

The effect of parent and child operational stress on postoperative pain level in children

Surgery stress

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Abstract

Aim: Children's perception of pain may vary depending on defenselessness, negative and exaggerated behavior, level of persuasion, personality characteristics, and previously experienced negative experiences. This study was designed to investigate the relationship between anxiety and postoperative pain perception of children and the family's anxiety about the child's pain and negative attitudes on the effects of the pain.

Material and Methods: Thirty-five patients undergoing appendectomy between August-December 2017 were included in this prospective study. Seven patients were excluded because of incongruity. Face, leg, activity, cry, consolidation (FLACC), preoperative anxiety scale of Yale, and Post-Anesthetic Delirium scale were applied. In the postoperative period, parents and children were asked to complete a pain questionnaire.

Results: It is found that, as family education level increased, the anxiety of both children and parents decreased. The parents were found to have fewer levels of rumination as the level of education increased when the effect of postoperative analgesia selection on the visual analog pain scale (VPS) was investigated, there was a statistically significant difference between pain VPS scores only after surgery. It was found that mothers were more anxious than fathers. A moderately positive correlation was found between the VPS score and the child and parental rumination scale scores. It was seen that the education level of the family had a positive effect on the pain perception of the child.

Discussion: The results of the surgical experience in the long-term memory revealed that the children had a comfortable postoperative period and that they did not think much about the operation, but that they would be afraid to undergo surgery again.

Keywords

Pain; Anxiety; Catastrophe; Rumination; Helplessness; Surgery; Parent

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Introduction

Pain is an unpleasant condition. If it lasts longer, it disturbs people and negatively affects psychology. In children, the response to pain and perception of pain differs from adults [1]. When children feel pain or have any health problems, they seek the compassion, kindness, and help of their parents in the first stage to reassure themselves in the face of this unexpected situation [2].

Children are often scared, even with minor interventions such as bloodletting and injections. When children encounter any intervention they have not experienced before, they may experience excessive fear and reaction due to negative thoughts passed on to them by their close relatives [1, 2]. Children who are most afraid of the procedure and have severe anxiety come to the operating room because parents do not tell their children the truth [2]. The fact that the parents treat the child differently due to surgery anxiety, also worries, agitation or sad facial expression in the presence of the child develops the idea that something bad is going to happen in the child, so the child is scared [3]. The child who has these feelings thinks that he will feel pain even when establishing vascular access, which is not normally considered a very painful procedure, and in this case, the persuasiveness decreases for the child [3]. If the procedure is an emergency, the level of anxiety increases more. The negative thoughts and fear experienced by the patient until the application of general anesthesia continues in the waking stage. The curious point about this is whether children's experiences about pain are transferred to their long-term memory. The level of contribution of the parents to children's perception of pain also varies depending on the children's and parents' personal characteristics and individual pain threshold. The importance of empathy is emphasized, along with the parents' catastrophizing thinking, facial expression, and restlessness [4]. The emotional preparedness and anxiety may seem to be different issues in an unpleasant situation such as pain, but they are basically combined at a cognitive level [3, 4].

Children's world-views and thoughts are generally based on their experiences with parents and society [5]. With the development of technology, access to digital resources such as the internet, television, tablets, and phones is becoming easier, and these contribute to children's experiences. The way the children are raised, the attitudes and behaviors of the parents contribute to the formation of the child's personal characteristics and behavior patterns. It is a matter of wonder how does the behavior of parents who have difficulty coping with problems and who have high levels of anxiety affect the development of children. Several hypotheses have been developed about this subject. In this study, we planned to investigate the effect of parents' emotional and cognitive levels on children's pain level after surgery. When they came for the follow-up, the thoughts and experiences of the parents and children during the postoperative period were questioned and the perception of pain in the children's memory was tried to be understood.

