

# Preoperative Blindfold Training Prevents Pediatric Psychological Behavior Disorders During the Anesthesia Recovery Period: A Randomized Controlled Trial

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**Purpose:** To identify the effectiveness and feasibility of blindfold training on preventing pediatric psychological behavior disorders during the anesthesia recovery period.

**Design:** This study investigated the effect of blindfold training through the assessment of anxiety, delirium, and pain in children during the anesthesia recovery period.

**Methods:** This study was a prospective, randomized, controlled trial. Pediatric patients were randomized into either a control (routine practice) or blindfold training group (routine practice + blindfold training). Anxiety, delirium, and pain levels of children were assessed by the modified Yale Preoperative Anxiety Scale, Pediatric Anesthesia Emergence Delirium scale, and the Face, Legs, Activity, Cry, Consolability scale.

**Findings:** The blindfold training group had significantly lower scores for emergence delirium, anxiety, and pain during the anesthesia recovery period and a lower incidence of anesthesia complications (all P's < .05).

**Conclusions:** Preoperative blindfold training was able to reduce anxiety, pain, and the incidence of delirium during the anesthesia recovery period in pediatric patients.

**Keywords:** blindfold training, postanesthesia care unit, anxiety, pediatric delirium, pain.

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**PERIOPERATIVE PEDIATRIC MENTAL HEALTH** protection remains an important goal in anesthetic practice across the world. The postanesthesia care unit (PACU) is thus a crucial component of anesthetic practice. During this time, pediatric patients are prone to experiencing negative

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emotions and abnormal behaviors as a result of being in an unfamiliar environment, experiencing postoperative discomfort, and being separated from their parents. Fortier and Kain<sup>1</sup> reported that up to 60% of all young children undergoing anesthesia and surgery experience significant anxiety. Anxiety is defined as an unpleasant emotion when a person is in a tense and apprehensive state, which arises when they anticipate danger, either internally or externally.<sup>2</sup> In addition, emergence delirium (ED) is a common perioperative complication in children and also known as emergence agitation, which has been described as a psychological disturbance during the recovery from general anesthesia consisting of hallucinations, delusions, and confusion, manifested by moaning, restlessness, involuntary physical activity, and thrashing about in bed.<sup>3</sup>

In general, pharmacologic and nonpharmacologic interventions are used to prevent or treat such pediatric psychological behavior disorders in the PACU. Pharmacology interventions have reliable effects on the prevention of pediatric psychological behavioral disorders, but in many cases have been found to increase the observation time in the PACU as well as the cost.<sup>4,5</sup> Nonpharmacologic interventions include parental visitations,<sup>6,8</sup> music therapy,<sup>9-11</sup> and the use of distraction for children through watching video animations and playing with toys.<sup>12</sup> However, these measures lack personalization and remain controversial, and therefore other intervention methods need to be explored.

Preoperative blindfold training is derived from scenario simulation training and is a method of performing various technical operations and handling challenges in a particular environment by means of physical demonstration, role-playing, and other means.<sup>13</sup> Adaptive behaviors formed ahead of surgery for ophthalmologic patients through blindfold training involves simulating the scenario of having blindfolded eyes after surgery. It should reduce postoperative maladaptive and emotional problems as the pediatric patients have experienced the situation in advance. We predicted that blindfold training, as a way of developing adaptive behaviors before surgery, might be of benefit to pediatric patients during the anesthesia recovery period. Consequently, our study aimed to investigate whether blindfold training improved children's behavior and emotional problems during the anesthetic recovery period.

## Methods

This prospective, randomized, controlled trial was approved by the institutional review board of West China Hospital of Sichuan University, China. Written informed consent was obtained from all parents or legal guardians of the children who participated.

### *Patients and Their Parents*

Patients aged 2 to 6 years who underwent general anesthesia for elective ophthalmic surgery between May 2017 and September 2017 were randomly assigned to either the control or blindfold group. The inclusion criteria were as follows: (1) children with an American Society of Anesthesiologists status I to III and (2) children with eyes requiring dressing after surgery. The exclusion criteria were as follows: (1) children with neurologic or psychiatric history and (2) hearing impairment.

