesthesia. A 5 mm central corneal area was marked with a trephine and the epithelium was scraped from it. Precision of erosion formation was controlled by instillation of a 1 percent fluorescein solution.

RIKTA-03 (OFT) was used in therapy of group 1 rabbits. The device combines effects of four factors on tissues:

1. Static magnetic field
2. Continuous diode-emitted infrared light
3. Pulsed infrared laser light
4. Pulsed red laser light.

A SLSO-1 laser with a 0.63 mcm wavelength and 1.6 mW output power was used in group 2. Exposure was 2 minutes. Ten scanning laser treatments were delivered. Complete corneal epithelialization and reversal of inflammation were accepted as criteria of therapy success.

To assess the erosion regeneration rate, a 1 percent sodium fluorescein solution was instilled and then flushed away with saline every day in all groups. Stainable areas of erosions were measured with a millimeter ruler and therapy was started.

Table 1

Days	Duration of corneal regeneration			P>
	Erosion Experimental group 1	Erosion Experimental group 2	Erosion Control group	
1.	5 mm	5 mm	5 mm	
2.	4.0+0.1 mm	4.2+0.1 mm	4.5+0.1 mm	
3.	3.0+0.1 mm	3.2+0.1 mm	4.1+0.1 mm	0.1
4.	0	2.5+0.1 mm	3.6+0.1 mm	0.0001
5.		1.2+0.1 mm	3.0+0.1 mm	0.001
6.		0.5+0.1 mm	2.6+0.1 mm	0.001
7.		0	2.1+0.1 mm	0.001
8.			1.3+0.1 mm	0.001
9.			0.4+0.1 mm	0.001
10.			0	-

The experimental study has shown that therapy using the RIKTA-03 (OFT) device and the scanning helium-neon laser with a 0.632 μ m wavelength caused no collagen damage and induced a significantly faster and more adequate regeneration.

The study results have allowed using the RIKTA-03 (OFT) device in treatment of patients after refraction surgery. The operation was intrastromal insertion of rings into the cornea for correction of high anisometropia in 36 children ranging in age from 5 to 12 years. Anisometropia of 9-10 dioptres was related to congenital unilateral stable shortsightedness.

RIKTA-03 (OFT) was used in 12 children for palliating corneal edema and the corneal syndrome. Daily treatments using 5,000 Hz frequency, 72 mW power and 15 MTL magnetic field induction were delivered for 3 days starting from the second postoperative day.

Edema and the corneal syndrome resolved and corneal healing was 2-5 days faster in this group.

Magnetic-infrared laser therapy has acquitted itself very creditably in our clinic. It has been also seen to abate inflammation and to make the postoperative period smoother after intraocular lens implantation. The ophthalmic RIKTA device has a beneficial effect on intraocular muscle function, eliminates spasticity and enhances the accommodation range, thereby increasing visual acuity. We have not seen complications of this mode of therapy thus far.