The effect of parental presence on anxiety during anesthesia induction in children 2 to 11 years of age undergoing surgery

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Introduction:
Surgery which is one of the most frightening medical procedures for children can prevent the achieving therapeutic goals, and controlling its consequent fear is very important. This study was conducted with the aim to examine the effect of parental presence on anxiety during anesthesia induction in children 2 to 11 years of age undergoing surgery.

Materials and Methods:
In this clinical trial, 60 children aged 2 to 11 years old undergoing surgery were randomly assigned to two experimental and control groups. In the experimental group, parents were present during induction of anesthesia. Children’s anxiety was measured by m-YPAS scale (Modified-Yale preoperative anxiety scale) in two phases and finally the data were analyzed by descriptive statistics and chi-square test, Fisher’s exact test, t and paired-t tests by using SPSS 18 software.

Results:
There was no significant difference between mean total score of children’s anxiety in the control group (70.39±20.93) and the experimental group (67.83±16.78) before surgery (p>0.05). Also there was no statistically significant difference between changes in children's anxiety total score in the control group (-3±16.45) and in the experimental group (-8.39±22.95) before and after surgery (p>0.05).

Conclusions:
It seems that the presence of parents has no useful and significant effect on children’s anxiety undergoing surgery and thus in order to reduce complications due to surgery anxiety, other effective interventions should be investigated.

Keywords: Anxiety, Children, Surgery

Introduction
The surgical operation is a common therapeutic method in many hospitals and also one of the most disturbing events happening during one’s life (1). Surgery may be scheduled or not, small or large, invasive or noninvasive, and involve any part or system of the body (2). Any type of surgery is always considered a stressful experience because it is a threat to the whole body and sometimes to life (3). Invasive medical procedures in children, especially surgery, are the most fearful procedures that result in many problems and interfere with the objectives of the treatment (4). In fact, every surgical
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operation can be a major crisis in children’s life (5). Getting sick, being hospitalized, and probably undergoing a surgery are of main causes of children's anxiety and the initial crises facing them (6). In the United States, over five million children undergo surgical operations every year, and 50%-70% of these children experience much fear and anxiety (7). Anxiety is a natural physiological process making people comply with and resist against unfavorable conditions (8). Anxiety is prevalent in surgery candidates, reported as 11%-80% by Caumo and Ferreira, and 20% by Bronze et al. (9 & 10). Generally, certain degrees of anxiety is observed in all patients before surgery, but children experience more anxiety that necessitates special attention (11). Children, especially in initial years of life, are more vulnerable to this anxiety because the tension changes the normal heath status and the familiar safe environment of children, and children have limited adaptation mechanisms to deal with stressful conditions (6). There are many factors affecting children’s anxiety before surgery. Some of these factors are as follows: 1- Physical damages or injuries, and the subsequent discomfort, pain, mutilation, or death; 2- Separation from parents and friendly relationship with strangers in the absence of family; 3- Fear of unknowns; 4- Uncertainty about the limits of acceptable behaviors; and 5- Loss of autonomy, control, and competence (12). The presence of these influential factors in children may be due to their different perception of the world from that of adults. Children’s anxiety may be caused by their various interpretations of healthcare environments. Manifestations of anxiety vary with different stages of physical, emotional, and mental growth in children (13).

