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The Association between Preoperative Parental Anxiety and Emergence Agitation in Preschoolers

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Abstract

Introduction: The preoperative distress and anxiety experienced by preschoolers are associated with an increased incidence of troubled recovery from anesthesia. However, influences of parental anxiety on children at different stages of the surgical processes are not clear. The aim of this study was to evaluate any existing association between preoperative parental anxiety and emergence agitation in a pediatric surgery population. **Materials and Methods:** A total of 60 children ASA class I or II, aged 3 - 12 years old, undergoing adenotonsillectomy with sevoflurane, were included in the study. Before surgery, we used State-Trait Anxiety Inventory S-T (STAI S-T) to assess parental anxiety. Emergence agitation of the children was assessed with Watcha scale and recorded every 10 min of first 30 min of the postoperative period. Parents were contacted 24 hours after the surgery to evaluate their satisfaction, post operative pain and any side effect observed in the children. **Results:** Preoperatively, the mean STAI-S scores of mothers were significantly higher than those of fathers ($p < 0.05$). The details of surgery, anesthesia and length of hospital stay after surgery were found to be associated with these scores. The STAI-T scores of mothers and fathers were similar ($p > 0.05$). The children had the highest agitation scores at 10^{th} postoperative minutes with an incidence of 73.9%. There was no correlation between parental anxiety and emergence agitation. Logistic regression analysis showed that low educational level of the parent was the only independent factor for state anxiety (OR: 8.96, 95% CI: 1.50 - 40.35, $p = 0.030$). **Discussion:** In this study, we observed that education level of the parents might affect their preoperative anxiety. The factors influential in parental anxiety were not correlated with pediatric emergence agitation in this study.

Keywords

Preoperative Parental Anxiety, Emergence Agitation, Adenotonsillectomy

1. Introduction

Stress and anxiety experienced by patients, during the preoperative period due to mysteries of surgery and anesthesia are a significant problem. These factors have important impacts mainly in the early postoperative period. Studies performed have shown that: agitation and behavioral changes in the postoperative period are seen more frequently in children compared to adults [1]. Many factors play a role in the development of this condition, which has been recently observed more frequently; with the wide use of inhalation agents that provide rapid recovery. Emergence agitation in children may result in self-damage, injury in the surgical field, or removal of intravenous catheters and drains. On the other hand, the drugs administered to treat this condition may cause delay in discharge from the care unit [2]. Generally, different factors such as age of children, technique of anesthesia and surgery and adjuncts to the anesthetics are thought to be associated with the situation [3]. Parental presence was reported recently to be beneficial on emergence behavior of children undergoing general anesthesia [4]. The impact of parental anxiety on behavior in children before surgery has been a matter of curiosity [5] [6].

The aim of this study is to assess any existing associations between preoperative parental anxiety and emergence agitation in a pediatric patient group undergoing adenotonsillectomy with sevoflurane anesthesia.

2. Materials and Methods

After obtaining local ethics committeeeapproval and informed consent from the parents, 60 children aged 3 - 7 years with the American Society of Anesthesiologists (ASA) physical status I-II, planned to undergo adenotonsillectomy by general anesthesia and their parents were included in the study. The children were evaluated at preanesthetic evaluation clinic one week before the operation. The study protocol was described to the parents, and one of them (mother/father) was asked to complete the State-Trait Anxiety Inventory (STAI-S and STAI-T) with the help of the professionals in about 25 - 30 minutes. If the patient was taken to hospital with one of the parents, that parent became the person who answered the questions. When the patient was taken with both of the parents, the parent who became volunteer to complete the questions was selected.