### *Blindfold Training*

Patients who met the inclusion criteria were assigned to a study group (control or blindfold training) according to a random number table that had been generated on the first day of the study using a computer program.

*Preoperative day:* On the preoperative day, anesthesiologists completed routine preoperative visits and completed the anesthetic informed consent forms with patients and their caregivers. All patients completed a preoperative examination including a chest x-ray, use of antibiotic eye drops, and conventional preoperative nursing procedures, specifically: (1) introduction to the anesthetic room environment, (2) provision of information to caregivers regarding children's forbidden drink times and fasting times, (3) ensuring the attention and cooperation of accompanying caregivers when entering the anesthetic room, (4) ensuring that each child's caregivers was able to find the holding area in the PACU. All the above nursing measures and examinations were completed by nurses and doctors in the ophthalmologic ward who were blinded to patient group allocation. The blindfold training was completed independently by a specific anesthesia nurse who had been trained for this study. The

nurse arrived at the ophthalmologic ward 1 day before surgery and completed the training with all caregivers and their families together. She sought to ensure that caregivers or families did not tell other medical staff (eg, on the ophthalmology ward or anesthesia operation center) about the blindfold training. Blindfold training was conducted separately on mornings, noon, and evenings. During training, the postoperative scene was simulated using medical gauze and explanations were provided. We chose to cover each operative eye according to the specific operation method.

*On the day of surgery:* General anesthesia with a laryngeal mask was performed for all patients who received a unified anesthesia program. After the pediatric patient and their caregivers entered the operating room, routine monitoring was initiated including electrocardiogram (ECG), noninvasive blood pressure (NIBP), pulse oxygen saturation ( $S_pO_2$ ), and end-tidal carbon dioxide partial pressure ( $P_{et}CO_2$ ). Anesthesia was induced with intravenous anesthetic (propofol 3–4 mg/kg, fentanyl 2–2.5  $\mu$ g/kg), and 1 to 2 drops of *benoxil* into the affected eye after induction. Anesthesia was maintained with inhaled 1.5% to 2% sevoflurane, which was discontinued at the end of the surgery.

After the operation, patients were assisted in establishing regular breathing as soon as possible and the laryngeal mask was removed under deep anesthesia. The patient was escorted to the PACU after awakening and recovery of physiological function. Anesthesiologists, surgeons, and operating room nurses were all blinded to the group allocation of patients.

*Anesthesia recovery period:* When the patient was transferred to the PACU, the nurse immediately notified the patient's caregivers after handover with the anesthesiologist. Caregivers were allowed to enter the PACU to accompany their child. All patients received the same clinical routine procedure (oxygen inhalation, recording of vital signs with ECG, and pulse oximetry). Analgesia drugs used in the PACU were determined by the attending anesthesiologist. A member of our research team was responsible for the assessment of anxiety, delirium, and pain in the anesthesia recovery period (on entering the PACU, after 15 minutes

in the PACU, and at discharge from the PACU). This team member and the PACU nurses were blinded to experimental group assignment.

### **Data Collection**

Data were collected using a case report form which included (1) demographic characteristics (age, gender, and weight). (2) Relationship with the long-term caregiver, defined as the person or people taking care of the child for three or more months each year. This included parents, grandparents, and relatives, for example. (3) Educational level of long-term caregiver, for example, uneducated, primary school, junior school, senior school, junior college, undergraduate, or graduate level completed. (4) Whether the patient was an only child or a second-born child. (5) Whether the patient was or was not a leftover child (leftover child was defined as a special group of people who are concerned by Chinese society because their parents have been working in other places for a long time and they lack emotional support and spiritual communication with their parents). (6) Surgical diagnosis.

Postoperative information was obtained relating to the following: (1) emergence anxiety, (2) ED, (3) emergence pain, (4) emergence complications, (5) duration of surgery, (6) duration of stay in the recovery room, and (7) analgesia and sedatives used during the emergence period.