The preoperative anxiety stimulates sympathetic, parasympathetic, and endocrine systems, increases heart rate, blood pressure, and cardiac irritability, and consequently results in arrhythmias. Long-term anxiety may result in breakdown of proteins, decreased wound healing and immune responses, increased risk of infections, and water-electrolyte imbalance. If anxiety remains unknown and continues for a long time, it can produce harmful outcomes and delay patient’s recovery (14). The preoperative anxiety in children is a common complication appearing in different ways. Avoiding eye contact, refusing to talk or talking too much, sticking to parents, restlessness, screaming, and crying are some negative preoperative behaviors that requires physical limitation of children during induction of anesthesia (9 & 15). More than 65% of children undergoing anesthesia and surgery show preoperative fear and anxiety during induction of anesthesia, and the anxiety can interfere with the normal process of anesthesia and even reduce the oxygen saturation during anesthesia. Furthermore, postoperative delirium has been observed in 12%-18% of children undergoing anesthesia and surgery, and behavioral changes, such as general anxiety, nighttime crying, nocturia, separation anxiety, and irritability, have been seen in 50% of them (16). Kin et al. estimated that 50%-75% of children undergoing surgery experience preoperative anxiety. This phenomenon is of special importance due to not only the incidence of postoperative behavioral incompatibility but also the clinical results and the effect on the quality of the recovery process (17). Preoperative anxiety also associates with postoperative maladaptive behaviors, including postoperative pain, sleep disturbances, child-parent conflict, separation anxiety, nocturia, difficulty in feeding, apathy, restlessness, and isolation (14). Severe anxiety during induction of anesthesia causes postoperative negative behaviors that may cause long-term problems, adverse effects on recovery, and develop an unpleasant feeling about treatment in patients' mind. If this issue is not attended to and children enter the operation room
and undergo the operation with intense fear, the severe effect of this mental damage results in postoperative stress (18). Reduction of the anxiety to an average level is a humanitarian objective that should be achieved in all patients (19). The fear and anxiety experienced by patients, especially children, before a diagnostic-therapeutic intervention or anesthesia and surgery may involve adverse effects more considerable than the intervention (20). Children are more vulnerable to the anxiety associated with surgery due to their limited ability, higher dependence on others, self-control inability, little experience of life, and little understanding of healthcare systems (7). Therefore, children’s higher readiness for surgical operations can inhibit physiological and behavioral complications of anxiety (7). There are various pharmacological and non-pharmacological methods for reducing the anxiety associated with separation of children from their parents and relaxing them for induction of anesthesia (21). The common non-pharmacological methods include dolls, movies, hospital tours, using photos, parental presence during induction of anesthesia, etc. (22). Currently, some hospitals are running programs including parental presence during induction of anesthesia and after the operation (23). Actually, separation of children from their parents before entering the operating room is an important problem in children surgery (20). The parental presence during induction of anesthesia has been always controversial, while, initial studies showed that parental presence could diminish children's anxiety and increase their contribution (24). Most parents prefer to stay with their children for a while before the operation (25). The parental presence during induction of anesthesia can considerably reduce children's anxiety (23). When parents stay with their children during induction of anesthesia, children experience more relaxed induction of anesthesia, less need for taking medicines before and after the operation, less time for recovery, and parents’ higher satisfaction (23). Previous studies showed that children whose parents contribute to all dimensions of the care provided to children were less sad and showed more contribution than children whose parents did not contribute to the care (26). Hernandez et al.’s study (2011) showed that the parental presence during induction of anesthesia improved the quality of anesthesia for both sides, children and parents (27). Kin et al. found that the parental presence during induction of anesthesia did not improve children's anxiety than midazolam did, while, it reduced parents’ anxiety and satisfied them (28).

Preoperative anxiety in children should be controlled due to the difficult induction of anesthesia in the absence of parents on one hand, and the pain of watching children’s fear and crying while trying to take IV line on the other hand (29). In order to diminish postoperative complications, which is very important in nursing care, and also improve long- and short-term physical and mental complications in children and parents after the operation. Considering the few studies conducted in this regard in Iran and shortage of nursing literature in the field of anxiety in children undergoing surgery and the effect of parental presence in reducing children's anxiety for the purpose of better planning of nursing care, the present study was conducted to examine the effect of parental presence on the level of anxiety during induction of anesthesia in children aged 2-11 years and undergoing the surgical operation in teaching hospitals in Boushehr, Iran, in 2013.

