Original Article

Effect of video distraction on preoperative anxiety scores in pediatric patients undergoing general anesthesia in ophthalmic daycare procedures: A randomized controlled trial

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Abstract

Background and Aims: Parental separation, fear, and exposure to the operating room environment lead to stress and anxiety in pediatric patients. This study aims to identify the research gaps in the effect of video distraction on pediatric patients of Indian origin. We hypothesized that video distraction along with parental presence would reduce preoperative anxiety in pediatric patients undergoing ophthalmic procedures under general anesthesia compared with parental presence alone.

Material and Methods: In this prospective randomized trial, 145 patients aged 2–8 years, ASA I-II, with at least one functional eye undergoing elective ophthalmic daycare procedures were enrolled. They were randomly allocated to two Groups: Group V had distraction by watching a video/playing a video game together with parental presence, whereas control Group C had parental presence alone without any video distraction. The primary objective of the study was to compare preoperative anxiety using the Modified Yale Preoperative Anxiety score (mYPAS) and heart rate (HR), whereas the secondary objective was to compare child fear, emergence delirium, and parental satisfaction between the two groups. The three time points for intergroup comparisons were the preoperative holding area 10 min before induction (T0), transport of the child to the operating room (T1), and face mask introduction (T2).

Results: There was a statistically significant difference between mYPAS score in groups V and C at all time points ($P = 0.036$, $P = 0.0001$, $P = 0.0000$), parental satisfaction score at all three time points ($P = 0.0049$, $P = 0.0000$, $P = 0.0000$), and Child Fear Score at T1 and T2 ($P = 0.0001$, $P = 0.0001$, respectively). However, there was no statistically significant difference in the emergence of delirium between the two groups.

Conclusions: Video distraction together with parental presence has a promising role for implementation in hospitals with heavy workload settings where pharmacological intervention would not be feasible, to alleviate preoperative anxiety in children. However, preoperative anxiety may not translate into increased postoperative emergence delirium as was earlier believed.

Keywords: Postoperative emergence delirium, preoperative anxiety, video distraction

Introduction

Parental separation, fear, and exposure to an unfamiliar environment of the operating room lead to preoperative anxiety in 40%–60% of pediatric patients.[1] The resultant effects are reduced anesthesia compliance, increased complications during induction of anesthesia such as breath-holding spells, laryngospasm; increased anesthetic requirements; higher rates of emergence delirium; higher analgesic requirements; longer

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hospital stays; post-operative maladaptive behavior such as eating and sleeping disturbances and delayed post-operative recovery, which are more evident at repeated exposures.[2]

Behavioral and pharmacological interventions are utilized to overcome preoperative anxiety in children including parental presence, oral premedication, clown therapy, and behavioral preparation programs. The use of premedication is restricted by undesirable side effects, conflicts on the timing and amount of drug to be administered, and increased health care costs or a combination of these.[3] Furthermore, it is difficult to monitor the children after premedication in a busy ambulatory setup with high turnover rates at our center. Although there has been an overall increase in allowing parental presence during the induction of anesthesia over the past few years, it is controversial as parental anxiety is believed to translate into increased child anxiety and vice versa.[1]

Recently, attention has been paid to the use of audio-visual stimuli as distractors in the operating room. Watching cartoons and videos has become a ubiquitous activity in society today.[3] Children become so engrossed in watching that they become unaware of their surroundings and disregard any verbal or tactile stimuli. The trend toward the use of distraction technology seems to be growing globally.[4] Technology distraction has been studied in minor procedures such as intravenous (iv) cannulation, dental procedures, combat pain in burn injuries, radiotherapy, and even to combat nausea in pediatric cancer patients receiving chemotherapy but very less in daycare surgeries.

This study aimed to identify the research gaps in the effects of video distraction and parental presence on pediatric preoperative anxiety and fear compared to parental presence alone. We hypothesized that video distraction along with parental presence would reduce preoperative anxiety in pediatric patients undergoing ophthalmic procedures under general anesthesia compared to parental presence alone.