The primary outcomes were patient anxiety, delirium, and pain during anesthesia emergence. We selected the following three scales as research tools: (1) The modified Yale Preoperative Anxiety Scale (m-YPAS)<sup>14</sup> is used to measure anxiety and is of high reliability and good validity, which includes 22 specific behaviors across five domains (activity, emotional expressivity, state of arousal, vocalization, and use of parents). The highest behavioral level observed in each of the five m-YPAS categories was the score for that category. The calculation was:  $(1/4 + 1/6) \times 100/2 =$  total adjusted score. This ranged from 0 to 100. (2) The Pediatric Awake Delirium (PAED) rating scale<sup>3</sup> is composed of five items using the response options of not at all (score of 0), just a little (score of 1), quite a bit (score of 2), very much (score of 3), and extremely (score of 4). Reverse scoring of items included the options of not at all (4), just a

little (3), quite a bit (2), very much (1), and extremely (0). The reliability and validity are high and ranged from 0 to 20. The greater the item score, the greater the degree of ED. (3) The Faces, Legs, Activity, Cry, Consolability (FLACC)<sup>15</sup> pain scale is a five-item behavioral scale that measures facial expression, leg movement, activity, crying, and consolability in young children. Each item is scored on a scale of 0 to 2, resulting in a total score ranging from 0 to 10. The FLACC pain scale was originally validated by Merkel et al<sup>15</sup> to measure postoperative pain in children aged between 2 months and 7 years. The researcher used these three scales to assess patients on entering the PACU, after 15 minutes in the PACU, and at discharge from the PACU.

The secondary outcomes were as follows: (1) the incidence of anesthesia complications during the emergence period, (2) analgesia and sedatives used during the emergence period, and (3) the duration of time spent in the PACU.

### Statistical Analysis

Excel 2013 and IBM SPSS, version 20.0, were used for data collection and statistical analysis. Categorical data were described as proportions.  $\chi^2$  tests and Fisher exact probability methods were used to test for group differences. Means and standard deviations ( $M \pm SD$ ) were used to describe measurement data when the requirements for a normal distribution were satisfied. *T* tests and paired *t* tests were adopted to compare differences between the control and blindfold groups. The associations between anxiety, delirium, and pain were analyzed using Pearson correlation analyses. Results were considered statistically significant when the *P* value was lower than .05.

## Results

### Patient Recruitment

One hundred and five patients who underwent ophthalmic surgery with general anesthesia requiring bandaging of their operative eyes were randomly allocated to study group between May 2017 and September 2017. Family members of two patients gave up blindfold training halfway, and another two refused to receive blindfold training in the blindfold group.

One patient in the control group did not have surgery on the day of the scheduled operation because of having a cold. On completion, a total of 100 patients were included in the data analysis. The control group consisted of 56 cases and the blindfold group of 44 cases as shown in Figure 1.

### Preoperative Characteristics

There were no statistically significant differences between the two groups in terms of age ( $P = .386$ ), gender ratio ( $P = .207$ ), long-term care relationship ( $P = .253$ ), education level of the long-term caregiver ( $P = .562$ ), whether the patient was an only child/second-born child ( $\chi^2 = 0.626, P = .429$ ) or leftover child/unleftover child ( $P = .727$ ). There was also no significant difference in the surgical procedures between the two groups ( $\chi^2 = 7.615, P = .268$ ). However, children's weight differed significantly between the two groups ( $t = 2.252, P = .027$ ). These basic characteristics are shown in Table 1.

The preoperative anxiety score for the control group was  $24.57 \pm 0.73$  and for the blindfold training group was  $26.16 \pm 1.07$ , but the two groups did not differ significantly ( $t = 1.257, P = .212$ ). No patients had delirium or pain before their operation.

### Postoperative Characteristics

The blindfold group had significantly lower anxiety and delirium scores than the control group when entering the PACU, after 15 minutes in the PACU, and at discharge from the PACU (anxiety:  $P$ 's  $< .001$ , delirium:  $P$ 's  $< .001$ ). The scores for pain in the blindfold group (on entering the PACU and at discharge from the PACU) were lower than in the control group ( $P < .010$  and  $P < .002$ , respectively). The specific results are shown in Table 2.

