International Surgery

Influence of preoperative health education based on the theory of enhanced recovery after surgery on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision

--Manuscript Draft--

Manuscript Number:	INTSURG-D-24-00013R1
Full Title:	Influence of preoperative health education based on the theory of enhanced recovery after surgery on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision
Article Type:	Original Article
Keywords:	theory of enhanced recovery after surgery; health education; pterygium excision with conjunctival flap transplantation; anxiety; rehabilitation status
Corresponding Author:	Mei Wu Lixin people hospital Bozhou, CHINA
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	Lixin people hospital
Corresponding Author's Secondary Institution:	
First Author:	Mei Wu
First Author Secondary Information:	
Order of Authors:	Mei Wu
Order of Authors Secondary Information:	
Abstract:	Pterygium excision with conjunctival flap transplantation is a common ophthalmic surgery, often associated with patient anxiety and involuntary eye movements, which can hinder surgical progress and postoperative recovery. This study aimed to evaluate the effects of preoperative health education based on Enhanced Recovery After Surgery (ERAS) principles on anxiety and postoperative rehabilitation in pterygium excision patients. Ninety patients scheduled for elective pterygium excision from March to December 2023 were randomly assigned to two groups: a control group receiving routine intervention and an observation group receiving ERAS-based preoperative education. The study assessed outcomes using the Generalized Anxiety Disorder Scale-7 (GAD-7), Self-Perceived Burden Scale (SPBS), Numerical Rating Scale (NRS), wound healing time, uncorrected visual acuity (UCVA), and nursing satisfaction. Results showed that the observation group had significantly lower GAD-7 and SPBS scores before surgery ($P<0.05$), indicating reduced anxiety and perceived burden. Additionally, NRS scores at 1 and 2 days post-surgery were lower in the observation group ($P<0.05$), and their wound healing time was shorter ($P<0.05$) compared to the control group. However, no significant difference in UCVA was observed between the groups at 4 weeks post-surgery ($P>0.05$). Nursing satisfaction was notably higher in the observation group ($P<0.05$). The study concludes that ERAS-based preoperative health education effectively reduces preoperative anxiety and enhances postoperative recovery in pterygium excision patients, supporting its high clinical application value.

Title page

Mei Wu*

Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Corresponding author: Mei Wu

Address: Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Email:19956715950@163.com

Acknowledgments

We would like to express our deep gratitude to the entire medical and nursing staff at Lixin People's Hospital for their dedication and support throughout this study.

We are also grateful to the patients who participated in this study, whose cooperation was essential to the success of our research.

Table 1. Comparison of preoperative psychological status of patients ($\bar{x}$±s, points)

Group	GAD-7 score		SPBS score	
	Enrollment	Before surgery	Enrollment	Before surgery
Observation (n=45)	10.02±2.29	7.27±2.43*	25.76±4.09	20.84±3.83*
Control (n=45)	10.13±2.16	10.56±1.71	25.24±4.17	25.07±3.74
t	-0.237	-7.411	0.587	-5.291
P	0.813	＜0.001	0.559	＜0.001

Note: Compared with at the time of enrollment, *P<0.05.

Table 2. Comparison of NRS score of patients ($\bar{x}$±s, points)

Group	2 hours after surgery	1 day after surgery	2 days after surgery
Observation (n=45)	4（3,4）	2（2,3）	2（1,2）
Control (n=45)	4（3,4）	3（2,4）	2（2,3）
Z	-0.610	-5.127	-5.011
P	0.542	＜0.001	＜0.001

Table 3. Comparison of rehabilitation status of patients ($\bar{x}$±s)

Group	Wound healing time (d)	UCVA (LogMAR)	
		Before surgery	4 weeks after surgery

Observation (n=45)	5.18±1.28	0.32±0.17	0.62±0.18*
Control (n=45)	7.20±1.41	0.32±0.16	0.59±0.15*
t	-7.119	-0.130	0.637
P	＜0.001	0.897	0.526

Note: Compared with the same group before surgery, *P<0.05.

Table 4. Comparison of nursing satisfaction of patients [n (%)]

Group	Very dissatisfied	Dissatisfied	Generally satisfied	Satisfied	Very satisfied	Satisfaction
Observation (n=45)	0（0.00）	0（0.00）	2（4.44）	12（26.67）	31（68.89）	43（95.56）
Control (n=45)	0（0.00）	3（6.67）	6（13.33）	16（35.56）	20（44.44）	36（80.00）
χ^2			—			5.075
P			—			0.024

Influence of preoperative health education based on the theory of enhanced recovery after surgery on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision

Mei Wu*

Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Corresponding author: Mei Wu

Address: Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Email:19956715950@163.com

Abstract: Pterygium excision with conjunctival flap transplantation is a common ophthalmic surgery. Due to the eye fragility property, patients are prone to fear and anxiety, and there is tonic and disorderly movement of the eyeball during surgery, which affects the surgical progress and postoperative rehabilitation. The aim of this study was to explore the influence on preoperative anxiety and postoperative rehabilitation status in patients undergoing pterygium excision after preoperative health education based on the theory of enhanced recovery after surgery (ERAS). Ninety patients who received elective pterygium excision with conjunctival flap transplantation in the hospital from March 2023 to December 2023 were randomized into two groups. 45 patients in the control group were given routine intervention guidance, and on this basis, the remaining 45 patients in the observation group adopted preoperative health education based on ERAS theory. The intervention effect was evaluated according to Generalized Anxiety Disorder Scale-7 (GAD-7), Self-Perceived Burden Scale (SPBS), Numerical Rating Scale (NRS), wound healing time, uncorrected visual acuity (UCVA) and nursing satisfaction. After intervention, the observation group had lower GAD-7 score and SPBS score before surgery than the control group (P<0.05). The NRS scores in the observation group at 1 and 2 days after surgery were lower than those in the control group (P<0.05). The wound healing time in the observation group was shorter compared to the control group (P<0.05), but the UCVA revealed no obvious difference between both groups at 4 weeks after surgery (P>0.05). The nursing satisfaction was higher in the observation group (P<0.05). It is concluded that preoperative health education based on ERAS theory has obvious advantages in improving preoperative anxiety and postoperative rehabilitation of patients with pterygium excision, and its clinical application value is high.

Keywords: theory of enhanced recovery after surgery; health education; pterygium excision with conjunctival flap transplantation; anxiety; rehabilitation status

INTRODUCTION

Pterygium refers to the redundant tissue on the conjunctiva and cornea of the palpebral fissure, which is increasing after invading the cornea, and is more common in outdoor workers. A report on a multi-ethnic population in Russia shows that the incidence of pterygium is 2.3% in people over 40 years old [1]. In a survey in China, the incidence of pterygium in patients with type 2 diabetes mellitus (T2DM) over 50 years old in Jiangsu Province is 22.37% [2]. Although the incidence of pterygium varies in different countries and regions, most reports suggest that older age, rural areas, plateau areas, and long outdoor working hours are risk factors for pterygium [3,4]. Pterygium excision with conjunctival flap transplantation is the main treatment method for pterygium at present. However, due to the particularity of eye surgery, patients are prone to negative emotions such as preoperative anxiety and fear, leading to obvious postoperative stress response and affecting postoperative rehabilitation. In addition, the surgical method is local anesthesia, with clear consciousness. If the surgical cooperation skills are not mastered, it may lead to different degrees of eye position, head position and body position changes during surgery, which will affect the smooth progress of the surgery, thus affecting the postoperative rehabilitation progress.