The primary objective of the study was to compare preoperative anxiety using the Modified Yale Preoperative Anxiety score (mYPAS) and heart rate (HR), whereas the secondary objective was to compare child fear, emergence delirium, and parental satisfaction between the two groups.

Material and Methods

The present prospective single-blind randomized controlled study was conducted at a tertiary level hospital after ethical approval (Institute Ethics Committee for Post Graduate Research: Ref no: IECPG-408/27.06.2019) (Chairman Prof. S. N. Dwivedi) on September 2, 2019, and was registered with Clinical Trial Registry CTRI (CTRI/2019/10/021588). Sample size calculation was done using a two-sided *t*-statistic. Sixty patients per group were needed to detect a mean difference of 15 points in mean mYPAS score, assuming a standard deviation of 27.18 in both the groups as obtained from previous studies with an alpha error of 0.05 and a power of 90%.[1,4]After obtaining written and informed parental consent (ascent form for children older than 7 years), 145 patients aged 2–8 years, American Society of Anesthesiologists (ASA) I-II, with at least one functional eye undergoing elective ophthalmic daycare procedures, [Figure 1] were randomly allocated to two Groups using computer-generated random number tables and the sealed opaque envelope technique. Group V underwent induction of anesthesia with video distraction and parental presence, whereas Group C underwent induction of anesthesia with parental presence alone. Exclusion criteria were ASA III or IV, syndromic children, general anesthesia exposures >3, children who received preoperative anxiolytic medication such as midazolam, children with significant cognitive impairment or developmental delays impairing language or vision, and children on psychotropic medications.

After preoperative evaluation and ensuring adequate fasting of children, the parents were explained about the study and its importance, and consent was taken. One parent was asked to accompany their child throughout the pre-operative period until induction in both groups. The investigator introduced themselves to the children and used small talk to make themselves familiar with and explain the procedure. The children in the video group were then asked about their preferred cartoon game/videos of any language and it was shown to them from the pre-anesthetic check-up room (PAC). They continued to watch the videos or play games while transporting and during the application of the mask until induction of anesthesia. Videos of all children were recorded during the entire period for analysis and scoring purposes. In the operating theater, standard ASA monitoring Electrocardiography (ECG), pulse oximetry, and capnography) was attached to the child. Anesthesia was induced by titration of oxygen, N_2O, and sevoflurane up to 8%. Care was taken to minimize interruptions in the video-based distraction. Anesthesia was maintained using oxygen and sevoflurane. Parents were escorted back to the waiting room after the induction of anesthesia and they were asked to rate their satisfaction: Parental Satisfaction (PS) with their child's induction on a scale of 0 to 5 (0 being unsatisfied to 5 being extremely satisfied). In the Post Anaesthesia Care Unit (PACU), post-operative emergence delirium was assessed using the Watcha Score (WS) after 10 min in the recovery room. Using the videos recorded, the investigator measured pre-operative anxiety using the mYPAS, a validated observer-rated scale (subjective measure) and HR (objective

