Observation on Effect of 0.05% Cyclosporine Eye Drops Combined with 0.3% Sodium Hyaluronate Eye Drops on Dry Eyes after Cataract Surgery

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Abstract: Objective: to observe the curative effect of 0.05% cyclosporine eye drops combined with 0.3% sodium hyaluronate on dry eyes after cataract surgery. Methods: from June 2021 to September 2021, 78 patients (78 eyes) who underwent Phaco+IOL surgery in our hospital were diagnosed with dry eye after routine use of eye drops for one month. They were randomly divided into two groups according to the order of treatment, with 39 cases in each group. The control group used 0.3% sodium hyaluronate eye drops, while the observation group used 0.05% cyclosporine eye drops combined with 0.3% glass. Results: after treatment, BUT and SIt of the two groups were significantly longer than before treatment, while FL was significantly lower than before treatment. All indexes of the observation group combined with 0.05% cyclosporine eye drops were better, that is, BUT, SIt and FL were better, and the total effective rate of the observation group was significantly higher than that of the control group, with statistical significance (P＜0.05). Conclusion: for dry eyes after cataract surgery, the application of 0.05% cyclosporine eye drops combined with 0.3 sodium hyaluronate eye drops has obvious curative effect, which is worth popularizing.

Keywords: *0.05% cyclosporine; 0.3% sodium hyaluronate; dry eyes after cataract surgery*

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Cataract is a blinding disease, and its clinical treatment is mainly surgery. At present, the mainstream surgical method is Phaco+IOL (Phacoemulsification combined with intraocular lens implantation). Because of its short surgical time and relatively mature technology, the success rate of cataract surgery is almost 100% in hospitals with relatively complete technical equipment. However, due to the surgical operation and the influence of some drugs during the perioperative period, the secretion function of corneal epithelium and conjunctival goblet cells is damaged to a certain extent, especially the change of tear osmotic pressure and the production of various inflammatory factors, which break the steady state of tear film on the ocular surface, resulting in symptoms such as dry eyes, astringent eyes and fatigue, leading to dry eyes [1]. It is reported that the incidence of dry eye after cataract extraction is 9.8%-72.6%[2]. Studies have shown that 60% ～ 90% of patients can have abnormal ocular surface in the early stage after surgery, and some patients can't recover for 1 ～ 3 months or longer. If timely and effective treatment is not given, it will cause adverse effects on visual function, and then affect normal work and life [3-4]. The clinical treatment for this disease is usually local medication, and the commonly used drugs mainly include sodium hyaluronate, polyvinyl alcohol, recombinant bovine basic fibroblast eye drops or eye ointment and other eye surface lubricants [5], aiming to improve the discomfort of patients, so as to create a repair environment for the eye surface, and use the patient's own repair ability to repair the eye surface. However, usually the symptoms are not treated, and the treatment time is often long, the patients felt that the curative effect was not good. The main objective of this article is to observe the effect of 0.05% cyclosporine eye drops and 0.3% sodium hyaluronate eye drops on dry eyes after cataract surgery.

1 Materials and Methods

1.1 General information

From June 2021 to September 2021, Phaco+IOL was performed in our hospital. After one month of routine use of eye drops such as antibiotics, 78 patients (78 eyes) were definitely diagnosed as dry eyes according to diagnostic criteria [6]. Inclusive criteria: ① The cataract surgery was smooth. ② There was no dry eye before operation, and dry eyes were diagnosed after operation. ③ There is no need to add other drugs except conventional drugs after operation. ③ Informed consent of patients. Exclusion criteria: ① Diseases affecting the ocular surface such as eyelid ectropion, trichiasis, etc Systemic diseases such as diabetes, systemic connective tissue and autoimmune diseases. The patients were divided into reference group and observation group by parity method according to the order of treatment, 39 patients in each group. In the reference group, male: female=18:21, age 69.20 ±3.05 years. In the observation group, male: female=20:19, age 69.14 ±3.42 years old.

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Table 1 Comparison of related indexes of patients with dry eye before and after treatment

Group	Number of cases(n)	Tear film rupture time (s)		Tear secretion results (mm)		Fluorescent staining of cornea (points)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Reference group	39	4.79±1.31	8.23±2.20	2.98±1.01	4.84±0.81	4.44±1.03	1.41±0.74
Observation group	39	4.87±1.07	11.01±2.07	2.86±0.96	7.32±1.80	4.32±1.04	0.94±0.59
T	/	0.0859	13.8070	0.0898	6.4981	0.0788	15.1526
P	/	0.9445	0.0000	0.9206	0.0000	0.9373	0.0000

There is no statistical significance ($P > 0.05$) in comparing the general information and dry eye degree of the two groups of patients, which is comparable, as shown in Table 1.

