· Original article ·

Alteration of tear film after sutureless large incision manual cataract extraction

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Abstract

• AIM: To investigate the alterations of tear film after sutureless large incision manual cataract extraction (SLIMCE).

• METHODS: Sixty-eight SLIMCE operation eyes were studied with slit-limp microscope, break- up time (BUT), Schirmmer Ⅰ test (SⅠt), and fluorescence(FL) to observe the alterations of tear film at different time points in postoperation. Impression cytology and microphoto-analyses technique were also applied to observe the goblet cells at different time points postoperation(7,14, 30,60,90 days).

• RESULTS: Subjective complaint of dry eye within 90 days after the operations were significantly increased compare with preoperations(5-27,23,19,16,13; 2-16,14,8, 6,3). The schirmmer Ⅰ test were greatly increased in 14 days postoperation(10.1 ± 4.5;15.0 ± 4.7,13.8 ± 5.7), the mean scores of fluorescence increased (0-17,9,5;0-8,3,1) and the mean break-up time decreased in 30 days post-operation(10.3 ± 2.2;5.5 ± 2.3,7.0 ± 2.4,7.9 ± 2.2) (P < 0.05).

• CONCLUSION: SLIMCE operation have effect on the stability of tear film.

• KEYWORDS: sutureless large incision manual cataract extraction; cataract; tear film; impression cytology
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INTRODUCTION

Sutureless large incision manual cataract extraction (SLIMCE) possessing many advantages, such as: less procedure, less astigmatism and lower charge is main modus operandi of cataract at hospital of basement layer. With more and more recognition about ocular surface disease, we are thinking highly of dry eye symptom including foreign body sensation, dry feeling etc. Therefore, the tear film conditions of 68 patients after SLIMCE from April 2007 to April 2008 were studied.

MATERIALS AND METHODS

Subjects A total of 68 eyes underwent SLIMCE operation since 2008 June, including 37 eyes of male, 31 eyes of female, aged 67-88(mean 79 ± 7.4) years. Another eye without operation of every patient was studied as control group. Preoperation preparation and anaesthesia reference operation routine of cataract. Operating procedure: making conjunctival flap regarding upper fornix as basal body, then making a 8mm layers scleral incision of anti-arcus superciliaris at the position from central part to limbus corneae about 2mm, making scleral tunnel to intra-limbus corneae 2mm with tunnel knife, obtaining a choanoid tunnel of 10mm interior incision; making transparent corneal incision at 12,3(9),6 of limbus corneae with paracentesis knife, injecting healon at anterior chamber, tearing ring forming anterior capsular about 7mm, free nuclei to anterior chamber, inserting anterior chamber delivery tube at 3(9) corneal incision, inserting lens loop under nucleus, unfolding anterior chamber infuse at the same time, expulsing lens nucleus from scleral incision. After cleaning cortex, injecting healon at anterior chamber again, imbedding IOL into capsular, cleaning healon. Dropped by eye ointment (3g/L tobramicin + 1g/L dexamethasone) immediately, and dropped by eyewater (3g/L tobramicin + 1g/L dexamethasone) 4,3,2,1 every day and dappered gradually 1 time every week.

Methods Slit-limp microscope, break- up time (BUT), Schirmmer Ⅰ test (SⅠt), fluorescence(FL) were used to observe the alterations of tear film at different time points in postoperation. Impression cytology and microphoto-analyses technique were also applied to observe the goblet cells at different time points postoperation. Slit-limp microscope, BUT, SIt, FL were used to observe the alterations of tear film at preoperation and 7,14,30,60,90 days in postoperation. Score standard: without dry eye symptom, 0 score; with some symptom by chance, 1 score; with light interruptable symptom, 2 score; with continue and obvious symptom, 3 score. Corneal staining: without fluorescein coloring, 0 score; with a little punctiform fluorescein coloring, 1 score; with more fluorescein coloring, 2 score; with close punctiform and lamellar fluorescein coloring, 3 score. Dividing cornea into four

Table 1 Subjective complains and stability of tear film before and after operation ($\bar{x} \pm s$)

t/d		Subjective complains				BUT <10s	SⅠt(mm)	FL(score)			
		0	1	2	3			0-3	4-6	7-9	10-12
Pre-op		61	5	2	0	10.3±2.2	10.1±4.5	68	0	0	0
Post-op	7	23	27	16	2	5.5±2.3	15.0±4.7	39	17	8	4
	14	29	23	14	2	7.0±2.4	13.8±5.7	55	9	3	1
	30	37	19	8	1	7.9±2.2	10.0±5.1	62	5	1	0
	60	46	16	6	0	10.0±2.5	10.0±5.1	64	4	0	0
	90	52	13	3	0	10.2±2.6	9.8±4.8	66	0	0	0