Therefore, it is necessary to strengthen the preoperative health education for patients with pterygium excision, and to carry out special training of cooperation skills for patients, so as to reduce the risk of ophthalmic surgery and improve the prognosis of patients. The theory of enhanced recovery after surgery (ERAS) was first proposed by Danish surgeon Henrik Kehlet et al. [5] in 1997. Its core idea is to reduce surgical trauma and stress, accelerate the rehabilitation progress of surgical patients and reduce the incidence rates of complications by integrating a variety of evidence-based medical evidence-supported treatments. In a clinical study, 49 patients with laparoscopic sleeve gastrectomy received intervention based on the ERAS theory, and the results manifested that the hospital stay of patients was shortened and the postoperative pain score was reduced[6]. Fay et al. [7] discussed the application effect of ERAS theory regimen on puerperae with cesarean section, and found that the implementation of ERAS theory regimen shortened the

hospital stay and reduced the use of opioids. The purpose of this study was to investigate the influence of preoperative health education based on ERAS theory on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision.

METHODS

Research Subjects

From March 2023 to December 2023, 90 patients receiving selective pterygium excision with conjunctival flap transplantation in the hospital were randomly classified into two groups. 45 cases in the control group performed routine intervention guidance, whereas 45 cases in the observation group were given preoperative health education based on ERAS theory.

Using simple randomization method, 90 experimental units were numbered from 1 to 90. Starting from any number in the random number table, a random number of each experimental unit was obtained in the same direction. The remainder was obtained by dividing the random number by the number of groups. If divisible, the remainder was taken as the number of groups and grouping was performed according to the remainder. Research assistants who did not participate in research evaluation implemented allocation concealment.

There were 14 males and 31 females in the observation group, aged 45-73 years, with an average of (56.93±6.72) years old. There were 13 males and 32 females in the control group, age ranging from 45 to 77 years old, with an average of (56.81±7.01) years old. No significant differences were demonstrated in baseline data between both groups (P>0.05). This study was approved by the Medical Ethics Committee of the Lixin People's hospital NO.LXXRMYY-2023LWO01.

Inclusion criteria: (1) Primary pterygium was diagnosed by combining clinical symptoms, conjunctival scraping, routine ophthalmic examination, etc. [8], and it was a monocular lesion; (2) Consistent with the indications for surgical resection: progressive, hypertrophic and congested pterygium or pterygium invading the proximal pupillary area and affecting the visual activity; (3) Pterygium excision with conjunctival flap transplantation was performed by the same team of doctors; (4) Patients were informed and agreed with this study.

Exclusion criteria: (1) Concurrent mental illness, cognitive impairment or malignant tumor; (2) Concurrent eye disease surgery history or other eye diseases; (3) Concurrent organic diseases of

important organs such as heart, brain and kidney; (4) Low treatment compliance or follow-up possibility; (5) Patients with surgical contraindications; (6) Speech and hearing impairments.

Methodology

Routine intervention guidance was implemented on patients in the control group, including the following contents. (1) Preoperative: After admission, the primary nurse carried out routine health education for patients, orally taught the symptoms, etiology, treatment methods, surgical procedures, prognosis and precautions of pterygium, and assisted the patients to complete various auxiliary examinations. (2) Intraoperative: Personal information of patients was checked, the temperature of operating room was adjusted according to the patients' needs and the operating room environment was kept clean and comfortable to relieve the tension of patients. (3) Postoperative: Primary nurse paid close attention to the postoperative conditions of patients, and reported to the doctors in time if there was any abnormal condition. Primary nurse replaced the eye aseptic dressing in time, and observed the corneal recovery status regularly, followed the doctor' s advice for medication guidance after removing the wound dressing, informed the patients the correct use of antibacterial eye drops to flush the lacrimal passage and keep the eye clean. Primary nurse guided patients to eat correctly, avoid spicy, irritating, greasy, quit smoking and drinking, and eat more easily digestible or vitamin-rich foods. (4) Discharge: On the day of discharge, primary nurse instructed the patients to follow the doctor' s advice to guide the use frequency of postoperative eye drops, the time of withdrawal and the time of follow-up, and admonished patients to review in time and guide patients with self-assessment and treatment of the common eye discomfort after pterygium surgery, and seek for medical treatment immediately if there was any abnormality

Preoperative health education based on ERAS theory was performed on patients in the observation group on the basis of the control group. The specific implementation was as follows:

Formation of intervention team

The intervention team was composed of 1 ophthalmologist, 1 head nurse and 3 nurses. The team members applied CNKI, CINAHL Complete, PubMed and other databases to search for pterygium, perioperative intervention of pterygium excision, theory of enhanced recovery after surgery, health education and other related contents. Referring to "Clinical Practice Guidelines for

ERAS in China (2021)" [8] and combining with the medical conditions and current situation of the hospital, preoperative health education intervention strategy based on ERAS theory was formulated. The attending physician was responsible for the comprehensive assessment of disease condition and the formulation and adjustment of treatment methods, the rehabilitation physician was responsible for the formulation of postoperative rehabilitation strategy, the head nurse was in charge of the formulation of research regimen, quality control and related knowledge training, and the primary nurse was responsible for the implementation of intervention strategy, and participated in the intervention work after qualified training. Specific strategies included:

Evaluation of basic conditions of patients: The basic conditions of patients and their families were evaluated by primary nurse, including age, education level, cognition degree towards pterygium disease and surgery, and psychological status at the present stage of patients and their families, so as to judge the understanding ability and psychological needs of patients and their families.

Disease knowledge health education: One-to-one health education was conducted for patients and their families, focusing on postoperative ocular autonomic symptoms, common complications and prognosis status, so that patients and their families could understand the surgery and prognosis status. Considering that pterygium affects visual acuity and patients see things vaguely, patients should be educated by easy-to-understand language as much as possible, and preoperative education videos were played for patients, including operating room environment, surgical operation, instrument use, cooperation methods, etc. Primary nurse answered patients' questions in a timely manner.

Emotional management: Generalized Anxiety Disorder-7 (GAD-7) [9] was used to evaluate the negative emotions of patients, and psychological intervention was performed according to the evaluation results. For patients with mild anxiety (GAD-7 score of 5-9 points), psychological counseling and encouragement could be combined with the personality characteristics of patients, and family members were recommended to participate in soothing the emotions of patients. For patients with moderate and above anxiety (GAD-7 score≥10 points), primary nurse combined with the basic conditions of patients, and applied psychological intervention with emotional transfer method, respiratory relaxation adjustment method, music adjustment method and application of narrative method on the basis of emotional counseling, to guide patients to relieve psychological

stress.