Material and Methods

After the ethics committee approval (Hitit University School of Medicine Ethics Committee, April 07, 2017, approval number: 2017/20) and obtaining informed consent forms from the

participants, 35 patients who had an emergency appendectomy due to acute appendicitis in the Pediatric Surgical Clinic between August-December 2017, and the mothers or fathers caring for the child were included in the study. The selected parents (mother or father) were informed about the study. Seven patients were excluded from the study because of incompatibility with the study and problems with follow-up. In order to be able to fill out the form easily by the children and understand what it means, the children who are literate and have a mental capacity were included in the study. Children with other known health problems, low mental capacity, and parents who did not agree to participate in the study were not included. Demographic characteristics, age, the gender of the patients, parents (mother or father) who primarily care of the child, as well as, waiting time in the operating room, which is thought to increase the child's stress, were recorded. Yale preoperative anxiety scale (YPAS), FLACC scale (Face, leg, activity, cry, consolidation) in the postoperative period, and the pediatric anesthesia emergence delirium (PAED) scale were recorded in the postoperative period. The parents and children were asked after the operation to fill out "pain and pain interpretation questionnaires" separately from each other.

The visual analog pain scale (VPS) form was used to help children to describe their pain better. The pediatric patient was asked to fill out the VPS form on a daily basis for one week postoperatively.

The Pediatric Pain Questionnaire was filled out by the children after the postoperative 24 hours. In the children's pain questionnaire, thoughts about pain, previous hospital experiences and, if any, surgery experiences were evaluated with a 5-point Likert type scale (1: none 5: too much) [6].

The postoperative pain questionnaire was filled out by the parents at the 24th hour. In the parent pain questionnaire prepared according to Likert, the parent's thoughts about pain and surgery, previous hospital experiences, if any, their own experience of surgery, as well as whether the child's pain was excessive were questioned. Besides these, the income level of the parents, sociocultural status, and educational level were noted [6].

Pain catastrophizing parent (PCP) and pain catastrophizing children (PCC) forms were used for the pain catastrophic thought scale, which has previously been shown to be valid and realistic, used in other studies [7, 8]. The forms prepared according to the 5-point Likert scale contained 13 questions. The forms were filled out separately by the child and the parents. The questions were based on the persistence of a subject, exaggeration, and despair. The way parents and the child answered similar questions was evaluated. The parents' thoughts of despair due to suffering, avoidance, and pain were recorded. The child's negative thoughts and exaggeration about pain were also recorded simultaneously.

Parents were called for postoperative follow-up after two months by phone, and their views and children's views on the pain were questioned again using questionnaires. The level of anxiety and pain recall of children and parents and how they went through the operation process were determined.

Statistical Methods

Statistical analyses of data were performed with the SPSS

package software (Version 22.0, SPSS Inc., Chicago, IL, USA, and Licensed to Hitit University). Descriptive statistics were presented by mean \pm standard deviation (SD) and median (minimum-maximum) for continuous variables, and by number and percentage for categorical variables in accordance with the data distribution. For statistical test selection, the normal distribution of the data was examined by the Shapiro-Wilk test. Since parametric test assumptions were not provided, two independent group comparisons were made with the Mann-Whitney U test. The relationship between the scale scores was investigated with the Spearman correlation coefficient in accordance with the data distribution. The statistical significance level was considered as $P < 0.05$.

Results

Between August 2017 and December 2017, a total of 35 patients were included in the study. Seven patients who did not come to the control and did not complete postoperative follow-up forms were excluded from the study and the data of 28 patients were evaluated.

Also, 67.9% (n: 19) of the participants were male, and 32.1% (n: 9) were female. The mean age of the patients was 11.64 years (minimum: 6, maximum: 17). Twenty-five percent of the patients (n: 7) had a history of prior hospitalization for any reason, and 17.9% (n: 5) had undergone minor surgery.

There was a statistically significant difference between only parent rumination scale scores according to the educational status of the parents ($P = 0.033$). Those with a high level of education had a lower scale point's medians. There was no statistically significant difference between the other scores. The parents were found to have fewer levels of rumination as the level of education increased (Figure 1a).

Memory and VPS scores in children and parents showed similarities according to the educational levels. No statistically significant difference was detected ($P > 0.05$).

When the effect of postoperative analgesia selection on VPS was investigated, there was a statistically significant difference between pain VPS scores only after surgery ($P = 0.012$). The VPS medians of those taking acetaminophen and metamizole were higher (Figure 1b). There was no significant difference between the other VPS scores ($P > 0.05$).