The variation and trends for the anxiety and delirium scores at each time point were similar in both groups. For both, the overall trend was to decline as the observation time increased. However, the variation amplitude of the blindfold group was lower than that of the control group. The changes in the two groups at the three time points show discrepancies ( $P < .001$ ) (Figure 2). The

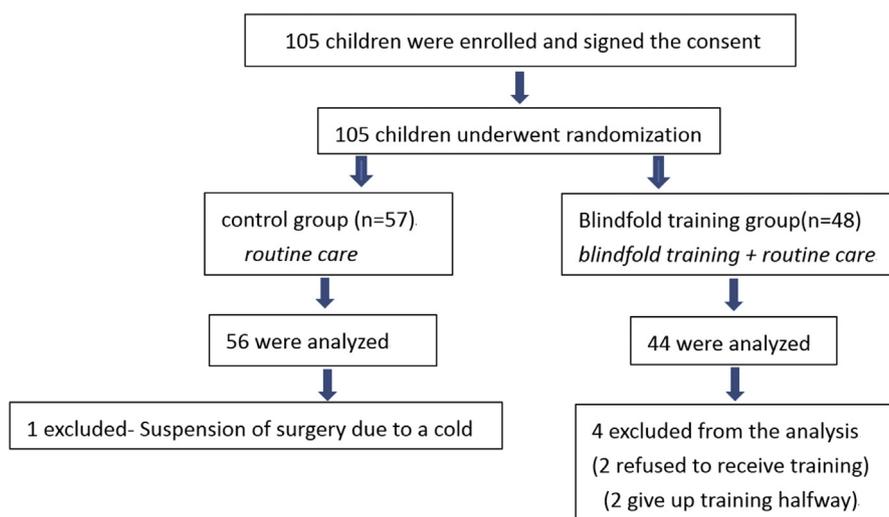


Figure 1. Randomization, intervention, and inclusion in analysis. This figure is available in color online at [www.jopan.org](http://www.jopan.org).

PACU pain score declined over time, slowly at first and then faster in the control group. In the blindfold group, the trend of rising and falling was clear. The highest and lowest values in the control group were higher than those in the blindfold group (Figure 2).

Patients' anxiety, delirium, and pain have obvious correlations with one another after 15 minutes in the PACU and then at discharge from the PACU. All three indicators show the same trend of change, and each combination of the two increases with the other. The correlation coefficient for anxiety and delirium was 0.791 ( $P < .05$ ) after 15 minutes in the PACU. Furthermore, the correlation coefficients among the three indicators were as high as 0.8 ( $P < .05$ ). The specific results are shown in Figure 3 and Table 3.

A total of 22 patients experienced emergence complications (control group: 17 and blindfold group: 5). There were 17 cases of complications: hypoxemia (1), laryngospasm (1), apnea (3), glossocoma (3), agitation (7), and nausea and vomiting (2). In addition, 3 cases of agitation and 2 cases of glossocoma occurred in the blindfold group. The rate of emergence complications was higher in the control group ( $\chi^2 = 5.18$ ,  $P = .02$ ) than the blindfold group (Table 4).

The operative duration for the blindfold group was  $34.62 \pm 3.04$  min and for the control group was

$34.65 \pm 2.67$  min. The PACU duration was  $57.67 \pm 3.08$  min (blindfold group) and  $55.20 \pm 3.00$  min (control group). There was no statistical difference for the operative duration or the PACU duration between the two groups. There was also no significant difference in the use of analgesics and sedatives in the PACU between the two groups (Table 5).

## Discussion

In this randomized controlled trial, 100 patients successfully completed the study and discharged from the hospital. Our results indicated that patients who received blindfold training in the preoperative period had lower scores for anxiety, delirium, and pain, as well as a lower incidence of complications during the anesthesia recovery period.