STAI is a self-report questionnaire consisting of 2 sub-scales each including 20 items allocated to each of the STAI-S and STAI-T subscales evaluating the level of anxiety. STAI-S evaluates the current state of anxiety, asking how respondents feel “right now”, using items that measure subjective feelings of apprehension, tension, nervousness, worry, and activation/arousal of the autonomic nervous system. STAI-T evaluates relatively stable aspects of “anxiety proneness”, including general states of calmness, confidence, and security. Responses for the STAI-S scale assess intensity of current feelings “at this moment”: 1) not at all, 2) somewhat, 3) moderately so, and 4) very much so. Responses for the STAI-T scale assess frequency of feelings “in general”: i) almost never, ii) sometimes, iii) often, and iv) almost always [7]. The Turkish validity and reliability studies were

performed by Oner and le Compte in the Turkish adult population [8]. We accepted the scores ≥ 40 for STAI-S and STAI-T as the presence of state and trait anxiety in this study. Although no cut-off indicating clinically significant levels of anxiety is established in the technical or administrative materials for the STAI, cut-offs of 40 and 45 were used in prior studies [9] [10] [11] [12].

The patients with prior admission or surgery and those with any medical diseases were excluded from the study. They received 0.5 mg·kg^{-1} midazolam orally 30 min before the induction of anesthesia. Then each child was accompanied by an anesthesiologist to the operating room without parents. Vital signs were monitored and recorded throughout study. Anesthesia was induced with 8% sevoflurane in 50% O_2-N_2O by a face mask with a fresh gas flow of 5 L·min^{-1} and all patients had a 22 G intravenous cannula placed after induction of anesthesia. Fentanyl at a dose of 1 μg·kg^{-1} was added. The patients were intubated endotracheally after administration of 0.6 mg·kg^{-1} ivrocuronium bromide. All patients were operated by the same surgeon. Similar mechanical ventilation parameters were set in IPPV with volume control mode using the same anesthesia machine. General anesthesia was maintained with 1 MAC sevoflurane delivered in 50% O_2-N_2O that provided stable heart rate, mean arterial blood pressure, and peripheral oxygen saturation throughout surgery. When heamostasiswas accomplished, 15 mg·kg^{-1} of metamizol was administer edintravenously to all patients. At the end of the procedure, anesthetic gases were discontinued, the circuit was flushed and 100% O_2 was used with a fresh gas flow of 6 L·min^{-1} during emergence. Any residual neuromuscular blockade was antagonized with 0.01 mg·kg^{-1} atropine and 0.05 mg·kg^{-1} neostigmine in all patients. Tracheal extubation was performed when the patients regained gag or cough reflexes. Thereafter, all patients were transferred to recovery room. Pulse rate and oxygen saturation were recorded until the child was fully alert. Modified Aldrete scores were recorded during recovery room stay [13]. Children were considered ready for discharge from the recovery room when an Aldrete score of ≥9 was achieved. Emergence agitation was assessed using the Watcha scale and recorded every 10 min of first 30 min of the postoperative period (**Table 1**). The score more than 2 indicated the presence of emergence agitation.

Postoperative pain was assessed by using OPS (objective pain scale) recorded at 30 minutes, 2, 4, 6, 12 and 24 hours postoperatively [14]. Paracetamol was prescribed to patients and the parents were asked to give an oral dose of 15 mg·kg^{-1} only in case of pain with a minimum interval of 4 hours and to keep a

Table 1. Watcha scale to assess emergence agitation.

Behavior	Score
Asleep	0
Calm	1
Crying, but can be consoled	2
Crying, but cannot be consoled	3
Agitated and thrashing around	4

record of the dose they gave to their children. Every parent was contacted 24 hours after the surgery to evaluate pain after discharge and parent satisfaction. Parent satisfaction was scored as: 1) definitely unsatisfied; 2) poorly satisfied; 3) fairly satisfied; 4) definitely satisfied.

