Application of local anesthesia in ophthalmic surgery

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Introduction: To compare effects of local anesthesia alone and local anesthesia combined with intravenous intensive anesthesia in adult strabismus surgery.
Methods: This study was a prospective study. Forty patients who underwent strabismus surgery at our Hospital were included in study. General information of patients was collected including age, gender, duration of disease, trigeminal prescription, weight, strabismus diagnosis type and other indicators. Patients were numbered according to their admission order, and a computer-generated random number was used to randomly divide 40 patients into two groups: A was operated with local anesthesia alone, and B was operated with local anesthesia + intravenous intensive anesthesia. All patients were operated by same chief ophthalmologist, and all patient data were recorded and collected by one person:
(1) To compare systolic blood pressure, diastolic blood pressure, heart rate, Percutaneous oxygen saturation (SpO2) and incidence of surgical complications such as oculocardiacreflex (OCR), postoperative nausea and vomiting (OCR) at T1, T2, T3 and T4. Postoperative nausea and vomiting (PONV), and respiratory depression;
(2) To compare pain scores of intraoperative, 2h, 4h and 8h postoperatively;
(3) To compare time required for surgical muscle;
(4) To compare efficiency of surgical treatment of strabismus at 1 day and 1 week after surgery.
Results: 1. General data: There was no difference in age, gender, weight, duration of disease, visual acuity, trigeminal prescription and strabismus diagnosis type.
2. In comparison, there were no statistical differences in blood pressure, heart rate and SpO2 at T1, T2, T3 and T4, but in comparison within groups, differences in blood pressure and heart rate at each time point were significant ($P<0.05$), while differences in SpO2 were not significant ($P>0.05$). The results indicated that there was no interaction between time and in changes of blood pressure, heart rate and SpO2, that is, effect of time factors (T1, T2, T3, T4) did not vary (local anesthesia alone versus local anesthesia + intravenous intensive anesthesia). 3, The incidence of intraoperative OCR was higher in A (70%) than B (35%) . The incidence of PONV in B (25%) was higher than A (5%). No respiratory depression occurred. 4, Intraoperative, 2h postoperative and 4h postoperative pain scores in A were higher than B. Although pain scores in A were still slightly higher than B at 8h postoperatively. 5. In A and B, a total of 57 and 61 extraocular muscles were operated on, respectively, and average operating time required for each muscle was greater in A than B. When comparing different surgical methods (posterior migration of external rectus muscle and shortening of

internal rectus muscle), average surgical time required per muscle was greater in A than B. Time required for posterior migration of external rectus muscle was shorter than shortening of internal rectus muscle. 6. The efficiency of surgical treatment of strabismus in A and B at 1 day and 1 week after surgery was higher than A (100%) than B (95%).
Conclusion: 1. There was no difference in effects of two anesthesia methods on intraoperative blood pressure, heart rate, SpO2 and respiratory depression, PONV, and strabismus surgical treatment effect, 2. Local anesthesia combined with intravenous intensive anesthesia is safe and effective in strabismus surgery. Compared with local anesthesia alone, it can not only reduce occurrence of OCR, improve intraoperative and early postoperative analgesia, but also shorten average operating time required for each muscle.
Keywords: strabismus; surgery; anesthesia; dexmedetomidine; sufentanil

INTRODUCTION

Strabismus is clinical term for separation of visual axis of both eyes due to abnormal eye position or movement. [1-3]Strabismus is a common disease in ophthalmology with a prevalence rate of 3%, and treatment is mainly surgical. With progress of society and development of various technologies, anesthesia management of strabismus correction has also made great progress in airway management, anesthesia medication, reconceptualization of oculocentric reflex, intraoperative arousal and sedation and analgesia anesthesia in strabismus surgery. The most common and major complication of strabismus surgery is oculocardiac reflex (OCR), incidence of which can be as high as 100%. Since its first discovery, it has been a popular topic of research for ophthalmologists and anesthesiologists. As reflex has been studied in depth, it has become clear that it does not simply affect cardiovascular system, but also produces systemic symptoms involving multiple systems, such as respiratory and digestive symptoms, so it seems more reasonable to rename it oculovagal reflex (OVR)[4]. The eye is a multifunctional central organ with visual, pain, temperature, and tactile sensations, which is jointly innervated by sympathetic and parasympathetic nerves. Injurious stimulation such as shearing and needling during surgical procedures, especially ocular muscle surgery, can cause sympathetic excitation and release of adrenaline, which increases blood glucose, while operations such as pulling extraocular muscles can cause parasympathetic excitation and release of insulin, which lowers blood glucose. Strabismus surgery is simple, less traumatic, and takes less time, usually within tens of minutes to hours, except for infants and children who cannot cooperate and must be put under general anesthesia to ensure life safety and surgery.[5-6] For some children aged 10-14 years who can cooperate and need to be observed during surgery, their families and patients have fear of general anesthesia and have difficulty cooperating with surgery under simple local anesthesia. Most of patients are given sedative and analgesic anesthesia by anesthesiologist under local anesthesia, and nurses use limb restraints and intermittent intraoperative operations, which are safe and have advantages. However, specific drug dosing scheme, when to wake up, grade assessment, what position to observe, how to manage anesthesia, etc. are not yet uniform and have become a difficult problem for anesthesiologists.