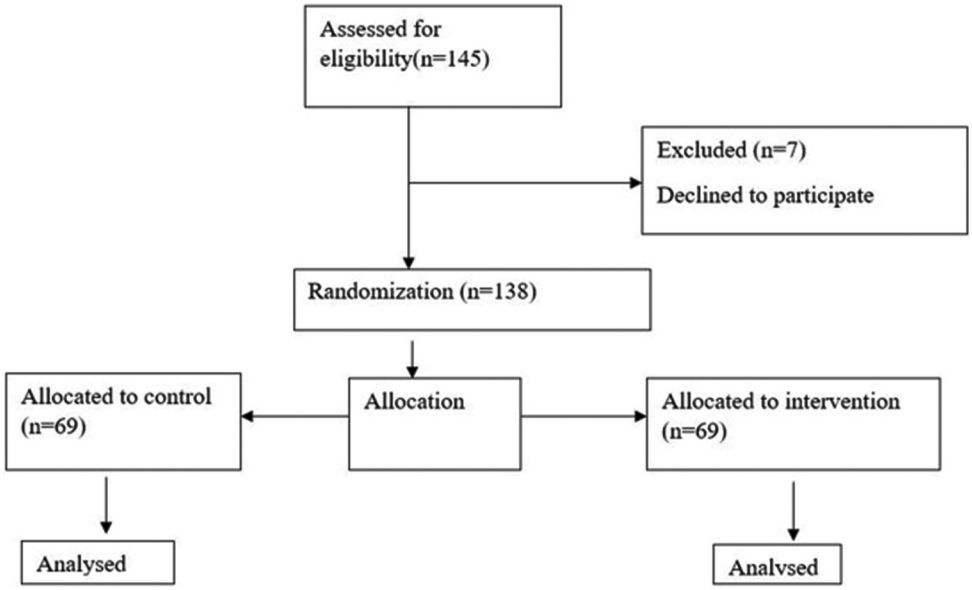

Figure 1: CONSORT diagram

measure), at three time points: preoperative holding area 10 min before induction (T0), during transport of the patient in a trolley just before entering the operating room (T1), and on mask introduction (T2). Child fear was also assessed using the Child Fear Scale (CFS) at the three time points.

Statistical tests

The data were entered in an MS Excel spreadsheet, and statistical analysis was done using the Stata 15 software by the Statistics Department at AIIMS, New Delhi.

Categorical variables are presented as frequency (%) and continuous variables are presented as mean ± standard deviation (SD) or median (min/max). Continuous variables following normal distribution such as demographics, HR, mYPAS score, and Parental Satisfaction (PS) Score were compared using a two-sample *t*-test. Variables that did not follow a normal distribution such as CFS were compared using the Wilcoxon rank sum test. Categorical variables such as sex were correlated using the Fisher exact test. WS was considered a categorical variable and compared using the Cochrane–Armitage test followed by the Chi-square test. Repeated measures analysis of variance (ANOVA) was used to determine whether there was a significant change in the mYPAS, HR, and CFS scores from baseline to transport and induction for each intervention group separately. Statistical significance was set as a P value of < 0.05.

Results

One hundred forty-five patients were enrolled in the study, of which 7 patients declined to participate. One hundred thirty-eight students were randomly allocated to Control (Group C) and intervention (Group V) of 69 patients each as depicted in the CONSORT diagram [Figure 1]. There was no significant difference in the demographic data and surgical characteristics of the patients between the Groups ($P > 0.05$) [Table 1]. Only 10 patients out of 69 (14.49%) had chosen to play games, whereas the rest preferred to see videos.

Primary outcome-Preoperative anxiety was assessed using HR and mYPAS. The mean HR (± SD) in Groups V and C at different time points is depicted in Table 2. No statistically significant differences were found in HR between the groups in the PAC room ($P = 0.157$) and during transport ($P = 0.105$). HR significantly increased during mask introduction in Group C ($P = 0.007$). The increase in HR from PAC room to transport to mask introduction was significant in both groups as depicted in Figure 2.

mYPAS more than 30 signifies anxiety. Most children demonstrated anxiety at all three time points in both groups. The mean mYPAS (± SD) in Group V in the PAC room was 37.7 ± 17.8 (23-90), during transport, was 38.8 ± 20.7 (23–96), and on mask introduction was 41.3 ± 23.5 (23–98). The mean mYPAS (± SD) in Group C in the PAC room was 45.6 ± 21.4 (23–88), during transport, was 56.5 ± 24.8 (23–98), and on mask introduction was 68.7 ± 28.3 (23–98) [Table 2]. Significant differences were noted in mYPAS between both the groups at all time points with higher scores in Group C denoting higher anxiety levels. mYPAS increased significantly across time in Group C but not in Group V [Figure 3].