Statistical Analysis:

Data analysis was performed by using SPSS for Windows, version 15.0 (SPSS Inc., Chicago, IL, United States). Whether the distributions of continuous variables were normally or not was determined by Kolmogorov Smirnov test. Data were shown as mean ± SD or median (min-max), where applicable. While, the mean differences between groups were compared by Student's t test, otherwise, Mann Whitney U test was applied for comparisons of the median values. While, the mean differences among more than two independent groups were analyzed by One-Way ANOVA, otherwise, Kruskal Wallis test was applied for comparisons of the median values. When the p value from One-Way ANOVA or Kruskal Wallis test statistics are statistically significant post hoc Tukey HSD or Bonferroni Adjusted Mann Whitney U test were used to know which group differ from which others. Categorical data were analyzed by Pearson's Chi-square test. Paired Samples t-test or Wilcoxon Sign Rank test was used for within group comparisons. A p value less than 0.05 was considered statistically significant.

A total sample size of 59 cases was required to detect at least 0.35 correlation between preoperative parental anxiety and emergence agitation with a power of 80% at 5% significance level. The correlation coefficient of 0.35 was taken from both pilot study and our clinical experiments. Sample size estimation was performed by using G*Power (version 3.0.10, Kiel, Germany) software.

3. Results

60 children (31 girls-29 boys) and their parents (47 mothers-13 fathers) were included in this study. We accepted either mother or father (caregiver of the child at the time of surgery) as-parent-in this study. The demographics of children and their parents with data related to surgery and anesthesia were given in Table 2. Postoperative agitation was noted in 12 (20%) patients at 30th postoperative minutes.

Table 2. The demographics of children and their parents with data about surgery and anesthesia.

Variable	
Children's age (year)	5.1 ± 1.0
Children's weight (kg)	21.9 ± 7.3
Children's gender (Boy/Girl)	29/31
Parents (Father/Mother)	13/47
Parents' age (year)	31.1 ± 4.8
Parents' education level (None/Primary-Secondary school/High school/University)	2/17/34/7
Duration of anesthesia (min)	54 ± 17.2
Duration of surgery (min)	41.9 ± 16.2

Data are mean ± SD or numbers of patients.

Preoperatively, the mean STAI-S scores of the mothers and fathers were 41.3 ± 6.9 and 36.0 ± 5.9, respectively ($p < 0.05$). The STAI-T scores of mothers were 31.2 ± 6.6, while the fathers had a mean score of 31.5 ± 9.1 ($p > 0.05$) (Table 3). The parents with higher STAI-S scores were mainly interested in surgery, anesthesia, and length of hospital stay after the surgery. The STAI-S scores of working mothers, mothers with sons were found to be lower compared to the unemployed ones and the ones with daughters ($p < 0.05$). As for the relationship between parents' anxiety and the children's emergence agitation, there was no correlation in between ($r = -0.158$, $p = 0.030$). During the postoperative 24 hours; the mean count of required paracetamol dose (15 $mg \cdot kg^{-1}$) in children was 2.48 (0 - 6) (mean (range)), while the pain score at 24th hour was 2.5 (2.17) (mean (SD)). The parent satisfaction scores were high after the surgery [3.31 (3 - 4) (mean (range))].

4. Discussion

In the present study, we evaluated the association between preoperative anxiety experienced by parents with postoperative emergence agitation of children. However, we couldn't demonstrate any relationship between the two.

Children undergoing surgery depend critically on parents for coping with stressful conditions [9]. However, parents who are distressed are less able to help their children [10]. Parents generally express a high degree of anxiety correlated significantly with lack of information regarding the current medical conditions [11]. It has long been demonstrated that a parent's anxiety can affect distress and behavioral attitudes of a child in hospital. Lamontagne *et al.* demonstrated high anxiety scores in the children of parents; who also had increased anxiety levels preoperatively [15]. It was suggested that children experienced lower anxiety levels if less anxious parents accompanied them [16] [17]. In our study, mothers had higher preoperative STAI-S scores than fathers. This was similar to another study by Thompson *et al.* [18]. The reason for this insignificant difference may be due to mothers' being more sensitive to changes in their children's behavior. Besides, mothers spend more time in caretaking activities of children in our population.