[7]Based on above-mentioned research background, we found that current research on strabismus surgery is mainly focused on children, and safety of intraoperative DEX and sufentanil is controversial, we conducted this trial to investigate whether local anesthesia with DEX and sufentanil intravenous intensified anesthesia can reduce surgical risks, decrease postoperative complications, and improve patient satisfaction compared with local anesthesia alone in adult strabismus surgery. The purpose of this study was to investigate whether local anesthesia with DEX and sufentanil intravenous intensified anesthesia could reduce surgical risks, reduce postoperative complications, and improve patient satisfaction in adult strabismus surgery compared with local anesthesia alone[8].

MATERIALS AND METHODS

2.1 Study population

Age, gender, weight, duration of disease, visual acuity, trigeminal prescription, and type of diagnosis of 40 patients who underwent strabismus surgery treatment in our hospital from July 2015 to December 2021.

2.2 Inclusion criteria

(1) Age >18 years;
(2) Patients with horizontal strabismus diagnosed by ophthalmologic examination and requiring surgical treatment;
(3) No other ocular organic pathology except refractive error and amblyopia;
(4) No difficulty in cannulation.

2.3 Exclusion criteria

(1) Previously corrected strabismus surgery;
(2) Various types of psychiatric disorders;
(3) Speech and communication disorders;
(4) No self-control ability;
(5) Recent use or injection of sedative or psychotropic drugs;
(6) cardiac insufficiency, pathological sinus node syndrome or severe sinus bradycardia. According to inclusion criteria, all patients' data were recorded and collected by one person.

2.4 Grouping criteria

Patients were numbered according to their admission order, and random numbers generated by computer (excel software) were used to randomly divide 40 patients, A with simple local anesthesia and B with local anesthesia + intravenous intensive anesthesia.

2.5 Main instruments and drugs(See in Table 1 and Table 2).

Table 1 Main Instruments

Main Instruments	Source	
Standard logarithmic visual acuity meter	Leapfrog	China
Slit lamp microscope	Zeiss	Germany
Automatic IOP meter	Canon	Japan
Fundus color photometer	KOWA	Japan
Synoptic machine	INAMI (medical NAMI)	Japan
Block Trigonometry	SYJ-K	China
Ophthalmic operating microscope	Alcon	USA
Cardiac monitor	GE	USA
Five classification blood cell analyzer	sysmcxXE-2100	Japan
Automatic biochemical analyzer	OLYMPUS5421	Japan

Table 2 Main Drugs

Main Drugs	Source
Dexmedetomidine hydrochloride injection (Yupitol)	Yangtze River Pharmaceutical
Sufentanil citrate injection (Renfusufen)	Yichang Renfu Pharmaceutical
Promethazine Hydrochloride Eye Drops (Elcaine)	s .a. ALCON-COUVREUR n.v
Lidocaine Hydrochloride Injection	Shanxi Jinxin Shuanghe Pharmaceutical
Levofloxacin eye drops (Colapidol)	Japan Sento Pharmaceuticals
Bromfenac sodium eye drops	Cenxin Fodu Pharmaceuticals
Tobramycin dexamethasone eye drops (Dianshu)	Qilu Pharmaceutical
Ofloxacin eye ointment (Telipitol)	Japan SenTen Pharmaceutical

2.6 Systemic examination

All patients included in this study were given preoperative basic systemic examinations, including: blood routine, urine and stool routine, blood biochemistry, coagulation function, four pre-transfusion items (hepatitis B, hepatitis C, AIDS, syphilis), electrocardiogram, chest X-ray, and blood pressure test.

