A Comparison of Preoperative Psychological Preparation with Midazolam Premedication to Reduce Anxiety in Children Undergoing Adenotonsillectomy

Mahin Seyedhejazi, Behzad Aliakbar Sharabiani, Afshin Davari, Nasrin Taghizadieh
Departments of Anesthesiology, Faculty of Medicine, Tabriz University of Medical Science, Tabriz, Iran

Abstract

Introduction: Considering the multiplicity of adenotonsillectomy in children 2–10-year old at the paediatric surgery centres, patient anxiety leads to an increase in surgical and anaesthetic complications. Patients’ unfamiliarity with surgical and anaesthetic interventions may increase their stress. Midazolam premedication reduces patient anxiety. In previous studies, psychological preparation before surgery using understandable terms to children, has reduced their anxiety. The aim of this study was to compare and study behavioural reflections among the children in two groups: the first group was prescribed oral midazolam, and the second group received psychological preparation with the booklet about anaesthesia and anaesthesia-resident explanation. Materials and Methods: This study is a clinical trial conducted on 48 children undergoing adenotonsillectomy. Children in the first group (midazolam group) received oral midazolam 0.5 mg/kg, 20 min before surgery. A booklet containing pictures and information about anaesthesia and the operating room was given to the second group (psychological preparation group) the night before surgery and anaesthesia resident explained the booklet to the children. The anxiety level was measured in both groups using the State-Trait Anxiety Inventory for Children questionnaire the night before surgery and on the morning of surgery (after giving midazolam to Group II). The results were analysed using SPSS. Results: In this study, 58.3% of the first group and 45.8% of the second group were male. The mean age of the first and second groups was 8.45 ± 1.86 and 9.12 ± 1.72 years, respectively. The anxiety in the first group significantly decreased in the morning before surgery compared to the night before operation (P < 0.001). The anxiety in the second group significantly decreased in the morning before surgery compared to the night before as well (P < 0.001). Conclusion: The results showed that midazolam and psychological preparation prior to surgery can reduce the anxiety of children before adenotonsillectomy.

Keywords: Adenotonsillectomy, children anxiety, midazolam, premedication, psychological preparation

INTRODUCTION

Millions of children undergo surgery every year and most of these children develop significant anxiety before surgery. About 50% of children show different reactions of anxiety during anaesthetic induction.[1] Anxiety before surgery is aligned with clinical, behavioural and psychological side effects such as delay in recovery, the increasing need for analgesic and new behavioural disorders.[2,3] Anxiety before surgery increases the stress hormones, leading to an increase of serum cortisol and epinephrine. These stress responses are stimulated by different stimuli such as fear, anxiety, pain, cold, infection and surgery.[4] There are different ways to reduce children’s anxiety, including sedation with various drugs, parent-child psychological preparation before surgery and creation of a good relationship between parents, children and medical staff through group training. Methods such as psychological preparation through video, toys and books, carrying patient to surgery room by toy wagon, use of clowns and scented masks in the form of toys at induction have been used at various centres to reduce children’s anxiety while waiting for surgery. Parents’ presence during induction has reduced children’s anxiety in some studies. However, parents’ presence...
Seyedhejazi, et al.: Preoperative training and midazolam

operating room practice and psychological preparation was
was measured the night before surgery in the second
entering the operating room. The level of anxiety in children
premedication using midazolam or the presence of parents
throughout the procedure and premedication (midazolam) has
been compared. In some studies, midazolam has been preferred
to the presence of parents.[9] Midazolam premedication has
been used in the Tabriz University children’s Hospital in recent
years to reduce separation anxiety from parents. This study
aimed at creating a psychological preparation before surgery by
anaesthesiology residents and comparing children’s anxiety with
a group receiving midazolam premedication. The booklet in the
psychological preparation group contained useful information
about anaesthesia which was prepared (in accordance with
the regional culture) by the anaesthesiologist in the university
children’s hospital and was put at the patients’ and their parents’
disposal.[10]