Table 1: Baseline characteristics

Variable	Group V	Group C	*P*
Age, years [Mean±SD]	5.3±1.2	5.3±1.3	0.896
Gender, male/female [*n* (%)]	48/21 (69.57/30.43)	40/29 (57.97/42.03)	0.157
Weight, kg [Mean±SD]	16.7±4.5	16.6±4.6	0.911
Height, cm [Mean+SD]	108.8±10.3	108.8±10.2	1.000
Duration of surgery, mins [Mean±SD]	17.9±8.5	17.2±6.8	0.547
Duration of anesthesia, mins [Mean±SD]	28.2±9.0	27.7±7.7	0.731
Baseline HR, beats/min [Mean±SD]	98.7±18.3	98.6±16.6	0.965

P<0.05 were statistically significant

Table 2: Intergroup comparison of primary objectives: preoperative anxiety (HR, mYPAS), secondary objectives: fear (Child Fear Scale), emergence delirium, and parental satisfaction between Groups V and C for ophthalmic daycare procedures

	Group V (mean±SD)	Group C (mean±SD)	*P*
Heart rate (beats/min)			
PAC room	96.0±15.9	100.0±16.7	0.157
Transport	101.2±15.6	105.9±17.9	0.105
Mask introduction	109.8±18.3	121.1±20.2	*0.0007
mYPAS score			
PAC room	37.7±17.8	45.68±21.48	*0.036
Transport	38.8±20.7	56.5±24.9	*0.0001
Mask introduction	41.3±23.6	68.8±28.3	*0.0000
CFS score			
PAC room	1 (0-2)	1 (0-2)	0.080
Transport	1 (0-1)	2 (0-3)	*0.0001
Mask introduction	1 (0-2)	3 (1-3)	*0.0001
PS score			
PAC room	4.2±0.9	3.7±0.9	*0.0049
Transport	4.1±0.9	3.3±1.1	*0.0000
Mask introduction	4.1±0.9	3.1±1.3	*0.0000

**P<0.05 was considered statistically significant. mYPAS score, CFS score, PS score*

The secondary outcomes included median CFS scores [Table 2], emergence delirium (WS), and PS score. On inter-group comparison, no statistically significant difference in the CFS score was seen between the two groups in the PAC room ($P = 0.08$) but a significant increase was observed during transport and on mask introduction in group C ($P = 0.0001$ and 0.0001, respectively). The increase in CFS was significant across time points in Group C. In Group V, the increase was not significant from PAC to transport but increases significantly on mask introduction [Figure 4].

Emergence delirium as assessed by the WS was equivalent between both groups. Considering the WS as ordinal scores, Cochrane–Armitage test was applied, and 20 patients in Group C (29%) and 11 patients in Group V (15.9%) displayed behavior consistent with emergence delirium (WS >2). Based on the Chi-square test, no statistically significant difference

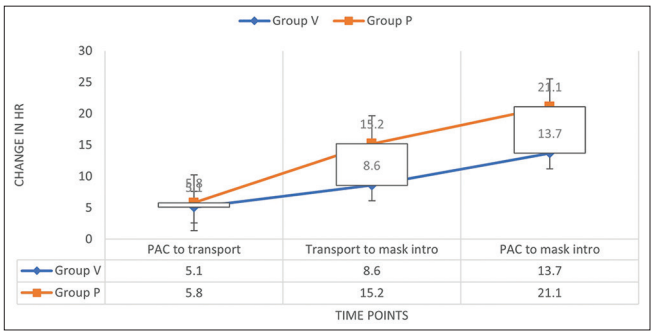

Figure 2: Change in HR between Group V and Group C

in WS score between the two groups was seen ($P = 0.33$). Also, no correlation was noted between mYPAS at mask introduction and WS by spearman's correlation. Both were independent of each other ($P = 0.3892$) [Table 3].