Scenario simulation health education: The surgical scene simulation was performed at 1 day before the patients planned to undergo surgery. The simulated operating room was equipped with a treatment bed, a simple microscope, and simulated surgical instruments. The primary nurse conducted detailed preoperative education on the patients, explaining the surgical procedure, intraoperative cooperation and postoperative precautions, emphasizing to avoid shaking the head during surgery and rotating the eyeball at will, and to prohibit extending the hand to the head. Patients were guided to lie on the treatment bed, with the towel covering to the forehead, exposing the surgical side eye, and simulating the disinfection of the surgical eye; patients were guided to take a calm and rhythmic breathing, and gradually adapt to the operating room environment; patient were informed to breathe deeply and push the tip of the tongue against the upper jaw to relieve the impulse to cough or sneeze and avoid the intraoperative accidents and bleeding. If there was pain and intraoperative discomfort, patients could reflect to the surgeon but did not move at will. Meanwhile, eye position training was performed and patients were instructed to perform eye position training according to the nurse' s language instructions under the guidance of the light source of the fixation device, such as turning the eyeball upward, downward, left, right, upper left, and upper right until the patients fully grasped the training without accompanying head rotation.

Perioperative pain management: Numerical Rating Scale (NRS) [10] was adopted to assess the pain status of patients. The pain score sign was set up at the bedside, and medical intervention was given when the score was >4 points. Painkillers were taken according to the pain status of patients.

Observation indicators

Preoperative psychological status: At the time of enrollment and before surgery, the anxiety status of patients was assessed by GAD-7. GAD-7 is composed of 7 questions, each item ranging from 0 to 3 points, with a total score of 0-21 points. The higher the GAD-7 score, the more serious the anxiety symptoms, and GAD-7 score≥5 points indicates the presence of anxiety. Self-Perceived Burden Scale (SPBS)[11] was used for evaluation, which includes three dimensions such as physical factor, emotional factor and economic factor, with 10 items in total, each item ranging from 1 to 5 points (never~always) and a total score range of 10-50 points. SPBS score> 20

points represents the presence of burden perception, and the higher the score, the higher the physical/emotional/economic burden.

Pain status: The pain status of patients was evaluated by adopting NRS at 2 hours, 1 day and 2 days after surgery. NRS score ranges from 0 to 10 points, 0 points=no pain, 1-3 points=mild pain (no influence on sleep), 4-6 points=moderate pain (mild influence on sleep), 7-9 points=severe pain (unable to fall asleep or wake up in painful sleep) and 10 points=sharp pain. Let the patients circle the number that best represents the degree of pain.

Rehabilitation status: The wound healing time of patients was recorded. Uncorrected visual acuity (UCVA) was measured by visual acuity measuring instrument before surgery and at 4 weeks after surgery.

Nursing satisfaction: Before discharge, Newcastle Satisfaction with Nursing Scales (NSNS) [12]was adopted for nursing satisfaction assessment of patients. NSNS consists of 19 questions, 1-5 points for each item and 19-95 points for total score (19-35 points for very dissatisfied, 36-54 points for dissatisfied, 55-64 points for generally satisfied, 65-80 points for satisfied, and 81-95 points for very satisfied). Satisfaction (%)=[(very satisfied cases + satisfied cases)/total number of subjects] × 100%.

Statistical analysis

The above data were analyzed by SPSS22.0, and enumeration data were represented as [*n* (%)] by using chi-square test. Rank sum test was used for ranked data. Measurement data conforming to the normal distribution were expressed as ($\bar{x}$ ±s) by applying independent sample *t* test for comparison, and measurement data with non-normal distribution were manifested as [M (QL, QU)] by Mann-Whitney test. $P<0.05$ was considered as statistically significant.

RESULTS

Preoperative Psychological Status

With regard to psychological status, compared with the control group receiving routine intervention guidance, the observation group receiving preoperative health education based on ERAS theory had better psychological status, and the scores of GAD-7 and SPBS in the

observation group before surgery were lower than those in the control group (P<0.05) (Table 1).

Table 1. Comparison of preoperative psychological status of patients ($\bar{x}$±s, points)

Group	GAD-7 score		SPBS score	
	Enrollment	Before surgery	Enrollment	Before surgery
Observation (n=45)	10.02±2.29	7.27±2.43*	25.76±4.09	20.84±3.83*
Control (n=45)	10.13±2.16	10.56±1.71	25.24±4.17	25.07±3.74
t	-0.237	-7.411	0.587	-5.291
P	0.813	＜0.001	0.559	＜0.001

Note: Compared with at the time of enrollment, *P<0.05.

Pain Status

The observation group had lower NRS scores at 1 day and 2 days after surgery than the control group (P<0.05). There was no obvious difference in NRS score between groups at 2 hours after surgery (P>0.05) (Table 2).

Table 2. Comparison of NRS score of patients ($\bar{x}$±s, points)

Group	2 hours after surgery	1 day after surgery	2 days after surgery
Observation (n=45)	4（3,4）	2（2,3）	2（1,2）
Control (n=45)	4（3,4）	3（2,4）	2（2,3）
Z	-0.610	-5.127	-5.011
P	0.542	＜0.001	＜0.001

Rehabilitation Status

The observation group had shorter wound healing time than the control group (P<0.05), but the UCVA was not obviously different at 4 weeks after surgery between both groups (P>0.05) (Table 3).

Table 3. Comparison of rehabilitation status of patients ($\bar{x}$±s)

Group	Wound healing time (d)	UCVA (LogMAR)	
		Before surgery	4 weeks after surgery
Observation (*n*=45)	5.18±1.28	0.32±0.17	0.62±0.18*
Control (*n*=45)	7.20±1.41	0.32±0.16	0.59±0.15*
t	-7.119	-0.130	0.637
P	＜0.001	0.897	0.526

Note: Compared with the same group before surgery, *P<0.05.

Nursing Satisfaction

The nursing satisfaction in the observation group was higher than that in the control group (P<0.05) (Table 4).

Table 4. Comparison of nursing satisfaction of patients [*n* (%)]

Group	Very dissatisfied	Dissatisfied	Generally satisfied	Satisfied	Very satisfied	Satisfaction
Observation (*n*=45)	0（0.00）	0（0.00）	2（4.44）	12（26.67）	31（68.89）	43（95.56）
Control (*n*=45)	0（0.00）	3（6.67）	6（13.33）	16（35.56）	20（44.44）	36（80.00）
χ^2			—			5.075
P			—			0.024

DISCUSSION

Pterygium is one of the common conjunctival degeneration diseases in the eye, and it usually manifests as conjunctival swelling, congestion and edema, foreign body sensation in the eyes, dryness and itching, with the characteristics of high incidence and high recurrence rate. In the face of surgical procedure, hospitalized patients often have psychological stress reactions such as anxiety, especially in elderly patients. Because the eye is relatively fragile, it is sensitive to surgical stimulation and discomfort, and pterygium excision needs to be performed under the

microscope. The changes of head or eye movements caused by anxiety, tension and discomfort will affect the operation under the magnification of the microscope. In severe cases, the corneal conjunctiva may be accidentally injured by surgical instruments, resulting in surgical complications, and affecting the surgical effect and rehabilitation progress [13]. Therefore, it is necessary to strengthen the preoperative health education of patients, so as to promote them to face the surgery with a positive attitude and good cooperation.

