

Pharmacological and non-pharmacological interventions to alleviate anxiety before pediatric anesthesia: a survey of current practice in Korea

Department of Anesthesiology and Pain Medicine, Yeungnam University School of Medicine, *Kyungpook National University School of Medicine, Daegu, Korea

Hyo Eun Kang, Sung Mee Jung, and Sungsik Park*

Background: This study was undertaken to determine current practice for preoperative anxiety reduction in Korean children.

Methods: An email survey of all members (n = 158) of the Korean Society of Pediatric Anesthesiologists was conducted from November 2014 to January 2015 to assess current practice, preferences, and general opinions regarding pharmacological and non-pharmacological interventions performed to alleviate preoperative anxiety in children prior to general anesthesia.

Results: Forty-one anesthesiologists completed the survey; a response rate of 26%. Only 4.9% of respondents undertook anxiety reduction according to a written hospital policy, and 95.1% did not. Most respondents (70.7%) performed anxiolytic intervention guided by informally standardized hospital protocol. In clinical practice, 90% of respondents used pharmacological and/or non-pharmacological intervention to alleviate anxiety in children. Nearly half of the respondents (53.7%) used premedication to reduce anxiety, and midazolam was most frequently used. Parental presence during induction of anesthesia was considered the most effective non-pharmacological intervention (60.4%), and was allowed by 78% of respondents, and watching a video was considered the second most effective intervention (27.1%).

Conclusions: Korean pediatric anesthesiologists use both pharmacological and non-pharmacological interventions to alleviate preoperative anxiety, and these interventions are generally guided by an informally standardized hospital protocol. Anesthesiologists requiring effective anxiety reduction prefer pharmacological intervention and most commonly use intravenous midazolam, whereas those that want safe anxiety reduction prefer non-pharmacological

intervention and most frequently use parental presence during induction of anesthesia. (*Anesth Pain Med* 2016; 11: 55-63)

Key Words: Anesthesia, Anxiety, Pediatrics, Policy, Premedication, Preoperative period.

INTRODUCTION

A significant number of young children undergoing general anesthesia experience high levels of preoperative anxiety caused by separation from parents, exposure to an unfamiliar environment, or fear of the surgical procedure. Because preoperative anxiety can complicate the induction of anesthesia and develop negative postoperative behavior [1,2], pediatric anesthesiologists generally use a variety of interventions to reduce preoperative anxiety in children. Surveys conducted in different countries have documented the frequencies of and the reasons for anxiolytic interventions in pediatric patients [3-7]. However, no such study has been previously conducted in Korea. In addition, practices have changed over decades due to the introductions of short-acting anesthetics with fewer side effects, advances in distraction technology, and the increasing trend toward parental presence during induction of anesthesia (PPIA).

The aims of this study were to document current practice and general opinions regarding pharmacological and non-pharmacological interventions for alleviating preoperative anxiety in children about to undergo general anesthesia in Korea.

MATERIALS AND METHODS

An approval was obtained from our hospital Institutional Review Board for this study. After obtaining permission from the Korean Society of Pediatric Anesthesiologists (KSPA), we conducted a survey of current clinical practice, preferences, and

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Corresponding author: Sung Mee Jung, M.D., Department of Anesthesiology and Pain Medicine, Yeungnam University School of Medicine, 170, Hyeonchung-ro, Nam-gu, Daegu 42415, Korea. Tel: 82-53-620-3368, Fax: 82-53-626-5275, E-mail: applejms@gmail.com

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Table 1. Questionnaire Sections

1. Respondent demographics
Age, gender, subspecialty, type of hospital work, practicing region.
2. Preference and guideline for anxiolytic intervention in pediatric anesthesia
Presence of a written policy, preference for pharmacological and non-pharmacological interventions and actual use in clinical practice
3. General opinions and practices regarding pharmacological intervention for anxiety reduction
Premedication regimen and route of administration, side effects of concern and those experienced, a beliefs concerning the need for routine anticholinergic use
4. General opinions and practices of non-pharmacological intervention for anxiety reduction
Non-pharmacological intervention used in practice and preferred and attitude to parental presence during induction of anesthesia

general opinions regarding perioperative anxiety reduction in Korean children from November 2014 to January 2015. The questionnaire with an explanation of this survey and its significance was emailed to all members ($n = 158$) of the KSPA in November and a reminder email was sent in December 2014 by the KSPA to ensure personal privacy. Completion of the questionnaire by the participants was conducted on a voluntary, anonymous basis.

The survey (Appendix 1) consisted of 1 open and 23 closed questions in four sections (Table 1), which addressed; 1) respondent demographics, 2) preferences and guidelines for anxiolytic intervention prior to pediatric anesthesia, 3) general opinions and practices of pharmacological intervention for anxiety reduction, and 4) general opinions and practices of non-pharmacological intervention for anxiety reduction.