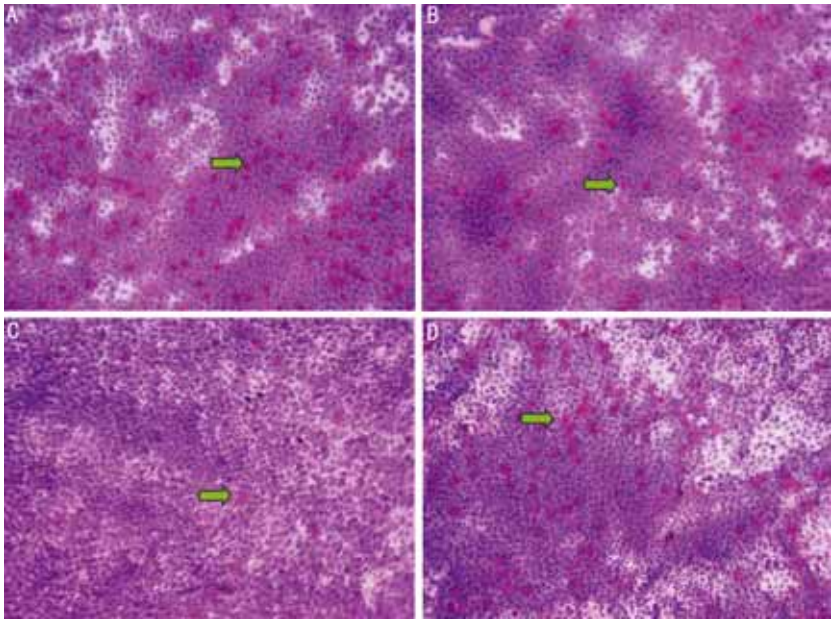

Figure 1 Goblet cells existed(green arrow, PAS×200) A:Preoperation; B:7 days after surgery; C:14 days after surgery; D:30 days after surgery.

equal quadrants to score, score range:from 0 to 12. Normal value(BUT): 10-45 seconds, less than 10 seconds as tear-film instability.

Cutting cellulose-acetafolic to 3mm×4mm, then soaking it into distilled water to eliminate surface activity, dislodging and open-air drying, and marking rough surface, then sterilizing. Patients were dropped 5g/L oxybuprocaine twice before examination. Absorbing tear fluid in infra-fornix with filter paper, putting cellulose-acetafolic of downward rough surface on the operative incision positional bulbar conjunctiva, pressing continual 6 seconds with glass rod lightly to obtain endothelial cells, example fixed with 950mL/L alcohol 10 minutes and prepared for PAS stain. Microphoto-analyses technique as applied to observe the goblet cells. Five positions were chosen at random, and the number of conjunctival goblet cells was taken separately and took the mean value.

Statistical Analysis All the data were analyzed with SPSS 11.0, measurement data were denoted by $\bar{x} \pm s$, obtained data employed analysis of variance. $P < 0.05$ was regarded as statistical significance.

RESULTS

Dry Eye Rational Symptoms Dry eye rational symptoms at 30 days after SLIMCE were more serious($P<0.05$), and after 30 days were still more serious than those before operation. But there were no statistically differences(Table 1).

Tear Film BUT Compared with preoperation, BUT reduced significantly since 7 days after operation, and BUT at different time points within 30 days after operation were less than before those before operation, The differences were statistically significant($P<0.05$). BUT 30 days after operation was still less than those before operation, but the differences were no statistically significant(Table 1).

Schirmmer Ⅰ Test The SⅠt was greatly increased within 14 days postoperation. Compared with preoperation, the differences were statistically significant($P<0.05$). Lacrimal secretory volume taper and achieved preoperative level at 30 days postoperation, and were lower at 60 days and 30 days than preoperation, but the differences were no statistically significant(Table 1).

Fluorescein Staining Compared with preoperation, the mean scores of FL increased at 7 days and 14 days, the differences were statistically significant ($P < 0.05$). The scores of fluorescence after 7 days postoperation were no significant differences compared with preoperation(Table 1).

The Impression Cytology The number of conjunctiva goblet cells in surgery aera at 7,14,30,60 and 90 days was 29.6±4.3, 22.7±4.7, 39.0±4.3, 44.8±3.6, 45.8±3.6 respectively. After 60 days it achieved preoperative level (46.4±4.9, Figure 1) without statistical differences.