Theory of enhanced recovery after surgery (ERAS) emphasizes that under the premise of ensuring the smooth surgery of patients, adopting a series of comprehensive evidence-based medical measures can minimize the surgical trauma and stress, promote the rehabilitation of patients, and thus improve the quality of life of patients. This theory has gradually shown its unique advantages in many medical fields [14, 15]. This study demonstrates that the preoperative GAD-7 score and SPBS score in the observation group were lower than those in the control group, and the NRS scores at 1 and 2 days after surgery were lower, indicating that preoperative health education based on ERAS theory can improve the preoperative anxiety and self-perceived burden and relieve the postoperative pain in patients with pterygium excision. The possible reasons are as follows: preoperative health education based on ERAS theory includes five aspects such as evaluation of basic conditions of patients, health education of disease knowledge, emotional management, scenario simulation health education and perioperative pain management. By assessing the basic conditions of patients, medical staff understand the physical condition, past medical history and living habits of patients, so as to develop a personalized preoperative health education regimen for patients. In the aspect of disease knowledge health education, medical staff adopt different ways for patients with different cognition levels to explain the pathophysiological process, treatment methods and expected effects of the disease in detail as much as possible, so as to help patients and their families fully understand their own conditions, reduce the anxiety and fear, and relieve the self-perceived burden of patients. As an important part of preoperative health education, emotional management aims to help patients learn to adjust their mentality and actively face the surgery. Medical staff guide patients to use emotional transfer method, respiratory relaxation regulation method and other methods to relieve tension, and encourage family members to participate in the emotional management of patients, so that patients can get more emotional support. Scenario simulation health education is a vivid and intuitive way of education. By

simulating the operating room, patients can understand the surgical process, postoperative precautions and possible complications in advance. Patients can not only be familiar with the surgical process, alleviate the preoperative anxiety and reduce the surgical stress, but also vividly understand what needs attention and cooperation during perioperative period, which is conducive to the smooth process of the surgery [16]. Additionally, perioperative pain management is also one of the main contents to promote postoperative rehabilitation. Medical staff should evaluate the pain of patients in time and carry out targeted pain management to promote the corneal wound recovery and accelerate postoperative rehabilitation [17,18].

Correctly cooperating with the doctor' s eye position requirements is conducive to the smooth progress of surgery. Although the specific intraoperative and postoperative requirements are explained to the patients before surgery, some patients cannot achieve good eye position cooperation under the intraoperative tension state. The common manifestations are eye shaking, eye position deviation, and eye failure to rotate as required, resulting in the forced stop of the surgery to adjust the eye position, lengthening the surgical time, and also affecting the surgical efficiency. Eye position and head position training is a practical training method to enhance cognitive ability, and strengthen intraoperative cooperation awareness and psychological endurance of patients. This clinical observation also confirms that good eye position training and head position training are important measures to achieve good efficacy of pterygium surgery and good patient satisfaction and reduce surgical complications. Due to the special way of ophthalmic surgery and medication, perioperative low compliance and anxiety are common in ophthalmic patients, which will also affect the progress of rehabilitation [19]. There is no obvious difference in UCVA between the two groups at 4 weeks after surgery, suggesting that although preoperative health education based on ERAS theory promotes the early postoperative ocular surface repair, it does not change the visual quality, which may be explained by the fact that the postoperative visual quality is affected by many factors, such as the patient' s own high myopia, compensatory repair of corneal epithelium, and irregular corneal healing. This study also shows that the wound healing time in the observation group is shorter, and the nursing satisfaction is also higher compared to the control group. It is further confirmed that preoperative health education based on the theory of ERAS is beneficial to the postoperative rehabilitation of patients with pterygium excision. In the scenario simulation health education, this study adds eye position training on the

basis of routine preoperative education, guides patients to carry out repeated training, and achieves the eye position requirements needed for surgery. Correctly cooperating with the doctor' s eye position requirements is conducive to the smooth surgery and can enhance the surgical efficiency, reduce the surgical complications caused by improper cooperation, improve the postoperative comfort of patients, and increase the medical satisfaction [20].

The limitations have been supplemented at the end of the paper. The sample size of this study is relatively small, and large-sample randomized controlled studies are still needed to verify the conclusion. Meanwhile, other ERAS in ophthalmology are not included for comparison.

CONCLUSIONS

Preoperative health education based on the theory of enhanced recovery after surgery (ERAS) has important clinical value by means of evaluation of basic conditions of patients, disease knowledge health education, emotional management, scenario simulation health education and perioperative pain management to enhance the cognition of patients with pterygium resection on disease and surgery, relieve the preoperative anxiety and promote the postoperative rehabilitation of patients. The main contribution of this study is to validate and apply ERAS principles in specific ophthalmic surgeries, focusing on evaluating their clinical effects. Our team plans or has promoted the ERAS health education regimen that has proven effective in this study in daily practice, and encourages other ophthalmological centers to adopt it.

Acknowledgments

We would like to express our deep gratitude to the entire medical and nursing staff at Lixin People's Hospital for their dedication and support throughout this study.

We are also grateful to the patients who participated in this study, whose cooperation was essential to the success of our research.

REFERENCES

[1] Bikbov.MM, Zainullin.RM, Kazakbaeva.GM, et al, "Pterygium Prevalence and Its Associations in a Russian Population: The Ural Eye and Medical Study", *Am J Ophthalmol*, **2019**,*205*,27-34.

[2] Zhang.J, Qin.B, Liu.B, et al, “Prevalence and associated factors for pterygium in a Chinese rural population with type 2 diabetes in a cross-sectional study: Jiangsu Diabetic Eye Disease Study (JDEDS)”, *Int Ophthalmol,* **2023**,*43*,411-422. (in Chinese).

[3] Akbari.M, “Update on overview of pterygium and its surgical management”, *J Popul Ther Clin Pharmacol*, **2022**,*29*,e30-e45.

[4] Wanzeler ACV, Barbosa IAF, Duarte.B, et al, “Mechanisms and biomarker candidates in pterygium development”, *Arq Bras Oftalmol*, **2019**,*82*,528-536.

[5] Kehlet.H, “Multimodal approach to control postoperative pathophysiology and rehabilitation”, *Br J Anaesth*, **1997**,*78*,606-617.

[6] Demirpolat.MT, Şişik.A, Yildirak.MK, et al, “Enhanced Recovery After Surgery Promotes Recovery in Sleeve Gastrectomy: A Randomized Controlled Trial”, *J Laparoendosc Adv Surg Tech A*, **2023**,*33*,452-458.

[7] Fay.EE, Hitti.JE, Delgado.CM, et al, “An enhanced recovery after surgery pathway for cesarean delivery decreases hospital stay and cost”, *Am J Obstet Gynecol*, **2019**,*221,*349.e1-349.e9.

[8] Chinese Society of Surgery, Chinese Society of Anesthesiology, “Clinical Practice Guidelines for ERAS in China (2021)”, *Medical Journal of Peking Union Medical College Hospital*, **2021,** *12*, 624-631(in Chinese).

[9] Niileksela.CR, Ghosh.A, Janis.RA, “Dynamic changes in generalized anxiety and depression during counseling”, *J Couns Psychol*, **2021**,*68*,112-124.

[10] Shafshak.TS, Elnemr.R, “The Visual Analogue Scale Versus Numerical Rating Scale in Measuring Pain Severity and Predicting Disability in Low Back Pain”, *J Clin Rheumatol*, **2021**,*27*,282-285.

[11] Pedroso-Chaparro.MDS, Cabrera.I, Márquez-Gonzále.M, et al, “Validation of the Guilt associated with Self-Perception as a Burden Scale (G-SPBS)”, *Behav Cogn Psychother*, **2021**,*49*,185-196.