**Materials and Methods**

This study is a single-blind clinical trial in the operating
room of University Children’s Hospital after obtaining the
approval of the medical school ethics committee and informed
consent of the parents. 48 children admitted to hospital were
included in the study. A sample size of 21 was calculated for
each group based on the study of Lehman[11] and using online
software (http://www.stat.ubc.ca/~rollin/stats/s ssize/nz.html)
considering $\alpha = 0.05$ and power $= 80\%$. The number of
patients in each group was increased to 24 people to increase
the accuracy of the study. The children were divided randomly
into two groups: midazolam premedication ($n = 24$) and
psychological preparation ($n = 24$) through a simple sampling
method and in order of entering the operating room and using
online software available at http://graphad.com/quickcalc/
randomized.cfm. All candidate of adenotonsillectomy who
were 6 years or older and without underlaying disease (ASA
I or II) were included in this study. Unwillingness of parents
to participate in the study, emergency surgery, children with
chronic diseases, a history of hospitalization and medication
and illiterate parents were exclusion criteria. Surgeries were
performed under general anaesthesia for both groups. The
level of anxiety in children was measured the night before
surgery in both groups (before any intervention). On the
day of surgery, midazolam group received $0.5$ mg/kg oral
midazolam (midazolam maleate - $2.5$ mg/1 mL manufactured
by Amsed (UK)) with $20–30$ mL of water $20–30$ min before
entering the operating room. The level of anxiety in children
was measured the night before surgery in the second
group (psychological preparation), then they were given a
booklet containing information about anaesthesia and
operating room practice and psychological preparation was
provided by an anaesthesia resident. The second group of
children was asked to read the booklet prepared by paediatric
anaesthesiologist. The anxiety of children was measured and
scored twice in both groups, once the night before surgery
and the second time in the morning just before entering the
operating room, using the State-Trait Anxiety Inventory for
Children. The STAIC (the State-Trait Anxiety Inventory for
Children) containing 20 questions, each question represent
three modes. To assess children’s anxiety, the questionnaire
contained 20 questions that 10 was scored on the basis of
direct and 10 on reverse direction of scoring (positive emotion
score 1, negative emotion score 3, intermediate emotion
score 2). In this way the minimum score for children was $20$
and maximum score was $60$. The scores equal or less than
$33$ represented weak anxiety, scores equal or more than $43$
sever anxiety, other scores showed intermediate anxiety. The
questions contained the following items: being calm, being
confused, being cheerful, being nervous, being angry, being
relieved, being scared, being at peace, being worried, being
pleased, being threatened, being happy, being confident,
feeling good, having problems, being anxious, being pleasant,
being panicked, being confused and being hopeful. The
questions were scored in a way that half the questions had
positive scales and half the questions were reversed (positive
feeling: 1, feel in between: 2 and negative feeling: 3). The
minimum and maximum scores obtained were $20$ and $60$,
respectively. Scores less than or equal to $33$ indicate mild
anxiety, more than or equal to $47$ indicate severe anxiety and
scores between $33$ and $47$ moderate anxiety. The resident who
completed questionnaire was unaware (blind) about type of
preparation. Once the data were collected and coded, SPSS
16 (SPSS Inc. Chicago, IL) was used for statistical analysis
using Chi-squares and $t$-tests and in the form of tables and
graphs through descriptive statistics. The significance level
was considered to be $P < 0.05$ in all tests listed. All personal
information of the patients was kept confidential and none of
the patients’ names were mentioned in the study.

**Results**

In this study, 48 patients were equally divided into two
groups. The number of male patients was $14$ in the midazolam
group ($58.3\%$) and $11$ ($45.8\%$) in the psychological
preparation group ($P = 0.386$). The mean age of the children in
the midazolam group and the psychological preparation group was
$8.45 \pm 1.86$ and $9.12 \pm 1.72$ years, respectively ($P = 0.205$).

In this study, $20$ questions were asked from the children
receiving the psychological preparation on the night before
surgery (pre-intervention) and on the day of the surgery just
before entering the operating room. At first, the impact of the
booklet on the children’s anxiety reduction was examined and it
was found that the distress ($P = 0.034$) and fear ($P = 0.004$)
before surgery were reduced and relaxation before surgery ($P = 0.003$)
was increased among children in the psychological preparation
group. However, other anxiety criteria in the psychological
preparation group did not change significantly. The effect of

African Journal of Paediatric Surgery  ¦  Volume 17  ¦  Issues 1 & 2  ¦  January-June 2020
midazolam on anxiety was also examined in the midazolam group. The results showed that midazolam could only increase the relaxation before the operation in children \( (P = 0.015) \). It should be noted that midazolam made significant changes in the cheerfulness \( (P = 0.022) \), pleasure \( (P = 0.009) \) and panic \( (P = 0.021) \) in children; however, cheerfulness was reduced and panic was increased in children in the midazolam group.

The patients’ anxiety level was analysed by statistical tests. The results showed that the anxiety level of children in the morning before surgery was significantly less than the night before surgery \( (30 \text{ min before surgery}) \) as well \( (P = 0.193) \) [Table 1].