2.7 Basic ophthalmology examination

(1) Visual acuity: check binocular naked visual acuity (UCVA) and best correct visual acuity (BCVA) of all patients with a standard logarithmic visual acuity chart

(2) Strabismus examination: corneal reflection method, trigeminal plus corneal reflection method and trigeminal plus masking test;

(3) Extraocular muscle function examination: binocular and monocular eye movements;

(4) Synoptic machine: to check patient's binocular monocular function, stereopsis and quantification of strabismus;

(5) Fundus photography: to record patient's preoperative and postoperative ocular rotation;

(6) Ophthalmoscopy: to record patient's preoperative and postoperative eye position;

(7) Intraocular pressure: record preoperative and postoperative intraocular pressure of

patient;
(8) Pain scoring: Intraoperative and postoperative pain scoring was performed using Verbal rating scale (VRS), and scoring criteria were: no pain: 0; mild pain: 1; moderate pain: 2; severe pain: 3; severe pain: 4.
All patients were diagnosed by same experienced ophthalmologist for type of strabismus, and strabismus degree was measured before designing surgical plan.
2.8 Surgical method
(1) All patients were given levofloxacin eye drops 3 days before surgery, 3 times a day. No oral or intravenous medication was administered before surgery. On day of surgery, lacrimal flushing was performed to exclude lacrimal inflammation, saline flushing of conjunctival sacs of both eyes, and informed consent for surgical operation was signed.
(2) Upon arrival at operating room, a GE cardiac monitor was installed to monitor patient's ECG, blood pressure, and percutaneous oxygen saturation (SpO2). Patients were operated by same chief ophthalmologist, and both patients underwent adjustable suture strabismus surgery using a conjunctival incision at corneal rim. One person recorded patients' intraoperative pain scores, blood pressure and heart rate at 5 min (T1) and 10 min (T2), 15 min (T3), and 20 min (T4) from beginning of surgery (the lowest heart rate during surgical muscle retraction was heart rate at time of retraction, and a decrease (more than 20% is defined as positive OCR), SpO2 (Sp02<94% is defined as respiratory depression), and operation time of each muscle (from time of cutting bulbar conjunctiva to end of first fixation of muscle stop).
(3) Simple local anesthesia (group A): 75 mg/15 ml of proparacaine hydrochloride drops were injected into conjunctival sac of operated eye three times at an interval of 5 minutes, and 20 g/L lidocaine injection 0.3-0.5 ml was injected under bulbar conjunctiva on operated muscle side, bulbar conjunctiva and fascia were cut, muscle was separated and exposed, and posterior migration or amputation was performed. The last muscle is fixed with adjustable sutures, and eye position is checked after surgery.
(4) Local anesthesia + intravenous intensive anesthesia (group B): intravenous access was established, and intravenous dexmedetomidine hydrochloride injection 0.5u g/kg + 0.9% sodium chloride 100ml was started 15 min before surgery, and 75mg/15ml of promethazine hydrochloride drops were injected into conjunctival sac of operated eye for 3 times with an interval of 5 minutes each. After patient was in position, a cardiac monitor was installed, oxygen was administered, sufentanil injection 0.2ug/kg was slowly pushed into vein, and patient was sedated before operation. If patient has bradycardia (defined as heart rate <50 beats/min) for 5s, immediately relax operation and release pull on extraocular muscles, and if heart rate still cannot be restored, push 0.01mg/kg of atropine intravenously and wait until heart rate returns to normal rhythm before continuing operation,
2.9 Postoperative care
(1) The number of postoperative nausea and vomiting was recorded (if more than 3 times, 1mL/20mg metoclopramide injection was administered intramuscularly), and