There was a statistically significant difference between VPS scores only at the 30th minute after surgery according to the state of participation in the survey ($P = 0.028$). From parent VPS questionnaires, the mother VPS medians were higher (Figure 1c). There was no significant difference between the other VPS scores ($P > 0.05$). In the first 30 minutes after surgery, fathers were more relaxed. Mothers were more worried about pain at the 30th minute, and later measurements showed that this anxiety was similar in both parents, then decreased (Figure 2). A moderately positive correlation was found between the zeroth minute VPS score and the child and parental rumination scale scores ($r = 0.483$, $P = 0.009$; $r = 0.500$, $P = 0.007$, respectively; Figure 3). No significant correlation was found in measurements made in other time periods.

Postoperative VPS scores of children and parents who participated in the study were calculated. The VPS score of 5 was interpreted as moderate pain, VPS score above 5 as a high

Table 1. Scale score comparisons of groups according to VPS*

	Time	Group	N	Mean \pm SD	Median	P** values
VPS Parent Overall	30 minute	≥ 5	20	14.15 \pm 3.29	14.5 (7-21)	0.038
		< 5	8	17.00 \pm 2.67	17 (13-20)	
VPS Child Overall	9th hour	≥ 5	12	12.50 \pm 3.31	13 (4-17)	0.023
		< 5	16	10.50 \pm 2.19	10.5 (7-15)	
Parent Helplessness	0 minute	≥ 5	20	19.80 \pm 2.96	20 (13-25)	0.038
		< 5	8	17.13 \pm 3.60	15.5 (14-25)	
Child Rumination	0 minute	≥ 5	20	13.75 \pm 2.33	13.5 (10-19)	0.003
		< 5	8	10.50 \pm 2.39	10.5 (7-15)	
Parent Rumination	0 minute	≥ 5	20	15.45 \pm 2.98	15.5 (10-20)	0.043
		< 5	8	13.00 \pm 2.87	14 (9-18)	
Child Helplessness	3rd hour	≥ 5	18	17.94 \pm 3.24	17 (14-24)	0.031
		< 5	10	14.80 \pm 3.96	14.5 (10-22)	
Parent Overall	0 minute	≥ 5	20	44.65 \pm 4.80	45.5 (35-53)	0.018
		< 5	8	38.25 \pm 6.54	37.5 (30-51)	
Child Overall	3rd hour	≥ 5	18	39.83 \pm 7.25	38 (31-55)	0.045
		< 5	10	34.00 \pm 6.73	33 (25-47)	

*VPS: Visual pain score ** Mann-Whitney U test

level of pain and VPS score below 5 as a low level of pain. In the VPS values measured in the zero minute, child and parents' rumination scores between VPS groups showed a statistically significant difference ($P = 0.003$, $P = 0.043$, respectively). In the pain values measured in the zeroth minute, the parental helplessness and overall scores among the VPS groups showed a statistically significant difference ($P = 0.038$, $P = 0.018$ respectively). In the 30th minute VPS values, the parental overall VPS score among the VPS groups showed a statistically significant difference ($P = 0.038$). In the 3rd hour of VPS values, children's helplessness and overall scores showed a statistically significant difference among the VPS groups ($P = 0.031$, $P = 0.045$, respectively). In the VPS values measured in the 9th hour, the overall VPS score of the child showed a statistically significant difference among the VPS groups ($P = 0.023$; Table 1).

According to the results, parents were more stressed than children, and mothers were more stressed in the postoperative 30th minute than fathers. The VPS median of child VPS filled out by mothers was high ($P = 0.028$).

The zeroth hour VPS scores of the patients who underwent pain control with narcotic analgesics in the postoperative period were low and statistically significant ($P = 0.012$). In other hours, there was no difference in terms of the VPS score. As the parents' level of education increased, it was seen that they exhibited more positive attitudes to children about pain and that as the level of education decreased, they had negative or even catastrophic thoughts about pain ($P = 0.033$).

In addition, the results of the pain questionnaire filled out by children and their parents in the postoperative period, which included similar questions, showed a 46% similarity. The Pain Catastrophizing Scale scores filled out by the children and parents during the postoperative period were found to be high and statistically significant (child rumination $P = 0.003$, parent rumination $P = 0.043$, parent overall $P = 0.018$, child overall $P = 0.045$).