No significant difference was observed between the two groups in terms of anxiety on the night before surgery \( (30 \text{ min before surgery}) \) as well \( (P = 0.012) \). The increased heart rate difference in the midazolam group was lower than in the psychological preparation group, but the difference was not statistically significant \( (P = 0.663) \). No significant difference was observed between the two groups comparing the average heart rate the night before surgery and the morning of surgery \( (P = 0.597 \text{ night}; P = 0.941 \text{ morning}) \).

The systolic blood pressure in both groups significantly increased before surgery in the morning \( (30 \text{ min before the operation}) \) compared to the night before surgery \( (P < 0.001 \text{ in both groups}) \). Although the psychological preparation group was higher than the midazolam group, no statistically significant difference was seen between the two groups in mean systolic blood pressure \( (P = 0.707) \). In addition, no significant difference was observed in systolic blood pressure between the two groups on the night before surgery \( (P = 0.513) \) or 30 min before surgery \( (P = 0.338) \). Diastolic blood pressure of the patients was also examined. The diastolic blood pressure in the psychological preparation group \( (P < 0.001) \) and the midazolam group \( (P < 0.001) \) increased significantly on the morning of surgery compared to the night before surgery. The average diastolic blood pressure in both groups the night before surgery \( (P < 0.001) \) and 30 min before surgery \( (P < 0.001) \) were also examined [Tables 2 and 3].

### Table 1: Comparison of the average amount of anxiety on ‘The night before the surgery’ and ‘30 min before surgery’

| Group/time | Time/group       | Mean anxiety±SD | \( P \) |
|------------|------------------|-----------------|--------|
| Midazolam  | Night before surgery | 57.50±6.07     | <0.001 |
|            | Morning before surgery | 36.70±6.03     |        |
| Psychological preparation | Night before surgery | 59.50±6.07     | <0.001 |
|            | Morning before surgery | 37±5.41        |        |
| Night before surgery | Midazolam        | 57.50±6.07     | 0.861  |
|            | Psychological preparation | 59.50±6.07     |        |
| Morning before surgery | Midazolam        | 36.70±6.03     | 0.193  |
|            | Psychological preparation | 37±5.41        |        |

SD: Standard deviation

### Table 2: Comparison of the mean heart rate, systolic pressure and diastolic pressure in both groups on the ‘night before surgery’ and ‘30 min before surgery’

| Group/time | Time/group       | Mean heart rate±SD | \( P \) | Mean systolic pressure±SD | \( P \) | Mean diastolic pressure±SD | \( P \) |
|------------|------------------|--------------------|--------|---------------------------|--------|---------------------------|--------|
| Manual training | Night before surgery | 107.70             | 0.002  | 115.12±9.60               | <0.001 | 76.62±10.61               | <0.001 |
|            | Morning before surgery | 91.33±13.02       |        | 95.50±8.34                |        | 62.08±5.69                |        |
| Midazolam  | Night before surgery | 107.29±20.60      | 0.012  | 111.75±14.13              | <0.001 | 76.41±11.17               | <0.001 |
|            | Morning before surgery | 93.75±18.00      |        | 95.70±10.37               |        | 60.62±9.81                |        |
| Night before surgery | Psychological preparation | 107.70±16.69    | 0.597  | 115.12±9.60               | 0.513  | 76.62±10.61               | 0.532  |
|            | Midazolam        | 93.75±18.00       | 0.941  | 95.50±8.34                | 0.338  | 62.08±5.69                | 0.948  |

SD: Standard deviation

### Table 3: Comparison of the mean heart rate, systolic pressure and diastolic pressure changes between two groups

| Group                      | Mean heart rate±SD | \( P \) | Mean systolic pressure±SD | \( P \) | Mean diastolic pressure±SD | \( P \) |
|----------------------------|--------------------|--------|---------------------------|--------|---------------------------|--------|
| Psychological preparation  | 16.37±6.77         | 0.663  | 17.62±13.70               | 0.707  | 14.45±9.38                | 0.675  |
| Midazolam                  | 13.54±5.39         |        | 16.04±12.12               |        | 15.79±8.99                |        |