Because of the immature psychological and physiological development of children, combined with the impact of surgery, pediatric patients are prone to negative emotions and maladaptive behaviors in the anesthesia recovery period. Previous studies<sup>16-18</sup> have stated that ED, postoperative pain, and postoperative behavior changes result from high levels of preoperative anxiety. Therefore, the current intervention aimed to reduce preoperative anxiety. Previously, sedatives have been used before surgery. However, the use of sedative drugs has been associated with

**Table 1. Patient Demographics**

| Basic Information of Children             | Blindfolded Group (n = 44) | Control Group (n = 56) | P Value |
|---|----------------------------|------------------------|---------|
| Age ( $\bar{X} \pm SD$ ), y               | 3.52 $\pm$ 0.207           | 3.77 $\pm$ 0.189       | .386    |
| Gender, n                                 |                            |                        |         |
| Male                                      | 27                         | 41                     | .207    |
| Female                                    | 17                         | 15                     |         |
| Weight, kg                                | 15.739 $\pm$ 0.498         | 17.366 $\pm$ 0.507     | .027    |
| Relationship with long-term caregiver, n  |                            |                        |         |
| Father                                    | 12                         | 10                     |         |
| Mother                                    | 27                         | 32                     | .253    |
| Grandfather/Grandmother                   | 5                          | 13                     |         |
| Other                                     | 0                          | 1                      |         |
| Education level of long-term caregiver, n |                            |                        |         |
| Uneducated                                | 0                          | 3                      |         |
| Primary school                            | 7                          | 13                     |         |
| Junior school                             | 8                          | 10                     | .562    |
| Senior school                             | 5                          | 9                      |         |
| Junior college                            | 16                         | 15                     |         |
| Undergraduate                             | 7                          | 5                      |         |
| Graduate                                  | 1                          | 1                      |         |
| Leftover child, n                         | 3                          | 6                      | .727    |
| Unleftover child, n                       | 41                         | 50                     |         |
| Only child, n                             | 29                         | 41                     | .429    |
| Second-born child, n                      | 15                         | 15                     |         |
| Diagnosis, n (%)                          | 7.68 ( $\chi^2$ )          |                        | .263    |
| Blepharoptosis                            | 20 (45.4)                  | 15 (26.8)              |         |
| Retinopathy                               | 7 (15.9)                   | 11 (19.6)              |         |
| Cataract                                  | 6 (13.6)                   | 5 (8.9)                |         |
| Strabismus                                | 2 (4.5)                    | 5 (8.9)                |         |
| Aphakia                                   | 1 (2.3)                    | 7 (12.5)               |         |
| Keratopathy                               | 1 (2.3)                    | 3 (5.4)                |         |
| Other                                     | 7 (16.0)                   | 10 (17.9)              |         |

ED, maladaptive behaviors, and increasing operational costs. In addition to pharmaceutical interventions, nonpharmaceutical psychologic

interventions provide crucial ways to alleviate and eliminate anxiety. Research focusing on parental presence<sup>4,19</sup> has been controversial so

**Table 2. Scores for Anxiety, Delirium, and Pain at Different Time Point in the PACU (N = 100)**

| Variate                        | $\bar{X} \pm SD$         |                        | F      | P      |
|--------------------------------|--------------------------|------------------------|--------|--------|
|                                | Blindfold Group (n = 44) | Control Group (n = 56) |        |        |
| Anxiety (Entering PACU)        | 61.51 $\pm$ 2.99         | 72.84 $\pm$ 2.70       | 13.993 | < .001 |
| Anxiety (15 min in PACU)       | 57.36 $\pm$ 2.76         | 70.69 $\pm$ 2.50       | 7.995  | < .001 |
| Anxiety (Discharge from PACU)  | 44.49 $\pm$ 2.97         | 59.94 $\pm$ 2.69       | 16.342 | < .001 |
| Delirium (Entering PACU)       | 9.02 $\pm$ 0.56          | 11.73 $\pm$ 0.51       | 13.669 | < .001 |
| Delirium (15 min in PACU)      | 8.62 $\pm$ 0.52          | 11.42 $\pm$ 0.47       | 18.214 | < .001 |
| Delirium (Discharge from PACU) | 6.87 $\pm$ 0.48          | 9.29 $\pm$ 0.44        | 14.849 | < .001 |
| Pain (Entering PACU)           | 4.47 $\pm$ 0.44          | 6.04 $\pm$ 0.40        | 6.956  | .010   |
| Pain (15 min in PACU)          | 6.04 $\pm$ 1.44          | 6.00 $\pm$ 1.30        | 0.001  | .982   |
| Pain (Discharge from PACU)     | 2.71 $\pm$ 0.37          | 4.33 $\pm$ 0.34        | 10.431 | .002   |

PACU, postanesthesia care unit.