Parents' education levels had significant impact on anxiety. In a study, the anxiety scores were found to be inversely related to education levels of the parents, besides, age; as another factor; also affected the anxiety scores negatively [19]. In this study, as education levels of parents increased, desire to obtain knowledge from the physician decreased significantly. This could be interpreted as lessening of anxiety with increasing educational level. However, we studied the parents of children undergoing adenotonsillectomies. The results might change under more

Table 3. Preoperative STAI-S and STAI-T scores of mothers and fathers.

Scores	Mothers (n = 47)	Fathers (n = 13)	p value
STAI-S	41.3 ± 6.9	36.0 ± 5.9	0.903
STAI-T	31.2 ± 6.6	31.5 ± 9.1	0.678

stressful conditions; like emergency cases, or in children with chronic diseases. On the other hand, having a daughter rather than a son and being unemployed made parents more anxious in our study. Commonly, in our population, female infants are thought to be more dependent than male ones. Thus, we believe that these findings reflect our traditional behaviors fairly well.

The preoperative anxiety in children mainly has an important role in the development of a clinical picture of behavioral changes, crying, restlessness, agitation, and orientation disorders during the recovery period after anesthesia, which is commonly known as emergence agitation [20]. The incidence of emergence agitation in our study population was 43.5% in half an hour after the surgery. Terri Voepel-Lewis *et al*., reported an incidence of 18% of EA, in a population of 521 children [21]. The most striking point about these children was their significant young age and less previous surgery experience, compared to others. Besides; the ones complaining of EA were mainly the ones undergoing otorhinolaryngologic procedures. In many reports, postoperative agitation and restlessness have been associated with surgeries related to head and neck and reported with an incidence of 10% - 50% [22].

The presence of pain, a predisposing factor for EA, explains the effectiveness of analgesic drugs given either as prophylaxis or for treatment of agitation [23]. Thus, we tried to control the children's postoperative pain with paracetamol. The children complained of less pain and the parents were highly satisfied at the end of 24 hours.

Sevoflurane is a popular anesthetic for children because it is less pungent and has a more rapid onset and offset due to its lower solubility in blood, a relative lack of airway agitation and greater heamodynamic stability than other potent inhaled anesthetic agents [24]. However, a number of studies report that sevoflurane is associated with a relatively high incidence of emergence agitation in children [24] [25] [26]. Age, premedication, rapid awakening in a hostile environment, parental presence upon awakening, pain, surgery type are the other factors affecting emergence agitation.Although, some authors suggest that tonsillectomy or head and neck surgeries increase the frequency of emergence agitation, there are no recent clarification for the relationship between certain surgeries and emergence agitation [27]. The reason for high incidence in these types of surgeries, could be a feeling of being unable to breath during emergence.

Recently, individuals with an increased level of education obtain information about health using media and internet. In fact, these sources are being over and misused. In our study, all parents were informed by the anesthesiologist and all the parents declared that they were informed adequately, so more information would not decrease their anxiety.

Even, we tried to keep the most confounding participants of this condition, parental distress couldn't be limiting factor for our study. We believe, more clear explanations of the certain terms like preoperative anxiety, emergence delirium, and postoperative maladaptive behavioral changes are required before studying. Thus, there are some limitations of the present study. One of them was the rela-

tively small sample size of the patient group. Therefore the results should be evaluated as preliminary results. Another limitation was the cross-sectional nature of the study. Lastly, we didn't distribute the questionnaires to both mothers and fathers of the children, but only to one parent. So we couldn't separate parents in terms of education level, psychological status and anxiety background.

5. Conclusion

In summary, we have found that, despite a lot of contributing factors for emergence agitation, parental anxiety does not correlate in one to one correspondence with children's emergence agitation.

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Conflict of Interest

We have no conflict of interest in relation to our paper.