Statistically significant improvement in parental satisfaction was found in Group V as compared to Group C across all time points [Table 2].

Discussion

The present study was designed to evaluate the effect of video distraction intervention in combating preoperative anxiety in children in ophthalmic daycare surgeries.

Nonpharmacological interventions are economical, minimally invasive, and cost-effective with lesser adverse effects and therefore can have widespread implementation. In the new modern era of technology, portable multimedia devices such as mobile health (mHealth) technology (i.e. smartphones, tablets, computers, handheld DVD players, and other web-enabled devices) are readily available at low cost.[5] Active distraction by video games or passive viewing of animated cartoons has been proven to be an effective distraction. A literature search reveals a few studies on audio-visual nonpharmacological interventions,[1-3,6,7] a Cochrane review,[8] and a meta-analysis.[9] However, none discusses the full implications of audio-visual interventions. Further, there is a paucity of large adequately powered randomized controlled

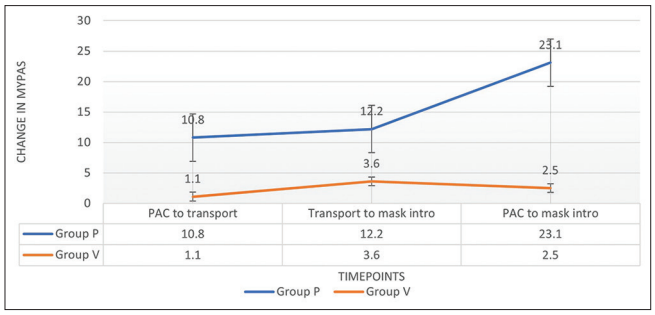

Figure 3: Change in mYPAS between Group V and Group C

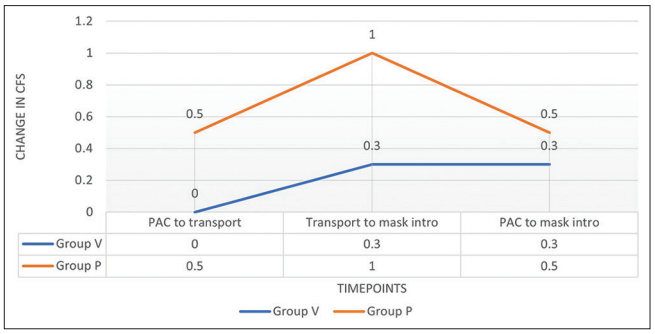

Figure 4: Change in Child Fear Score between Group V and Group C

Table 3: Intergroup comparison of Watcha Score for emergence delirium

Watcha Score	0	1	2	3	4
Group C	1	20	28	12	8
Group V	5	35	18	7	4

trials to confirm the usefulness of non-pharmacological interventions in the Indian children subpopulation. Many children who visit our center for treatment belong to low socio-economic backgrounds and may not have access to video games or cartoon videos. We wanted to test the effectiveness of this intervention in children visiting our center. Hence, the present study was designed with a large sample size with 90% power to evaluate the effect of video distraction intervention on preoperative anxiety in Indian children undergoing daycare surgeries in a busy ambulatory setup where pharmacological intervention could not be an option.

The observations in video group patients were of active visual engagement up to the loss of consciousness, with most children accepting the application of the mask while continuing to watch videos.

Based on the behavioral and physiologic variables (HR and mYPAS), it was seen that the anxiety of children increases progressively from PAC room to transport to mask introduction. Video distraction is found to ameliorate the increase in anxiety from the holding area to mask introduction. This suggests the following possibilities. First, contrary to the general belief, separation from parents may not be the most important cause of preoperative anxiety and fear in children. Although children accompanied by their parents did not experience separation anxiety, anxiety levels until induction of anesthesia were more than the Group in which video distraction was done along with. Our study results are consistent with previous reports that noticed that the placement of masks for anesthetic induction caused the greatest distress to children in the entire perioperative period.[1-3,5,7,10] Our results suggest that parental presence alone is unlikely to be effective to reduce preoperative anxiety and fear in children.