Materials and Methods
In this random clinical trial, the participants were randomly divided into case and control groups. The independent categorical variable and dependent variable were parental presence and anxiety, respectively. The study population included children aged 2-11 years presenting to medical centers in Boushehr...
for a surgical operation, and the research setting was the operating room of Boushehr's teaching medical centers. The study was performed upon approval of the ethics committee and adoption of informed verbal consent from parents for participation in the study. Sample size of each group was determined as 27 patients given $\alpha=5\%$, $\beta=20\%$, standard deviations of 6 and 7 for the two groups, and children's anxiety mean difference of 5 based on their behavior, but increased to 30 patients to cover the 10\% sample loss. The inclusion criteria of the study were as follows: 1- Age range of 2-11 years, 2- Lack of chronic diseases (cancers and liver or renal diseases), 3- Good sense of hearing and the ability to talk, 4- Having age-appropriate cognitive abilities, 5- Having father, mother, or a specific custodian at the time of admission and hospitalization, 6- No experience of operation in the past, and 7- No history of central nervous system diseases and mental disorders. Sampling lasted three months, and the data were collected using a demographic specification questionnaire and modified-Yale preoperative anxiety scale. The demographic specification questionnaire included the background information and all specifications of the studied samples, such as sex, age, birth order, family size, father's education, mother's education, father's occupation, mother's occupation, etc. The modified-Yale preoperative anxiety scale was a standard questionnaire developed and standardized in Kin et al.'s study (1997), and its reliability was $K\approx0.66-0.91$. The scale contains 22 items measuring children's preoperative anxiety based on five categories of activity, tone of voice, expression of emotions, apparent irritation or incitement, and dependence on parents. Each category of Yale's modified scales was scored regarding the different levels of behaviors related to that category. Some of these categories included 4-6 items, and children's weighted average percentage of the behavioral highest level in each category was divided by the number of categories in order to score from 0 to 100. For instance, the total score of a child who had two categories, of the 5 categories available in the scale, including 4 and 6 items with the score 1 was calculated as follows:

$$\text{Total score} = \left(\frac{\left(\frac{1}{4} + \frac{1}{6}\right) \times 100}{2}\right)$$

This scale was completed through behavioral observation not self-report, and the assessment could be done in less than one minute.

To do the study, the children were randomly divided into case and control groups. One hour before the operation, upon obtaining an informed verbal consent from parents whose children were ready and waiting for the surgical operation, the researcher provided participants with necessary information on the method of the research, completion of the questionnaire, and confidentiality of the information. The parents had to decide on which of them could stay with the child during induction of anesthesia. The researcher completed the anxiety questionnaire in the operating room after observing child’s behavior immediately before the induction. After the induction of anesthesia in the case group, the researcher and the parent exit the operating room, and the parents were asked to be present in the recovery room immediately after their child was recovered. The questionnaire was completed again after the child was recovered in the recovery room. The collected data were analyzed using the descriptive statistics, including mean, standard deviation, and confidence interval of 95\%; and Chi-square test, Fisher's exact test, t test, and paired t test at significance level of 0.05 in SPSS18 software.

**Results**

Most of the study population in both groups were male (73.3\%). The most frequent age in both groups (86.7\% in the case group and 70\% in the control group) was in the range 2-6 years (pre-school
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ages). Mean age in the case and control group was 5.11±2.30 years and 5.81±2.32 years. The most frequent child attendants in both groups (63.3% in the case group and 76.7% in the control group) were mothers. Regarding the birth order, most of them in both groups were the first child of their family. In terms of the family size and type of surgery, the highest percentage in both groups belonged to families of four, and most of children in both groups had been hospitalized for ear, nose, and throat surgery. In both groups, most mothers had high school diploma, and most fathers had middle school and high school diploma. The Chi-square test and Fisher’s exact test showed no significant difference between the case group and the control group in terms of sex (P=0.6), age (P=0.2), the attendant parent (P=0.2), birth order (P=0.3), family size (P=0.2), type of surgery (P=0.5), mothers’ education level (P=0.5), fathers’ education level (P=0.9), and place of residence (P=0.054). Moreover, the Chi-square test showed no significant difference between the two groups in terms of activity (P=0.6), expression of emotions (P=0.6), and tone of voice (P=0.6) before the operation. However, the two groups were significantly different in terms of the state anxiety or irritation (P=0.03) and dependence on parents (P=0.03), as the case group performed more favorable than the control group (Table 1).