References

[1] Smessaert, A., Schehr, C.A. and Artusio Jr., J.F. (1960) Observations in the Immediate Postanaesthesia Period. II. Mode of Recovery. *British Journal of Anaesthesia*, **32**, 181-185. https://doi.org/10.1093/bja/32.4.181

[2] Vlajkovic, G.P. and Sindjelic, R.P. (2007) Emergence Delirium in Children: Many Questions, Few Answers. *Anesthesia & Analgesia*, **104**, 84-91. https://doi.org/10.1213/01.ane.0000250914.91881.a8

[3] Jerome, E.H. (1989) Recovery of the Pediatric Patient from Anesthesia. In: Gregory, G.A., Ed., *Pediatric Anesthesia*, 2nd Edition, Churchill Livingstone, New York, 629.

[4] Cohen, I.T., Finkel, J.C., Hannallah, R.S., Hummer, K.A. and Patel, K.M. (2003) Rapid Emergence Does Not Explain Agitation Following Sevoflurane Anaesthesia in İnfants and Children: A Comparison with Propofol. *Pediatric Anesthesia*, **13**, 63-67. https://doi.org/10.1046/j.1460-9592.2003.00948.x

[5] Aono, J., Mamiya, K. and Manabe, M. (1999) Preoperative Anxiety Is Associated with a High Incidence of Problematic Behavior on Emergence after Halothane Anesthesia in Boys. *Acta Anaesthesiologica Scandinavica*, **43**, 542-544. https://doi.org/10.1034/j.1399-6576.1999.430509.x

[6] Kain, Z.N., Caldwell-Andrews, A.A., Maranets, I., *et al.* (2004) Preoperative Anxiety and Emergence Delirium and Postoperative Maladaptive Behaviors. *Anesthesia & Analgesia*, **99**, 1648-1654. https://doi.org/10.1213/01.ANE.0000136471.36680.97

[7] Spielberger, C.D. (1983) State-Trait Anxiety Inventory STAI. Consulting Psychologists Press, Palo Alto.

[8] Oner, N. and Le Compte, A. (1983) Durumluk Surekli Kaygı Envanteri El Kitabı. Bogazici Universitesi Yayınları, Istanbul, 1-26. (In Turkish)

[9] El Sawy, A.A. (2012) Anxiety Level and Difficult Patients in Prosthodontic Clinic. *Journal of American Science*, **8**, 258-263.

[10] Van Dam, N.T., Gros, D.F., Earleywine, M. and Antony, M.M. (2013) Establishing a Trait Anxiety Threshold That Signals Likelihood of Anxiety Disorders. *Anxiety*

Stress Coping, **26**, 70-86. https://doi.org/10.1080/10615806.2011.631525

[11] Di Marco, F., Verga, M., Reggente, M., Maria Casanova, F., Santus, P., Blasi, F., *et al*. (2006) Anxiety and Depression in COPD Patients: The Roles of Gender and Disease Severity. *Respiratory Medicine*, **100**, 1767-1774. https://doi.org/10.1016/j.rmed.2006.01.026

[12] Hermanns, N., Kulzer, B., Krichbaum, M., Kubiak, T. and Haak, T. (2005) Affective and Anxiety Disorders in a German Sample of Diabetic Patients: Prevalence, Comorbidity and Risk Factors. *Diabetic Medicine*, **22**, 293-300. https://doi.org/10.1111/j.1464-5491.2005.01414.x

[13] Aldrete, J.A. (1998) Modifications to the Postanesthesia Score for Use in Ambulatory Surgery. *Journal of PeriAnesthesia Nursing*, **13**, 148-155. https://doi.org/10.1016/S1089-9472(98)80044-0

[14] Norden, J., Hannallah, R.S., Getson, P., O'Donnell, R., Kelliher, G. and Walker, N. (1997) Concurrent Validation of an Objective Pain Scale for Infants and Children. *Anesthesiology*, **75**, A934. https://doi.org/10.1097/00000542-199109001-00933

[15] La Montagne, L.L., Hepworth, J.T., Johnson, B.D. and Cohen, F. (1996) Children's Preoperative Coping and Its Effects on Postoperative Anxiety and Return to Normal Activity. *Nursing Research*, **45**, 141-147. https://doi.org/10.1097/00006199-199605000-00004