1.2 Methods

Both groups of patients have performed Phaco+IOL operation in our hospital. The operation was performed by the same person. The operation was successful. The limbal incision was taken, and there was no corneal epithelium and conjunctiva damage during the operation. After the operation, hormone eye drops, non steroidal eye drops, antibiotic eye drops and artificial tears were routinely used. The routine re examination was performed in the outpatient department 1 day, 1 week, 2 weeks and 4 weeks after the operation, and the drug was stopped at 1 month according to the ocular inflammation. Collect dry eye patients after drug withdrawal.

1.2.1 Reference group

The group was treated with 0.3% sodium hyaluronate eye drops (Shengtian Pharmaceutical Co., Ltd., GYZZ H20173248), and the usage was 1 drop 4 times a day.

1.2.2 Observation group

On the basis of the treatment of the reference group, this group was combined with 0.05% cyclosporine eye drops (Shenyang Xingqi Eye Drops Co., Ltd., GYZZ H20203239), which was used twice a day.

Both groups were treated for 3 months.

1.3 Observation index

Statistical analysis and comparison of relevant data, namely BUT, SIt and FL, respectively indicate tear film rupture time, tear secretion length and corneal fluorescein staining. The curative effect and adverse reactions were compared between the two groups. As follows [7]:

1.3.1 BUT measurement method

Drop sodium fluorescein into the upper bulbar conjunctiva, observe with cobalt blue light, instruct the patient to blink for 3 ～ 4 times, then open his eyes, stare ahead, and calculate the time from the opening of his eyes to the appearance of the first dark spot. Take the average value after three consecutive measurements.

1.3.2 SIt measurement method

Use a 5mm×35mm filter paper, fold it at 5mm at one end and put it in the conjunctival sac at the middle and outer third of the lower eyelid, instruct the patient to close his eyes lightly, and expose the other end naturally outside the eyelid. After 5 minutes, take out the filter paper to measure the length of infiltration.

1.3.3 FL examination method [8]

After BUT examination, continue to observe with cobalt blue light, divide the cornea into four quadrants, and observe the corneal fluorescein staining in each quadrant. If there is no staining, it will be 0; If there are less than 30 staining spots, it will be 1; If there are more than 30 staining spots but no fusion, it will be 2; If there is fusion of staining spots, it will be 3, totaling 0-12.

1.3.4 Curative effect judgment and cured

The symptoms of the patient disappeared, but ＞ 10s; Remarkable effect: The symptoms of dry eye were significantly improved, BUT it was 5 ～ 10s; Effective: symptoms of dry eye were improved, but ＜ 5s; Invalid: the patient felt no improvement, but ＜ 5s. Total effective rate = cure rate+remarkable efficiency+effective rate.

1.4 Statistical analysis

Through SPSS22.0 software, the counting data and measurement data are expressed by statistical symbols, which are% and ($\bar{x}\pm s$) in turn. The two inspection methods are χ^2 inspection and T inspection in turn. The difference was statistically significant ($P < 0.05$).

2 Results

2.1 Comparison of BUT, SIt and FL between the two groups before and after treatment

After treatment, the BUT and SIt values of the two groups were significantly higher than those before treatment, while the FL was significantly lower than that before treatment. After treatment, all indexes of the observation group of combined treatment were better, that is, BUT, SIt and FL were better, and the difference was statistically significant ($P < 0.05$). See table 1.

2.2 Comparison of curative effect between the two groups

The total effective rates of the observation group and the reference group were (92.3%,36 /39) and (74.4%, 29/39) respectively, and the difference was statistically

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significant (χ^2 = 4.501 p ＜ 0.05), as shown in Table 2. After 3 months of medication, no adverse reactions such as allergy and infection were found in both groups.

Table 2 Comparison of curative effect between two groups [cases (%)]

Group	Number of cases	Cured	Remarkable effect	Effective	Invalid
Reference group	39	2(5.0)	13(35.0)	14(35.0)	10(25.0)
Observation group	39	5(12.5)	19(50.0)	12(30.0)	3(7.5)
χ^2	/		4.501		
P	/		0.034		

3 Discussion

With the progress of cataract surgery technology, the continuous optimization of various surgical AIDS and intraocular lens materials, and the increasingly accurate measurement of intraocular lens power, almost all cataract patients' vision after surgery has been improved, and surgeons are more and more able to grasp the success of cataract surgery. However, even so, some patients are not satisfied with the surgical results after surgery. These patients' tangled places have changed from unsatisfactory vision improvement in the past to complaining about eye discomfort, such as eye astringency, dry eyes, eye pain, foreign body sensation and even vision fluctuation. These symptoms are caused by dry eyes, and even some patients have stubborn symptoms and doubt about the operation [3].