Table 1: Frequency distribution of the study population in the case and control group based on different indexes before the operation

<table>
<thead>
<tr>
<th>Levels of indexes in both groups*</th>
<th>Group</th>
<th>Case</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0  1  2  3  4  5  6  0  1  2  3  4  5  6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>2(6.7) 6(20) 0(0)</td>
<td>7(23.3) 15(50)</td>
<td>- -</td>
<td>- -</td>
</tr>
<tr>
<td>Expression of emotions</td>
<td>8(26.7) 0(0) 18(60)</td>
<td>1(3.3) 3(10) 0(0) 4(13.3) 0(0) 19(63.3) 1(3.3) 6(20) - -</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Tone of voice</td>
<td>0(0) 5(16.7) 3(10) 12(40) 1(3.3) 4(13.3) 1(3.3) 3(10) 4(13.3) 72(23.3) 11(36.7) 21(70) 2(6.7)</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State anxiety or irritation</td>
<td>0(0) 0(0) 10(33.3) 1(3.3) 19(63.3) - -</td>
<td>0(0) 0(0) 5(16.7) 1(3.3) 24(8) - -</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Dependence on parents</td>
<td>4(13.3) 12(40) 3(10) 11(36.7) 0(0) - -</td>
<td>3(10) 10(33.3) 3(10) 10(33.3) 4(13.3) - -</td>
<td>0.4</td>
<td></td>
</tr>
</tbody>
</table>

*Values show number (percentage) of children in each level of indexes.

There was no significant difference between the two groups in terms of activity (P=0.3), expression of emotions (P=0.5), tone of voice (P=0.3), the state anxiety or irritation (P=0.8), and dependence on parents (P=0.4) after the operation (Table 2).

Table 2: Frequency distribution of the study population in the case and control group based on different indexes after the operation

<table>
<thead>
<tr>
<th>Levels of indexes in both groups*</th>
<th>Group</th>
<th>Case</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0  1  2  3  4  5  6  0  1  2  3  4  5  6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>2(6.7) 6(20) 0(0)</td>
<td>7(23.3) 15(50)</td>
<td>- -</td>
<td>- -</td>
</tr>
<tr>
<td>Expression of emotions</td>
<td>8(26.7) 0(0) 18(60)</td>
<td>1(3.3) 3(10) 0(0) 4(13.3) 0(0) 19(63.3) 1(3.3) 6(20) - -</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Tone of voice</td>
<td>0(0) 5(16.7) 3(10) 12(40) 1(3.3) 4(13.3) 1(3.3) 3(10) 4(13.3) 72(23.3) 11(36.7) 21(70) 2(6.7)</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State anxiety or irritation</td>
<td>0(0) 0(0) 10(33.3) 1(3.3) 19(63.3) - -</td>
<td>0(0) 0(0) 5(16.7) 1(3.3) 24(8) - -</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Dependence on parents</td>
<td>4(13.3) 12(40) 3(10) 11(36.7) 0(0) - -</td>
<td>3(10) 10(33.3) 3(10) 10(33.3) 4(13.3) - -</td>
<td>0.4</td>
<td></td>
</tr>
</tbody>
</table>

*Values show number (percentage) of children in each level of indexes.
The t test did not show any significant difference between the case (67.83±16.78) and control (70.39±20.93) groups in terms of the mean total score for children’s anxiety before the operation (P>0.05). Although the mean total scores for children’s anxiety after the operation in the case (59.44±15.81) and control (67.39±13.97) groups were different from each other (P<0.05), the changes in the total score of children’s anxiety before and after the operation in the case (-8.39±22.95) and control (-3±16.45) differed from each other (P>0.05) (Table 3). Furthermore, the paired t test showed no significant difference between the case and control groups in terms of the mean total score for children’s anxiety before and after the operation (P=0.055).