When it was evaluated in terms of the Yale preoperative anxiety

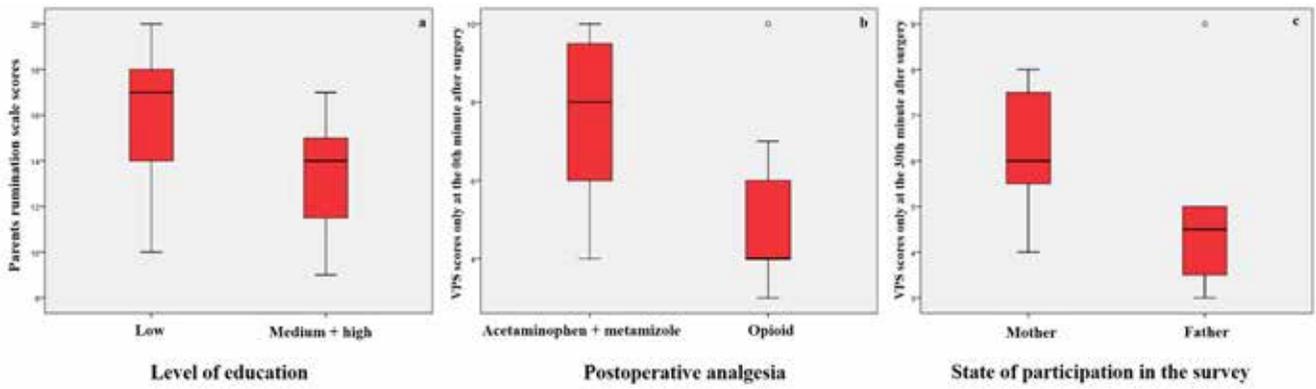


Figure 1. a) Education level of parents b) Postoperative analgesia and VPS comparison c) Parental participation in the survey and effect on 30. Minute VPS score