[16] Rancourt, K.M., Chorney, J.M. and Kain, Z. (2015) Children's Immediate Postoperative Distress and Mothers' and Fathers' Touch Behaviors. *Journal of Pediatric Psychology*, **40**, 1115-1123. https://doi.org/10.1093/jpepsy/jsv069

[17] Teetsel, R.N., Ginsburg, G.S. and Drake, K.L. (2014) Anxiety-Promoting Parenting Behaviors: A Comparison of Anxious Mothers and Fathers. *Child Psychiatry & Human Development*, **45**, 133-142. https://doi.org/10.1007/s10578-013-0384-8

[18] Thompson, C., MacLaren, J.E., Harris, A. and Kain, Z. (2009) Brief Report: Prediction of Children's Preoperative Anxiety by Mothers and Fathers. *Journal of Pediatric Psychology*, **34**, 716-721. https://doi.org/10.1093/jpepsy/jsn105

[19] Serinken, M., Kocyigit, A., Karcioglu, O., Sengül, C., Hatipoğlu, C. and Elicabuk, H. (2014) Parental Anxiety and Affecting Factors in Acute Paediatric Blunt Head Injury. *Emergency Medicine Journal*, **31**, 637-640. https://doi.org/10.1136/emermed-2013-202492

[20] Fincher, W., Shaw, J. and Ramelet, A.S. (2012) The Effectiveness of a Standardised Preoperative Preparation in Reducing Child and Parent Anxiety: A Single-Blind Randomised Controlled Trial. *Journal of Clinical Nursing*, **21**, 946-955. https://doi.org/10.1111/j.1365-2702.2011.03973.x

[21] Voepel-Lewis, T., Malviya, S. and Tait, A.R. (2003) A Prospective Cohort Study of Emergence Agitation in the Pediatric Postanesthesia Care Unit. *Anesthesia & Analgesia*, **96**, 1625-1630. https://doi.org/10.1213/01.ANE.0000062522.21048.61

[22] Dahmani, S., Stany, I., Brasher, C., Lejeune, C., Bruneau, B., Wood, C., Nivoche, Y., Constant, I. and Murat, I. (2010) Pharmacological Prevention of Sevoflurane- and Desflurane-Related Emergence Agitation in Children: A Meta-Analysis of Published Studies. *British Journal of Anaesthesia*, **104**, 216-223. https://doi.org/10.1093/bja/aep376

[23] Aouad, M.T. and Nasr, V.G. (2005) Emergence Agitation in Children: An Update. *Current Opinion in Anaesthesiology*, **18**, 614-619. https://doi.org/10.1097/01.aco.0000188420.84763.35

[24] Isik, B., Arslan, M., Tunga, A.D. and Kurtipek, O. (2006) Dexmedetomidine Decreases Emergence Agitation in Pediatric Patients after Sevoflurane Anesthesia without Surgery. *Paediatric Anaesthesia*, **16**, 748-753.

https://doi.org/10.1111/j.1460-9592.2006.01845.x

[25] Cohen, I.T., Finkel, J.C., Hannallah, R.S., Hummer, K.A. and Patel, K.M. (2003) Rapid Emergence Does Not Explain Agitation Following Sevoflurane Anaesthesia in Infants and Children: A Comparison with Propofol. *Paediatric Anaesthesia*, **13**, 63-67. https://doi.org/10.1046/j.1460-9592.2003.00948.x

[26] Ibacache, M.E., Muñoz, H.R., Brandes, V. and Morales, A.L. (2004) Single-Dose Dexmedetomidine Reduces Agitation after Sevoflurane Anesthesia in Children. *Anesthesia & Analgesia*, **98**, 60-63. https://doi.org/10.1213/01.ANE.0000094947.20838.8E

[27] Silva, L.M., Braz, L.G. and Módolo, N.S. (2008) Emergence Agitation in Pediatric Anesthesia: Current Features. *Jornal de Pediatria*, **84**, 107-113. https://doi.org/10.2223/jped.1763