[12] Rodríguez-Herrera.C, López-Jiménez.JJ, Del Toro-Valero.A, et al, “The Newcastle satisfaction with nursing scales in a Mexican Oncology Hospital”, *Afr Health Sci,* **2021**,*21*,60-66.

[13] Graue-Hernandez.EO, Córdoba.A, Jimenez-Corona.A, et al, “Practice Patterns in the Management of Primary Pterygium: A Survey Study”, *Cornea*, **2019**,*38*,1339-1344.

[14] Bogani.G, Sarpietro.G, Ferrandina.G, et al, “Enhanced recovery after surgery (ERAS) in gynecology oncology”, *Eur J Surg Oncol*, **2021**,*47*,952-959.

[15] Joliat.GR, Kobayashi.K, Hasegawa.K, et al, “Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations 2022”, *World J Surg*, **2023**,*47*,11-34.

[16] Naftalovich.R, Singal.A, Iskander.AJ, “Enhanced Recovery After Surgery (ERAS) protocols for spine surgery - review of literature”, *Anaesthesiol Intensive Ther*,**2022**,*54*,71-79.

[17] Mendez.E, Puig.G, Barquero.M, et al, “Enhanced recovery after surgery: a narrative review on patient blood management recommendations”, *Minerva Anestesiol*, **2023**,*89*,906-913.

[18] Macones.GA, Caughey.AB, Wood.SL, et al, “Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery (ERAS) Society recommendations (part 3)”, *Am J Obstet Gynecol*, **2019**,*221*,247.e1-247.e9.

[19] Chang.J, Cao.Q, Yong.J, et al, “The effect of different pterygium surgery techniques on the ocular surface parameters in different durations: a systematic review and meta-analysis”, *Graefes Arch Clin Exp Ophthalmol*, **2024**,*262*,1383-1396.

[20] Noba.L, Rodgers.S, Chandler.C, et al, “Enhanced Recovery After Surgery (ERAS) Reduces Hospital Costs and Improve Clinical Outcomes in Liver Surgery: a Systematic Review and Meta-Analysis”, *J Gastrointest Surg*, **2020**,*24*,918-932.

Influence of preoperative health education based on the theory of enhanced recovery after surgery on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision

Mei Wu*

Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Corresponding author: Mei Wu

Address: Department of ophthalmology, Lixin People's Hospital, Bozhou City, Anhui Province, China

Email:19956715950@163.com

Abstract: Pterygium excision with conjunctival flap transplantation is a common ophthalmic surgery. Due to the eye fragility property, patients are prone to fear and anxiety, and there is tonic and disorderly movement of the eyeball during surgery, which affects the surgical progress and postoperative rehabilitation. The aim of this study was to explore the influence on preoperative anxiety and postoperative rehabilitation status in patients undergoing pterygium excision after preoperative health education based on the theory of enhanced recovery after surgery (ERAS). Ninety patients who received elective pterygium excision with conjunctival flap transplantation in the hospital from March 2023 to December 2023 were randomized into two groups. 45 patients in the control group were given routine intervention guidance, and on this basis, the remaining 45 patients in the observation group adopted preoperative health education based on ERAS theory. The intervention effect was evaluated according to Generalized Anxiety Disorder Scale-7 (GAD-7), Self-Perceived Burden Scale (SPBS), Numerical Rating Scale (NRS), wound healing time, uncorrected visual acuity (UCVA) and nursing satisfaction. After intervention, the observation group had lower GAD-7 score and SPBS score before surgery than the control group (P<0.05). The NRS scores in the observation group at 1 and 2 days after surgery were lower than those in the control group (P<0.05). The wound healing time in the observation group was shorter compared to the control group (P<0.05), but the UCVA revealed no obvious difference between both groups at 4 weeks after surgery (P>0.05). The nursing satisfaction was higher in the observation group (P<0.05). It is concluded that preoperative health education based on ERAS theory has obvious advantages in improving preoperative anxiety and postoperative rehabilitation of patients with pterygium excision, and its clinical application value is high.

Keywords: theory of enhanced recovery after surgery; health education; pterygium excision with conjunctival flap transplantation; anxiety; rehabilitation status

INTRODUCTION

Pterygium refers to the redundant tissue on the conjunctiva and cornea of the palpebral fissure, which is increasing after invading the cornea, and is more common in outdoor workers. A report on a multi-ethnic population in Russia shows that the incidence of pterygium is 2.3% in people over 40 years old [1]. In a survey in China, the incidence of pterygium in patients with type 2 diabetes mellitus (T2DM) over 50 years old in Jiangsu Province is 22.37% [2]. Although the incidence of pterygium varies in different countries and regions, most reports suggest that older age, rural areas, plateau areas, and long outdoor working hours are risk factors for pterygium [3,4]. Pterygium excision with conjunctival flap transplantation is the main treatment method for pterygium at present. However, due to the particularity of eye surgery, patients are prone to negative emotions such as preoperative anxiety and fear, leading to obvious postoperative stress response and affecting postoperative rehabilitation. In addition, the surgical method is local anesthesia, with clear consciousness. If the surgical cooperation skills are not mastered, it may lead to different degrees of eye position, head position and body position changes during surgery, which will affect the smooth progress of the surgery, thus affecting the postoperative rehabilitation progress.

Therefore, it is necessary to strengthen the preoperative health education for patients with pterygium excision, and to carry out special training of cooperation skills for patients, so as to reduce the risk of ophthalmic surgery and improve the prognosis of patients. The theory of enhanced recovery after surgery (ERAS) was first proposed by Danish surgeon Henrik Kehlet et al. [5] in 1997. Its core idea is to reduce surgical trauma and stress, accelerate the rehabilitation progress of surgical patients and reduce the incidence rates of complications by integrating a variety of evidence-based medical evidence-supported treatments. In a clinical study, 49 patients with laparoscopic sleeve gastrectomy received intervention based on the ERAS theory, and the results manifested that the hospital stay of patients was shortened and the postoperative pain score was reduced[6]. Fay et al. [7] discussed the application effect of ERAS theory regimen on puerperae with cesarean section, and found that the implementation of ERAS theory regimen shortened the

hospital stay and reduced the use of opioids. The purpose of this study was to investigate the influence of preoperative health education based on ERAS theory on preoperative anxiety and postoperative rehabilitation status in patients with pterygium excision.

METHODS

Research Subjects

From March 2023 to December 2023, 90 patients receiving selective pterygium excision with conjunctival flap transplantation in the hospital were randomly classified into two groups. 45 cases in the control group performed routine intervention guidance, whereas 45 cases in the observation group were given preoperative health education based on ERAS theory.

Using simple randomization method, 90 experimental units were numbered from 1 to 90. Starting from any number in the random number table, a random number of each experimental unit was obtained in the same direction. The remainder was obtained by dividing the random number by the number of groups. If divisible, the remainder was taken as the number of groups and grouping was performed according to the remainder. Research assistants who did not participate in research evaluation implemented allocation concealment.

There were 14 males and 31 females in the observation group, aged 45-73 years, with an average of (56.93±6.72) years old. There were 13 males and 32 females in the control group, age ranging from 45 to 77 years old, with an average of (56.81±7.01) years old. No significant differences were demonstrated in baseline data between both groups (P>0.05). This study was approved by the Medical Ethics Committee of the Lixin People's hospital NO.LXXRMYY-2023LWO01.