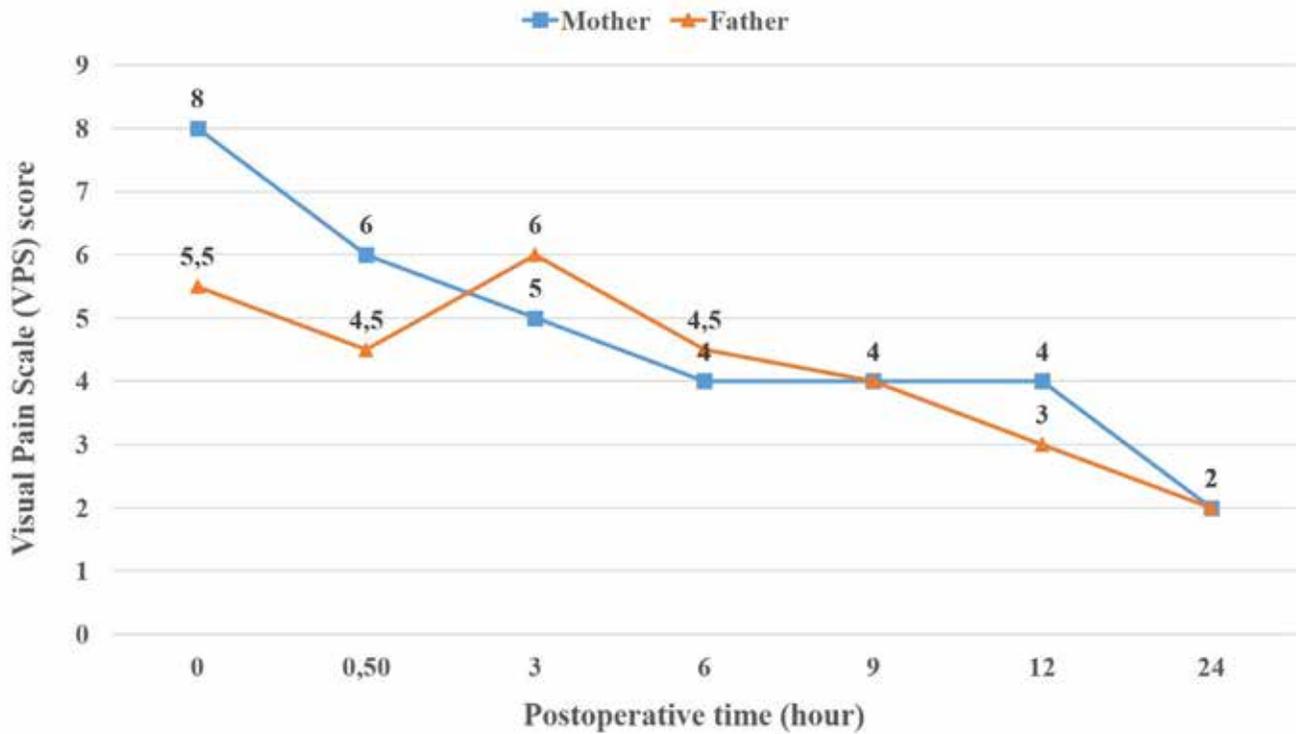


Figure 2. Visual pain score of parents in postoperative period

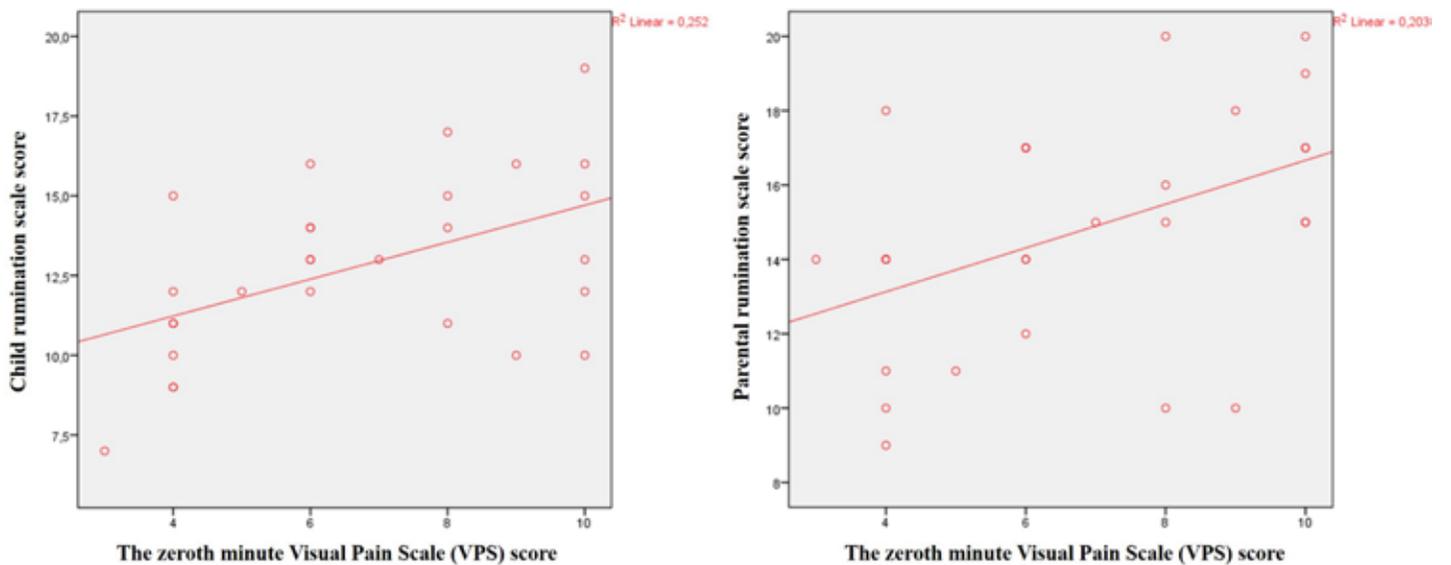


Figure 3. Comparison of Visual Pain score with rumination scale scores

scale, it was determined that the postoperative 24th hour VPS score increased as the Yale score increased. A positive significant correlation was found in this respect ($r=0.520$, $P=0.005$).

As the postoperative FLACC score increased, the postoperative 3rd hour and 9th hour VPS scores increased. A positive significant correlation was found between postoperative FLACC and postoperative 3rd and 9th hour VPS scores ($r=0.458$, $P=0.014$, $r=0.384$, $P=0.044$).