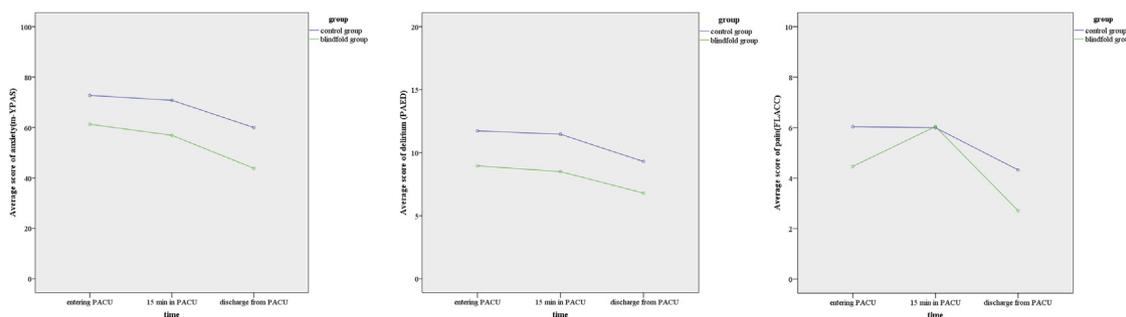


Figure 2. Average score of anxiety, delirium, and pain. m-YPAS, modified Yale Preoperative Anxiety Scale; PACU, postanesthesia care unit; PAED, Pediatric Anesthesia Emergence Delirium; FLACC, Face, Legs, Activity, Cry, Consolability. This figure is available in color online at [www.jopan.org](http://www.jopan.org).

far in terms of whether it can reduce either children’s or parents’ anxiety. A common characteristic among various measures (clown doctors,<sup>20</sup> preoperative education,<sup>21</sup> and mask adaptation<sup>22,23</sup>) is that they let patients acquire surgical information and experience in advance regarding what they will face or go through on the day of the operation. Studies<sup>6-8</sup> suggest that parental visitation results in less crying and anxiety for children in the PACU. However, there are arguments that these reports were

retrospective, nonrandomized, and that there are confounding factors which need to be considered. Within the context of family-centered care, the role of the parent in the PACU has been examined over the past few years. Chorney et al<sup>24</sup> observed and explored the adult behaviors that can have a positive effect on children and how adult and children’s behavior influence each other in the perioperative period. It is arduous to form a standard behavior flow as everyone’s understanding and acceptance is different.