Table 3: Children’s anxiety mean total score and its changes in the case and control group before and after the operation

<table>
<thead>
<tr>
<th>Children’s anxiety</th>
<th>Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Case</td>
</tr>
<tr>
<td>Anxiety mean total score before</td>
<td>70.39±20.93</td>
<td>67.83±16.78</td>
</tr>
<tr>
<td>operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety mean total score after</td>
<td>67.39±13.97</td>
<td>59.44±15.81</td>
</tr>
<tr>
<td>operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean total change score before</td>
<td>-3±16.45</td>
<td>-8.39±22.95</td>
</tr>
<tr>
<td>and after the operation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussions
As mentioned before, anxiety before operation and anesthesia could result in severe mental pressures, mental adverse effects accompanied with nightmares, restlessness during sleeping, separation anxiety, developmental and nutritional problems, and fear of medical staff in children (30). Therefore, interventions should be programmed to reduce the anxiety. Kin et al. divided the interventions for reducing the anxiety in children undergoing surgical operations and their parents into three categories: 1- Administration of sedatives before surgery, 2- Parental presence during the entire surgery and even during the induction of anesthesia, and 3- Providing appropriate informative and preparation programs (31). The present study aimed to apply the second category to reduce anxiety and provide a suitable environment free from anxiety for children waiting for the anesthesia and surgery. Based on the analyzed results, the two groups matched at baseline in terms of the demographic specifications, and all the anxiety indexes were examined. Although the analysis revealed that children’s anxiety mean score in the case group after the operation was lower than that in the control group, the more reliable index, that is, the mean total change score before and after the operation, did not show any significant difference. This means that the parental presence during induction of anesthesia does not affect children’s anxiety. Minimization of children’s anxiety through parental presence is an important part of the care provided to children undergoing surgical operations. However, the results showed that the parental presence during induction of anesthesia was not useful. Similar to this study, Kin et al.’s study (32) and Gupta et al.’s study (29) indicated that the parental presence during induction of anesthesia was not effective in children's anxiety. Akinci et al. also showed that the maternal presence did not reduce children’s anxiety during induction of anesthesia, and its effectiveness was related to when the children were separated from their parents (33). Another study conducted by Kin et al. (2000) in the United States on the parental presence along with a sedative for children undergoing a surgical operation revealed that the parental presence along with the oral midazolam did not have any additional effect on reduction of children’s anxiety. Moreover, their results showed that the parents accompanying their
children when transferred to the operating room were less anxious and more satisfied (34). In some studies, the ineffectiveness of the parental presence in children’s anxiety was not only relevant to the time before the operation. In Lardner et al.’s study, the parental presence after the operation in the recovery room did not affect children’s anxiety (35). However, some other studies showed the effectiveness of the parental presence. A study conducted in Britain showed that the parental presence reduced children’s anxiety and increased their contribution (29). Wright et al. also explained that children whose parents were present during induction of anesthesia significantly faced with less anxiety than children whose parents were not present (36). As mentioned earlier, the two groups in the present study did not significantly differ from each other in terms of the anxiety mean total score before and after the operation. In other words, the parental presence did not have any effect on the anxiety of children undergoing the surgical operation in the case and control groups before and after the operation. Obviously, further complementary studies in this regard can enhance validity of the obtained results. Although researchers have different opinions about the effect of anxiety before the operation on children, most of them believe that the preoperative anxiety detected by the personal emotions, such as feeling pressure, restlessness, anxiety, and disappointment, causes unfavorable mental and physiological outcomes and increased children’s fear of the medical staff. Therefore, more effective interventions should be conducted in order to prepare children undergoing surgical operations and reduce their anxiety.

Acknowledgements

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References:

35. Lardner DR, Dick BD, Crawford S. The effects of parental presence in the postanesthetic care unit on children's