Streaming video clips or video games make children totally unaware of their surroundings and provide a better means of distraction during inhaled induction of anesthesia. Similar findings were also noted in the study by Lee *et al.*[7] where cartoon distraction in preschool children accompanied by their parents showed less anxiety compared to the control group during induction of anesthesia.

However, Kim *et al.*,[5] in their study, found similar effects on preoperative anxiety levels in video distraction, parental presence, or a combination of both groups. Although children with video distraction had lower anxiety levels compared to those with parental presence only or their combination, on entry to the OR and during induction of anesthesia, it was not significantly different between the three groups. Thus, in their study, each intervention or a combination of both interventions may result in similar effects on preoperative anxiety in children. Mifflin *et al.*[2] in his study reported a greater increase in anxiety from holding area to induction in the control group than did children in the video distraction group.

Secondary outcomes of our study included child fear, the emergence of delirium, and parental satisfaction. Video distraction was noted to reduce child fear during transport and on mask introduction. It was suggested that high levels of preoperative anxiety and fear are associated with maladaptive behavior and the emergence of delirium postoperatively and might be reduced by a preoperative intervention targeting anxiety reduction. In our study, we did not notice differences in emergence delirium between the two groups. Also, there was no correlation between higher mYPAS scores at mask introduction denoting higher levels of anxiety and incidences of emergence delirium. Hence, the emergence of delirium might not be dependent on preoperative anxiety as was earlier believed.[11] In an earlier study by Kim *et al.*,[5] incidences of the emergence of delirium were also comparable in the three groups. For the evaluation of emergence delirium, we used the WS as it is simple, commonly used, and has a higher overall sensitivity and specificity than the other scales such as Pediatric Anesthesia Emergence Delirium (PAED) and Cravero scales.[12]

Parental satisfaction was found to be higher in the video distraction Group than the control Group as the parents felt that their children were getting attention and were being cared for, and seeing their child being effectively distracted reduced their anxiety as well. However, in the study by Kim *et al*.,[5] no significant differences were observed in parental anxiety with respect to the intervention.

Patel *et al*.[3] has shown that having children play an interactive video game while receiving anesthesia by facemask was a better distractor than the parental presence or oral midazolam. These authors suggested that the interactive part of a video game was more engaging than its video component, which would be passive. In our study, we offered an option to children of choosing between watching cartoon videos or playing a game. Only 10 patients out of 69 (14.49%) had chosen to play games, whereas the rest preferred to see videos. Hence, we could not evaluate the differences in the relative effectiveness of passive and interactive distraction techniques due to the lesser subjective preference for playing video games.

Another important observation was that we did not need to explain to any of our patients, even those hailing from remote areas of India about the use of tablets/smartphones, thus we can conclude that the young generation is well equipped to use technology, and video distraction will be an effective intervention and must be routinely used in heavy workload settings where premedication may not be an option due to lack of time for monitoring, in alleviating preoperative anxiety in children. Other things that need to be kept in mind are communication with the children and parents, educating them about the procedure, and creating a friendly atmosphere that are of utmost importance and should not be forgotten. Video distraction can supplement these age-old techniques of reducing stress in patients but cannot replace them.

Further, children suffering from chronic illnesses such as retinoblastoma patients who undergo multiple general anesthesia exposures are most distressed not just because of frequent hospital visits but because of the disease itself, which deprives them of a normal childhood. They should be treated with sensitivity and attention and the experience should be made as pleasant to them as possible.