SD: Standard deviation
In this study, it was observed that preoperative psychological preparation through a booklet containing information on anaesthesia and the operating room practice reduced children’s confusion and fear before surgery and increased preoperative relaxation; however, midazolam premedication only increased preoperative relaxation. It was also observed that the psychological preparation did not reduce children’s anxiety more than midazolam premedication; anxiety decreased in both groups on the morning of surgery. A number of studies have compared psychological preparation and pharmaceutical premedication in reducing anxiety. In the study of Mohammad Olya et al., it was observed that psychological preparation did not significantly reduce anxiety. Zakeri Moghaddam et al. showed that anxiety in a psychological preparation group was significantly less than in a control group. Li et al.\cite{12} indicated that children receiving mental practical information had less anxiety before and after their surgery. However, their anxiety after surgery showed no significant difference compared to that of the control group. In the study conducted by Guo et al.,\cite{13} preoperative psychological preparation significantly reduced children’s anxiety (P < 0.001) and depression (P < 0.001). Momeni et al. showed that patients’ anxiety decreased after the psychological preparation in both groups compared to the past. Majzoobi et al.\cite{14} study showed that children in a psychological preparation group had less preoperative anxiety compared to a control group. Bahrami et al.\cite{15} discovered that increased vital signs in the group receiving psychological preparation for reducing anxiety were lower than those found in the antianxiety treatment group; however, no significant relationship was seen in the levels of vital signs between two groups. They also observed that serum cortisol level in patients undergoing pharmaceutical treatment compared to a psychological preparation group was significantly lower (P < 0.01). Felder-Puig et al.\cite{16} showed that psychological preparation through a booklet could have a great impact on children’s anxiety reduction before surgery; this impact and anxiety reduction were statistically significant. A study carried out by Seyedhejazi et al. in 2015 on children candidates for surgery and their parents showed that simultaneous psychological preparation of children and their mothers could be effective at reducing preoperative anxiety.\cite{17} Considering the aforementioned studies, we conclude that preoperative psychological preparation can have an impact on children’s anxiety levels. However, given that a number of studies have also failed to show such a relationship, it is likely that there are many factors which increase or decrease children’s anxiety. These factors may include the mother’s education level, the type of underlying disease, the children’s history of surgery and the type of surgery. Some other studies have also been conducted on adults in this area: a number of these studies failed to show a relationship between stress level and psychological preparation. In the Ranhami et al. study,\cite{18} it was shown that anxiety decreased before surgery in both a psychological preparation group and an antianxiety medication receiving group. The reduction in the psychological preparation group was higher than that seen in the pharmaceutical group; however, the difference was not statistically significant. The results of the Salzwedel et al. study\cite{19} showed that an educational video program had no significant effect in reducing patients’ anxiety but the knowledge of patients in the groups watching film was higher than the control group. In the study of Diez-Álvarez et al.,\cite{20} it has been shown that the patients’ anxiety when visited before surgery was 18.96 and 20.03 in the control group, and no significant difference was observed between the two groups. However, the following studies have shown this relationship. The results of Wang and Lin’s\cite{21} study showed that anxiety level of the study group was reduced after nursing education interventions compared to the control group at a confidence level of more than 90% (P < 0.001). In their study, Jlala et al.\cite{22} indicated that the patients in the control group experienced more preoperative anxiety compared to that of the training group (P < 0.001), and that patients in the psychological preparation group were more relaxed before surgery compared to the control group (P = 0.004). In a study done by Nikumb et al.,\cite{23} it was observed that preoperative visiting and providing patients with training information led to anxiety reduction in 26.5% of patients.

Furthermore, some studies examined the pharmaceutical effect on patients’ anxiety: Rostami et al. showed that 93.3% of the children in a study group (midazolam) separated from parents without crying or mild crying, and 90% of children in the control group separated with moderate and severe crying. The results of Ayatollah and Behdad’s study showed that 14% of the children in the first group and 68% in the second group were calm and alert while separating from their parents 20 min after administration of midazolam drops (P < 0.00001). It should be noted that while the children’s heart rate receiving midazolam was lower than ones receiving psychological preparation (intervention) in the present study, this difference was not statistically significant. The results of this study show that preoperative psychological preparation through a booklet as well as receiving midazolam as premedication reduced children’s anxiety before adenotonsillectomy surgery. However, the difference between the two groups was not significant in terms of anxiety reduction.

**Conclusion**

It seems that both midazolam and preoperative psychological preparation decreases the anxiety level of children in the morning of surgery comparing to the night before surgery. We recommend that the pediatric age group must have preoperative preparation with the psychological preparation or midazolam or both.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.
REFERENCES

1. Chorney JM, Torrey C, Blount R, McLaren CE, Chen WP, Kain ZN. Healthcare provider and parent behavior and children’s coping and distress at anesthesia induction. Anesthesiology 2009;111:1290-6.

2. Fortier MA, Blount RL, Wang SM, Mayes LC, Kain ZN. Analysing a family-centred preoperative intervention programme: A dismantling approach. Br J Anaesth 2011;106:713-8.