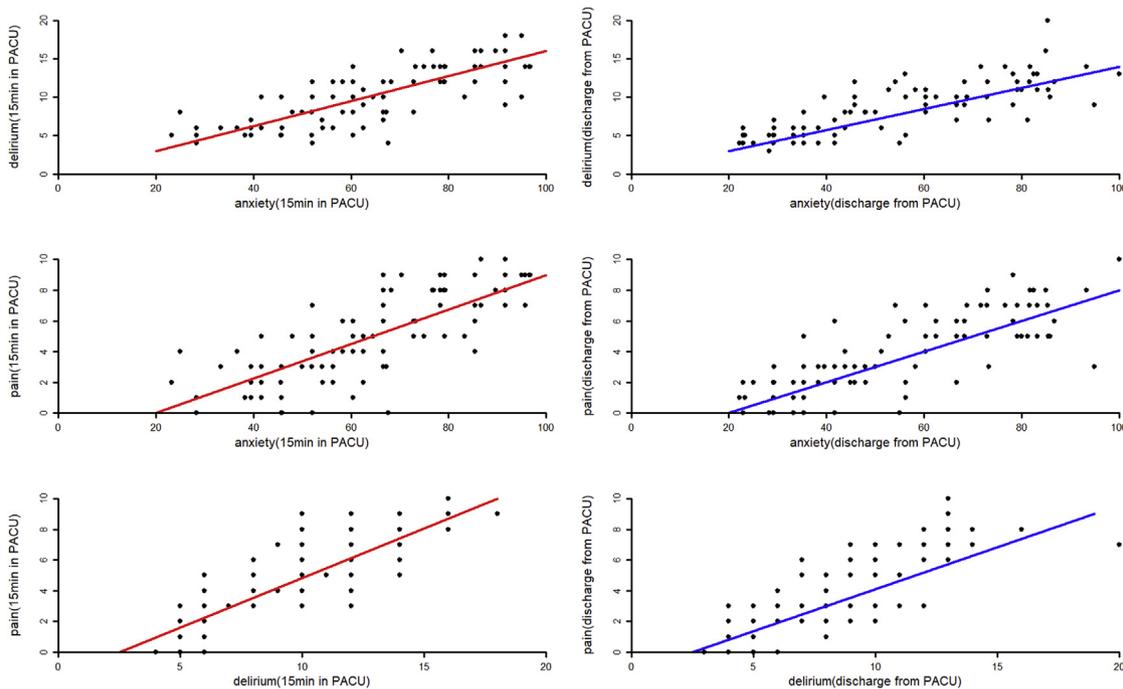


Figure 3. Correlation between anxiety, delirium, and pain at 15 min and discharge from PACU. PACU, postanesthesia care unit. This figure is available in color online at [www.jopan.org](http://www.jopan.org).

**Table 3. Correlation Between Anxiety, Delirium, and Pain at 15 min and Discharge From the PACU**

|                       | Anxiety at 15 min    | Delirium at 15 min    | Pain at 15 min    |
|-----------------------|----------------------|-----------------------|-------------------|
| Anxiety at 15 min     | 1.000                | —                     | —                 |
| Delirium at 15 min    | 0.791                | 1.000                 | —                 |
| Pain at 15 min        | 0.249                | 0.308                 | 1.000             |
|                       | Anxiety at Discharge | Delirium at Discharge | Pain at Discharge |
| Anxiety at discharge  | 1.000                | —                     | —                 |
| Delirium at discharge | 0.811                | 1.000                 | —                 |
| Pain at discharge     | 0.814                | 0.834                 | 1.000             |

PACU, postanesthesia care unit

Discontentment resulting from unitary interventions to prevent delirium triggers the use of pharmacologic interventions, which is controversial. Nonpharmacologic interventions primarily focus on preoperative anxiety because some research suggests that higher preoperative anxiety gives rise to a higher rate of ED. Therefore, it is critical that the incidence of delirium is reduced, and better still, prevented.

Suboptimal pain management is associated with undesirable postoperative outcomes.<sup>25</sup> There is no single reason which account for this because pain is subjective and affected by psychological factors.<sup>26</sup> Previous studies<sup>1,27</sup> have been conducted on pain-related levels of anxiety. Walding<sup>28</sup> proposed that both pain and anxiety work via a similar mechanism. An increase in the awareness of pain will reduce pain thresholds and consequently increase the extent of pain experienced.<sup>29</sup>

**Table 4. The Distribution of Complications in Two Groups (N = 100)**

| Complication        | Group                |                        | $\chi^2$<br>Value | <i>P</i><br>Value |
|---------------------|----------------------|------------------------|-------------------|-------------------|
|                     | Control,<br><i>n</i> | Blindfold,<br><i>n</i> |                   |                   |
| Hypoxemia           | 1                    | 0                      | 5.18              | .02               |
| Laryngospasm        | 1                    | 0                      |                   |                   |
| Apnea               | 3                    | 0                      |                   |                   |
| Glossocoma          | 3                    | 2                      |                   |                   |
| Agitation           | 7                    | 3                      |                   |                   |
| Nausea and vomiting | 2                    | 0                      |                   |                   |
| Total               | 17                   | 5                      |                   |                   |