Statistical analysis was performed using SPSS version 21.0 (IBM Corporation, New York, NY, USA). Descriptive variables are reported as means \pm SDs or as medians and ranges. For categorical variables, both single and multiple response questions are reported as numbers (%) of all responses. The respondent demographics were analyzed using the one sample t-test and the chi-square test or Fischer's exact test. Statistical significance was accepted for P values < 0.05 .

RESULTS

Demographics of respondents

Forty-one of the 158 members of the KSPA participated in the survey; an overall response rate of 26%. The characteristics of pediatric anesthesiologists who responded to the survey are summarized in Table 2. Respondents were typically in their forties (39%), the gender ratio was almost 1 : 1 (males 46.3% and females 53.7%), and they had been in practice for 14.4 ± 8.4 years. Most of them (85.4%) worked at tertiary hospital. Respondents usually anesthetized inpatients (84.6%); followed

Table 2. Demographics of Respondents

Characteristics	Value	
Age (yr)	31-40	10 (24.4)
	41-50	16 (39.0)
	51-60	13 (31.7)
	61-70	2 (4.9)
Gender	Male	19 (46.3)
	Female	22 (53.7)
Years in practice	Mean \pm SD	14.4 ± 8.4
	Range	1-32
Subspecialty training	Yes	21 (51.2)
	No	20 (48.8)
Type of hospital	Primary	1 (2.4)
	Secondary	5 (12.2)
	Tertiary	35 (85.4)
Number of beds	≤ 200	1 (2.4)
	201-500	2 (4.9)
	501-800	10 (24.4)
	801-1000	20 (48.8)
	> 1000	8 (19.5)
Type of patients (%)	Outpatients	5.3 ± 10.4
	Inpatients	84.6 ± 18.6
	Same-day admit	10.1 ± 13.1
Practicing region	Capital region	17 (41.5)
	Gangwon	2 (4.9)
	Chungcheong	4 (9.8)
	Jeolla	6 (14.6)
	Gyeongsang	9 (22.0)
	Jeju	3 (7.3)

Values are expressed as number (%), means \pm SDs or ranges.

by same-day admittance patients (10.1%), and outpatients (5.3%). The capital area (41.5%), Gyeongsang (22.0%), and Jeolla (14.6%) were the three most common practicing regions.

Written hospital policies for reducing anxiety prior to anesthesia

Most respondents (95.1%) had no written hospital policy; only 4.9% of the respondent performed reduction of child

anxiety according to a written hospital policy. Majority of respondents (70.7%) performed anxiolytic interventions according to an informally standardized hospital protocol (habitual choice generally accepted in their hospital and learned by word of mouth).

Preferences and actual practice regarding pharmacological and non-pharmacological interventions

Non-pharmacological intervention (46.3%) was preferred to premedication (39.0%) to reduce preoperatively anxiety. Small proportion of respondents (14.6%) stated they had no preference. The three most common reasons given to support preference were effectiveness (32.0%), concern about side effects (26.0%), and convenience (24.0%, Table 3). However, these reasons were found to depend on anxiolytic preferences, that is, effectiveness was favored by those who preferred pharmacological intervention, and concern about side effects was favored by those who preferred non-pharmacological intervention.

Actually used intervention for reducing anxiety in clinical practice were significantly different according to the anxiolytic preference ($P = 0.005$) but they did not consistently match each other (Table 4). Overall, non-pharmacological intervention and premedication were actually performed by 36.6 and 24.4% of the respondents, respectively, in clinical practice. Both were

used by 29.3% and neither was used by 9.8% of the respondents.

Current practice and general opinions regarding pharmacological anxiolytic intervention in pediatric patients

About half of the respondents (53.7%) reported use of premedication prior to surgery as single intervention or combination with non-pharmacological intervention. However, the other respondents (46.3%) stated they were unlikely to use premedication in practice because of needlessness of premedication (42.1%), concern about side effects (31.5%) and invasiveness of administration (21.5%).

Reducing child anxiety (63.4%) and control of sympathetic activity (17.1%) were reported to be the two most important reasons for premedication. Reducing parental anxiety, pain control, and improving cooperation during induction of anesthesia tied as the third most important reasons (each 9.8%). Age limitation to premedication was applied by 39.0% of respondents. Although minimum age for premedication ranged from 1 month to 5 years, majority of respondents (68.8%) adopted a minimum age of 1 year.

Drug selection for premedication was guided by customarily use (45.1%), the literature (17.1%), and effectiveness (14.6%).