DISCUSSION

Cataract effect quality of life seriously, and operation is the main method to cure the disease. Sutureless large incision manual cataract extraction combinating intraocular lens (SLIMCE + IOL) has been proved to be a kind of perfect modus operandi for poverty-stricken zone because of its cheap, simplity and effect. Some studies indicated that physiologic function of tear film changed after some ocular operations[1,2], the changes may lead to dry eye symptom even influence operation effect. Accordingly, it is very important to learn condition of tear film after SLIMCE to reduce complication. Stabilization of tear film is foundation to keep ocular surface health, and stable tear film depends on quality and quantity of composition and normal lacrimal kinetics. Dry eye refers to abnormal quality and quantity of lacrimal fluid and abnormal lacrimal kinetics induced by any causes, and accompaning with complaint and ocular surface tissure affection[3]. Etiological factors are multiplicity, including systemic disease, drug, environmental contamination, local inflammatory reaction, malposition of eyelid, age and gender, etc[4]. The mucoprotein secreted by conjunctival goblet cells is important factor to keep stabilization of tear film. Miopragia of goblet cells or reduced quantity can lead to less mucoprotein to affect hydrophilic interation and integrity of tear film to cause dry eye.

The study indicated that multiple index of stabilization of tear film after SLIMCE changed markedly compared with pre-operation, the SⅠt were greatly increased 7 days after operation. With extention of observation time, sit degraded gradully, and achieved preoperative level. We considered that the increased SⅠt may related to irritating secrete of lacrimal fluid induced by conjunctival wound healing after surgery. BUT reduced significantly 7 days postoperation, and fluorescein stain degree increased markedly. This condition exist until 30 days postoperation. we concluded that the condtion may due to mechanical injury of corneal and conjunctival epithelium induced by topical anesthetic and operative procedure and punctiform stripping of corneal epithelium and unstabilization of tear film induced by inflammatory reaction after surgery [5,6].

Conjunctival goblet cells are very important to keep stabilization of tear film. The conjunctival impression cytology detection *in vivo* can reflect morphous and functional difference of cells on ocular surface objectively[7]. The impression cytology detection showed that the number of conjunctiva goblet cells in surgery area within 30 days were lower obviously (29.6±4.3, 22.7±4.7, 39.0±4.3, 44.8±3.6, 45.8±3.6), this condition may due to local larger conjunctival and corneal wound in surgery aera and inflammatory reaction induced by wound healing earlier period after surgery. With better wound heal and weakened inflammatory reaction, the number of conjunctival goblet cells still were lower, we concluded the condition may be on account of dropping gutta with antisept (benzalkonium chloride) long-termly.

Stabilization of tear film were destroyed after SLIMCE, patients may complain of uncomfortable symptom or even dry eye. For better quality of visual sence and lower uncomfortable complain, we should notice some points: avoid mechanical injury of ocular surface epithelium as far as possible during operation; choose better eyewater induced less injury of ocular surface epithelium preoperatively and postoperatively; decrease applied frequency as far as possible on the foundation of infection prevention postively; employ artificial tears to aviod symptom increased for patients with dry eye preoperatively, and apply artificial tears routinely to increase viscosity of tissure on ocular surface to alleviate uncomfortable symptom and protect tear film postoperatively; perform operation after identifing etiological factor and appling reasonable medicine to control symptom of dry eye .

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大切口无缝线白内障术后泪膜变化的研究

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摘要

目的:探讨大切口无缝线白内障囊外摘除术(SLIMCE)后泪膜情况。

方法:行 SLIMCE 术眼 68 例,分别于术前及术后 7,14,30,60,90d 行症状、泪膜破裂时间(BUT)、基础泪液分泌试验(SⅠt)、角膜荧光素染色(FL)检测。运用结膜印迹细胞学及显微图象分析系统对 SLIMCE 术区结膜杯状细胞进行记数分析。

结果:90d 内术眼不适患者较术前增加(5-27,23,19,16,13; 2-16,14,8,6,3),术后 14d 内 SⅠt 增加(10.1±4.5; 15.0±4.7, 13.8±5.7),30d 内 BUT 缩短(10.3±2.2; 5.5±2.3, 7.0±2.4, 7.9±2.2),FL 增高(0-17,9,5; 0-8,3,1),与术前相比有统计学差异($P<0.05$)。

结论:SLIMCE 术后会影响泪膜稳定性。

关键词:大切口无缝线白内障(囊外)摘除术;白内障;泪膜;印迹细胞学