pain score was scored by VRS at 2h, 4h and 8h postoperatively. The strabismus treatment was considered effective if horizontal deviation was within 10 and vertical deviation was within 5, and invalid if not, and postoperative eye position was recorded with a camera.
(2) Routine drug changes were performed daily, and operated eyes were treated with levofloxacin eye drops, 4 times a day; sodium oxybate eye drops, 2 times a day; tobramycin dexamethasone eye drops, 4 times a day (gradually reduce dosage until discontinuation), and oxyfloxacin eye ointment, once a night.
2.10 Observation indexes
(1) Compare systolic blood pressure, diastolic blood pressure, heart rate, SpO2 and incidence of surgical complications, such as OCR, respiratory depression and PONV, in T1, T2, T3 and T4.
(2) To compare pain scores of intraoperative and postoperative 2h, 4h and 8h.
(3) To compare surgical time required to complete extraocular muscle.
(4) To compare efficiency of surgical treatment of strabismus at 1 day and 1 week after surgery.
3 Results
There was no difference in terms of age, gender, weight, duration of disease, visual acuity, number of trigeminal lenses, and type of strabismus diagnosis (P>0.05). See Table 3.

Table 3 General data analysis of local anesthesia alone and local anesthesia + intravenous intensive anesthesia

	Group A (n=20)	Group B (n=20)	t-value	p-value
Age (years)	24.55±7.90	24.65+8.62	-0.038	0.947
Gender (male/female)	10/10	8/12	N/A	0.525
Duration of disease (years)	19.05±6.28	19.60±6.04	-0.282	0.832
Body weight (kg)	58.40±6.27	57.40±7.39	0.461	0.196
UCVA (right eye)	0.35±0.35	0.45±0.35	-0.949	0.349
UCVA (left eye)	0.36±0.41	0.50±0.42	-1.044	0.303
BCVA(right eye)	0.89±0.30	0.89±0.25	0.006	0.995
BCVA(left eye)	0.86±0.34	0.81±0.36	0.456	0.651
Trigonometry degrees(△)	64.40±19.99	72.50±18.17	-1.341	0.681
Primary diagnosis:	16/4	18/2	N/A	0.376

Exotropia/Internal strabismus

Multivariate ANOVA with repeated measurements was used to compare blood pressure, heart rate, and SpO2 of patients 5 min (T1) and 10 min (T2), 15 min (T3), and 20 min (T4) after start of surgery, and results indicated that there were no statistical differences in blood pressure, heart rate, and SpO2 at each time point when comparing(See Table 4). However, in within-group comparison, i.e., ANOVA using each time point for grouping, patients had P<0.05 for systolic blood pressure, diastolic blood pressure, and heart rate, indicating that differences in blood pressure and heart rate at each time point were significant in within-group comparison, while differences in SpO2 were not significant (see Table 5). The results indicated that there was no interaction between time and changes of blood pressure, heart rate and SpO2, that is, effect of time factors (T1, T2, T3, T4) did not vary (local anesthesia alone versus local anesthesia + intravenous intensive anesthesia).

Table 4 Comparison of each circulatory index of patients at different time points($\bar{x} \pm s$)

Group	Systolic blood pressure (mmHg)	Diastolic blood pressure(mmHg)	Heart rate (beats/min)	SpO_2(%)
Group A				
T1	126.90± 13.72	70.45± 9.57	62.05± 14.78	99.30± 0.73
T2	127.90± 17.34	76.50± 9.96	58.55± 15.13	99.05± 1.19
T3	125.75± 18.35	76.50± 11.84	71.55± 14.58	99.15± 0.88
T4	126.05± 19.36	76.25 ± 13.40	71.20± 14.13	99.15± 1.14
Group B				
T1	121.80± 14.45	69.605± 8.76	63.75± 15.96	99.15± 0.81
T2	126.30± 19.86	74.35± 13.30	59.90± 17.19	98.80± 1.51
T3	123.50± 21.23	74.60± 13.33	71.15± 16.01	98.60± 1.27
T4	124.00± 19.75	74.10 ± 13.81	71.90± 15.46	98.90± 1.12
F-value	0.020	0.203	0.266	1.465
P-value	0.890	0.655	0.609	0.234

Table 5 Test results for comparison of each circulatory index at different time points for patients

	Systolic blood pressure	Diastolic blood pressure	Heart rate	SpO_2(%)
F-value	5.667	9.534	9.277	1.172
P-value	0.001	0.004	<0.001	0.324

①The incidence of intraoperative OCR in A was higher than B. ②The incidence of PONV in B was higher than A (see Table 6). (iii) No respiratory depression occurred.