Table 3. Reasons for Anxiolytic Intervention Preferences in Pediatric Patients

	Non-pharmacological preference (n = 19)	Pharmacological preference (n = 16)	No preference (n = 6)	Overall (n = 41)
Effectiveness	5 (17.9)	11 (68.8)	0	16 (32.0)
Concern about side effect	10 (35.7)	0	3 (50.0)	13 (26.0)
Convenience	7 (25.0)	4 (25.0)	1 (16.7)	12 (24.0)
Reduction of parental anxiety	5 (17.9)	1 (6.3)	1 (16.7)	7 (14.0)
Psychological stability of anesthesiologist	1 (3.5)	0	1 (16.7)	2 (4.0)
All responses	28 (100)	16 (100)	6 (100)	50 (100)

Multiple responses are possible. Values are expressed as number (%) of all responses.

Table 4. Preference and Actual Practice of Anxiolytic Intervention in Pediatric Anesthesia

Actual practice	Non-pharmacological preference (n = 19)	Pharmacological preference (n = 16)	No preference (n = 6)	Overall (n = 41)
Non-pharmacological intervention	12 (63.2)	2 (12.5)	1 (16.7)	15 (36.6)
Pharmacological intervention	1 (5.3)	8 (50.0)	1 (16.7)	10 (24.4)
Both	5 (26.3)	4 (25.0)	3 (50)	12 (29.3)
Neither	1 (5.3)	2 (12.5)	1 (16.7)	4 (9.8)

Values are expressed as numbers (%) of respondents.

Of all responses, the most frequently used premedication was midazolam (24.7%) followed by ketamine (20.3%) when multiple responses were allowed by the respondent (Table 5). The use of anticholinergic premedication for children undergoing surgery was considered routinely by 24.4%, occasionally by 34.1% and as unnecessary by 39.0% of the respondents. Premedication was administered in the preoperative holding area (54.7%), in the ward (24.5%), or in the operating room (20.8%). Intravenous administration was usually preferred to

intramuscular administration. Children that remained anxious despite premedication were usually managed with an intravenous anesthetic (61%) or by PPIA (31.7%).

Respiratory depression was the side effect of most concern (53.7%) when considering use of premedication, and was also the most commonly experienced side effect (22.0%). Other side effects actually experienced by respondents were overexcitement (14.6%), injection pain (12.2%), delayed recovery after anesthesia (9.8%), and nausea and vomiting (2.4%). However, 20% of respondents report no adverse event after premedication.

Table 5. Premedication of Pediatric Patients before Elective Surgery

Premedication	Route	Number (%)
Midazolam	IV	19 (21.3)
	IM	3 (3.4)
Ketamine	IV	15 (16.9)
	IM	3 (3.4)
Glycopyrrolate	IV	14 (15.7)
	IM	4 (4.5)
Atropine	IV	9 (10.1)
	IM	3 (3.4)
Thiopental	IV	8 (9.0)
Propofol	IV	3 (3.4)
Diazepam	IV	1 (1.1)
Fentanyl	IV	4 (4.5)
Dexmedetomidine	IV	2 (2.2)
Meperidine	IV	1 (1.1)
All responses		89 (100)

Multiple responses are possible. Values are expressed as numbers (%) of all responses. IV: intravenous administration, IM: intramuscular administration.

Current practice and general opinions regarding non-pharmacological anxiolytic intervention in pediatric patients

The respondents replied that PPIA, watching a video using a hand-held electronic device, such as, a smartphone or personal computer, and conversation effectively reduced anxiety prior to surgery (Table 6). On the other hand, reading books, an operating room tour, hypnosis, and the use of clowns were reported to be ineffective.

PPIA was allowed on a case by case basis by 78% of the respondents, but was absolutely forbidden by 19.5% of them. Respondents used PPIA to prevent separation anxiety (65.0%), to induce volatile anesthesia smoothly (20.0%), and to reduce parental anxiety (15.0%). On the contrary, respondents forbade PPIA to maintain stability of the operating room environment (46.2%) and to prevent transmission of anxiety from parents to children (30.8%) and used premedication (75%), conversation (50%), a video viewing (50%), or a video game (12.5%) as

Table 6. Non-pharmacological Interventions Actually Used and Their Perception of Effectiveness

Non-pharmacological Intervention	Actually used intervention (n = 40)	Effective intervention (n = 39)	Ineffective intervention (n = 33)
Parental presence	31 (26.7)	29 (60.4)	3 (3.8)
Watching animated video	25 (21.6)	13 (27.1)	1 (1.3)
Conversation	25 (21.6)	4 (8.3)	6 (7.7)
Toys	17 (14.7)	0	4 (5.1)
Humors	8 (6.9)	0	8 (10.1)
Playing video games	4 (3.4)	0	1 (1.3)
Reading books	1 (0.9)	0	14 (17.9)
Operating room tour	1 (0.9)	0	12 (15.4)
Preoperative preparation video	0	1 (2.1)	7 (8.9)
Hypnosis	0	0	10 (12.8)
Clowns	0	0	10 (12.8)
None	4 (3.4)	1 (2.1)	2 (2.6)
All responses	116 (100)	48 (100)	78 (100)

Multiple responses are possible. Values are expressed as numbers (%) of all responses.

non-pharmacological interventional means.