Inclusion criteria: (1) Primary pterygium was diagnosed by combining clinical symptoms, conjunctival scraping, routine ophthalmic examination, etc. [8], and it was a monocular lesion; (2) Consistent with the indications for surgical resection: progressive, hypertrophic and congested pterygium or pterygium invading the proximal pupillary area and affecting the visual activity; (3) Pterygium excision with conjunctival flap transplantation was performed by the same team of doctors; (4) Patients were informed and agreed with this study.

Exclusion criteria: (1) Concurrent mental illness, cognitive impairment or malignant tumor; (2)

Concurrent eye disease surgery history or other eye diseases; (3) Concurrent organic diseases of important organs such as heart, brain and kidney; (4) Low treatment compliance or follow-up possibility; (5) Patients with surgical contraindications; (6) Speech and hearing impairments.

Methodology

Routine intervention guidance was implemented on patients in the control group, including the following contents. (1) Preoperative: After admission, the primary nurse carried out routine health education for patients, orally taught the symptoms, etiology, treatment methods, surgical procedures, prognosis and precautions of pterygium, and assisted the patients to complete various auxiliary examinations. (2) Intraoperative: Personal information of patients was checked, the temperature of operating room was adjusted according to the patients' needs and the operating room environment was kept clean and comfortable to relieve the tension of patients. (3) Postoperative: Primary nurse paid close attention to the postoperative conditions of patients, and reported to the doctors in time if there was any abnormal condition. Primary nurse replaced the eye aseptic dressing in time, and observed the corneal recovery status regularly, followed the doctor' s advice for medication guidance after removing the wound dressing, informed the patients the correct use of antibacterial eye drops to flush the lacrimal passage and keep the eye clean. Primary nurse guided patients to eat correctly, avoid spicy, irritating, greasy, quit smoking and drinking, and eat more easily digestible or vitamin-rich foods. (4) Discharge: On the day of discharge, primary nurse instructed the patients to follow the doctor' s advice to guide the use frequency of postoperative eye drops, the time of withdrawal and the time of follow-up, and admonished patients to review in time and guide patients with self-assessment and treatment of the common eye discomfort after pterygium surgery, and seek for medical treatment immediately if there was any abnormality

Preoperative health education based on ERAS theory was performed on patients in the observation group on the basis of the control group. The specific implementation was as follows:

Formation of intervention team

The intervention team was composed of 1 ophthalmologist, 1 head nurse and 3 nurses. The team members applied CNKI, CINAHL Complete, PubMed and other databases to search for pterygium, perioperative intervention of pterygium excision, theory of enhanced recovery after

surgery, health education and other related contents. Referring to "Clinical Practice Guidelines for ERAS in China (2021)" [8] and combining with the medical conditions and current situation of the hospital, preoperative health education intervention strategy based on ERAS theory was formulated. The attending physician was responsible for the comprehensive assessment of disease condition and the formulation and adjustment of treatment methods, the rehabilitation physician was responsible for the formulation of postoperative rehabilitation strategy, the head nurse was in charge of the formulation of research regimen, quality control and related knowledge training, and the primary nurse was responsible for the implementation of intervention strategy, and participated in the intervention work after qualified training. Specific strategies included:

Evaluation of basic conditions of patients: The basic conditions of patients and their families were evaluated by primary nurse, including age, education level, cognition degree towards pterygium disease and surgery, and psychological status at the present stage of patients and their families, so as to judge the understanding ability and psychological needs of patients and their families.

Disease knowledge health education: One-to-one health education was conducted for patients and their families, focusing on postoperative ocular autonomic symptoms, common complications and prognosis status, so that patients and their families could understand the surgery and prognosis status. Considering that pterygium affects visual acuity and patients see things vaguely, patients should be educated by easy-to-understand language as much as possible, and preoperative education videos were played for patients, including operating room environment, surgical operation, instrument use, cooperation methods, etc. Primary nurse answered patients' questions in a timely manner.

Emotional management: Generalized Anxiety Disorder-7 (GAD-7) [9] was used to evaluate the negative emotions of patients, and psychological intervention was performed according to the evaluation results. For patients with mild anxiety (GAD-7 score of 5-9 points), psychological counseling and encouragement could be combined with the personality characteristics of patients, and family members were recommended to participate in soothing the emotions of patients. For patients with moderate and above anxiety (GAD-7 score≥10 points), primary nurse combined with the basic conditions of patients, and applied psychological intervention with emotional transfer method, respiratory relaxation adjustment method, music adjustment method and application of

narrative method on the basis of emotional counseling, to guide patients to relieve psychological stress.

Scenario simulation health education: The surgical scene simulation was performed at 1 day before the patients planned to undergo surgery. The simulated operating room was equipped with a treatment bed, a simple microscope, and simulated surgical instruments. The primary nurse conducted detailed preoperative education on the patients, explaining the surgical procedure, intraoperative cooperation and postoperative precautions, emphasizing to avoid shaking the head during surgery and rotating the eyeball at will, and to prohibit extending the hand to the head. Patients were guided to lie on the treatment bed, with the towel covering to the forehead, exposing the surgical side eye, and simulating the disinfection of the surgical eye; patients were guided to take a calm and rhythmic breathing, and gradually adapt to the operating room environment; patient were informed to breathe deeply and push the tip of the tongue against the upper jaw to relieve the impulse to cough or sneeze and avoid the intraoperative accidents and bleeding. If there was pain and intraoperative discomfort, patients could reflect to the surgeon but did not move at will. Meanwhile, eye position training was performed and patients were instructed to perform eye position training according to the nurse' s language instructions under the guidance of the light source of the fixation device, such as turning the eyeball upward, downward, left, right, upper left, and upper right until the patients fully grasped the training without accompanying head rotation.

Perioperative pain management: Numerical Rating Scale (NRS) [10] was adopted to assess the pain status of patients. The pain score sign was set up at the bedside, and medical intervention was given when the score was >4 points. Painkillers were taken according to the pain status of patients.

Observation indicators

Preoperative psychological status: At the time of enrollment and before surgery, the anxiety status of patients was assessed by GAD-7. GAD-7 is composed of 7 questions, each item ranging from 0 to 3 points, with a total score of 0-21 points. The higher the GAD-7 score, the more serious the anxiety symptoms, and GAD-7 score≥5 points indicates the presence of anxiety. Self-Perceived Burden Scale (SPBS)[11] was used for evaluation, which includes three dimensions such as physical factor, emotional factor and economic factor, with 10 items in total, each item

ranging from 1 to 5 points (never~always) and a total score range of 10-50 points. SPBS score> 20 points represents the presence of burden perception, and the higher the score, the higher the physical/emotional/economic burden.

Pain status: The pain status of patients was evaluated by adopting NRS at 2 hours, 1 day and 2 days after surgery. NRS score ranges from 0 to 10 points, 0 points=no pain, 1-3 points=mild pain (no influence on sleep), 4-6 points=moderate pain (mild influence on sleep), 7-9 points=severe pain (unable to fall asleep or wake up in painful sleep) and 10 points=sharp pain. Let the patients circle the number that best represents the degree of pain.