Table 6 Comparison of incidence of surgical complications of patients

Group	n	OCR		PONV		Respiratory depression
		Number of people	Incidence(%)	Number of people	Incidence(%)	Number of people / Incidence(%)
Group A	20	14	70	1	5	0
Group B	20	7	35	4	20	0
X^2-value		4.912		2.057		*
P-value		0.027		0.151		*

The pain scores of patients were scored by VRS: ①The pain scores of A were higher than B intraoperatively, 2h and 4h postoperatively (see Table 7). ②The pain scores of A at 8h postoperatively were still slightly higher than B as shown in Figure 1.

Table 7 Comparison of intraoperative and postoperative VRS scores of patients($\bar{x} \pm s$,score)

Time	Group A(n=20)	Group B(n=20)	t-value	P=value
Intraoperative	3.45±0.76	2.55±0.51	4.440	<0.001
2h postoperative	2.35±0.75	1.65±0.49	3.512	0.001
4h postoperativel	1.85±0.49	1.40±0.50	2.869	0.007
8h postoperativel	1.25±0.64	1.00±0.56	1.314	0.197

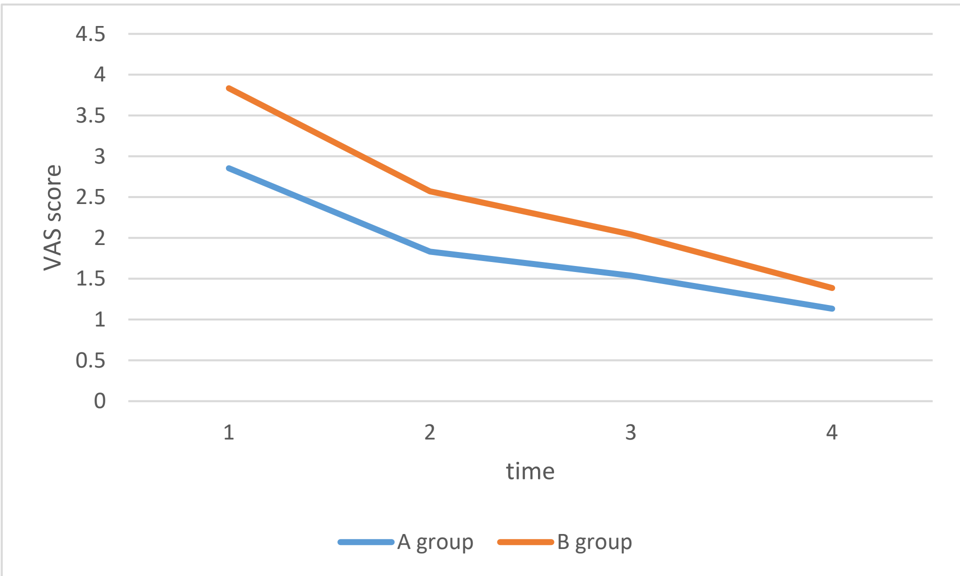

Figure 1 Changes in VRS scores at different time points

①In this study, a total of 57 and 61 extraocular muscles were operated on in A and B, respectively, and average operating time required per muscle was greater in A than B.(see Table 8). ②Figure 2 shows number of extraocular muscles with different surgical approaches, and Figure 3 shows distribution of number of patients with total number of muscles operated. [9]When comparing different surgical approaches (posterior migration of external rectus muscle and shortening of internal rectus muscle), mean surgical time required for each muscle was greater in A than B. Time required for posterior migration of external rectus muscle was shorter than shortening of internal rectus muscle.

Table 8 Comparison of time required to complete extraocular muscle surgery

Surgery method	Group A		Group B		t-value	P-value
	Number of cases ah (strip)	Operating time (min)	Number of cases ah (strip)	Operating time (min)		
Muscle for all surgeries	57	11.04±1.49	61	8.82±2.05	6.671	<0.001
Posterior migration of the external rectus muscle	25	10.72±1.34	32	8.78±1.54	4.990	<0.001
Shortening of internal rectus muscle	15	11.47±1.26	17	9.00±1.17	6.050	<0.001