3. MacLaren JE, Thompson C, Weinberg M, Fortier MA, Morrison DE, Perret D, et al. Prediction of preoperative anxiety in children: Who is most accurate? Anesth Analg 2009;108:1777-82.

4. Dredder VA, Tremback TF. Management of preoperative anxiety in children. AORN J 2006;84:778-80, 782-6, 788-90.

5. Chundamala J, Wright JG, Kemp SM. An evidence-based review of parental presence during anesthesia induction and parent/child anxiety. Can J Anaesth 2009;56:57-70.

6. Salzwedel C, Petersen C, Blanc I, Koch U, Goetz AE, Schuster M. The effect of detailed, video-assisted anesthesia risk education on patient anxiety and the duration of the preanesthetic interview: A randomized controlled trial. Anesth Analg 2009;106:202-9.

7. Kain ZN, Caldwell-Andrews AA, Mayes LC, Weinberg ME, Wang SM, MacLaren JE, et al. Family-centered preparation for surgery improves perioperative outcomes in children: A randomized controlled trial. Anesthesiology 2007;106:65-74.

8. Cheung A, Finegan BA, Torok-Both C, Donnelly-Warner N, Lujic J. A patient information booklet about anaesthesiology improves preoperative patient education. Can J Anaesth 2007;54:355-60.

9. Kain KN, Strom S, Kim J, Splinter WM, Cyna A. Commentaries on ‘Non-pharmacological interventions for assisting the induction of anaesthesia in children’ with a response by the review authors. Evid Based Child Health 2011;6:137-40.

10. Straessle R, Gilliard N, Frascarolo P, Rossat J, Albrecht E. Is a pre-anesthetic information form really useful? Acta Anaesthesiol Scand 2011;55:517-23.

11. Lehman EL. Nonparametris: Statistical Methods Based on Ranks. Available from: http://www.graphpad.com/Library/BiostatSpecial/article_154.html. [Last accessed on 2012 Jun 25].

12. Li HC, Lopez V, Lee TL. Psychoeducational preparation of children for surgery: The importance of parental involvement. Patient Educ Couns 2007;65:34-41.

13. Guo P. A Preoperative Education Intervention to Reduce Anxiety and Improve Recovery among Chinese Cardiac Patients: A Randomised Controlled Trial. PhD Thesis, University of Nottingham; 2012.

14. Majzoobi M, Amani R, Majzoobi F. Effects of psychological preparation on reduction of surgery anxiety signs in children. Koomesh 2013;14:466-73.

15. Bahrami N, Soleimani MA, Shariﬁnia H, Shaigan H, Sheikhi MR, Mohammad-Rezaei Z, et al. Effects of anxiety reduction training on physiological indices and serum cortisol levels before elective surgery. Iran J Nurs Midwifery Res 2013;18:416-20.

16. Felder-Puig R, Maksya N, Noestlinger C, Gadner H, Stark H, Pfuegler A, et al. Using a children’s book to prepare children and parents for elective ENT surgery: Results of a randomized clinical trial. Int J Pediatr Otorhinolaryngol 2003;67:35-41.

17. Sadegh Tabrizi J, Seyedhejazi M, Fakhari A, Ghadimi F, Hamidi M, Taghzadieh N, et al. Preoperative education and decreasing preoperative anxiety among children aged 8 – 10 years old and their mothers. Anesth Pain Med 2015;5:e25036.

18. Rahmani H, Davoodzadeh H, Ebadi A. Effect of an educational intervention on the preoperational anxiety of patients candidates for orthopedic surgery. Int J Pharm Ther 2014;5:203-6.

19. Díez-Alvarez E, Arrospide A, Mar J, Alvarez U, Belaustegi A, Lizaur B, et al. Effectiveness of pre-operative education in reducing anxiety in surgical patients. Enferm Clin 2012;22:18-26.

20. Lin LY, Wang RH. Abdominal surgery, pain and anxiety: Preoperative nursing intervention. J Adv Nurs 2005;51:252-60.

21. Jlala HA, French JL, Foxall GL, Hardman JG, Bedforth NM. Effect of preoperative multimedia information on perioperative anxiety in patients undergoing procedures under regional anaesthesia. Br J Anaesth 2010;104:369-74.

22. Nikumb VB, Banerjee A, Kaur G, Chaudhury S. Impact of doctor-patient communication on preoperative anxiety: Study at industrial township, Pimpri, Pune. Ind Psychiatry J 2009;18:19-21.