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Research Article

The Degree of Corneal Opacity as an Indicator of the Effectiveness of the Treatment of Corneal Ulcers

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Abstract

Introduction: The degree of corneal opacity as an indicator of the effectiveness of the treatment of corneal ulcers.

Inflammatory eye diseases remain a serious problem in practical ophthalmology, as a cause of disability (80%) and as a cause of blindness (10 - 20%). The problem of treatment and rehabilitation of patients with corneal ulcers remains very relevant and far from being resolved in modern ophthalmology.

Purpose of the Study: To assess the degree of corneal opacity using a combined method for the treatment of corneal ulcers.

Methodology: The study included 129 patients (129 eyes) with corneal ulcers. The first group of patients (43 patients in each group) received traditional treatment. In the second group of patients, intrastromal administration of an antibiotic into the cornea was added to the traditional treatment. The third group of patients received complex treatment with the addition of platelet-rich plasma instillations.

Result: The results of the study showed that the use of platelet-rich plasma in combination with intrastromal administration of an antibiotic makes it possible to increase the effectiveness of the treatment of corneal ulcers by reducing the risk of formation of coarse and moderately intense opacities, increases the number of patients with transparent cornea at discharge by 48.8 ± 7.6% of cases ($p < 0.05$), and in the long-term period - in 76.7 ± 6.4% of cases ($p < 0.05$).

Keywords: *Platelet-Rich Plasma; Intrastromal Administration of an Antibiotic; Corneal Ulcer; Corneal Opacity*

Introduction

Inflammatory eye diseases remain a serious problem of practical ophthalmology, as a cause of disability (80%) and as a cause of blindness (10 - 20%) [1]. According to M. D. Green, the frequency of adverse outcomes reaches 54.2% [2], and in 1.2 - 23.7% the disease ends with enucleation, which significantly reduces the quality of life of patients and complicates their social adaptation [3-5]. Every year in the world 1.5 - 2 million people get blindness due to ulcers and corneal trauma [1].

The problem of treatment and rehabilitation of patients with ulcers of the cornea of the eye remains very relevant and far from solved in modern ophthalmology.

The increase in the resistance of microflora to antibacterial drugs over the past decades has led to insufficient effectiveness of conservative treatment of this disease.

With superficial corneal lesions, the regeneration process occurs due to keratocytes with the formation of a delicate, almost transparent scar [6]. In severe injuries, when a large number of keratocytes die, the remaining cells are not enough for full regeneration. The violent inflammatory reaction observed in such cases leads to migration of connective tissue cells from the sclera, episclera and other sources to the damage zone. The predominant participation of foreign cells in the synthesis of collagen leads to the formation of a dense, rough scar.

In recent years, the attention of ophthalmologists has been attracted by the technology associated with the use of platelet-rich plasma (PRP) for the treatment of patients with corneal diseases [7-11].

Thus, the general direction of scientific and practical developments should be the search for new methods of treating diseases of the cornea, which, in turn, will reduce the duration of treatment, reduce the degree of disability.

Purpose of the Study

To assess the degree of corneal opacity using a combined method of treatment of corneal ulcers.

Materials and Methods

129 people (129 eyes, 72 men, 57 women) aged from 18 to 55 years with a cornea ulcer were under observation in the eye microsurgery department of the DOKTMO. All patients were divided into 3 groups (43 patients each) by simple (random) randomization. All patients were given a detailed information briefing on the nature of treatment, potential complications and alternative treatment options. Informed consent for treatment was obtained from all patients.

The patients were divided into three groups:

1. Group 1: 43 (33.3%) patients received traditional treatment according to standard regimens (cefuroxime intravenously (IV), subconjunctivally (s/c), metrogil IV, solcoseryl s/c, dicloberl iv; topically: levofloxacin, diclofenac, solcoseryl eye gel, oil sea buckthorn, floxal eye ointment).
2. Group 2 consisted of 43 (33.3%) patients who, along with traditional treatment, were injected with an antibiotic into the corneal stroma (declarative patent for corisna model id 24.04.14g No. 8755/ZU/14).
3. Group 3 consisted of 43 (33.3%) patients who, against the background of traditional treatment, received a combination of intrastromal administration of an antibiotic into the corneal stroma with instillation of PRP, which was obtained using the Geerling G technique., *et al* [12].

Plasma instillation was performed from the 2nd day after intrastromal administration of the antibiotic. Determining the day on which we attached PRP to treatment, we focused on reducing the clinical signs of inflammation [13]. The resulting plasma was instilled directly onto the ulcerative defect of the cornea and kept for 30 seconds at 1 drop of 6 r/day.

The effectiveness of treatment in this article was assessed by the degree of corneal opacity.

The follow-up period of patients is 6 months.

In statistical processing of the material, taking into account the normal distribution of indicators, parametric statistical methods were used. The mean value (M), the standard deviation (δ), the error of the mean (m), the Pearson pair correlation coefficient (r) were calcu-

lated. To test the hypothesis of the equality of the mean values of two unrelated (independent) samples, a two-sample Student t-test was used, coupled samples were paired Student t-test. For multiple comparisons, the Scheffe method was used. When analyzing the frequency of the trait, the percentage and error of representativeness were calculated. Statistically significant differences were considered at $p < 0.05$.

Results and their Discussions

In all groups, as a result of treatment, corneal opacities of varying degrees of intensity were obtained. The formation of gross opacities was detected only in patients of the first group: at discharge - in 26.8 ± 6.9% of cases (11 eyes), 1 month after treatment - in 22.0 ± 6.5% of cases (9 eyes), after 6 months - in 19.5 ± 6.2% of cases (8 eyes). moderate opacities at discharge are more common in patients of the second group (69.8 ± 7.0% of cases (30 eyes), and after 1 and 6 months, these opacities occur in patients of the 1st and 2nd groups in almost equal percentages.

In patients of group 3, corneal opacities of moderate intensity at discharge and in the long term (1 and 6 months) are quite less common than in patients of the first two groups (in 30.2 ± 7.0% of cases (13 eyes); in 23.3 ± 6.4% of cases (10 eyes) and in 11.6 ± 4.9% of cases (5 eyes), respectively), which indicates the positive dynamics of our treatment.

Gentle oblacoid opacities at discharge and in long-term follow-up occur least in patients of the first group (22.0 ± 6.5% of cases (9 eyes) throughout the entire time), and in patients of the second group at discharge, 1 and 6 months after treatment - in 30.2 ± 7.0% of cases (13 eyes); 41.9 ± 7.5% of cases (18 eyes) and 41.9 ± 7.5% of cases (18 eyes), respectively), that is, there is a positive trend in restoring corneal transparency.

It is essential that only in patients of group 3, a transparent cornea without any opacities was observed biomicroscopically at discharge (in 48.8 ± 7.6% of cases (21 eyes)). And in the long-term period (1 and 6 months) of follow-up, such indicators increased to 58.1 ± 7.5% of cases (25 eyes) and 76.7 ± 6.4% of cases (33 eyes), respectively.

It should be noted that in the first group, during treatment, two patients had complications such as panophthalmitis and corneal perforation on the 20th day of treatment, and therefore enucleation was performed urgently. These patients (2 people- 2 eyes) were excluded from further development.

Conclusion

The use of PRP in combination with intrastromal administration of an antibiotic makes it possible to increase the effectiveness of treatment of corneal ulcers by reducing the risk of formation of coarse opacities and opacities of moderate intensity, increases the number of patients with transparent cornea at discharge in 48.8 ± 7.6% of cases ($p < 0.05$), and in the long-term period - in 76.7 ± 6.4% of cases ($p < 0.05$).

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