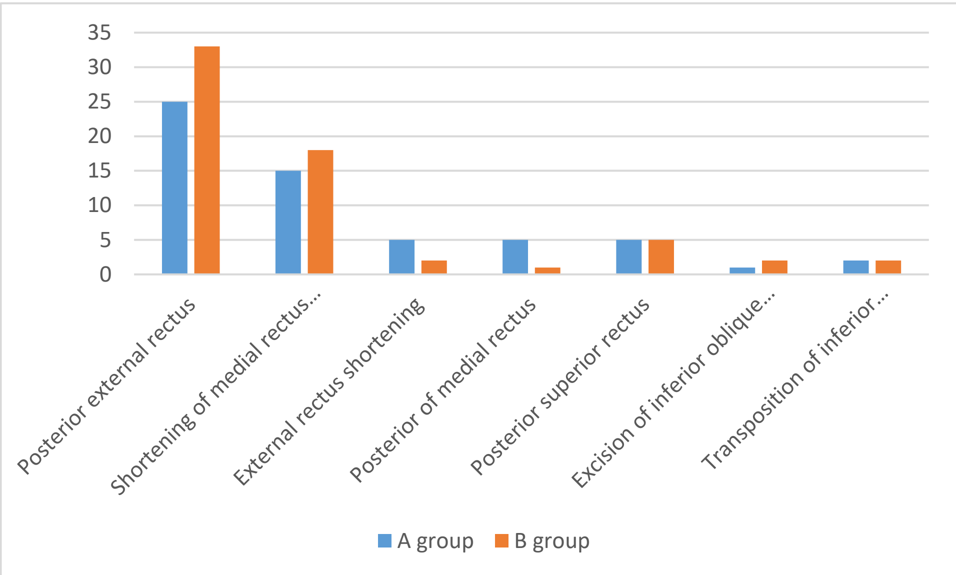

Figure 2 Number of extraocular muscles of patients with different surgical approaches

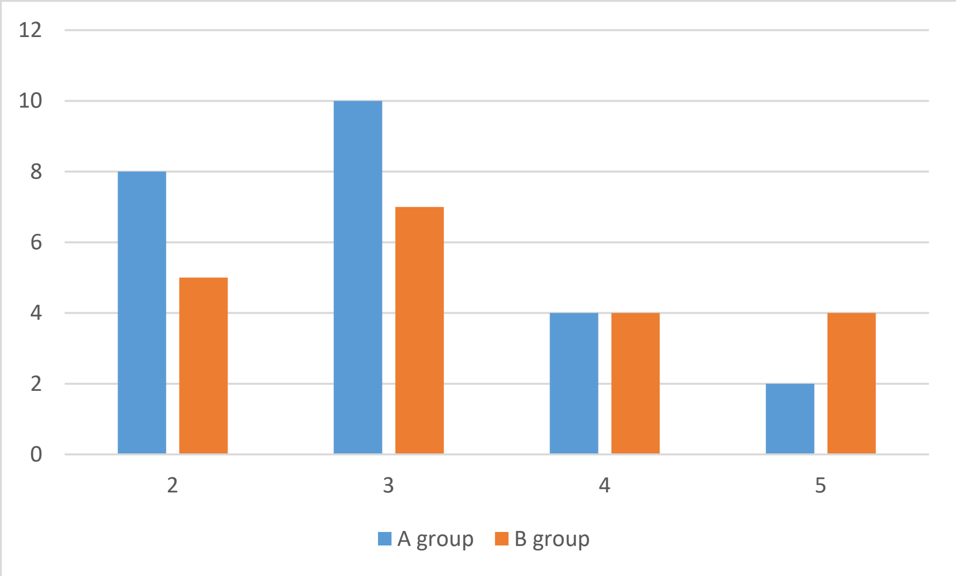

Figure 3 Distribution of number of patients in terms of total number of operated muscles

The efficiency of surgical treatment of strabismus at 1 day and 1 week after surgery was higher in A (100%) than B (95%)(see Table 9).

Table 9 Comparison of postoperative strabismus correction rate of patients

Time	n	Group A	Group B	X^2-value	P-value
1 day after surgery	20	20 (100%)	19 (95%)	1.026	0.311
1 week after surgery	20	20 (100%)	19 (95%)	1.026	0.311

In order to observe effect of applying sedative drugs, implementing nursing interventions and traditional nursing care during local anesthesia surgery to reduce patients' psychological and physiological adverse reactions, we grouped patients according to randomized double-blind principle. In group A, midazolam was injected intravenously 30 min before surgery; in group B, perioperative nursing interventions were carried out by visiting patients 1 d before surgery to understand their basic conditions and enhance nurse-patient relationship. On day of surgery, patients were greeted and greeted at entrance of operating room to give them a sense of affection and security. Give necessary comfort and explanation to patient with a smile and gentle, standardized language to enhance patient's confidence in cooperating with surgery and overcoming disease. During operation, we gently touched patient's hand or forehead, gently asked patient how he/she was feeling, exchanged words, distracted him/her, gave timely encouragement and psychological guidance, and accompanied patient to inform him/her of operation process until end of operation. 2 mL of intravenous saline was injected 30 min before operation in group C. Comparison of systolic blood pressure, heart rate and oxygen saturation of patients in three groups (see Table 10).