These results are consistent with our own study; there was a high correlation between anxiety and pain during the recovery period. Pain is an essential factor in ED, but the occurrence of this is not entirely caused by pain. Preoperative blindfold training, as a novel preoperative intervention, was studied by repeated exposure to having the operative eye covered ahead of the operation, and has some advantages in reducing levels of anxiety, which may lead to lower rates of delirium, pain, and analgesia. This approach may be easily generalized as an inexpensive intervention with high feasibility.

The effect of the intervention was evaluated by applying scales which quantify children's emotions and behaviors. In our study, we choose the m-YPAS, PAED, and FLACC scales as evaluation indexes, to assess patients' emotions, behavior, and pain during their time in the PACU. The original Yale Preoperative Anxiety Scale was applied to access anxiety in children undergoing induction of anesthesia, which analyzed by researchers through videotapes of children's behaviors in the holding area. With new behaviors observed, certain items were modified (m-YPAS) and more applicable to evaluation of interventions. m-YPAS is an excellent tool for assessing children's anxiety during the perioperative period because it can be applied easily and used to evaluate the effectiveness of blindfold training on anxiety reduction in less than 1 minute during the anesthesia recovery period.<sup>14</sup> The PAED<sup>3</sup> was used to derive the following ED behaviors: cognitive behavior, behavioral response to environmental stimuli, behavior threatening patient safety, motor behavior, affective behavior, and vocal behavior. This scale adopts

**Table 5. Medication Use, Length of PACU, and Operation in Two Groups (N = 100)**

| Variate                          | Group                    |                        | <i>t</i> Value/ $\chi^2$ Value | <i>P</i> Value |
|----------------------------------|--------------------------|------------------------|--------------------------------|----------------|
|                                  | Blindfold Group (n = 44) | Control Group (n = 56) |                                |                |
| Length of PACU, min              | 57.67 ± 3.08             | 55.20 ± 3.00           | -0.574                         | .567           |
| Length of operation, min         | 34.62 ± 3.04             | 34.65 ± 2.67           | 0.008                          | .994           |
| Medication use in PACU, <i>n</i> | 4                        | 11                     | 2.152                          | .168           |

PACU, postanesthesia care unit.

reverse scoring which can be easily calculated by having all items scored during routine clinical work. The FLACC is a behavior scale for scoring pain in children, which provides a convenient, consistent method for physicians and nurses to identify, document, and evaluate pain.<sup>15</sup>

The incidence of PACU's complications in the control group was higher than that in the blindfold group. It may be related to the improvement of mood and behaviors in blindfold group. There was no statistically significant difference between the two groups in the use of analgesics and sedatives in the PACU. Neither classification of scale nor protocol of medication intervention was provided, therefore the use of analgesics and sedatives in the PACU is a comprehensive intervention combining clinical manifestation and personal experience on the basics of objective indicators, which probably result no statistical difference between the two groups. There was no discrepancy in the length of stay in the PACU between the two groups, and this may be related to the fact that patients would be transferred when the nurse and the central transportation worker were present at the same time. In addition, patients from the same department are usually transferred together to save human resources.

Our study has several limitations. First, this was a single-center study only considering pediatric pa-

tients undergoing ophthalmic surgery. A multi-center and larger sample study is needed to verify our experimental results. Second, the scales for evaluating postoperative anxiety, delirium, and pain partly overlap with one another. For example, the item "inconsolable" exists in both the PAED and FLACC, and "moaning" and "crying" exist simultaneously in the FLACC and m-YPAS. Using the same indicators within the scales means that they may have impacted on each other period. The same items, in some extent, increase their correlations, the state of their occurrence, and the trend of change was not affected yet.

## Conclusions

Our results showed that children who received preoperative blindfold training had lower anxiety, delirium, and a lower incidence of complications during the recovery period. This technique is worthy of clinical reference and promotion because of its high maneuverability, low cost, and considerable results.

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