Dry eye is a chronic ocular surface disease caused by many factors. It is the instability of tear film or the imbalance of ocular surface microenvironment caused by the abnormal quality, quantity and dynamics of tears, which may be accompanied by ocular surface inflammatory reaction, tissue damage and nerve abnormality, resulting in various ocular discomfort symptoms and/or visual dysfunction [9]. The key mechanism of the formation or aggravation of dry eyes after cataract surgery lies in inflammation, instability of tear film and high osmotic pressure of tears [10]. Analysis of specific causes: ① Toxic effects of drugs before, during and after operation. ② Exposure injury of keratoconjunctiva under microscope during operation. ③ The toxic effect of inflammatory factors caused by surgical irritation on the conjunctival epithelium. ④ Corneal nerve injury. ⑤ The morphological change of corneal incision leads to the steady change of tear film [11], which to some extent damages the intrinsic cells of the ocular surface, especially the conjunctival goblet cells, resulting in the decrease of the secretion function of goblet cells, the loss of the quality and quantity of tears, and the formation of dry eyes [12]. Studies have shown that dry eye after cataract surgery, if not treated in time, is the most obvious at 1 month after surgery and recovered at 3 months after surgery. However, all inspection indexes are still lower than those before surgery, and some patients' dry eyes can't recover at 6 months, and even develop into chronic dry eyes, which has adverse effects on patients' work and life [13-16]. Clinically, in view of the symptoms and signs of dry eye after some ophthalmic operations, some scholars put forward the name "operation-related dry eye" [17], which can be classified as dry eye after cataract surgery.

According to the severity of dry eyes, the treatment methods are different. Mild patients are mainly treated with local drugs, while moderate and severe patients need physical assistance or surgical treatment. Dry eyes after cataract surgery are generally mild and moderate. Clinically, the treatment of dry eyes after cataract surgery focuses on anti-inflammation, promoting corneal repair and stabilizing tear film, mainly on drug therapy. Especially in the early stage, the eye inflammation is severe, and sufficient anti-inflammation is the key to establish the steady state of tear secretion [18]. Therefore, in clinic, anti-inflammatory drugs and artificial tears are routinely used for one month after cataract surgery. One month after operation, the patients with dry eyes were treated with 0.05% cyclosporine eye drops and 0.3% sodium hyaluronate eye drops, and the curative effect was observed. Cyclosporine is a kind of lipophilic cyclic polypeptide with 11 amino acids from fungi. It is also a highly effective immunosuppressant and an internationally recognized prescription drug for treating dry eye. Its pharmacological effects are mainly through selectively and reversibly inhibiting the activation of T lymphocytes, inhibiting the release of inflammatory factors such as interleukin -1, interferon γ and tumor necrosis factor α, promoting T cell apoptosis and blocking the vicious circle of inflammation [19]. Moreover, it can inhibit the apoptosis of lacrimal acinar cells, directly promote the release of neurotransmitters, improve the nerve feedback of tears, inhibit the apoptosis of goblet cells, increase the storage and secretion of intracellular mucin, and directly promote the improvement of the quality and quantity of tears [20]. Therefore, 0.05% cyclosporine eye drops is a strict dry eye treatment drug. Previous studies have shown that 0.05% cyclosporine eye drops can significantly improve the symptoms and signs of dry eyes after cataract surgery, increase the thickness of tear film lipid layer, improve corneal perception and improve the visual quality after cataract surgery [21]. Sodium glass is a macromolecular polysaccharide biomaterial with high viscoelasticity, hydrophilicity and lubricity, which can reduce the friction of eye tissues, stabilize the tear film and prolong the tear film rupture time. Studies have shown that the application of high concentration sodium hyaluronate in dry eyes after cataract surgery can more effectively promote the repair and stability of tear film [22]. The reason is that high concentration sodium hyaluronate, besides the common characteristics of sodium hyaluronate, can be linked with

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protein, effectively promote the extension of corneal epithelial tissue, accelerate the healing of incision, and will not produce immune response [23]. In this study, after 0.3% sodium hyaluronate eye drops were used in the reference group, BUT and SIt were significantly longer than before treatment, and FL was significantly lower than before treatment, which indicated that 0.3% sodium hyaluronate eye drops had a good effect in dry eye patients. Combined use of the two drugs can treat symptoms and root causes from the exterior to the interior, and can further improve the ocular surface state of patients and relieve their discomfort.

The results of this study showed that the BUT, SIt and FL of the treatment group with 0.05% cyclosporine eye drops combined with 0.3% sodium hyaluronate eye drops were significantly better than those of the control group, and the comparison between the two groups was statistically significant. This shows that 0.05% cyclosporine eye drops combined with 0.3% sodium hyaluronate eye drops can optimize the eye symptoms of patients with dry eye after cataract surgery, which shows the curative effect of 0.05% cyclosporine eye drops in the treatment of dry eye, which is safe and worthy of popularization.

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