Table 10 Comparison of changes in systolic blood pressure, heart rate and blood oxygen saturation of three groups of patients ($\overline{x} \pm s$)

Group	Number of cases	Before and after medication	Systolic pressure	Heart rate/min	Blood oxygen saturation%
Group A	15	Before medication	19.6±2.5	86 ±14	98.1±0.6
		After medication	17.9±2.1	84±12	97.3±1.2
GroupB	15	Before medication	18.6±2.2	85±12	98.3±0.6
		After medication	18.3±1.8	86±12	98.1±0.6
Group C	15	Before medication	19.6±2.2	85±12	98.3±0.6
		After medication	20.1±2.5	95±16	97.6±0.8
1) Compared with group C in same period, P<0.05.					

Comparison of anxiety scores of three groups of patients (see Table 11)

Table 11 Comparison of anxiety scores of three groups of patients

Group	Number of cases	Before and after medication	0	1	2
Group A	15	Before medication	0	10	5
		After medication	13	2	0
GroupB	15	Before medication	8	6	1
		After medication	13	2	0
Group C	15	Before medication	0	12	4
		After medication	0	10	5
Note: The anxiety scores of group A and group B were compared with those of group C at same period, P<5.					

The intraoperative patient cooperation and postoperative patient satisfaction rates were evaluated by follow-up surgeons. The postoperative patient satisfaction rate was

93% in group A, 90% in group B, and 75% in group C. The patient satisfaction rate in groups A and B was statistically significant compared with group C (P<0.05), and there was no statistical significance between groups A and B (P>0.05). The main problems affecting satisfaction rate in group C were that they could not tolerate placement of surgical position, felt uncomfortable, and felt obvious pain during injection of local anesthesia.

DISCUSSION

Most of surgeries in adult ophthalmic patients are performed under local anesthesia, but local anesthesia is difficult to overcome patient's nervousness and anxiety[10-12]. Due to limited analgesic range of local anesthesia, intraoperative operations such as stretching and cutting can cause patients to feel varying degrees of pain and discomfort, and increase body movements, which affect smooth operation and its outcome. From patient's side, more serious anxiety and pain, lighter adverse effects on patient's body and mind, heavier, especially in combination with hypertension, cardiovascular disease, due to emotional stress, stress caused by sympathetic hyperexcitation may cause serious adverse consequences, and even life-threatening. These adverse reactions are local anesthesia is difficult to overcome, should take effective measures to prevent and control auxiliary. There are several methods of anesthesia used in ophthalmic surgery, and commonly used anesthesia is intensive anesthesia administered by doctor to regulate depth of anesthesia, but it is not conducive to observing patient and dealing with unexpected situations during ophthalmic surgery[13].

Strabismus correction surgery is most common procedure that causes OCR, and almost all patients who do not use anticholinergic drugs before surgery will have this reaction, especially when medial rectus muscle is pulled more than other muscles in area. In adults, predominance of vagus nerve and high oral secretions increase probability of intraoperative OCR and can lead to increased secretions, so preoperative anticholinergic medication is necessary. The conventional prevention method for oculocentric reflex is preoperative use of anticholinergic drugs such as atropine to reduce reflex. [14] showed that preoperative intramuscular injection of atropine can reduce incidence of intraoperative OCR by 50% to 90%. [15]However, atropine should be used with caution in adults when OCR occurs. One disadvantage is that it can cross blood-brain barrier leading to central anticholinergic effects, which, in infants, manifest as irritable crying for several hours after surgery. A second theoretical disadvantage is that esophageal pressure can be reduced within 2 min after administration, which can increase risk of reflux of gastric contents into esophagus. Although preoperative intramuscular atropine can reduce incidence of OCR from 90% to 50%, intravenous atropine or glycopyrroniumbromide is more effective in preventing OCR. It should be noted that glycopyrroniumbromide does not produce tachycardia response that atropine does. [16] demonstrated that effect of using anticholinergic drugs such as atropine to alleviate reflex method is also inaccurate. The use of anticholinergic drugs to reduce reflexes was also shown to be inaccurate.