Rehabilitation status: The wound healing time of patients was recorded. Uncorrected visual acuity (UCVA) was measured by visual acuity measuring instrument before surgery and at 4 weeks after surgery.

Nursing satisfaction: Before discharge, Newcastle Satisfaction with Nursing Scales (NSNS) [12]was adopted for nursing satisfaction assessment of patients. NSNS consists of 19 questions, 1-5 points for each item and 19-95 points for total score (19-35 points for very dissatisfied, 36-54 points for dissatisfied, 55-64 points for generally satisfied, 65-80 points for satisfied, and 81-95 points for very satisfied). Satisfaction (%)=[(very satisfied cases + satisfied cases)/total number of subjects] × 100%.

Statistical analysis

The above data were analyzed by SPSS22.0, and enumeration data were represented as [*n* (%)] by using chi-square test. Rank sum test was used for ranked data. Measurement data conforming to the normal distribution were expressed as ($\bar{x}$±s) by applying independent sample *t* test for comparison, and measurement data with non-normal distribution were manifested as [M (QL, QU)] by Mann-Whitney test. $P<0.05$ was considered as statistically significant.

RESULTS

Preoperative Psychological Status

With regard to psychological status, compared with the control group receiving routine intervention guidance, the observation group receiving preoperative health education based on

ERAS theory had better psychological status, and the scores of GAD-7 and SPBS in the observation group before surgery were lower than those in the control group (P<0.05) (Table 1).

Table 1. Comparison of preoperative psychological status of patients ($\bar{x}$±s, points)

Group	GAD-7 score		SPBS score	
	Enrollment	Before surgery	Enrollment	Before surgery
Observation (n=45)	10.02±2.29	7.27±2.43*	25.76±4.09	20.84±3.83*
Control (n=45)	10.13±2.16	10.56±1.71	25.24±4.17	25.07±3.74
t	-0.237	-7.411	0.587	-5.291
P	0.813	＜0.001	0.559	＜0.001

Note: Compared with at the time of enrollment, *P<0.05.

Pain Status

The observation group had lower NRS scores at 1 day and 2 days after surgery than the control group (P<0.05). There was no obvious difference in NRS score between groups at 2 hours after surgery (P>0.05) (Table 2).

Table 2. Comparison of NRS score of patients ($\bar{x}$±s, points)

Group	2 hours after surgery	1 day after surgery	2 days after surgery
Observation (n=45)	4（3,4）	2（2,3）	2（1,2）
Control (n=45)	4（3,4）	3（2,4）	2（2,3）
Z	-0.610	-5.127	-5.011
P	0.542	＜0.001	＜0.001

Rehabilitation Status

The observation group had shorter wound healing time than the control group (P<0.05), but the UCVA was not obviously different at 4 weeks after surgery between both groups (P>0.05) (Table 3).

Table 3. Comparison of rehabilitation status of patients ($\bar{x}\pm s$)

Group	Wound healing time (d)	UCVA (LogMAR)	
		Before surgery	4 weeks after surgery
Observation (*n*=45)	5.18±1.28	0.32±0.17	0.62±0.18*
Control (*n*=45)	7.20±1.41	0.32±0.16	0.59±0.15*
t	-7.119	-0.130	0.637
P	＜0.001	0.897	0.526

Note: Compared with the same group before surgery, *P<0.05.

Nursing Satisfaction

The nursing satisfaction in the observation group was higher than that in the control group (P<0.05) (Table 4).

Table 4. Comparison of nursing satisfaction of patients [*n* (%)]

Group	Very dissatisfied	Dissatisfied	Generally satisfied	Satisfied	Very satisfied	Satisfaction
Observation (*n*=45)	0（0.00）	0（0.00）	2（4.44）	12（26.67）	31（68.89）	43（95.56）
Control (*n*=45)	0（0.00）	3（6.67）	6（13.33）	16（35.56）	20（44.44）	36（80.00）
χ^2			—			5.075
P			—			0.024

DISCUSSION

Pterygium is one of the common conjunctival degeneration diseases in the eye, and it usually manifests as conjunctival swelling, congestion and edema, foreign body sensation in the eyes, dryness and itching, with the characteristics of high incidence and high recurrence rate. In the face of surgical procedure, hospitalized patients often have psychological stress reactions such as anxiety, especially in elderly patients. Because the eye is relatively fragile, it is sensitive to

surgical stimulation and discomfort, and pterygium excision needs to be performed under the microscope. The changes of head or eye movements caused by anxiety, tension and discomfort will affect the operation under the magnification of the microscope. In severe cases, the corneal conjunctiva may be accidentally injured by surgical instruments, resulting in surgical complications, and affecting the surgical effect and rehabilitation progress [13]. Therefore, it is necessary to strengthen the preoperative health education of patients, so as to promote them to face the surgery with a positive attitude and good cooperation.

Theory of enhanced recovery after surgery (ERAS) emphasizes that under the premise of ensuring the smooth surgery of patients, adopting a series of comprehensive evidence-based medical measures can minimize the surgical trauma and stress, promote the rehabilitation of patients, and thus improve the quality of life of patients. This theory has gradually shown its unique advantages in many medical fields [14, 15]. This study demonstrates that the preoperative GAD-7 score and SPBS score in the observation group were lower than those in the control group, and the NRS scores at 1 and 2 days after surgery were lower, indicating that preoperative health education based on ERAS theory can improve the preoperative anxiety and self-perceived burden and relieve the postoperative pain in patients with pterygium excision. The possible reasons are as follows: preoperative health education based on ERAS theory includes five aspects such as evaluation of basic conditions of patients, health education of disease knowledge, emotional management, scenario simulation health education and perioperative pain management. By assessing the basic conditions of patients, medical staff understand the physical condition, past medical history and living habits of patients, so as to develop a personalized preoperative health education regimen for patients. In the aspect of disease knowledge health education, medical staff adopt different ways for patients with different cognition levels to explain the pathophysiological process, treatment methods and expected effects of the disease in detail as much as possible, so as to help patients and their families fully understand their own conditions, reduce the anxiety and fear, and relieve the self-perceived burden of patients. As an important part of preoperative health education, emotional management aims to help patients learn to adjust their mentality and actively face the surgery. Medical staff guide patients to use emotional transfer method, respiratory relaxation regulation method and other methods to relieve tension, and encourage family members to participate in the emotional management of patients, so that patients can get more emotional

support. Scenario simulation health education is a vivid and intuitive way of education. By simulating the operating room, patients can understand the surgical process, postoperative precautions and possible complications in advance. Patients can not only be familiar with the surgical process, alleviate the preoperative anxiety and reduce the surgical stress, but also vividly understand what needs attention and cooperation during perioperative period, which is conducive to the smooth process of the surgery [16]. Additionally, perioperative pain management is also one of the main contents to promote postoperative rehabilitation. Medical staff should evaluate the pain of patients in time and carry out targeted pain management to promote the corneal wound recovery and accelerate postoperative rehabilitation [17,18].