The limitations of our study include potential observer bias. Assessment tools such as mYPAS are limited by observer bias as raters could not be blinded to the intervention because of the obvious use of video distraction. Also, the target population in both groups included children from 4–8 years of age, and our findings may not be corroborated to children younger than 4 years and older than 8 years. Another limitation of our study was that we excluded children with general anesthesia exposures >2, but they comprise the most vulnerable population and video distraction might not be as effective for them as for children with infrequent exposures.

Routine video distraction can be employed in daycare settings with a high turnover of patients as a low-cost, easy-to-implement, effective method of reducing anxiety in the preoperative period and during the induction of anesthesia. Future research can be directed toward larger age group analysis (<4 years., >8 years.), assessing the utility of active and passive distractors, and small and large screen analysis to guide non-pharmacological anxiolysis practice.

Conclusions

Video distraction along with a parental presence in comparison to parental presence alone reduces preoperative anxiety (HR, mYPAS) and fear (CFS) during anesthesia induction and increases parental satisfaction in children of age 4–8 years coming for ophthalmic daycare procedures. However, video distraction along with a parental presence in comparison to a parental presence alone has no effect on the emergence of delirium.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kerimoglu B, Neuman A, Paul J, Stefanov DG, Twersky R. Anesthesia induction using video glasses as a distraction tool for the management of preoperative anxiety in children. AnesthAnalg 2013;117:1373-9.
2. Mifflin KA, Hackmann T, Chorney JM. Streamed video clips to reduce anxiety in children during inhaled induction of anesthesia. AnesthAnalg 2012;115:1162-7.
3. Patel A, Schieble T, Davidson M, Tran MC, Schoenberg C, Delphin E, *et al*. Distraction with a hand-held video game reduces pediatric preoperative anxiety. PediatrAnesth 2006;16:1019-27.
4. Jenkins BN, Fortier MA, Kaplan SH, Mayes LC, Kain ZN. Development of a short version of the modified Yale preoperative anxiety scale. AnesthAnalg 2014;119:643-50.

5. Kim H, Jung SM, Yu H, Park SJ. Video distraction and parental presence for the management of preoperative anxiety and postoperative behavioral disturbance in children: A randomised controlled trial. AnesthAnalg 2015;121:778-84.
6. Manyande A, Cyna AM, Yip P, Chooi C, Middleton P. Non-pharmacological interventions for assisting the induction of anaesthesia in children. Cochrane Database Syst Rev 2015;2015:CD006447.
7. Lee J, Lee J, Lim H, Son JS, Lee JR, Kim DC, *et al*. Cartoon distraction alleviates anxiety in children during induction of anesthesia. AnesthAnalg 2012;115:1168-73.
8. Manyande A, Cyna AM, Yip P, Chooi C, Middleton P. Non-pharmacological interventions for assisting the induction of anaesthesia in children. Cochrane Database Syst Rev 2015;2015:CD006447. doi: 10.1002/14651858.CD006447.
9. Chow CHT, Rizwan A, Xu R, Poulin L, Bhardwaj V, Van Lieshout RJ, *et al*. Association of temperament with preoperative anxiety in pediatric patients undergoing surgery: A systematic review and meta-analysis. JAMA Netw Open 2019;2:e195614.
10. Marechal C, Berthiller J, Tosetti S, Cogniat B, Desombres H, Bouvet L, *et al*. Children and parental anxiolysis in paediatric ambulatory surgery: A randomised controlled study comparing 0.3 mg kg − 1 midazolam to tablet computer based interactive distraction. Br J Anaesth 2017;118:247-53.
11. Kain ZN, Caldwell-Andrews AA, Maranets I, McClain B, Gaal D, Mayes LC, *et al*. Preoperative anxiety and emergence delirium and postoperative maladaptive behaviors. Anesth Analg 2004;99:1648-54.
12. Bajwa SA, Costi D, Cyna AM. A comparison of emergence delirium scales following general anesthesia in children: Comparison of emergence delirium scales. Pediatr Anesth 2010;20:704-11.