[17] It was shown that preoperative administration of anticholinergic drugs was not effective in preventing OCR because compensatory response of heart was inhibited by pre-stimulation of intravenous cholinergic drugs. [18] It was reported that when atropine was given to infants and children with bradycardia, onset of action of atropine was greatly prolonged due to a decrease in cardiac output. In addition, atropine can cause duplex rate and increase ectopic beats. [19] reported that preoperative atropine combined with 2% lidocaine retrobulbar block was effective in preventing OCR, but atropine may cause premature ventricular contractions and dystocia, and if atropine is given at same time as vagal nerve stimulation, it may lead to conversion of bradycardia to ventricular asystole. In addition, side effects such as severe unbearable dry mouth, elevated central body temperature of 37.5℃, feverish skin and facial flushing are also unacceptable to children and their families. It can better control symptoms of organophosphorus poisoning such as increased secretion of central nervous system, gastrointestinal tract, respiratory tract and glands, etc. More importantly, it has no effect on heart rate because it has less effect on M2 receptors in heart, and dosage is small and duration of action is long with half-life of 10.5h, so number of doses and dosage are less than atropine. Since post-synaptic membrane in brain is mainly M1 receptors and mainly distributed in cerebral cortex, striatum and brainstem upstream agonist system, strong central anti-M1 receptors of long tocopherol inhibit arousal, which makes it have some central sedative effect[20]. In this study, 40 patients who underwent strabismus surgery in our hospital from July 2015 to December 2021 were studied to compare clinical application of local anesthesia alone with local anesthesia assisted by DEX and sufentanil intravenous intensive anesthesia. In this study, we included patients with aqueous-flat strabismus as main diagnosis in childhood, including 16 exotropia and 4 endotropia in A and 18 exotropia and 2 endotropia in B. In addition, there were no statistical differences in general data ($P>0.05$), including age, sex, disease duration, trigeminal prescription, weight, and type of strabismus diagnosis, except for refractive error and amblyopia. This study also found that mean operative time per muscle was longer in patients in A than B. This indicates that compared with local anesthesia alone, patients operated under local anesthesia assisted by DEX and sufentanil intravenous intensive anesthesia are less likely to experience increased muscle tone and muscle spasm caused by nervousness and fear, thus causing surgical complications (such as eye pain, nausea and vomiting, and OCR) or even prolonging operation time. In addition, time required for posterior migration of external rectus muscle was shorter than shortening of internal rectus muscle. This may be due to more complex anatomical factors of internal rectus muscle, which led to a greater force required for resection and shortening of internal rectus muscle, and even caused adverse events such as OCR, which required suspension of surgical operation, thus prolonging surgical time. In fact, volume of extraocular muscle is also a key determinant of operative time, and further studies are needed to compare operative time of different anesthetic methods with same volume and same operative method. Finally, this study compared eye position at 1 day and 1 week after surgery and concluded that difference in efficiency of

strabismus surgery treatment was not significant.

In conclusion, local anesthesia combined with intravenous intensive anesthesia is safe and effective in strabismus surgery, and although difference in clinical outcomes between two anesthetic modalities was not significant in comparison of strabismus surgery treatment efficiency, it did not increase incidence of adverse events (hypotension, bradycardia, respiratory depression, and PONV) in patients. In addition, incidence of OCR in strabismus surgery was less with local anesthesia assisted by DEX-sulfentanil intravenous intensive anesthesia, and intraoperative and early postoperative analgesic effects were better than local anesthesia alone, and average operating time per muscle was shorter, which improved patient satisfaction and is worthy of clinical application and promotion. Finally, targeted psychological interventions by nursing staff through words, expressions, and behaviors can not only change patient's psychological condition and eliminate psychosomatic symptoms, but also have effects similar to those of sedative drugs. It can greatly reduce patient anxiety and increase patient satisfaction rate without side effects of sedative drugs. In conclusion, a correct understanding of problems brought about by surgery, timely and effective intervention and treatment of anxiety reactions of patients during surgery, and giving full play to role of nursing intervention can significantly reduce patient anxiety and make patients have a good psychological state, which is conducive to smooth progress of surgical process and postoperative recovery.

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Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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