Correctly cooperating with the doctor' s eye position requirements is conducive to the smooth progress of surgery. Although the specific intraoperative and postoperative requirements are explained to the patients before surgery, some patients cannot achieve good eye position cooperation under the intraoperative tension state. The common manifestations are eye shaking, eye position deviation, and eye failure to rotate as required, resulting in the forced stop of the surgery to adjust the eye position, lengthening the surgical time, and also affecting the surgical efficiency. Eye position and head position training is a practical training method to enhance cognitive ability, and strengthen intraoperative cooperation awareness and psychological endurance of patients. This clinical observation also confirms that good eye position training and head position training are important measures to achieve good efficacy of pterygium surgery and good patient satisfaction and reduce surgical complications. Due to the special way of ophthalmic surgery and medication, perioperative low compliance and anxiety are common in ophthalmic patients, which will also affect the progress of rehabilitation [19]. There is no obvious difference in UCVA between the two groups at 4 weeks after surgery, suggesting that although preoperative health education based on ERAS theory promotes the early postoperative ocular surface repair, it does not change the visual quality, which may be explained by the fact that the postoperative visual quality is affected by many factors, such as the patient' s own high myopia, compensatory repair of corneal epithelium, and irregular corneal healing. This study also shows that the wound healing time in the observation group is shorter, and the nursing satisfaction is also higher compared to the control group. It is further confirmed that preoperative health education based on the theory of ERAS is beneficial to the postoperative rehabilitation of patients with pterygium

excision. In the scenario simulation health education, this study adds eye position training on the basis of routine preoperative education, guides patients to carry out repeated training, and achieves the eye position requirements needed for surgery. Correctly cooperating with the doctor' s eye position requirements is conducive to the smooth surgery and can enhance the surgical efficiency, reduce the surgical complications caused by improper cooperation, improve the postoperative comfort of patients, and increase the medical satisfaction [20].

The limitations have been supplemented at the end of the paper. The sample size of this study is relatively small, and large-sample randomized controlled studies are still needed to verify the conclusion. Meanwhile, other ERAS in ophthalmology are not included for comparison.

CONCLUSIONS

Preoperative health education based on the theory of enhanced recovery after surgery (ERAS) has important clinical value by means of evaluation of basic conditions of patients, disease knowledge health education, emotional management, scenario simulation health education and perioperative pain management to enhance the cognition of patients with pterygium resection on disease and surgery, relieve the preoperative anxiety and promote the postoperative rehabilitation of patients. The main contribution of this study is to validate and apply ERAS principles in specific ophthalmic surgeries, focusing on evaluating their clinical effects. Our team plans or has promoted the ERAS health education regimen that has proven effective in this study in daily practice, and encourages other ophthalmological centers to adopt it.

Acknowledgments

We would like to express our deep gratitude to the entire medical and nursing staff at Lixin People's Hospital for their dedication and support throughout this study.

We are also grateful to the patients who participated in this study, whose cooperation was essential to the success of our research.

REFERENCES

[1] Bikbov.MM, Zainullin.RM, Kazakbaeva.GM, et al, "Pterygium Prevalence and Its Associations in a Russian Population: The Ural Eye and Medical Study", *Am J Ophthalmol*,

2019,*205*,27-34.

[2] Zhang.J, Qin.B, Liu.B, et al, "Prevalence and associated factors for pterygium in a Chinese rural population with type 2 diabetes in a cross-sectional study: Jiangsu Diabetic Eye Disease Study (JDEDS)", *Int Ophthalmol,* **2023**,*43*,411-422. (in Chinese).

[3] Akbari.M, "Update on overview of pterygium and its surgical management", *J Popul Ther Clin Pharmacol*, **2022**,*29*,e30-e45.

[4] Wanzeler ACV, Barbosa IAF, Duarte.B, et al, "Mechanisms and biomarker candidates in pterygium development", *Arq Bras Oftalmol*, **2019**,*82*,528-536.

[5] Kehlet.H, "Multimodal approach to control postoperative pathophysiology and rehabilitation", *Br J Anaesth*, **1997**,*78*,606-617.

[6] Demirpolat.MT, Şişik.A, Yildirak.MK, et al, "Enhanced Recovery After Surgery Promotes Recovery in Sleeve Gastrectomy: A Randomized Controlled Trial", *J Laparoendosc Adv Surg Tech A*, **2023**,*33*,452-458.

[7] Fay.EE, Hitti.JE, Delgado.CM, et al, "An enhanced recovery after surgery pathway for cesarean delivery decreases hospital stay and cost", *Am J Obstet Gynecol*, **2019**,*221,*349.e1-349.e9.

[8] Chinese Society of Surgery, Chinese Society of Anesthesiology, "Clinical Practice Guidelines for ERAS in China (2021)", *Medical Journal of Peking Union Medical College Hospital*, **2021,** *12*, 624-631(in Chinese).

[9] Niileksela.CR, Ghosh.A, Janis.RA, "Dynamic changes in generalized anxiety and depression during counseling", *J Couns Psychol*, **2021**,*68*,112-124.

[10] Shafshak.TS, Elnemr.R, "The Visual Analogue Scale Versus Numerical Rating Scale in Measuring Pain Severity and Predicting Disability in Low Back Pain", *J Clin Rheumatol*, **2021**,*27*,282-285.

[11] Pedroso-Chaparro.MDS, Cabrera.I, Márquez-Gonzále.M, et al, "Validation of the Guilt associated with Self-Perception as a Burden Scale (G-SPBS)", *Behav Cogn Psychother*, **2021**,*49*,185-196.

[12] Rodríguez-Herrera.C, López-Jiménez.JJ, Del Toro-Valero.A, et al, "The Newcastle satisfaction with nursing scales in a Mexican Oncology Hospital", *Afr Health Sci,* **2021**,*21*,60-66.

[13] Graue-Hernandez.EO, Córdoba.A, Jimenez-Corona.A, et al, "Practice Patterns in the

Management of Primary Pterygium: A Survey Study", *Cornea*, **2019**,*38*,1339-1344.

[14] Bogani.G, Sarpietro.G, Ferrandina.G, et al, "Enhanced recovery after surgery (ERAS) in gynecology oncology", *Eur J Surg Oncol*, **2021**,*47*,952-959.

[15] Joliat.GR, Kobayashi.K, Hasegawa.K, et al, "Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations 2022", *World J Surg*, **2023**,*47*,11-34.

[16] Naftalovich.R, Singal.A, Iskander.AJ, "Enhanced Recovery After Surgery (ERAS) protocols for spine surgery - review of literature", *Anaesthesiol Intensive Ther*,**2022**,*54*,71-79.

[17] Mendez.E, Puig.G, Barquero.M, et al, "Enhanced recovery after surgery: a narrative review on patient blood management recommendations", *Minerva Anestesiol*, **2023**,*89*,906-913.

[18] Macones.GA, Caughey.AB, Wood.SL, et al, "Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery (ERAS) Society recommendations (part 3)", *Am J Obstet Gynecol*, **2019**,*221*,247.e1-247.e9.

[19] Chang.J, Cao.Q, Yong.J, et al, "The effect of different pterygium surgery techniques on the ocular surface parameters in different durations: a systematic review and meta-analysis", *Graefes Arch Clin Exp Ophthalmol*, **2024**,*262*,1383-1396.

[20] Noba.L, Rodgers.S, Chandler.C, et al, "Enhanced Recovery After Surgery (ERAS) Reduces Hospital Costs and Improve Clinical Outcomes in Liver Surgery: a Systematic Review and Meta-Analysis", *J Gastrointest Surg*, **2020**,*24*,918-932.