When the relationship between The Pediatric Anesthesia Emergence Delirium (PAED) scale and VPS scores was evaluated, it was determined that the postoperative 9th hour VPS score increased as the delirium score increased. There was a positive correlation between the two parameters ($r=0.419$, $P=0.027$).

There was no statistically significant difference in the comparison between parents' education levels and Yale preoperative anxiety scale, postoperative FLACC, and delirium scales ($P=0.325$, $P=0.859$, $P=0.714$, respectively).

A negative correlation was found between preoperative waiting time and delirium ($r=-0.560$, $P=0.002$).

No significant relationship was found between preoperative waiting time and all hours VPS score after surgery, the pain catastrophizing scores (helplessness, rumination, magnification), and VPS child overall ($P>0.05$).

According to the memory questionnaires, the parents reported to be very concerned about their children immediately after surgery (46.4%), and unsure about informing their children about the surgery (42.9%), and did not think much about surgery over time (50%). Again, the parents reported having talked to their children after surgery that they would recover (39.3%), and indicated that they thought their children had little pain after surgery (35.7%), and the child's movement pain was moderate after surgery (53.6%).

According to the memory questionnaire, the children reported that their parents were overly concerned about them after surgery (42.9%), that they thought it would be useful to get preoperative information (42.9%), that their parents said that they would recover after the operation (28.6%), and that they feared of having re-operation (39.7%). Again, the children reported that they felt moderate pain after surgery (35.7%), that their morale was moderately bad after surgery (64.3%), and that the pain increased in moderate severity after surgery. Finally, if the thoughts of the selected parents about the previous surgical experience were negative, it was investigated whether it affects the child's pain. As a result, no significant relationship was found between the parents' surgery history and delirium, VPS, pain catastrophizing scores (helplessness, rumination, magnification, and VPS child overall) ($P>0.05$).

Discussion

Although there have been numerous studies about parent anxiety and catastrophic thoughts, this study is the first for emergency cases. In this study, the response of parents to the postoperative pain in children and the evaluation of these responses, the effect of the attitude of parents to the behavior of children, and the factors affecting the children's pain recall in the long term were investigated. Due to the lack of time in emergency operations, both parents and children are unable to

prepare themselves for surgery and the idea of surgery.

Our hypothesis is based on the ideas that parents will experience stress due to the operation that their children will undergo, that negative thoughts about the operation will occur in the parents after all, that the thought of the parents will affect the postoperative VPS scores of the children, and that the VPS scores will be high. The parents are affected by the stress of the child, also the child is affected by the stress of the parents, and often a vicious cycle occurs [9]. In our study, children varied on the subject of receiving information even though they have given similar responses to their parents in memory questionnaires during post-operative recovery. The children reported that they would feel better during and after the surgery if they had more detailed information before the surgery.

Determining the level of preoperative anxiety in children and taking precautions are necessary for the control of pain in the postoperative period. Spending enough time with patients and parents, informing them, in addition, distraction techniques and games can work to make the situation more endearing for young children [10-12]. In this study, the result of preoperative patient observation and distraction was that there was a significant correlation between the Yale anxiety scale, which was preoperatively applied, and the delirium scale, which was postoperatively applied.

It is important to see patients during preoperative visits and to inform them about the procedure. Zhong et al. reported that informing children during preoperative visits effectively reduced the incidence of delirium in postoperative delirium score comparison research [11]. In some of the answers given in this study, children think that it is beneficial to be informed in advance about the surgery. But parents abstain because they think that informing the child in advance about the surgery can increase the child's stress. The fact that parents have negative thoughts about surgery on children causes negative thoughts about pain in children [5].

The FLACC score is a score that enables us to have an idea about pain in the groups of patients who have difficulty communicating during the postoperative period, such as children [13]. The FLACC score is, in a sense, the definition of pain behaviorally. In this study, there is a positive correlation between the FLACC score of children in the postoperative period and the children's zeroth and third hours VPS score.

Questioning their children's pain to parents separately from children caused parents to reflect their moods outside of pain to the results of the test, and the detection of a negative correlation between the delirium scale recorded for children in the postoperative period and the perception of pain in parents may be associated with this situation. In a study using a post-anesthetic delirium scale, they also evaluated pain questionnaire, as well as, abnormal facial expression, inconsistency, and crying as the postoperative pain indicator [14].