DISCUSSION

This small-scale survey offers insights of current practice and the general opinions of pediatric anesthesiologists regarding preoperative anxiolytic interventions in children undergoing surgery in Korea. We found that the strategies used to reduce child anxiety were determined by an informally standardized hospital protocol or individual experience rather than a written policy. In contrast, 72% of US hospitals have a formal policy for premedication [3]. Without current best evidence, preoperative anxiolytic intervention based on hospital protocol may become dated, to the detriment of patients. In our opinion, decision making should be guided by formal policy integrated with individual clinical expertise and best available scientific evidence to ensure children are provided with the most effective and safe anxiolytic intervention.

Although many non-pharmacological interventions have been reported to be as effective as sedative premedication [8], respondents who wanted effective anxiolysis preferred pharmacological intervention, while those who wanted safe anxiolysis preferred non-pharmacological intervention. Our finding implies that anxiolytic intervention preference of pediatric anesthesiologists was usually determined by customarily established protocol or habitual choice rather than scientific research. And it also explains why actually used interventions did not consistently match with preferred interventions. The two most important purposes of premedication are to reduce anxiety and sympathetic activity during induction of anesthesia. In Korea, the sedative premedication rate for pediatric anesthesia (54.7%), as determined by the present study, is similar to those reported in Turkey, Germany, and the United States [5,9,10], but is much higher than reported in the United Kingdom for day-case surgery (19%) [7]. Although numerous drugs have been used in clinical practice, midazolam is currently the mainstay of sedative premedication for pediatric anesthesia. Its long history of safety, effectiveness, and minimal delay to discharge from post-anesthesia care unit well explain its global use in clinical practice. Because oral or intranasal midazolam, commonly used as a premedication in Europe and the US [5,9], is not currently available in Korea, respondents mostly administered midazolam intravenously in the preoperative holding area.

The routine use of anticholinergic agents prior to anesthesia and surgery now shows a declining trend, because of its adverse effects, such as, an uncomfortable dryness of mouth,

and the introduction of less irritating anesthetics [11,12]. In the present study, respondents premedicated anticholinergic agents (glycopyrrolate and less frequently atropine) based on clinical requirements rather than routine use and principally administered via an intravenous route immediately before anesthesia, which is similar to European and Australian practice [5,12,13].

Respiratory depression was the most commonly experienced side effect of premedication, and was the main reason for avoiding sedative premedication in children and for administering premedication in preoperative holding areas equipped with sufficient resources to monitor and manage side effects rather than in ward. We presume that fear for respiratory depression (the most serious side effect of premedication) caused the majority of respondents to forbid the premedication of children less than 1 year old.

Nearly half of the respondents preferred non-pharmacological intervention, which was also the most commonly used type of intervention in clinical practice. PPIA was the most frequently employed non-pharmacological intervention by respondents. Although the large Cochrane review conducted by Yip et al. [8] concluded that PPIA did not reduce preoperative anxiety or improve cooperation during induction of anesthesia, the majority of our respondents believed PPIA is the most effective non-pharmacological anxiolytic intervention. In our survey, 78.0% of respondents agree with PPIA and 19.5% allowed routine PPIA. On the other hand, 50% of American anesthesiologists forbade PPIA [9], and most anesthesiologists in the UK and Canada allowed PPIA [14-16]. Discrepancies between countries may be due to the use of different induction techniques, legal implications, and economic issues, such as, operating room efficiency.

This study has several limitations that bear consideration. First, the response rate was only 26%, and thus, we cannot claim our survey accurately reflects anxiolytic practices used by Korean anesthesiologists in pediatric patients. Accordingly, we suggest a larger-scale study be initiated to confirm and supplement our findings in all anesthesiologists currently worked in Korea. Second, we did not investigate the use of anxiolytic intervention by patient age or hospital stay after surgery, which could significantly affect decision making.

Summarizing, pediatric anesthesiologists in Korea use both pharmacological and non-pharmacological interventions based on informally standardized hospital protocols to reduce child anxiety prior to surgery. Those requiring the effective reduction of anxiety were found to prefer pharmacological intervention and to favor the use intravenous midazolam, whereas those

wanting safe reduction of anxiety preferred non-pharmacological intervention and most frequently used parental presence during induction the anesthesia.

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