Waiting for surgery in the preoperative waiting room can cause increased stress and anxiety. In a study, it was found that amusing children significantly reduced the behavior scale score they expressed during the postoperative period [15]. According to the results of this study, even if the waiting time for children under parental control is long during the waiting

period, there may be a reason for a negative correlation with the postoperative delirium scale.

Predisposing factors to keep pain in memory vary. These factors are known as the severity of pain, unpleasant pain, and state anxiety. The independent variables that affect these factors are previously encountered pain and discontent, experienced state anxiety and positive-negative effective feedback. Babel et al. studied the transfer of pain to memory in adults and reported that recalled pain may cause more of the state anxiety in the person [16]. These conditions are more common after pain experiences and unsuccessful postoperative pain management. While positive feedback after surgery is rare (the born of a baby or having an aesthetic looking nose), negative feedback is usually given (severe pain, digestive problems, difficulty in mobilization, and inability to perform personal tasks easily).

In this study, it was thought that similar conditions could be seen in children and the results were consistent with our hypothesis. Children's thought content attention differs from that of adults in that their attention can be quickly distracted through an activation such as game [17]. Although children are comfortable with the postoperative process by focusing their attention on a play or another activation that is of interest to them, they are afraid of the idea of having re-operation according to the results of this study.

Vervoort et al. conducted a study measuring children's facial expression after the parents' comments on painful procedures of children [18]. They discussed parents' communication with children in two groups: positive speech or no speech about pain. In this study, which selected children who went to school, it was observed that in children who were older and female pain levels were significantly lower with positive speech by parents. In case the parents were only observers without comment, the results were not significant at the pain level and facial expression of the children. In case the parents were only observers without comment, the presence of parents caused in children who did not exhibit exaggerated behavior, an increase in the painful facial expression compared to children who stayed alone. In children with exaggerated behavior, painful facial expression was found to be continuous (high), regardless of whether the parents were present or not. In this study, similarly, as the education level of the parents increased, a higher postoperative delirium scale in the children was interpreted as indicating that the information provided to the parents might change the perception of pain in the children, perhaps causing more stress.

In a large series of studies conducted by Caes et al. on talking and commenting on children by parents in cases when children underwent painful procedures, facial expressions (which connect to the corrugator muscle) were determined using EMG [19]. Parents were found to be less anxious when they were not given much information about the painful procedure. In their study, dialogues developed by Walker et al. for communication between parents and gives were used [20]. Based on this study, verbal communication between the parents and the child was not included in our study because it could increase the perception of pain by directing the child's attention to pain.

Parents will feel sadness, stress, and anxiety because of their children's possible pain. It is necessary to raise awareness of the ways of coping with stress and to take measures to

reduce the child's pain [21]. Based on these solutions, it will be expected that the stress of the parents and the child will be less in cases that are successful in postoperative pain control. The limited point in our study is that the choice of analgesics was determined by the patient's physician and varies from patient to patient since it was planned observationally. According to the results, the pain levels of patients who underwent narcotic analgesics for postoperative pain were lower, even if not statistically significant, than the pain levels of other patients, and the parents of patients undergoing narcotic analgesics had less anxiety. This has once again demonstrated the importance of postoperative pain management.

Monitoring the pain level of children in the hospital environment, the need and consumption of painkillers are under the supervision of physicians. The period in which parents mainly play an active role begins with the discharge of the children to their homes. Wong-Baker FACES® Pain Rating Scale used to evaluate postoperative pain in previous studies is a valid method, but it may cause us to be mistaken for other factors when evaluating pain. That is why this scale measures pain, not fear [22]. It is difficult to expect parents to be professional and act as health workers when assessing pain. In order to be a guide to the parents, necessary information on pain control needs to be made in detail prior to discharge.

Conclusion

As a result, the factors that affect the level of postoperative pain in children include parents' thought, the healing process, and postoperative pain control. While medical treatment of the physiological effects of pain is planned, psychological factors of pain should also be investigated. There is a need for studies with more patients to monitor the behavior and communication of the children and their parents, the ways of coping with stress, and the impact of this situation on the child, and their parents need guidelines to help them through this difficult process.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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